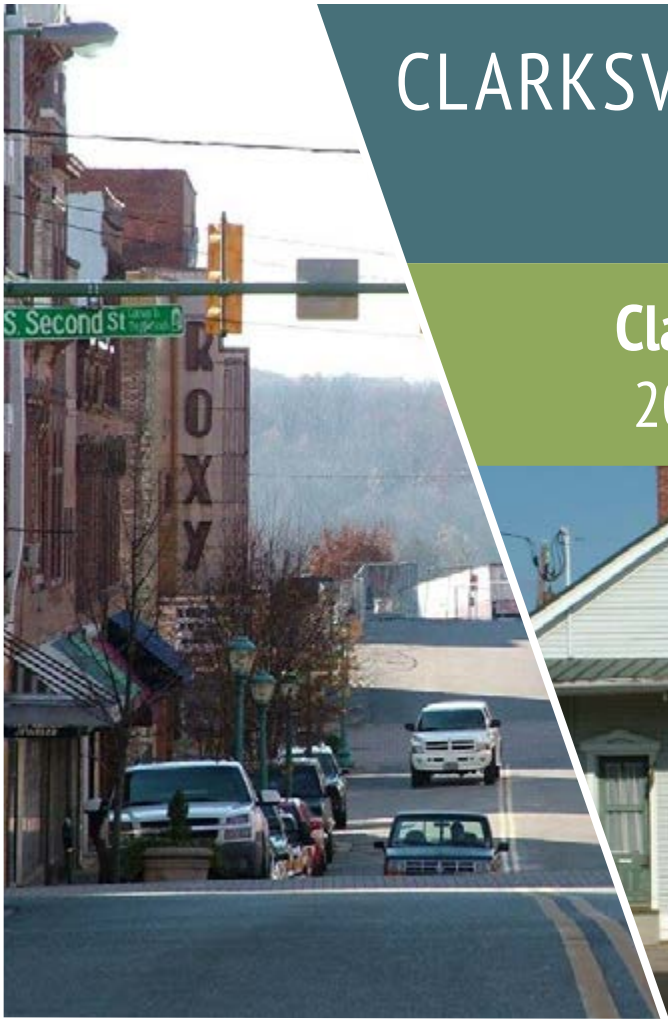
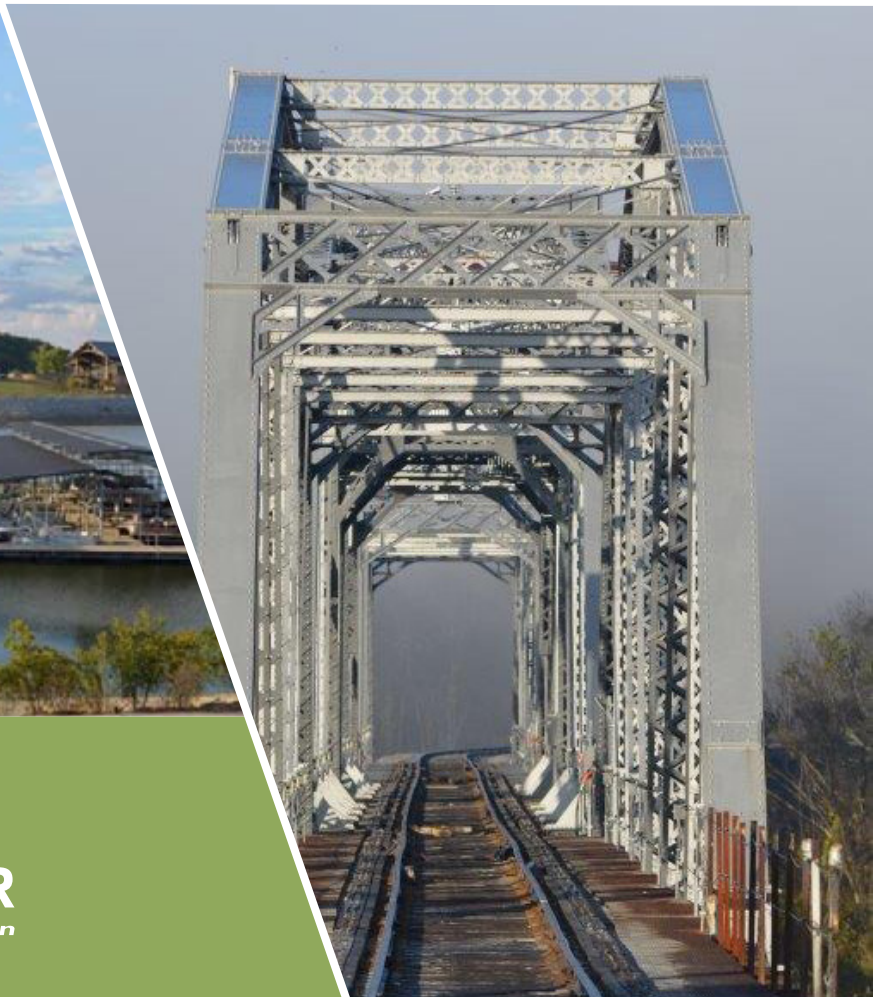
CLARKSVILLE URBANIZED AREA 2045

Clarksville Metropolitan Planning Area
2045 Metropolitan Transportation Plan





January 2019

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Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

Metropolitan Transportation Plan

Prepared By:

In Cooperation With:

TDOT Department of Transportation

KENTUCKY TRANSPORTATION CABINET

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U.S. Department of Transportation
Federal Highway Administration

Federal Transit Administration

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Table of Contents

page #

Table of Contents i

List of Tables iii

List of Figures vi

List of Acronyms ix

ES.0 Executive Summary ES-1

- ES.1 Introduction ES-1
- ES.2 Plan Development Process ES-3
- ES.3 Setting and Achieving the Vision ES-4
- ES.4 Assessing Current Performance and Forecasting Future Needs ES-5
- ES.5 Prioritizing Roadway Capacity Projects to Achieve the Vision ES-7
- ES.6 Staged Improvement Plan and Other Recommended Strategies ES-8

1.0 Introduction 1-1

- 1.1 The Metropolitan Planning Organization (MPO) 1-1
- 1.2 The Metropolitan Transportation Plan 1-10
- 1.3 Current Trends Affecting Transportation Planning 1-23
- 1.4 Plan Adoption and Amendment Process 1-27
- 1.5 Plan Implementation 1-29

2.0 Plan Development Process 2-1

- 2.1 Performance-based Planning Approach 2-1
- 2.2 Title VI in Development of the Metropolitan Transportation Plan 2-3
- 2.3 Public Involvement Process 2-4
- 2.4 Stakeholder Consultation and Coordination 2-8
- 2.5 Visioning Activities and Result 2-10
- 2.6 Public Comments 2-20

3.0 Visioning and Performance Measures 3-1

- 3.1 Public Vision 3-1
- 3.2 Goals and Objectives 3-1
- 3.3 System Performance Measures 3-8

4.0 The Environment 4-1

- 4.1 The Environment and the MTP 4-1
- 4.2 Regional Context 4-5
- 4.3 Air Quality and Emissions 4-10
- 4.4 Public Health 4-12
- 4.5 Project Development Considerations 4-14
- 4.6 Climate Change and Extreme Weather Events 4-35
- 4.7 Stormwater Mitigation 4-39

5.0 Current Land Use, Population, Economic, and Travel Patterns 5-1

- 5.1 Regional Context 5-1
- 5.2 Land Use Patterns 5-4
- 5.3 Population and Economic Trends 5-8
- 5.4 Freight Demand 5-16
- 5.5 Travel Patterns 5-21

Table of Contents

	page #
6.0 The Existing Transportation System	6-1
6.1 Roadways and Bridges	6-1
6.2 Bicycle and Pedestrian	6-30
6.3 Public Transit	6-48
6.4 Freight	6-74
6.5 Safety	6-87
6.6 Security	6-113
6.7 Overview of MPO Planning Performance Measures	6-118
7.0 Forecasting Future Travel Demand	7-1
7.1 Generalized Travel Demand Forecast Process	7-1
7.2 Forecasting Population and Employment Changes	7-2
7.3 Updating the Future Transportation Network	7-11
7.4 Travel Demand Model Outputs	7-14
8.0 Future Transportation Needs	8-1
8.1 Roadways and Bridges	8-1
8.2 Bicycle and Pedestrian Needs	8-20
8.3 Public Transit Needs	8-29
8.4 Freight Needs	8-32
8.5 Management and Operations	8-42
8.6 Enhancing Travel and Tourism	8-52
9.0 Forecasting Future Available Funding	9-1
9.1 Roadway Funding	9-1
9.2 Public Transit Funding	9-10
9.3 Bicycle and Pedestrian Funding	9-16
10.0 Project Development and Prioritization	10-1
10.1 Project Development	10-1
10.2 Roadway Project Prioritization	10-7
10.3 Transit, Bicycle, and Pedestrian Projects	10-16
10.4 Intersection Projects	10-18
11.0 Implementation Plan	11-1
11.1 Fiscally-Constrained Staged Improvement Program	11-1
11.2 Visionary (Unfunded) Roadway Projects	11-15
11.3 Allocation of Funds to Communities of Concern	11-18
11.4 Strategies to Improve Freight Conditions	11-24
11.5 Strategies to Improve Air Quality	11-29
11.6 Wilma Rudolph Boulevard Corridor Study	11-30
11.7 Freight and Nonmotorized Studies	11-31
Appendix A: Public Outreach Survey	A-1
Appendix B: Survey Letter, Flyer, and Mailing List	B-1
Appendix C: Webpage and Social Media Announcements	C-1
Appendix D: Clarksville Cycling Club- Transportation Bike Master Plan Requests	D-1
Appendix E: Model Development Report	E-1
Appendix F: Historic and Forecast Funding Development	F-1
Appendix G: Comments Received During the MTP Process	G-1

Table of Contents

List of Tables

page #

Table ES.1 Clarksville MPA Demographic Data Forecast ES-5
Table ES.2 Roadway Capacity Project Prioritization Criteria ES-7
Table ES.3 Fiscally Constrained Roadway Projects ES-8
Table ES.4 Travel Impacts of Fiscally Constrained 2045 MTP Roadway Capacity Projects ES-12
Table 1.1 MAP-21 National Performance Goals 1-17
Table 1.2 National Transportation Performance Measure Categories 1-18
Table 1.3 National Transportation Performance Measures and Metrics 1-19
Table 2.1 Priority Road Needs Identified by Survey Respondents 2-16
Table 3.1 Outcome, Output, and Activity-based Objectives 3-2
Table 3.2 Relationship of MTP 2045 Goals to FAST Act TPMs 3-7
Table 4.1 Typical Environmental Resources and Issues Evaluated 4-4
Table 4.2 Ecoregion Characteristics in the Metropolitan Planning Area 4-6
Table 4.3 National Ambient Air Quality Standards (NAAQS) as of 2017 4-11
Table 4.4 Selected County Public Health Indicators 4-12
Table 4.5 Test Projects Impacting Wetlands or Flood Zones 4-18
Table 4.6 Species Identified under Endangered Species Act in Region 4-22
Table 4.7 MPA Historic Districts 4-24
Table 4.8 Test Projects Impacting Historical or Recreational Resources 4-27
Table 5.1 Population Change in MPA and Local Jurisdictions, 2000 to 2010 5-8
Table 5.2 Estimated Population Change in MPO Jurisdictions, 2000 to 2016 5-9
Table 5.3 Top 10 Largest Employers in the MPA 5-11
Table 5.4 Change in Employment in MPA Counties by Industry, 2010-2016 5-14
Table 5.5 Location quotients for Freight-Generating Industries in the MPA, 2016 5-18
Table 5.6 Means of Transportation to Work in Metropolitan Planning Area Counties 5-21
Table 6.1 Major Roadways 6-1
Table 6.2 Roadway Network Lane Mileage by Functional Class 6-5
Table 6.3 Roadway Network Centerline Mileage by Maintenance Responsibility 6-5
Table 6.4 Pavement Condition for Roadways 6-9
Table 6.5 TDOT and KYTC Pavement Condition Targets 6-9
Table 6.6 Bridges by Condition 6-12
Table 6.7 TDOT and KYTC Bridge Condition Targets 6-15
Table 6.8 V/C Ratios by Functional Classification 6-17
Table 6.9 Daily Vehicle Trips by Purpose, 2016 6-19

Table of Contents

page #

Table 6.10 Roadway System Travel Characteristics, 2016 6-19
Table 6.11 Roadway Corridors with Volumes Exceeding Capacity, 2016 6-21
Table 6.12 MPA NHS Roadway Reliability 6-24
Table 6.13 TDOT and KYTC System Performance Targets 6-25
Table 6.14 Design of Bicycle Facilities for Given Conditions 6-34
Table 6.15 BCycle Locations 6-38
Table 6.16 CTS Fare Rates 6-54
Table 6.17 CTS Route Ridership 6-55
Table 6.18 CTS Demographics Breakdown 6-61
Table 6.19 Transit Asset Management Performance Measure Targets 6-73
Table 6.20 Freight Movement by Weight and Value in Montgomery County, 2012 6-74
Table 6.21 Freight Movement in Tennessee by Direction by Weight, 2012 6-75
Table 6.22 Freight Truck Movement in Montgomery County by Direction by Weight, 2012 6-75
Table 6.23 Means of Transporting Freight Originating in Kentucky, 2015 6-76
Table 6.24 Means of Transporting Freight Originating in Tennessee, 2015 6-76
Table 6.25 MPA Crashes by Year, 2012-2016 6-88
Table 6.26 MPA Study Area Crashes by Severity, 2012-2016 6-89
Table 6.27 Alcohol Involvement in Crashes, 2012-2016 6-89
Table 6.28 Top 20 Intersections with High Crash Frequency by Severity, 2012-2016 6-91
Table 6.29 Top 20 Intersections with High Crash Frequency by Collision Type, 2012-2016… 6-92
Table 6.30 Top 10 High Crash Frequency Segments and Crash Rates, 2012-2016 6-95
Table 6.31 Top 10 High Crash Rate Segments, 2012-2016 6-96
Table 6.32 Top 10 High Crash Rate Intersections, 2012-2016 6-97
Table 6.33 Pedestrian and Bicycle Crashes (2012-2016) 6-99
Table 6.34 Pedestrian Crashes by Severity (2012-2016) 6-100
Table 6.35 Bicycle Crashes by Severity (2012-2016) 6-100
Table 6.36 Motorcycle Crashes (2012-2016) 6-102
Table 6.37 Motorcycle Crashes by Severity (2012-2016) 6-103
Table 6.38 Heavy Vehicle Crashes by Year by County (2012-2016) 6-105
Table 6.39 MPA Baseline Safety Performance 6-109
Table 6.40 KYTC and TDOT Safety Targets 6-110
Table 6.41 Potential Countermeasures for Deployment Learned Behaviors 6-112
Table 6.42 MPA Interstate and Non-Interstate Performance 6-119
Table 6.43 Bridge Performance 6-120

Table of Contents

page #

Table 6.44 MPA Safety Performance 6-120
Table 6.45 FTA Transit Performance Measures 6-121
Table 7.1 Change in Population and Employment Variables in MPA, 2016 to 2045 7-4
Table 7.2 Existing + Committed Projects 7-12
Table 8.1 Vehicle Trips by Purpose, 2016 to 2045 8-1
Table 8.2 Travel Demand Impact of Growth and Existing and Committed Projects, 2016 to 2045 8-3
Table 8.3 Roadway Corridors with Volumes Exceeding Capacity (E+C) 8-5
Table 8.4 Roadway Segments in MPA with Poor Pavement Conditions 8-17
Table 8.5 Worst Performing Bridges in Poor Condition by Sufficiency Rating 8-18
Table 8.6 Safe Routes to School Recipients, Montgomery County 8-22
Table 8.7 Sidewalk Priority Indicator, City of Clarksville and Montgomery County 8-23
Table 8.8 Change in Truck Freight Tonnage in Montgomery County, 2012-2040 8-32
Table 8.9 Change in Freight Truck Movement in Montgomery County, 2012-2040 8-33
Table 8.10 Major Freight Roadways with Congestion Issues 8-35
Table 8.11 Change in Rail Freight Tonnage in Montgomery County, 2012-2040 8-38
Table 10.1 Clarksville Urbanized Area MTP 2045 Typical Project Cost by Improvement Type (2017Dollars) 10-2
Table 10.2 Roadway Capacity Project Prioritization Criteria 10-8
Table 10.3 Roadway Capacity Project Prioritization Criteria Measures 10-9
Table 10.4 Roadway Capacity Project Prioritization Results 10-10
Table 10.5 Bicycle and Pedestrian Transportation Projects 10-16
Table 10.6 Intersection Projects Identified in Public Outreach Survey 10-18
Table 10.7 Intersection Projects for Potential Programming 10-20
Table 11.1 Fiscal Constraint for Roadway Capacity Projects 11-3
Table 11.2 Fiscal Constraint for Public Transit Operations 11-3
Table 11.3 2045 MTP Staged Improvement Program – Stage I (2018-2026) 11-5
Table 11.4 2045 MTP Staged Improvement Program – Stage II (2027-2036) 11-7
Table 11.5 2045 MTP Staged Improvement Program – Stage III (2037-2045) 11-9
Table 11.6 Travel Impacts of Fiscally-Constrained 2045 MTP Roadway Capacity Projects 11-11
Table 11.7 Travel Impacts of Fiscally Constrained 2045 MTP Projects by Roadway Functional Class 11-12
Table 11.8 2045 MTP Visionary Needs List 11-16
Table 11.9 Level of Concern for Staged Improvement Program 11-19
Table 11.10 2045 MTP Roadway Projects with Freight Benefits 11-25
Table 11.11 Actions to Reduce Transportation-Related Air Pollution Emissions 11-29

Table of Contents

List of Figures

page #

Figure ES.1 Fiscally Constrained Roadway Capacity Improvement Projects ES-13
Figure 1.1 Nearby Urban Areas 1-4
Figure 1.2 Metropolitan Planning Area 1-6
Figure 2.1 Performance Based Planning and Programming Framework 2-1
Figure 2.2 Primary Method of Transportation 2-13
Figure 2.3 Travel Time to Work and School 2-13
Figure 2.4 Rating of Clarksville Regional Transportation System 2-15
Figure 2.5 Rating of Clarksville Safety Concerns 2-15
Figure 2.6 Desired Funding Allocation 2-17
Figure 2.7 Support for Increase in Transportation Revenue by Source 2-17
Figure 2.8 Ranking of Transportation Priorities 2-18
Figure 2.9 Transportation Projects from Public Input 2-19
Figure 3.1 Decision Support Tools 3-10
Figure 4.1 Study Area Land Cover 4-7
Figure 4.2 Land Cover Classification Breakdown 4-8
Figure 4.3 Concentration of Housing Built Pre-1960 4-9
Figure 4.4 Wetlands 4-16
Figure 4.5 Flood Zones 4-17
Figure 4.6 Historic and Recreational Resources 4-26
Figure 4.7 Potential Karst Areas 4-30
Figure 4.8 Minority Populations 4-33
Figure 4.9 Low Income Populations 4-34
Figure 5.1 Components of Clarksville, TN Metropolitan Statistical Area 5-2
Figure 5.2 Megaregions in the United States 5-3
Figure 5.3 Population Density, 2016 5-5
Figure 5.4 Employment Density, 2016 5-6
Figure 5.5 Activity Density, 2016 5-7
Figure 5.6 Change in Households, 2010-2016 5-10
Figure 5.7 Change in Employment, 2010-2016 5-12
Figure 5.8 Freight Truck Trip Generation, 2016 5-20
Figure 5.9 Workers Commuting by Transit or Walking 5-22
Figure 5.10 Households with No Access to a Vehicle 5-23
Figure 6.1 Functional Classification of Roadways 6-4

Table of Contents

page #

Figure 6.2 Roadway Maintenance Responsibility in MPA 6-6
Figure 6.3 Roadway Pavement Conditions 6-10
Figure 6.4 Bridge Conditions 6-14
Figure 6.5 Level of Service 6-18
Figure 6.6 Average Daily Traffic on Roadways, 2016 6-22
Figure 6.7 Existing Roadway Congestion, 2016 6-23
Figure 6.8 LOTTR on MPA NHS Routes 6-26
Figure 6.9 Alternative Fuel Vehicles in Use in United States, 2000-2011 6-28
Figure 6.10 Plug-In Electric Vehicles per 1,000 Registered Vehicles 6-29
Figure 6.11 Existing and Proposed Bicycle Paths in Clarksville 6-37
Figure 6.12 BCycle Locations 6-39
Figure 6.13 Statewide Bicycle Level of Service 6-40
Figure 6.14 Existing and Proposed Pedestrian Improvements 6-42
Figure 6.15 Sidewalks in Oak Grove 6-44
Figure 6.16 CTS Bus Routes 6-53
Figure 6.17 CTS Annual Fixed Rate Ridership 6-56
Figure 6.18 CTS Annual Lift Ridership 6-57
Figure 6.19 Minority Persons Compared to Plan Area Average 6-63
Figure 6.20 Poverty Compared to Plan Area Average 6-65
Figure 6.21 Zero-Vehicle Households Compared to Plan Area Average 6-67
Figure 6.22 Over 65 Compared to Plan Area Average 6-69
Figure 6.23 Age 18-34 Compared to Plan Area Average 6-71
Figure 6.24 Freight Network and Facilities – Trucking 6-78
Figure 6.25 Modeled MPO freight Truck Traffic, 2016 6-79
Figure 6-26 MPA Interstate TTTR 6-81
Figure 6.27 Freight Network Facilities- Rail 6-83
Figure 6.28 Freight Network Facilities- Airports and Ports 6-86
Figure 6.29 High Crash Frequency and Rate Areas 6-98
Figure 6.30 Crashes Involving Bicycles and Pedestrians 6-101
Figure 6.31 Crashes Involving Motorcycles 6-104
Figure 6.32 Crashes Involving Freight Trucks 6-106
Figure 6.33 Driving Behaviors Learned During Military Deployment 6-111
Figure 7.1 Change in Households, 2016 to 2045 7-5
Figure 7.2 Change in Employment, 2016 to 2045 7-6
Figure 7.3 2016 Household Density 7-7

Table of Contents

	page #
Figure 7.4 2045 Household Density	7-8
Figure 7.5 2016 Employment Density	7-9
Figure 7.6 2045 Employment Density	7-10
Figure 7.7 Existing and Committed Roadway Projects	7-13
Figure 8.1 Future Roadway Congestion, 2045 (Existing + Committed)	8-9
Figure 8.2 Sidewalk Construction Priority Map	8-24
Figure 8.3 Middle Tennessee Regional Transit Vision	8-31
Figure 8.4 Modeled MPO Freight Truck Traffic, 2045	8-34
Figure 8.5 Congested Freight Corridors, 2045	8-37
Figure 10.1 CTS Action Plan Costs	10-4
Figure 10.2 CTS Fixed Route Fleet Capital Plan	10-5
Figure 10.3 CTS Demand-Response Fleet Capital Plan	10-6
Figure 10.4 Roadway Capacity Project Prioritization	10-15
Figure 11.1 Fiscally-Constrained Roadway Capacity Improvement Projects	11-14
Figure 11.2 Visionary Roadway Capacity Projects	11-17
Figure 11.3 Communities of Concern	11-22
Figure 11.4 MTP Roadway Projects on Major Freight Facilities	11-28

Table of Contents

List of Acronyms

3-C	Continuine, Cooperative, and Comprehensive Planning Process
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AFV	Alternative Fuel Vehicle
AVL	Automatic Vehicle Locator
BEA	Bureau of Economic Analysis
BLOS	Bicycle Level of Service
CAAA	Clean Air Act Amendments
CAFE	Corporate Average Fuel Economy
CCTV	Closed-Circuit Television
CERCLA	Comprehensive Environmental Response, Compensations, and Liability Act
CIG	Capital Investment Grants
CTL	Center Turn Lane
CMAQ	Congestion Mitigation and Air Quality
CMCSS	Clarksville-Montgomery County School System
CMP	Congestion Management Process
CNG	Compressed Natural Gas
COA	Comprehensive Operations Analysis
CSXT	CSX Transportation
CTS	Clarksville Transit System
CUAMPO	Clarksville Urbanized Area Metroplitan Planning Organization
DOT	Department of Transportation
E+C	Existing Plus Committed
EE	External-External
EI	External-Internal
EJ	Environmental Justice
EPA	Environmental Protection Agency
EPDO	Equivalent Property Damage Only
ESA	Endangered Species Act
FAF	Freight Analysis Framework
FARS	Fatality Analysis Reporting System
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GDOT	Georgian Department of Transportation
GHG	Greenhouse Gas
HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
IRI	International Roughness Index

ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
JARC	Job Access and Reverse Commute
KBNA	Nashville International Airport
KOHS	Kentucky Office of Highway Safety
KYTC	Kentucky Transportation Cabinet
LEP	Limited English Proficiency
LNG	Liquified Natural Gas
LOS	Level of Service
LOTTR	Level of Travel Time Reliability
MAP-21	Moving Ahead for Progress in the 21st Century Act
MCHRA	Mid-Cumberland Human Resource Agency
MO	Maintenance and Operations
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MTP	Metropolitan Transportation Plan
MUTCD	Manual on Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NBI	National Bridge Inventory
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHPP	National Highway Performance Program
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration
NPFN	National Primary Freight Network
NPL	National Priorities List
NPMRDS	National Performance Management Research Data Set
NRHP	National Register of Historic Places
OMB	Office of Management and Budget
P3	Public-Private Partnerships
PACS	Pennyrile Allied Community Services
PBPP	Performance-Based Planning and Programming
PDO	Property Damage Only
ppm	Parts Per Million
PPP	Public Participation Plan
PRB	Population Reference Bureau

PUD	Planned Unit Developments
RCUT	Restricted Crossing U-Turn
RJCM	R.J. Corman Railroad Company
ROI	Return on Investment
RTA	Regional Transit Authority
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SGR	State of Good Repair
SHPO	State Historic Preservation Office
SHSP	Strategic Highway Safety Plan
SIP	State Implementation Plan
SMS	Safety Management System
STBGP	Surface Transportation Block Group Program
STP	Surface Transportation Program
STRAHNET	Strategic Highway Network
SUSMP	Standard Urban Stormwater Mitigation Program
TAM	Transit Asset Management
TAP	Transportation Alternatives Program
TAZ	Traffic Analysis Zone
TCC	Technical Coordinating Committee
TDM	Transportation Demand Management
TDOT	Tennessee Department of Transportation
TEMA	Tennesee Emergency Management Agency
TERM	Transit Economic Requirements Model
THSO	Tennesee Highway Safety Office
TIF	Tax-Increment Financing
TIP	Transportation Improvement Program
TITAN	Tennessee's Integrated Traffic Analysis Network
TMA	Transportation Management Area
TSM	Transportation System Management
TTTR	Truck Travel Time Reliability
TWLTL	Two-Way Left Turn Lane
TWRA	Tennessee Wildlife Resources Agency
ULB	Useful Life Benchmark
UPWP	Unified Planning Work Program
USDOT	United States Department of Transportation
V/C	Volume/Capacity Ratio
VHD	Vehicle Hours of Delay
VHT	Vehicle Hours Travelled
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds
ZERO	Zero Emission Research Opportunity

Executive Summary

ES.1 | Introduction

The 2045 Clarksville Metropolitan Transportation Plan (MTP) is the multimodal, long range transportation plan for the Clarksville Metropolitan Planning Area (MPA).

It sets a regional vision and course of action for addressing the transportation needs of the Clarksville MPA over the next twenty-seven years.

The recommendations of the 2045 MTP are the result of public input, technical analysis, and close coordination between local municipalities, counties, Clarksville Transit System, the Tennessee Department of Transportation (TDOT), the Kentucky Transportation Cabinet (KYTC), and other members of the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO).

The Clarksville MPA, comprised of the Clarksville, TN urbanized area and nearby areas expected to urbanize in the next twenty years, is federally required to maintain an MTP with a minimum twenty-year time horizon. The 2045 MTP serves this purpose for the next five years; at which point it must again be updated.

Scope of the Planning Process

The MTP addresses the following ten planning factors as specified in the most recent federal transportation legislation, the Fixing America's Surface Transportation (FAST) Act:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
2. Increase the safety of the transportation system for motorized and non-motorized users;
3. Increase the security of the transportation system for motorized and non-motorized users;
4. Increase accessibility and mobility of people and freight;
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns;
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
7. Promote efficient system management and operation;
8. Emphasize the preservation of the existing transportation system;
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and
10. Enhance travel and tourism.

ES.2 | Plan Development Process

In order to develop a truly effective transportation plan that addresses the needs of all system users, it is necessary to obtain meaningful input from the public and all stakeholders to ensure that no person is denied an opportunity to participate in the planning process on the basis of race, ethnicity, disability, or language barriers. To this end, the MPO followed the public involvement procedures spelled out in its Public Participation Plan.

Several opportunities for public and stakeholder participation and input were provided. Input received from the public and stakeholders provided valuable insight on current and future transportation needs and ultimately led to the development of a regional vision.

THIS VISION LAID THE GROUNDWORK FOR THE MTP'S PERFORMANCE-BASED APPROACH TO METROPOLITAN TRANSPORTATION PLANNING. THE GENERALIZED APPROACH IS SUMMARIZED BELOW:

1. Set Regional Vision
2. Define Goals and Objectives
3. Establish System Performance Measures
4. Assess Baseline System Performance
5. Identify Desired System Performance
6. Forecast Future Conditions and Need
7. Develop Implementation Strategy

ES.3 | Setting and Achieving the Vision

As mentioned, a regional vision was synthesized from public and stakeholder input. From this vision, goals and objectives were developed that support achievement of the stated vision.

Federally required performance measures are also included in the MTP. Following the established federal guidance, the MPO established performance measure targets and will periodically report on progress, all in coordination with the KYTC and TDOT.

Vision

"In 2045, the residents and workers of the Clarksville Urbanized Area will be able to travel within a safe, well-maintained, and multimodal transportation system. This sustainable system will provide reliable transportation with multiple travel options that support a higher quality of life."

Goals

1. Provide a safe transportation system.
2. Provide a well-maintained transportation system.
3. Provide a multimodal transportation system.
4. Provide a reliable transportation system by reducing travel delay times and improving mobility.
5. Develop an economically and environmentally sustainable transportation system that provides equitable participation and benefits across the diversity of the MPA.

ES.4 | Assessing Current Performance and Forecasting Future Needs

The 2045 MTP analyzes current environmental, land use, travel, and socioeconomic patterns to better understand the existing demand for transportation. It then assesses existing conditions of all transportation modes by means of an asset inventory, technical analysis, and input received from the public and stakeholders. This analysis provides a snapshot of current performance and a baseline for performance monitoring.

To forecast future transportation needs, the 2045 MTP developed future population and employment forecasts for 2026, 2036, and 2045 for small geographic areas called Traffic Analysis Zones (TAZs). The forecast data was developed by the CUAMPO through local consultation and analysis of third party county forecasts.

Table ES.1 Clarksville MPA Demographic Data Forecast

Year	Population	Employment
2016	196,758	68,326
2026	250,249	92,611
2036	295,483	111,007
2045	339,954	129,119

Roadways

In general, there is a lack of widespread congestion in the Clarksville Metropolitan Planning Area in the base year.

Congestion is mostly found near major intersections within the MPA.

Maintenance needs are also somewhat limited in nature. Less than one (1) percent of the MPA's National Highway System (NHS) roadways are in poor condition. The worst pavement conditions within the MPA are on US 79 to US 79/College St/Wilma Rudolph Blvd from McClure Street to Rossview Road. Conditions on US 41A/Fort Campbell Blvd from US 79/Dover Rd to the Tennessee/Kentucky State Line should also be monitored. Of the 15 bridges in poor condition within the MPA, none are on the NHS.

Based on the travel demand model results, congestion in the MPA is forecast to become more intense and more widespread. This congestion is expected to spread beyond the intersections and affect large areas of the MPA on the whole.

Bicycle and Pedestrian

For bicycle and pedestrian needs, a regional demand analysis, facility inventory, and crash analysis were undertaken to better understand current performance and future needs. While there are many areas with relatively high demand for bicycle and pedestrian infrastructure, most places in the MPA lack sufficient sidewalks or any bicycle accommodations. As the MPA continues to grow, demand will increase in high-growth areas. Bicycle and pedestrian improvements will need to be provided in tandem with new roadway projects.

Public Transit

For public transit, the MTP evaluates the fixed-route service provided by Clarksville Transit System (CTS), as well as other services offered within the MPA. Current performance and future needs were assessed primarily by means of the Comprehensive Operation Analysis conducted by CTS, as well as the service's Strategic Plan.

These analyses indicate that the CTS meets the needs of the current demographics within the MPA. Future consideration will need to be given to the anticipated increase in elderly persons as well as the 18-34 year-old riders due to Fort Campbell's presence.

Freight

For freight, an inventory of the existing freight network and facilities was conducted as well as an analysis of existing freight movement, capacity, traffic, and safety. Future freight volumes were also projected.

The growth in freight shipped to and from the Clarksville MPA by truck is projected to increase by nearly 79 percent. The growth in freight shipped to and from the MPA by rail is projected to lag the truck freight, but still grow by nearly 23 percent.

ES.5 | Prioritizing Roadway Capacity Projects to Achieve the Vision

The MTP prioritized roadway capacity projects that were identified by the public, stakeholders, MPO staff, and the previous MTP.

The first step in prioritization was developing project costs, which were estimated based on typical costs, or project-specific costs if such figures were available.

The MTP prioritization process utilized multiple criteria to evaluate projects for their potential to help achieve the regional vision, goals, and objectives.

Table ES.2 Roadway Capacity Project Prioritization Criteria

Criteria	Rationale	Maximum Points
Reduce Congestion	Prioritize projects with congestion reduction.	20
Improve Safety	Unsafe areas should receive priority over other areas.	20
Minimize Impacts on Natural Environment, Preserve Air Quality	Avoid negative and costly environmental impacts.	15
Balance Benefit vs Cost	Projects with benefits (annual dollars saved from reduced delay) exceeding construction costs should be considered first, and maximize limited federal funds.	10
Potential Impact to Minority and Low-Income Population*	Avoid disproportionately high and adverse impacts to Environmental Justice (EJ) groups.	10
Provide Pedestrian and Bicycle Facilities	Encourage projects that have the potential to improve bicycle and pedestrian conditions.	10
Improve Freight Movement, Support Economic Development	Encourage projects that benefit the movement of people and goods. Encourage projects that may result in the growth of economic corridors.	10
Plan Consistency	Encourage projects that have been vetted in locally-adopted plans or existing studies or plans.	5

*If a roadway project going through an Environmental Justice area receives support from its minority and low-income community, a project will receive maximum points for this criterion.

ES.6 | Staged Improvement Plan and Other Recommended Strategies

The MTP provides a fiscally-constrained staged improvement plan of projects and programs for roadway and public transit modes through 2045. It also recommends several short-term and long-term strategic actions that the MPO and its partner agencies should undertake in order to improve conditions for bicyclists, pedestrians, public transit users, and freight. Strategies to improve regional air quality are also recommended.

The fiscally-constrained list of roadway projects is provided in Table ES.3 and illustrated in Figure ES.1. In addition to these roadway projects, the fiscally constrained plan includes sufficient funding to continue operating transit at its current level of service. Roadway projects, which went through the prioritization process but could not be programmed due to a projected lack of available funding, are included in a separate list of projects called the visionary roadway capacity projects. While not currently programmed in the MTP, they may be added if funding becomes available.

Table ES.4 shows the travel impacts of implementing the fiscally-constrained capacity projects versus a "no-build" scenario. The "no-build" scenario includes only the existing and committed projects that are described in Chapter 7: Forecasting Future Travel Demand. This table indicates that the fiscally-constrained program of projects will reduce the hours of vehicle delay by 46 percent and the vehicle hours travelled by 31 percent, while the reduction in vehicle miles traveled will be less significant.

Table ES.3 Fiscally Constrained Roadway Projects

Stage	Map ID	Route	Location	Improvement	Project Cost (000's)
Stage I (2018 to 2026)	1	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway	$45,400
	2	SR-374 Ext/SR-149	Dotsonville Rd to SR-149; SR-374 to River Rd	New 4 Lane Roadway & Bridge, Widen to 5 Lanes	$120,375
	3	SR-237 (Rossview Rd) & Dunbar Cave Rd	I-24 to 400 ft. west of Keysburg Rd	Widen from 2 to 3/5 Lanes & Realignment	$13,300
	4	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes	$14,810
	7	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes	$35,700

continued

Table ES.3 Fiscally Constrained Roadway Projects

Stage	Map ID	Route	Location	Improvement	Project Cost (000's)
Stage I (2018 to 2026)	101	US 79/SR 13 (Guthrie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes	Under Construction
	102	SR 149/SR 13	River Rd to Zinc Plant Rd	Widen from 2/3 to 5 Lanes	Under Construction
	103	SR 374 (Warfield Blvd)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes	Under Construction
	104	North-East Connector Phase 1	Ted Crozier Blvd to Wilma Rudolf Blvd to Trenton Rd	New 4/5 Lane Roadway	$39,522
	106	Lafayette Rd	Walnut Grove Rd through Ft Campbell Gate	Widen from 2 to 5 Lanes	$2,438
	107	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement	Completed
	108	KY-400 (State Line Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	$5,486
	109	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL	$11,364
	110	KY-115 (Pembroke)	I-24 to KY-1453 (Barker's Mill Rd)	Reconstruct with CTL	$7,446
Stage II (2027 to 2036)	105	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway	$41,445
	201	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes	$22,629
	203	North-East Connector Phase 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway	$76,673
	204	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes	$4,310
	207	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	$71,523

continued

Table ES.3 Fiscally Constrained Roadway Projects

Stage	Map ID	Route	Location	Improvement	Project Cost (000's)
Stage II (2027 to 2036)	209	KY-109 (Bradshaw Rd)	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	Reconstruct with CTL	$5,687
	304	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes	$10,776
	401	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway	$11,190
	402	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway	$9,325
	403	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway	$34,503
	405	SR-374 (Richview Rd) Ext	SR-12 (Madison St) to US 41A Bypass	New 4 Lane Roadway	$20,723
	406	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway	$8,393
	409	8th St connector	Needmore Rd to Peterson Ln	New 2 Lane Roadway	$17,718
	411	SR-374 (Richview Rd)	Memorial Dr to US 41A (Madison St)	Widen from 3 to 5 Lanes	$8,621
	504	SR 13/48	River Road to Old Highway 48	Center Turn Lane	$6,426
	508	I-24	@ Exit 8 EB Off Ramp	Widen to 2 Lanes	$9,106
	514	Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes	$18,319
Stage III (2037 to 2045)	111	Oatts-Riggins Rd	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	New 3 Lane Roadway	$23,355
	112	KY-1453 (Elmo Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	$33,837

continued

Table ES.3 Fiscally Constrained Roadway Projects

Stage	Map ID	Route	Location	Improvement	Project Cost (000's)
Stage III (2037 to 2045)	202	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes	$78,494
	205	Ft Campbell Gate 5 Ext	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction	$10,920
	208	Ft Campbell Gate 5 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	$23,355
	303	Whitfield Rd/	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL	$5,892
	305	Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL	$1,309
	404	Dixie Bee Rd Ext	Sango Rd to US 41A	New 2 Lane Roadway	$8,645
	407	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway	$8,645
	408	New Roadway	9th St to 10th St	New 2 Lane Roadway	$1,235
	412	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 to 5 Lanes	$28,543
	502	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes	$25,689
	503	Dunbar Cave Road	Wilma Rudolph Rd (US 79/SR 13) to Rossview Rd (SR 237)	Widen to 4 Lanes	$57,087
	507	I-24	@ Dixie Bee Road	New interchange	$68,614
	510	Needmore Road	Wilma Rudolph Road to Trenton Road	Widen to 4 Lanes	$12,844
	512	Rossview Road	SR 374 to Dunbar Cave Rd	Widen to 5 Lanes	$21,407
	515	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes	$42,815

Table ES.4 Travel Impacts of Fiscally-Constrained 2045 MTP Roadway Capacity Projects

Measure	2045 Existing and Committed	2045 Fiscally Constrained MTP	Difference	Percent Difference
Daily Vehicle Miles Traveled	6,923,236	6,954,406	31,170	0.5%
Daily Vehicle Hours Traveled	522,963	345,200	-177,763	-34.0%
Daily Hours of Delay	375,722	198,147	-177,575	-47.3%

Source: Clarksville Travel Demand Model, NSI

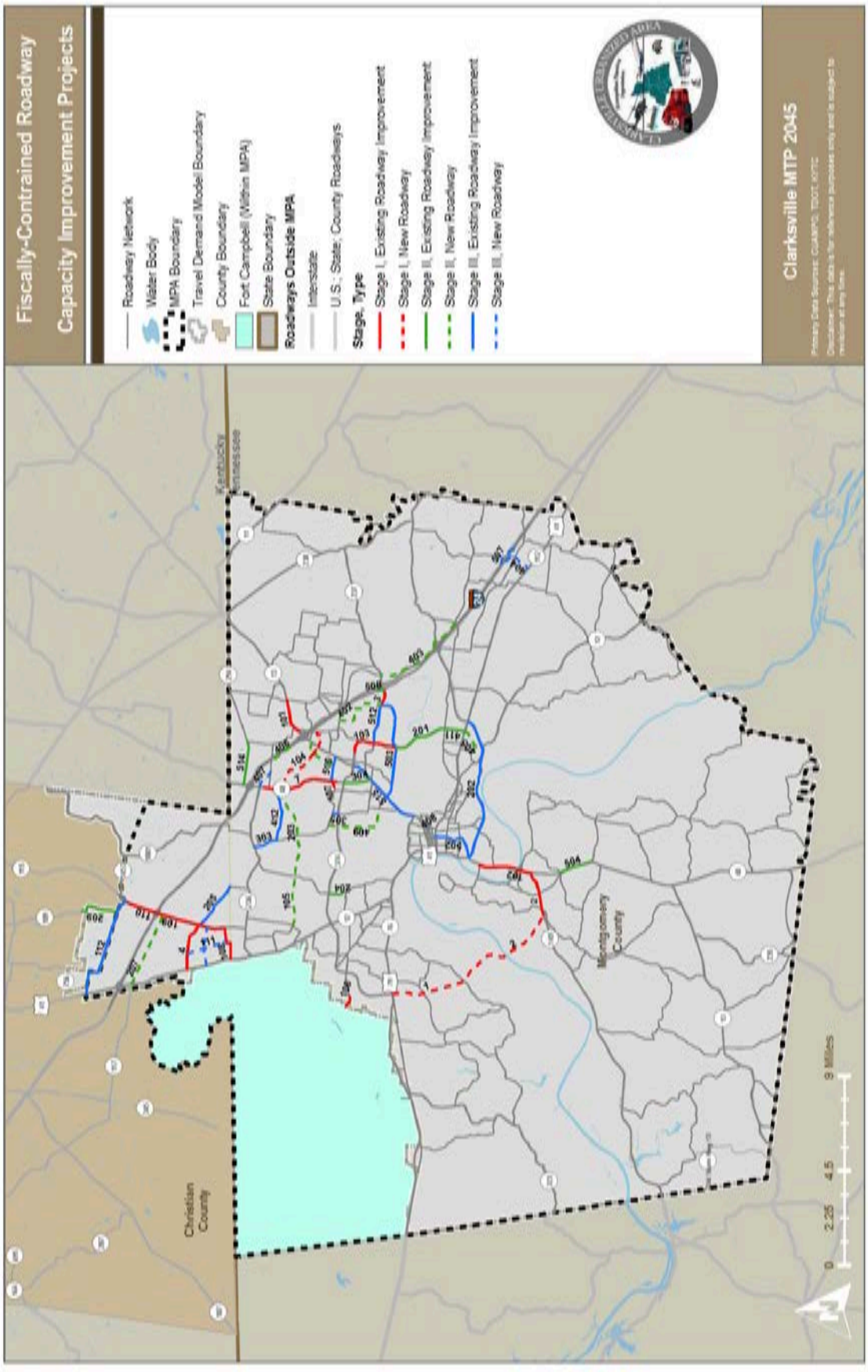


FIGURE ES.1 FISCALLY-CONSTRAINED ROADWAY CAPACITY IMPROVEMENT PROJECTS

2045 Clarksville Urbanized Area

CHAPTER 1

1.0 | Introduction

The 2045 Metropolitan Transportation Plan (MTP) is the long-range transportation plan for the Clarksville Metropolitan Planning Area (MPA) and replaces the 2040 MTP. The 2045 MTP sets a regional vision and course of action for addressing the transportation needs of the Clarksville MPA over the next twenty-seven years.

The recommendations of the 2045 MTP are the result of activities conducted through:

- **public input,**
- **technical analysis,**
- **close coordination between local municipalities and counties,**
- **the Clarksville Transit System,**
- **the Tennessee Department of Transportation (TDOT),**
- **the Kentucky Transportation Cabinet (KYTC), and**
- **other members of the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO).**

THE 2045 MTP SETS A REGIONAL VISION AND COURSE OF ACTION FOR ADDRESSING THE TRANSPORTATION NEEDS OF THE CLARKSVILLE MPA OVER THE NEXT TWENTY-SEVEN YEARS.

The 2045 MTP utilizes a performance-based approach to metropolitan transportation planning. This approach is described in detail in Chapter 2: Plan Development Process.

1.1 | The Metropolitan Planning Organization (MPO)

Purpose and Primary Functions

A Metropolitan Planning Organization (MPO) is a federally mandated transportation policy-making body that is made up of representatives from local governments and transportation agencies who have authority and responsibility within the MPAs.

With the passage of the Federal-Aid Highway Act of 1962, Congress made metropolitan transportation planning a condition for the receipt of federal funds for transportation projects in urban areas with a population of 50,000 or greater. That legislation, and those that have followed, encouraged a continuing, cooperative, and comprehensive (3-C) transportation planning process. This 3-C process is conducted between MPOs, states, and public transit providers in these urban areas.

2045 Clarksville Urbanized Area

CHAPTER 1

According to the Federal Highway Administration (FHWA) report The Transportation Planning Process: Key Issues, there are six core functions of an MPO:

1. **Establish a setting for effective decision-making:** Establish and manage a fair and impartial setting for effective regional decision-making in the metropolitan area.

2. **Identify and evaluate transportation improvement options:** Develop transportation improvement options and use data and planning methods to evaluate whether those options support criteria and system performance targets. Planning studies and evaluations are included in the Unified Planning Work Program (UPWP)

3. **Prepare and maintain a Metropolitan Transportation Plan:** Develop and update a long-range transportation plan for the metropolitan area covering a planning horizon of at least 20 years. The MPOs must prepare MTPs using performance measures and associated targets.

4. **Develop a Transportation Improvement Program (TIP):** Develop a short-range, four-year program of priority transportation improvements drawn from the MTP. The MPO creates the TIP with spending, regulating, operating, management, and financial tools. The TIP represents immediate priority actions used to achieve the area's goals and associated system performance targets.

5. **Identify performance measure targets and monitor whether implemented projects are achieving targets:** The MPOs coordinate with state and public transportation operators to establish performance targets that address performance measures. These targets, as required by federal law, are related to surface transportation and public transportation. The MPOs prepare plans that include performance targets addressing performance measures and standards. When updating the plan, the MPOs must also prepare a System Performance Report that tracks progress in meeting performance targets. In addition to the federally required performance measures, the MPOs may identify additional, locally significant, performance indicators that support decision-making.

6. **Involve the public:** Involve the general public and other affected constituencies related to the essential decision-making elements listed above.

Federal Designation

The Census Bureau defines urban areas after each decennial census, with all other areas being classified as rural. After identifying the urban areas, the Census Bureau classifies them as either an urbanized area or an urban cluster. Urbanized areas must have at least 50,000 people, while urban clusters are the remaining urban areas, or those with a population ranging from 2,500 to 49,999.

The MPOs have authority within an area referred to as the MPA, or Metropolitan Planning Area. The MPAs are established around urbanized areas, with formalized agreements between the affected jurisdictions and the governor(s) of the affected state(s). Typically, the MPA includes the smoothed urban area, and all areas expected to be urbanized within the next 20 years. The MPA boundary may also be influenced by jurisdictional lines, physical features of the landscape, or major roadways.

After the 2010 Census, urban areas were redefined. The first step in identifying the extent of urban areas was to identify a densely settled core of census tracts and/or census blocks that met the minimum population density requirements, as well as any adjacent territory containing non-residential urban land uses. Then, additional densely settled areas were added to the core based on their proximity. Finally, the area identified by Census Bureau criteria had to encompass at least 2,500 people. At least 1,500 of those people had to reside outside of institutional group quarters.

Following the 2010 Census, the Census Bureau identified just over 450 urbanized areas in the United States. Figure 1.1 shows the location of urban clusters and urbanized areas near the Clarksville Urbanized Area. Figure 1.2 displays the Clarksville Urbanized Area.

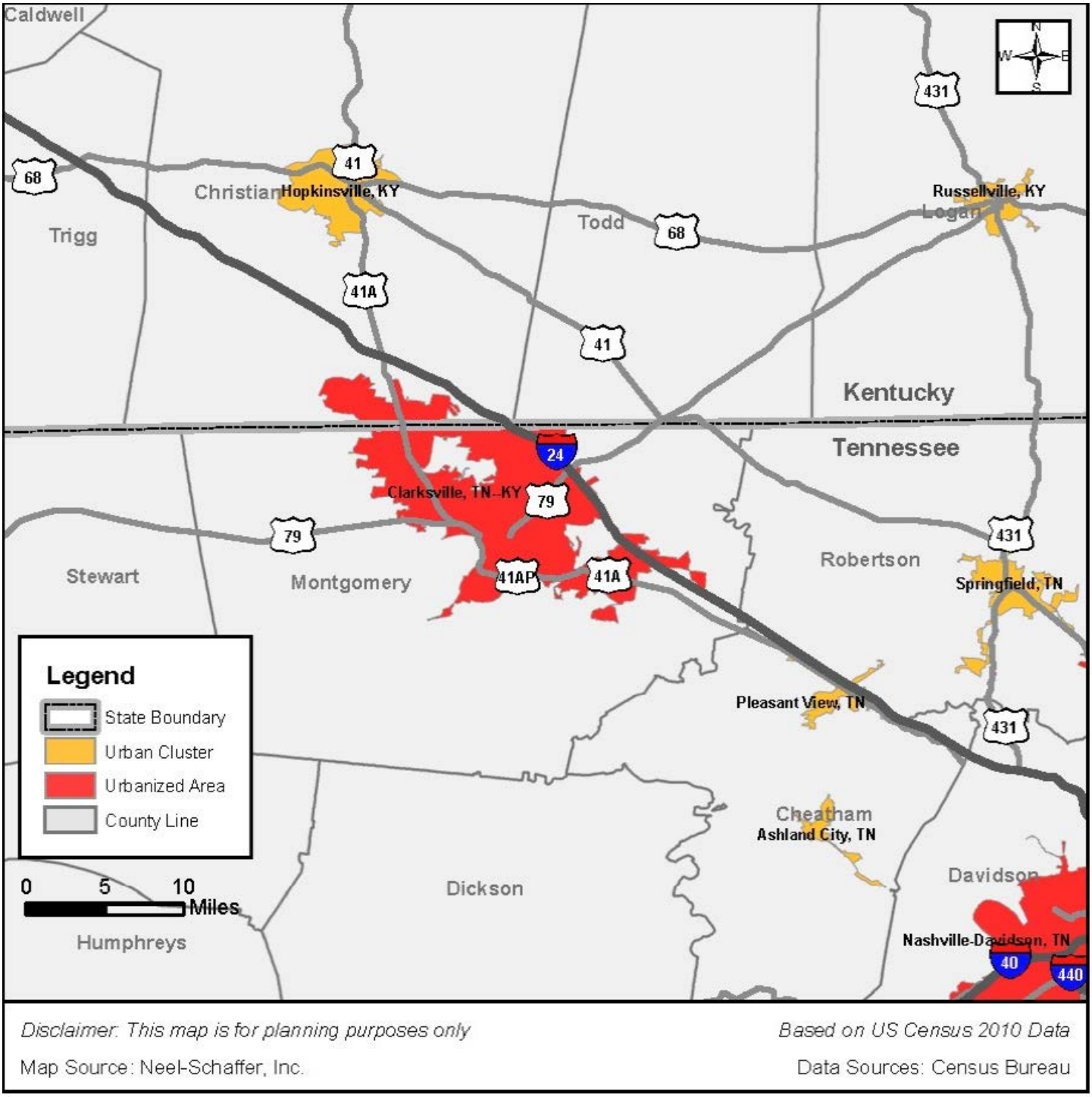


FIGURE 1.1 NEARBY URBAN AREAS

2045 Clarksville Urbanized Area

CHAPTER 1

About CUAMPO

The CUAMPO was formed in 1977 to provide the 3-C approach to transportation planning for the Clarksville metropolitan area. Since the creation of the MPO, the City of Clarksville has become the fifth largest city in the State of Tennessee. The region is also home to a large military installation, Fort Campbell, and the Austin-Peay State University.

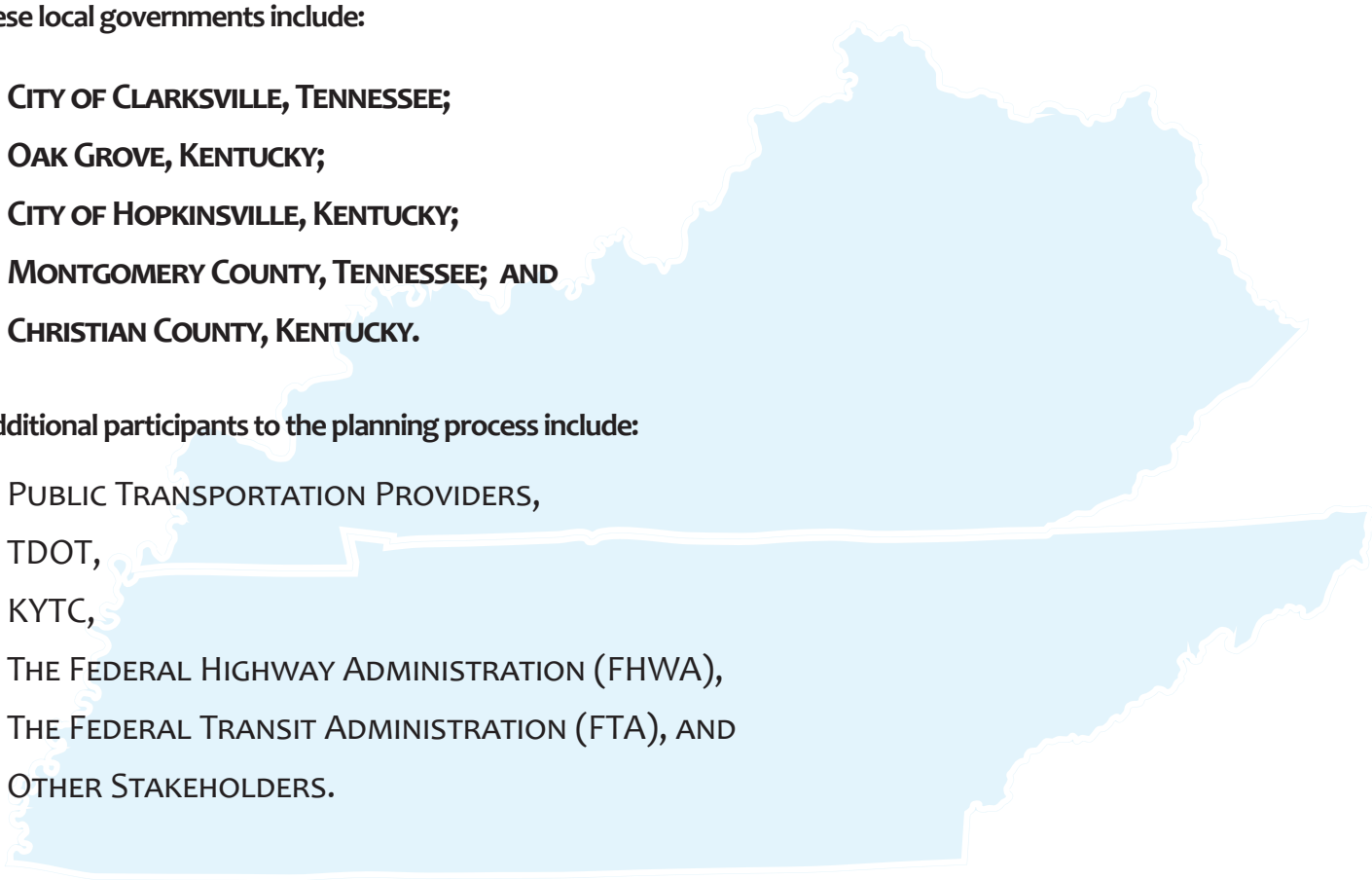
The Clarksville MPA encompasses almost the entirety of the Travel Demand Model area, as well as Fort Campbell in both Tennessee and Kentucky. Since Fort Campbell is responsible for its own planning, it has been excluded from the Travel Demand Model area. However, its impact on travel and roadway needs is taken into account by including the travel at the access gates as external stations. **For security reasons, socioeconomic, roadway, land use, and travel data for Fort Campbell are not included in the MTP tables and figures.**

These local governments include:

- **City of Clarksville, Tennessee;**
- **Oak Grove, Kentucky;**
- **City of Hopkinsville, Kentucky;**
- **Montgomery County, Tennessee; and**
- **Christian County, Kentucky.**

Additional participants to the planning process include:

- Public Transportation Providers,
- TDOT,
- KYTC,
- The Federal Highway Administration (FHWA),
- The Federal Transit Administration (FTA), and
- Other Stakeholders.



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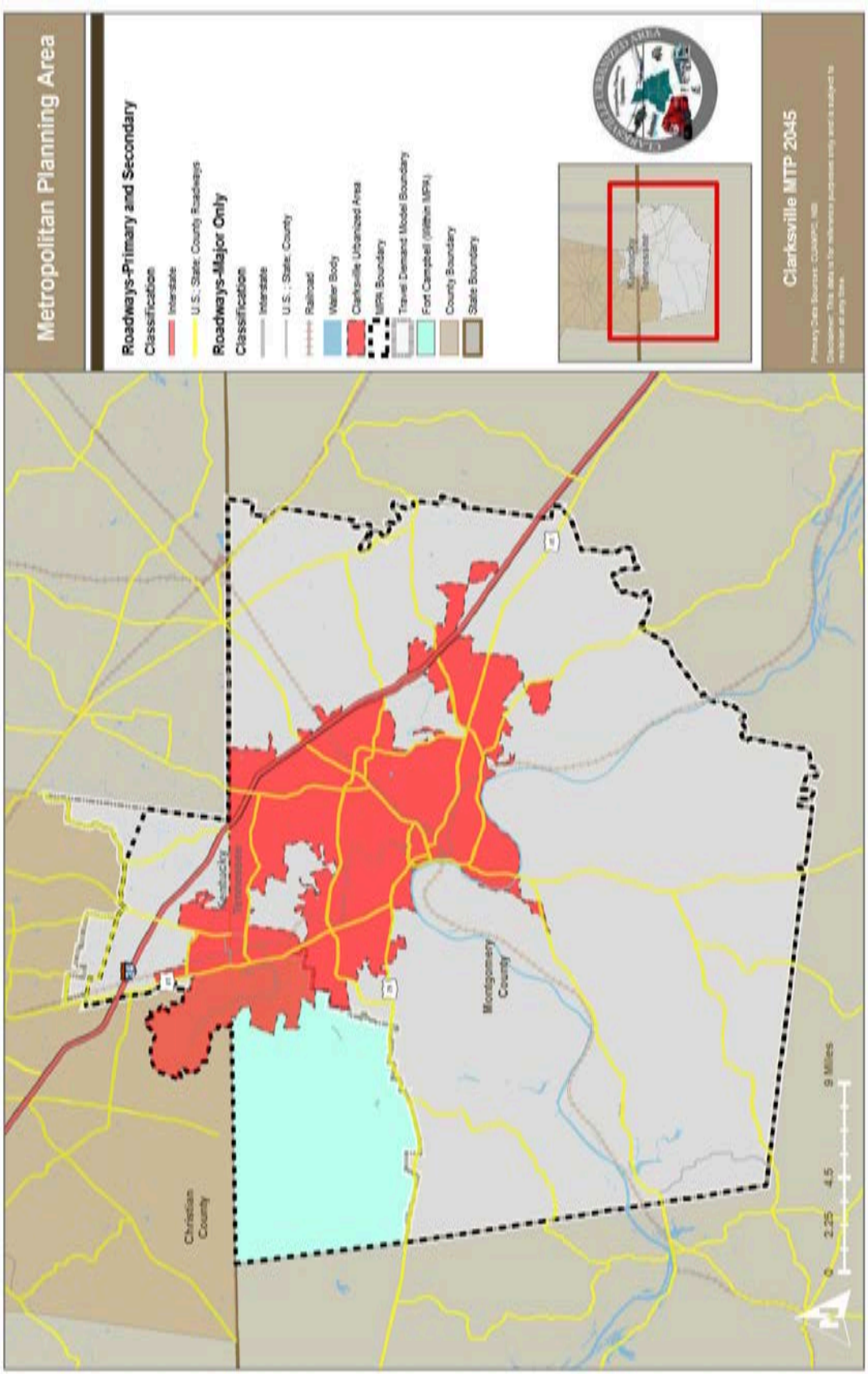


FIGURE 1.2 Metropolitan Planning Area

Organizational Structure and Committees

Two bodies shape the decision-making process of the MPO. The first of these bodies is the Executive Board, which is the official decision-making body and policy board of the MPO. The second is the Technical Coordinating Committee, which provides recommendations to the Executive Board. The CUAMPO also maintains a professional staff.

Executive Board

The Executive Board reviews the recommendations from the Technical Coordinating Committee. It also makes the final decisions regarding all documents and products produced by the MPO. These items include, but are not limited to:

- the Unified Planning Work Program (UPWP),
- MTP,
- Public Participation Plan (PPP), and
- the TIP.

The Executive Board membership is comprised of nine elected and appointed officials from several state and local governments within the MPO. Representatives from the FHWA and FTA also participate as non-voting members. The members of the Executive Board include:

- Mayor, City of Clarksville, TN;
- Mayor, Montgomery County, TN;
- Mayor, City of Oak Grove, KY;
- Mayor, City of Hopkinsville, KY;
- County Executive, Christian County, KY;
- Director, Clarksville Transit System;
- Director, Greater Nashville Regional Council;
- Secretary, KYTC;
- Commissioner, TDOT;
- FHWA -TN;
- FHWA-KY; and
- FTA-Region 4.

Technical Coordinating Committee

The Technical Coordinating Committee (TCC) serves as an advisory committee that makes recommendations to the Executive Board regarding the documents and products produced by the MPO. The committee is a group of transportation professionals comprised of:

- engineers;
- transportation and land use planners from federal, state, and local agencies; and
- representatives for transit, air, bicycle/pedestrian, and rail travel.

Like the Executive Board, the TCC also has representatives from the FHWA and FTA who participate as non-voting members. Organizations represented on the TCC include professional staff from:

- Christian County, Kentucky;
- City of Clarksville, Tennessee;
- City of Oak Grove, Kentucky;
- Clarksville Transit System;
- Clarksville-Montgomery County Regional Planning Commission;
- Fort Campbell Military Installation;
- Greater Nashville Regional Council;
- Hopkinsville-Christian County Planning Commission;
- Clarksville Regional Airport (John F. Outlaw Field);
- Kentucky Department for Environmental Protection;
- KYTC;
- Mid-Cumberland Human Resource Agency;
- Montgomery County Administration and Development;
- Pennyrile Area Development District;
- R.J. Corman Railroad Company;
- Tennessee Department of Environment and Conservation;
- TDOT; and
- U.S. Environmental Protection Agency.

CUAMPO STAFF

The CUAMPO staff is housed at the Clarksville-Montgomery County Regional Planning Commission and are responsible for the MPO's planning and administrative functions. The staff also serve as a bridge of communication between the:

- MPO's Committees,
- KYTC,
- TDOT,
- Federal Partners,
- Local Governments, and
- Other Groups and Individuals Interested in Transportation Issues Within the CUAMPO Planning Area.

1.2 | The Metropolitan Transportation Plan

Purpose and Authority of Plan

Beginning with the 1962 Federal-Aid Highway Act, federal legislation has required metropolitan transportation plans for urban areas with a population of at least 50,000 in order to receive surface transportation funds. Today, metropolitan transportation plans are governed by Public Law 114-94, the FAST Act (23 CFR 450, Subpart C).

According to the FHWA's website at https://www.fhwa.dot.gov/planning/processes/metropolitan/

"Metropolitan transportation planning is the process of examining travel and transportation issues and needs in metropolitan areas. It includes a demographic analysis of the community in question, as well as an examination of travel patterns and trends. The planning process includes an analysis of alternatives to meet projected future demands, and for providing a safe and efficient transportation system that meets mobility while not creating adverse impacts to the environment."

The primary purpose of metropolitan transportation planning is to ensure that transportation planning in urbanized areas is carried out through a 3-C planning process.

This 3-C process ensures that transportation planning is:

- **BASED ON THE MOST CURRENT INFORMATION,**
- **REFLECTS REGIONAL NEEDS AND PRIORITIES THAT ARE CONSISTENT WITH THOSE OF THE STATE,**
- **TAKES INTO ACCOUNT ALL MODES OF TRANSPORTATION, AND**
- **IS CONSISTENT WITH OTHER PLANNING EFFORTS.**

Adoption of the MTP is the first step towards the implementation of any transportation project using federal funds. It is also required for any regionally significant transportation project, regardless of funding source. Following the formal adoption of the plan, a project can be programmed in the TIP for design, right-of-way acquisition, or construction. The TIP is used to identify funding sources, fiscal year(s) of implementation, and the estimated amount of funding to be used.

Federal Requirements

As required by federal law, every MPO must prepare and update a transportation plan for its MPA. Aside from ensuring that the metropolitan transportation planning process is a 3-C process, the MTP must provide for consideration and implementation of projects, strategies, and services that will address the following ***ten planning factors:***

1. **Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;**
2. **Increase the safety of the transportation system for motorized and non-motorized users;**
3. **Increase the security of the transportation system for motorized and non-motorized users;**
4. **Increase accessibility and mobility of people and freight;**
5. **Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns;**
6. **Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;**
7. **Promote efficient system management and operation;**
8. **Emphasize the preservation of the existing transportation system;**
9. **Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and**
10. **Enhance travel and tourism.**

MTP Development and Content

The MTP must utilize the most recently available, valid information and assumptions to provide long- and short-range strategies and actions for the MPA. The MTP must preserve and enhance the multimodal transportation system, and facilitate the safe and efficient movement of people and goods. The 2045 MTP follows the requirements established in 23 CFR 450.324.

Federal regulations require the MTP to include:

- Projections of future demand of people and goods over the period of the plan (at least 20 years);
- Inventory of existing and proposed transportation facilities, with an emphasis on nationally and regionally significant facilities;
- Operational and management strategies that improve the efficiency and safety of the existing transportation system;
- Capital investment and other strategies to preserve the existing and future transportation system and improve multimodal capacity based on regional priorities and needs;
- Evaluation of environmental impacts and potential mitigation activities;
- Pedestrian and bicycle transportation facilities;
- Transportation and transit enhancement activities;
- A financial plan that demonstrates that the plan is fiscally constrained;
- Comparison of the transportation plan with state and local conservation plans and maps and natural and historic resource inventories, if available;
- A safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPA contained in the state's Strategic Highway Safety Plan;
- Reasonable opportunity for the public and all relevant parties to review the transportation plan and to provide comments;
- Consideration of the results of a Transportation Management Area's Congestion Management Process;
- Current and projected transportation demand of people and goods; and
- A system performance report evaluating the condition and performance of the transportation system.

Transportation Management Areas and The Congestion Management Process

Urbanized areas with populations that exceed 200,000 typically have more complex transportation systems and associated challenges than smaller regions. Accordingly, these large urbanized areas, designated as Transportation Management Areas (TMAs,) have additional planning responsibilities.

The major MTP-related requirement for TMAs is the development of a Congestion Management Process (CMP). The CMP is intended to address congestion through a process that provides for effective transportation system management and operations. A CMP is also based on cooperatively developed travel demand reduction and operational management strategies. The CMP establishes a systematic method to identify and evaluate transportation improvement strategies, including operations and capital projects.

Projects and strategies from the CMP should be considered for inclusion in the MTP and subsequently, the TIP.

The Clarksville urbanized area is not listed as a TMA as of the results of the 2010 Census. However, the population of the Clarksville Urbanized Area, is approximately 176,696 as of the base year, and will likely be designated as a TMA with the 2020 Census.

Air Quality Attainment

Areas exceeding air quality standards for transportation-related pollutants are designated as either an air quality nonattainment area or maintenance area. If an MPO includes nonattainment or maintenance areas, it must ensure that it's MTP, TIP, and federally funded projects conform to the purpose of the state's air quality plan, known as the State Implementation Plan (SIP).

Areas that are designated as air quality nonattainment areas must also update their plans every four years as opposed to every five years.

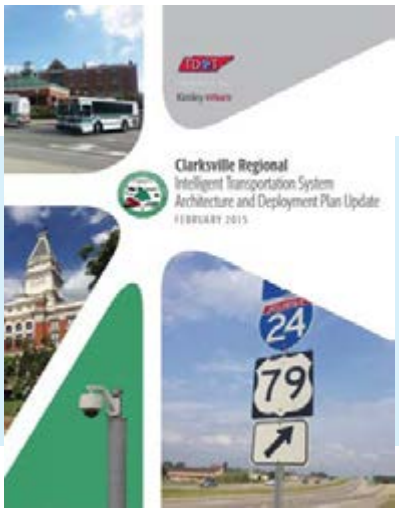
Even though Montgomery and Christian counties are in attainment for air quality standards, the area is expected to continue to perform transportation conformity as an anti-backsliding measure. This is required since the region is a former maintenance area for the 1997 Ozone NAAQS.

However, the U.S. Environmental Protection Agency (EPA) periodically updates the air quality standards. In the future, the MPO could become a non-attainment area if standards are made more stringent or pollution becomes worse in the region. In particular, the CUAMPO must monitor 8-hour Ozone and PM 2.5.

Consistency with Other Plans

A major federal requirement of the MTP is that it is consistent with other plans. This consistency with other plans extends to:

- the statewide transportation planning process,
- the state's Strategic Highway Safety Plan,
- other safety and security plans,
- the STIP, and
- the TIP.



Before any changes can be made to the MPO's TIP or the state's STIP, they must be made in the MTP.
The MTP should also be developed to be consistent with:

- the coordinated public transit human services transportation plan (Section 5310 Program of the FTA),
- the regional Intelligent Transportation Systems (ITS) architecture, and
- locally adopted planning documents.

The MTP was developed by reviewing the relevant plans and including projects and recommendations from them where possible. Roadway projects included in the TIP and state plans were analyzed during the MTP development process.

Planning Horizon and Update Cycle

The MTP must have a planning horizon of at least 20 years from its effective date and at least every five years in air quality attainment areas. This requirement ensures that transportation plans remain valid and consistent with current and forecasted transportation and land use conditions.

In between the five-year update cycle, the MPO may make amendments and modifications to the MTP at any time, without a requirement to extend the horizon year. However, these revisions must be approved by the MPO under the requirements set forth in the PPP and as described later in this chapter.

According to the FHWA document The Transportation Planning Process Briefing Book:

"Transportation Equity refers to the way in which the needs of all transportation system users, in particular the needs of those traditionally underserved by existing transportation systems, such as low-income and minority households, older adults, and individuals with disabilities, are reflected in the transportation planning and decision making process and its services and products. Transportation Equity means that transportation decisions deliver equitable benefits to a variety of users and that any associated burdens are avoided, minimized, or mitigated so as not to disproportionately impact disadvantaged populations."

Transportation Equity

Federal legislation and executive orders prohibit discrimination and/or exclusion from participation in any program or activity receiving federal financial assistance on the basis of race, color, national origin, disability, income, minority-status, or limited-English Proficiency. The MPO's PPP specifies the manner in which the MPO prevents discrimination and accommodates these populations. The PPP is discussed further in Chapter 2: Plan Development Process.

Title VI of the Civil Rights Act of 1964 ensures that no person is excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, or national origin.

The Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990 encourages the participation of people with disabilities in the development of transportation and paratransit plans and services.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, was signed by President Clinton in 1994. There are three fundamental Environmental Justice (EJ) principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Executive Order 13166: Improving Access to Services for Persons with limited English Proficiency was signed by President Clinton in 2000. Along with Title VI of the Civil Rights Act of 1964, the federal government requires federal agencies to:

- examine the services they provide,
- identify any need for service to those with limited English proficiency (LEP), and
- develop and implement a system to provide those services so LEP persons can have meaningful access to them.

For recipients of federal financial assistance, such as MPOs, the federal government requires provision of meaningful access to their LEP applicants and beneficiaries.

Performance-Based Planning

According to the FHWA report Performance Based Planning and Programming Guidebook:

"Performance-Based Planning and Programming (PBPP) refers to the application of performance management within the planning and programming processes of transportation agencies to achieve desired performance outcomes for the multimodal transportation system. PBPP attempts to ensure that transportation investment decisions are made - both in long-term planning and short-term programming of projects - based on their ability to meet established goals."

The most recent transportation legislation, the FAST Act, was enacted by Congress in 2015. This act largely continued the provisions of the Moving Ahead for Progress in the 21st Century Act (MAP-21), with some additions. One of MAP-21's most significant changes to the metropolitan transportation planning process is that it mandates performance-based planning for all MPOs.

The CUAMPO is working with its regional, State, and federal partners in order to meet the federal requirements. This plan integrates the performance measures required by the FAST Act.

THE UNITED STATES DEPARTMENT OF TRANSPORTATION (USDOT), THROUGH THE FHWA, HAS DEVELOPED PERFORMANCE-BASED PLANNING REGULATIONS.

In general, MTPs and TIPs are required to be developed through a performance-driven, outcome-based approach that supports the national goals that were developed through MAP-21. The performance goals are illustrated in Table 1.1.

TABLE 1.1 MAP-21 National Performance Goals

Source: FHWA

GOAL AREA	NATIONAL GOAL
Safety	To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
Infrastructure condition	To maintain the highway infrastructure asset system in a state of good repair
Congestion reduction	To achieve a significant reduction in congestion on the National Highway System
System reliability	To improve the efficiency of the surface transportation system
Freight movement and economic vitality	To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
Environmental sustainability	To enhance the performance of the transportation system while protecting and enhancing the natural environment
Reduced project delivery delays	To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

The MPOs are required to monitor the national Transportation Performance Measures (TPMs) and track them over time. The MPOs are required to establish their own targets in relation to these measures, or support the state targets. The MPOs report their progress on the performance measures within their MPA to the state, and the states report their progress on performance measures within their MPA to the USDOT.

The states have a year after a TPM's effective date to set their targets. The MPOs have 180 days after their state sets its relevant targets to set its own targets, or adopt the state's target. Table 1.2 displays the timeline of the developed TPM categories. The TPMs that were developed by USDOT are shown in Table 1.3.

As the CUAMPO is an attainment area, the CMAQ TPM category does not apply to this MTP. The MPO may elect to track more performance measures than USDOT requires.

Further performance measures from the FTA require the local transit service, Clarksville Transit System, to maintain a Transit Asset Management (TAM) Plan. The MPO and transit provider must work together to set targets for and monitor performance. These needs are further discussed in Chapter 6: The Existing Transportation System.

Table 1.2 National Transportation Performance Measure Categories Source: FHWA

PERFORMANCE MEASURE	FHWA Effective Date	State Target Required Date
Highway Safety Improvement Program	4/14/2016	4/14/2017
Safety Performance Management	4/14/2016	4/14/2017
Pavement Condition	5/20/2017	5/20/2018
Bridge Condition	5/20/2017	5/20/2018
Freight	5/20/2017	5/20/2018
CMAQ	5/20/2017	5/20/2018
System Performance	5/20/2017	5/20/2018

TABLE 1.3 National Transportation Performance Measures and Metrics

CATEGORY	PERFORMANCE	NOTE	TIMING OF TARGETS
HSIP (PM1)	N/A	All states must now have a HSIP in place and safety performance management performance measure targets are established and reported within the HSIP	HSIP documents are required every year.
Safety Performance Management (PM1)	Number of fatalities	Metric is number of fatalities during a calendar year. Target is all public roads in the study area. Based on a five-year rolling average. Recommended data source is FARS for fatalities.	Safety Performance Management targets are required to be established each year.
	Rate of fatalities	Metric is rate of fatalities per 100 million VMT during a calendar year. Target is all public roads in the study area. Based on a five-year rolling average. Recommended data source is FARS, and HPMS for VMT or the MPO if possible.	
	Number of serious injuries	Metric is number of serious injurites during a calendar year. Target is all public roads in the study area. Based on a five-year rolling average. Recommended data source is state motor vehicle crash database, doesn't specify if other data sets can be used.	
	Rate of serious injuries	Metric is rate of serious injuries per 100 million VMT during a calendar year. Target is all public roads in the study area. Based on a five-year rolling average. Recommended data source is state motor vehicle crash database, and HPFM for VMT or MPO if possible.	
	Number of non-motorized fatalities and non-motorized serious injuries.	Metric is number of non-motorized fatalities and serious injuries during a calendar year. Target is all public roads in the study area. Based on a five-year rolling average. Recommended data source is FARS and state motor vehicle crash database.	

continued

Table 1.3 National Transportation Performance Measures and Metrics

CATEGORY	PERFORMANCE	NOTE	TIMING OF TARGETS
Pavement Condition (PM2)	Percentage of pavements of the Interstate System in Good condition	Metric is percentage of Interstate in good condition. Target is the Interstate in the study area. No data source listed, however, the HPMS can be used to get this data.	Pavement Condition targets are reported every four years. States are required to establish 2-year and 4-year targets for these performance measures. MPOs must support the state's 4-year target or establish their own.
	Percentage of pavements of the Interstate System in in Poor condition	Metric is percentage of Interstate in poor condition. Target is the Interstate in the study area. No data source listed, however, the HPMS can be used to get this data.	
	Percentage of pavements of the non-Interstate NHS in Good condition	Metric is percentage of non-Interstate NHS in good condition. Target is non-Interstate NHS roads in the study area. No data source listed, however, the HPMS can be used to get this data.	
	Percentage of pavements of the non-Interstate NHS in Poor condition	Metric is percentage of non-Interstate NHS in poor condition. Target is non-Interstate NHS roads in the study area. No data source listed, however, the HPMS can be used to get this data.	
Bridge Condition (PM2)	Percentage of NHS bridges classified as in Good condition	Metric is percentage of bridges in good condition. Data is determined using the National Bridge Inventory methodology.	Bridge Condition targets are reported every four years. States are required to establish 2-year and 4-year targets for these performance measures. MPOs must support the state's 4-year target or establish their own.
	Percentage of NHS bridges classified as in Poor condition	Metric is percentage of bridges in poor condition. Data is determined using the National Bridge Inventory methodology.	
Freight (PM3)	Truck Travel Time Reliability (TTTR) Index on Inter-state System	TTTR data is needed for three peak periods, a weekend period, and overnight period. Calculations are specified. Data available through FHWA National Performance Management Research Dataset. States and MPOs can use own data if prefered.	The Freight target is reported every four years. States are required to establish 2-year and 4-year targets for the performance measure. MPOs must support the state's 4-year target or establish their own.

continued

Table 1.3 National Transportation Performance Measures and Metrics

CATEGORY	PERFORMANCE	NOTE	TIMING OF TARGETS
CMAQ (PM3)*	Annual Hours of Peak-Hour Excessive Delay per Capita	Metric is total peak-hour excessive delay person-hours. Target applicability is mainline of NHS in urbanized areas with a population over 1M, eventually changing to >200k, in nonattainment or maintenance for any of the criteria pollutants under the CMAQ program. Data available through FHWA National Performance Management Research Dataset.	The Annual Hours of Peak-Hour Excessive Delay per Capita targets are reported in the Baseline Performance Report in each reporting period. States and MPOs are required to collectively establish 4-year targets for each urbanized area for the 2018 report. With the first mid performance period progress report, due October 1, 2020, 4-year targets may be adjusted, and 2-year condition/performance will be reported as baselines. The Percent of Non-Single Occupancy Vehicle Travel targets are reported in the Baseline Performance Report in each reporting period. States and MPOs are required to collectively establish 2-year and 4-year targets for each urbanized area. Total Emission Reductions targets are reported in each state Baseline Performance Report. States are required to establish 2-year and 4-year targets for this performance measures. MPOs with a population of less than one million people must support the state's 4-year target or establish their own. MPOs with a population greater than one million people must also support the state's 2-year target or establish their own.
	Percent of Non-Single Occupancy Vehicle Travel	Metric is the percentage of non-SOV travel. Target applicability is mainline of NHS in urbanized areas with a population over 1M, eventually changing to >200k, in nonattainment or maintenance for any of the criteria pollutants under the CMAQ program. Data sources include ACS Journey to Work, local surveys and counts, etc.	
	Total Emission Reductions	Metric is on-road mobile source emissions. Target is all urbanized areas in nonattainment or maintenance under CMAQ. The CMAQ Public Access System is listed as the data source. The TPM is based on an assessment of the Congestion Mitigation and Air Quality Improvement (CMAQ) Program through measurement of total emissions reduction of on-road mobile source emissions. Total emissions reduction is calculated by summing 2-and 4-year totals of emissions reductions of applicable criteria pollutant and precursor, in kilograms per day, for all projects funded with CMAQ funds.	

continued

Table 1.3 National Transportation Performance Measures and Metrics

CATEGORY	PERFORMANCE	NOTE	TIMING OF TARGETS
System Performance (PM3	Percent of Person-Miles Traveled on the Interstate That Are Reliable	Metric is Level of Travel Time Reliability. Target is all Interstate routes in the study area. Calculations are specified. Data available through FHWA National Performance Management Research Dataset.	System Performance targets are reported every four years. States are required to establish 2-year and 4-year targets for these performance measures. For the first reporting period, a 2-year target for non-Interstate NHS routes is not required. MPOs must support the state's 4-year target or establish their own.
	Metric is Level of Travel Time Reliability. Target is all Interstate routes in the study area. Calculations are specified. Data available through FHWA National Performance Management Research Dataset.	Metric is Level of Travel Time Reliability. Target is non-Interstate NHS routes in the study area. Calculations are specified. Data available through FHWA National Performance Management Research Dataset.	

***** NOTE: CMAQ Performance Measures do not apply to the Clarksville MPA.

1.3 | Current Trends Affecting Transportation Planning

Changing Socio-Demographics

There are many national social and demographic trends affecting travel demand and transportation in general. The United States is projected to grow more slowly, age more rapidly, and become more ethnically diverse in the future. The country is also expected to experience more growth in central urban areas and suburban areas. The Clarksville MPA has followed this trend with rapid growth that is more than four (4) times that of the national growth rate.

The U.S. Census Bureau projects that the U.S. population will grow from 310 million in 2010 to 380 million by 2040. While substantial in absolute terms, the rate of growth during this period is slower than in recent decades. Most of this slowdown is attributed to lower fertility rates amongst U.S. women and lower rates of immigration. Despite lower rates of immigration, the majority of population growth over the next 25 years is anticipated to come from immigrants and their descendants.

The increase in ethnic diversity in the U.S. population will likely have a short-term effect that increases carpooling, transit ridership, walking, and biking. This change in transportation will decrease the Vehicle Miles Traveled (VMT) per capita. However, as immigrants adapt to American culture, they are anticipated to adopt travel patterns similar to those of native residents. This means a possible increase in VMT per capita for immigrants and their descendants in later decades.

The American workforce is also changing, largely mirroring demographic changes. As the population ages, the overall labor force participation rate will decrease as a lower proportion of the population will be in the prime working-age group. While some of this decrease in labor force participation may be made up by retiree-age workers seeking part-time employment, there is an anticipated drop in overall employment by

2050. Since commute trips are a major contributing factor to peak period congestion, structural workforce trends will have a major impact on transportation.

Though population and employment growth is anticipated to slow down, growth will likely continue to be uneven throughout the United States. The migration patterns from rural to urban and from Northeast and Midwest to the Southeast and Western part of the country are likely to continue. However, growth within metropolitan areas is expected to change slightly.

Suburban population and employment growth is anticipated to continue to outpace that of central urban areas, but growth in central urban areas is expected to occur at a faster rate than in recent decades. Both changes have the potential to decrease VMT per capita as urban residents are more likely to use transit, walk, or bike. The suburban areas will have the opportunity to develop more walkable and transit-oriented areas. However, there is also the potential for increases in VMT per capita, if urban sprawl continues within metropolitan regions. This impact can be reduced if transit services can effectively serve these areas and provide an attractive alternative to driving.

Changing Technology

The actual impact of technological improvements on transportation is difficult to predict. However, there are many current technological trends that are influencing travel demand.

Telecommuting has been around for several decades now, and its use has increased at a rapid rate within that time frame. However, it continues to represent a small percentage of the overall workforce. Advancement in communications and incentives provided by local governments implementing Transportation Demand Management (TDM) programs may cause this workplace trend to continue to grow. This would help to reduce the demand for peak period travel.

According to the USDOT, ITS technologies:

"improve transportation safety and mobility, reduce environmental impacts, and enhance productivity through the integration of advanced communications-based information and electronic technologies into the transportation infrastructure and vehicles."

Technology is also being used to improve operations on existing and new transportation infrastructure by allowing for improved Intelligent Transportation Systems (ITS).

ITS technologies that are likely to have a major impact on future transportation include connected vehicles, automated vehicles, and live data collection and dissemination. These technologies will enable new ITS solutions and improve existing ones such as:

- traffic signal coordination,
- reversible lane systems,
- traffic monitoring,
- demand-based roadway and parking pricing, and
- real-time travel information.

Bikesharing, carsharing, and ridesharing are all relatively new technologies that are impacting travel demand, especially in urban areas. These technologies are constantly improving with technological advances. Bikesharing and carsharing are both essentially rental services whereby a person pays for temporary use of a vehicle (bike or automobile, respectively). There are many variations of each service, but the intent is to provide convenience when one does not have access to a private vehicle. In urban areas where many trips can be made by walking, biking, or public transit, bikesharing and carsharing are filling in the gaps for destinations that are not easily accessible by these modes. In this manner, these rental services are making car ownership less important for urban residents. If these services become more widespread, VMT per capita, and potentially regional VMT, would decline in many urban areas.

Ridesharing, according to the Victoria Transport Policy Institute, is "carpooling or vanpooling service in which the vehicle carries additional passengers when making a trip, with minimal additional mileage." It is offered by multiple providers, such as public transit agencies, private taxis, vanpools, and carpools. The continued growth of smartphones and advancement in GPS and mobile technology are constantly improving ridesharing services. As with bikesharing and carsharing, ridesharing offers an affordable alternative to vehicle ownership in walkable areas or to traditional taxis in all areas.

Declining Transportation Revenues

Gasoline taxes are the primary revenue source for both federal and state transportation funds. Despite the fact that transportation project construction costs have increased over the last twenty years, the last increase in the federal gasoline tax was in 1993. The State of Tennessee passed an increased gas and diesel tax that went into effect on July 1, 2017. The State of Kentucky has a gasoline tax that is subject to change based on wholesale fuel prices. While the State of Kentucky has a minimum gas tax, this fluctuating value makes it hard to anticipate the available state funding for roadway projects. Furthermore, no significant new revenue streams have emerged to fill these funding gaps.

The Federal Highway Trust Fund, the primary source of funding for highway and transit projects, has been on the brink of insolvency many times in recent years. The USDOT, state DOTs, and local agencies have taken a variety of approaches to deal with declining and uncertain transportation revenue. For instance, in order to maximize its shrinking revenues, the FHWA encourages innovative financing strategies for transportation projects through its Innovative Program Delivery program.

At the local level, many local governments have begun to look at the Return on Investment (ROI) of their capital improvement projects, especially transportation projects. They have also raised new transportation revenue through temporary bonds, tax increases, special assessment districts, and other means.
At all levels, it is becoming increasingly important to prioritize transportation projects based on some measure of cost-effectiveness. It will also be necessary to seek innovative and alternative means of financing and funding transportation. There are many successful examples of local and state agencies utilizing public-private partnerships, privatization, Tax-Increment Financing (TIF), and other innovative financing structures to overcome funding shortfalls.

1.4 | Plan Adoption and Amendment Process

Plan Adoption

The development of the MTP is a time-consuming process that requires a large amount of data and information. The process provides several opportunities for the general public and the stakeholders within the area to participate and shape the plan and determine its needs and priorities. Chapter 2 describes the activities undertaken to involve the public and stakeholders. Chapter 3 displays how the results of the public outreach process guided the development of the MPA's vision, goals, and objectives.

The plan process also includes a formal review of the draft MTP and air quality conformity analysis. The draft MTP is provided to the general public and contains a 30-day public review and commenting period. After the public review process on the draft MTP, there are one or more advertised public meetings to review and obtain final comments from the public. Following this stage, the comments are considered and addressed. The MPO will then endorse or adopt the plan for approval, where it is then sent to the appropriate federal agencies for determination of compliance with the federal planning requirements. Once it has been determined that the MTP is compliant, the plan becomes an approved document.

Amending and Adjusting the MTP

Between five-year updates, the need may arise for revisions to the MTP which significantly alter the scope or budget of the plan. This situation typically occurs when existing projects are modified or removed, or new projects are added. This could also occur due to changes in project schedules, development changes, or additional roadway needs that arise over time. Since federally funded projects included in the short-range TIP for the MPO area must be consistent with the fiscally constrained MTP, these revisions would require a formal amendment.

When an amendment is made to the plan, the CUAMPO requires a 14-day public commenting period that is advertised through the local media. In addition, during the public commenting period for the amendment, it is available on the CUAMPO website and at the physical office.

THE CUAMPO DEFINES THE EXACT SITUATIONS AND PROCEDURES FOR WHEN A FORMAL AMENDMENT WOULD BE APPROPRIATE. 23 CFR 450.104 PROVIDES THE FOLLOWING DEFINITION:

"Amendment means a revision to a long-range statewide or metropolitan transportation plan, TIP, or STIP that involves a major change to a project included in a metropolitan transportation plan, TIP, or STIP, including the addition or deletion of a project or a major change in project cost, project/project phase initiation dates, or a major change in design concept or design scope (e.g., changing project termini or the number of through traffic lanes or changing the number of stations in the case of fixed guideway transit projects). Changes to projects that are included only for illustrative purposes do not require an amendment. An amendment is a revision that requires public review and comment and a redemonstration of fiscal constraint. If an amendment involves "non-exempt" projects in nonattainment and maintenance areas, a conformity determination is required."

1.5 | Plan Implementation

Implementation of the MTP occurs through the programming of transportation projects through the TIP. The TIP is a document that contains a four-year implementation program (updated every three years) for all modes of transportation within the MPA. The document covers projects that are to receive federal or state funding, or those that are regionally significant. It is developed by the CUAMPO, who consults with the appropriate city, county, and state transportation agencies in determining which projects from the MTP should be placed in the TIP. The document also covers smaller scale transportation improvements such as intersection improvements, safety projects, and more. In order to receive federal funding, projects in the TIP must come from the MTP.

2.0 | Plan Development Process

2.1 | Performance-based Planning Approach

Performance based planning and programming (PBPP) is the application of performance management - a strategic approach to decision-making that is based on the development, application, and monitoring of performance data - to the long-range planning and programming process. PBPP makes use of data derived indicators about the current and desired transportation system. These indicators are used to set strategic directions to analyze how funds are invested and programmed. The indicators are also used to evaluate program outcomes. Figure 2.1 displays the framework for PBPP, as shown by the FHWA in their Performance Based Planning and Programming Guidebook, September 2013.

FIGURE 2.1

THE 2045 MTP UTILIZES A PERFORMANCE-BASED PLANNING APPROACH THAT FOLLOWS FEDERAL RULE-MAKING AND GUIDANCE ON NATIONAL PERFORMANCE MEASURE MONITORING.

The MAP-21 legislation introduced requirements for performance-based planning in statewide and metropolitan planning. It required the USDOT to establish the performance measures that will enable the states and MPOs to track their performance in addressing the national goals set forth in MAP-21, as described in Chapter 1: Introduction. **THOSE REQUIREMENTS HAVE CONTINUED UNDER THE FAST ACT.** Since all of the performance measures have an effective date established by the FHWA, the states and MPOs are required to adopt state and metropolitan targets, respectively, for each measure.

The general planning process below illustrates how the 2045 MTP incorporates an outcome-oriented, performance-based planning approach:

1. **Set Regional Vision:** A regional vision is developed based on previous plans and public input.
2. **Define Goals and Objectives**: Goals are developed that address desired outcomes consistent with the regional vision and national goals set forth in MAP-21 and the FAST Act. Then, objectives that are specific and measurable are established to support achievement of the stated goals.
3. **Establish System Performance Measures:** Targets, set for the performance measures to monitor, are selected and are consistent with the MTP's stated goals and objectives; as well as with available guidance on federal performance measures. Monitoring these measures over time will allow the MPO to be responsive to unintended or unforeseen changes.
4. **Assess Baseline System Performance:** Existing conditions of the transportation system are assessed from an asset inventory, technical analysis, and input received from the public and stakeholders.
5. **Identify Desired System Performance:** As performance measure targets are in the earliest stages, the 2045 MTP focuses on the preferred overall trend of performance measures, establishing the initial targets, and placing a monitoring system for the targets in place.
6. **Forecast Future Conditions and Need:** Future growth in population and employment from 2016 to 2045 is forecasted. The impacts of the forecasted change in land use and demographic patterns were then modeled using the existing transportation network and committed projects. Future projects were then evaluated both individually and as part of larger packages of projects.
7. **Develop Implementation Strategy:** A prioritization methodology is developed to rank future transportation projects that are consistent with the stated goals and objectives, as well as public and stakeholder input. The projects that most effectively balance future demand with performance measure targets are then included in the fiscally constrained project list, as long as there is no preliminary concern of significant environmental impact or disproportionately adverse effects to environmental justice populations.

2.2 | Title VI in Development of the Metropolitan Transportation Plan

THE CUAMPO IS COMMITTED TO ENSURING PUBLIC PARTICIPATION IN THE DEVELOPMENT OF ALL TRANSPORTATION PLANS AND PROGRAMS.

It is the overall goal of the MPO that the transportation planning process be open, accessible, transparent, inclusive, and responsive. As a continuing effort by the MPO to provide public access and the means by which to engage in the planning process, the MTP development process is compliant with and follows all Title VI laws, processes, and programs, including the following:

- **Civil Rights Act of 1964, 42 USC 2000d, et seq. prohibits exclusion from participation in any federal program on the basis of race, color, sex, or national origin.**
- **Rehabilitation Act of 1973, 29 USC 701 Section 504, prohibits discrimination on the basis of a disability, and in terms of access to the transportation planning process.**
- **Americans with Disabilities Act of 1990 prohibits discrimination based solely on disability. ADA encourages the participation of people with disabilities in the development of transportation and paratransit plans and services. In accordance with ADA guidelines, all MTP meetings take place in locations which are accessible by persons with mobility limitations or other impairments.**
- **Executive Order 12898 or referred to as Environmental Justice, requires that federal programs, policies and activities affecting human health or the environment will identify and avoid disproportionately high and adverse effects on minority or low-income populations. The intent is to ensure that no racial, ethnic, or socioeconomic group bears a disproportionate share of negative environmental consequences resulting from government programs and policies.**
- **Limited English Proficiency (LEP) Plan which is required by Title VI of the Civil Rights Act of 1964, Executive Order 13166, and FTA Circular C 4702.1B, October 2012.**

The MPO's Public Participation Plan (PPP) supports Title VI compliance by enabling and encouraging all members of the public to actively participate in the development of the MTP. Details on the public involvement process for the MTP are discussed in the next section.

2.3 | Public Involvement Process

Public involvement is the cornerstone of metropolitan transportation planning. Successfully engaging the public throughout the planning process provides decision-makers with the information necessary to ensure that the needs and concerns of the public are adequately addressed.

Federal Requirements

Federal regulation (23 CFR 450.316) requires that each MPO develop and use a documented participation plan that defines a process for providing citizens with reasonable opportunities to be involved in the metropolitan transportation planning process. This PPP is required to address the following:

- Adequate public notice of activities and time for public review and comment.
- Timely notice and access to information.
- Employment of visualization techniques to describe plans and programs.
- Make information available electronically and on the internet.
- Hold meetings at convenient times and easily accessible venues.
- Demonstrating explicit consideration and response to public input received during the development of the metropolitan transportation plan and the TIP in a timely fashion.
- Seek out and consider the needs of the traditionally underserved in the community, such as low-income and minority populations.
- Provide additional opportunity for public comment on all plans, and changes to plans, following initial agency and public reviews during development, especially the MTP and TIP.
- Coordination with statewide public involvement and consultation processes.
- Periodically review procedures and effectiveness of plan strategies.
- Provide a summary of public comments on the draft for the MTP and TIP and include those in the final documents.
- Provide a minimum of a 45-day public comment period before finalization of a PPP or an update of an existing PPP.

FEDERAL LEGISLATION AND EXECUTIVE ORDERS ALSO PROHIBIT DISCRIMINATION AND/OR EXCLUSION FROM PARTICIPATION IN ANY PROGRAM OR ACTIVITY RECEIVING FEDERAL FINANCIAL ASSISTANCE ON THE BASIS OF RACE, COLOR, NATIONAL ORIGIN, OR DISABILITY. SPECIAL ACCOMMODATIONS MUST ALSO BE MADE FOR MINORITY, LOW-INCOME, AND LIMITED ENGLISH PROFICIENCY (LEP) POPULATIONS.

Public Participation Plan Requirements

The MPO's PPP addresses all the federal requirements and was amended in 2013. The 2045 MTP public involvement process follows the procedures outlined in the PPP.

Beyond the requirements for the MTP, all MPO activities must accommodate persons with disabilities and LEP persons. All MPO meetings were required to take place in locations which are accessible by persons with mobility limitations or other impairments. The MPO provided notice of the availability of language assistance to LEP persons. The MPO also made the effort to engage Environmental Justice populations, LEP populations, low-mobility populations, and other populations that are typically underrepresented or have unique needs.

THE CLARKSVILLE URBANIZED AREA
METROPOLITAN PLANNING ORGANIZATION

AMENDED PUBLIC PARTICIPATION PLAN

Prepared By:

Clarksville Urbanized Area Metropolitan Planning Organization

In Cooperation with:

Tennessee Department of Transportation,
Kentucky Transportation Cabinet,
Federal Highway Administration,
Federal Transit Administration
Clarksville Transit System

Adopted December 12, 2013

Metropolitan Transportation Plan

The following steps detail the MPO's policy for the adoption of the MTP:

1. **The draft of the MTP is submitted to TDOT and KYTC for review and comments that are related to federal planning requirements.**
2. **The CUAMPO staff revises the MTP based on the comments received from TDOT or KYTC.**
3. **The updated draft of the MTP and conformity analysis report are reviewed by other resource agencies for comment.**
4. **The updated draft MTP and conformity analysis report are submitted for review by FHWA and FTA.**
5. **The CUAMPO staff makes any appropriate changes before releasing the draft MTP and conformity analysis report for public review and comments.**
6. **The final draft of the MTP is created and then reviewed at a joint meeting of the Executive Board and TCC.**
   6a) This meeting includes a final public hearing to provide any last public comments.
7. **The TCC recommends the final draft of the MTP to the Executive Board, who votes on the MTP's adoption.**
8. **Once adopted by the Executive Board, copies of the MTP are sent to the involved state, federal and local officials.**
   8a) The adopted MTP is also published on the CUAMPO website and made available as necessary at the MPO office.

MTP ADOPTION

Public Involvement Activities

Public involvement activities were conducted to develop a transportation plan that effectively meets the needs of the public and is consistent with local values. Members of the general public participated by:

- clarifying a regional vision by expressing their opinions about current transportation system conditions,
- identifying future transportation projects to be evaluated in the MTP,
- communicating their ideal transportation investment strategies, and
- providing feedback on draft versions of the MTP.

Various outreach methods were used to inform the public about the update process and the public involvement activities. After building a database of stakeholders, local elected officials, and community organizations, outreach methods included the following:

- engaging transportation partners and stakeholders, such as state and federal government agencies;
- reaching out to all agencies, businesses, associations and others on the MPO's contact list database;
- using social media (Facebook/Twitter/websites);
- issuing a press release to media representatives; and
- posting fliers in local businesses, libraries, and schools.

Documentation of the advertising and survey used in the public participation process is located in the Appendix.

2.4 | Stakeholder Consultation and Coordination

TO DEVELOP AN EFFECTIVE TRANSPORTATION PLAN THAT ADDRESSES THE NEEDS OF ALL SYSTEM USERS, IT IS NECESSARY TO OBTAIN INPUT FROM ALL STAKEHOLDERS. For this reason, all stakeholders were contacted by the MPO to participate in the public participation process described earlier. This is so that they may be adequately represented in the MTP planning process. Where necessary, the stakeholders were also asked for any information they had about future projects or plans that could be used to develop the MTP.

Federal Requirements

As with public involvement for citizens, Federal regulations (23 CFR 450.316) require MPOs to develop and use a documented participation plan that defines a process for providing transportation-related stakeholders with reasonable opportunities to be involved in the metropolitan transportation planning process. These stakeholders include:

- affected public agencies,
- representatives of public transportation employees,
- freight shippers,
- providers of freight transportation services,
- private providers of transportation,
- representatives of users of public transportation,
- representatives of users of pedestrian walkways and bicycle transportation facilities,
- representatives of the disabled, and
- other interested parties.

Federal regulations also encourage MPOs to consult with agencies and officials responsible for other planning activities within the MPA that are affected by transportation. Beyond this, MTPs are required to give due consideration of other related planning activities within the MPA and to include transportation services and projects within the MPA that are provided by other agencies that receive federal funding, such as public transit systems or national parks.

The metropolitan planning process requires that where a MPA includes federal public lands and/or Indian Tribal lands, the affected federal agencies and Indian Tribal governments shall be involved appropriately in the development of transportation plans and programs.

Consultation Activities

Beyond the opportunities provided to the general public described previously, the MPO's PPP provides a list of agencies for consultation. This list includes:

- Elected Officials
- Local Government Staff
- Transportation Agencies (Airports, Transit, Freight Services, etc.)
- Local Media (TV, Radio, Print, etc.)
- Special Interest Groups
- Libraries (For Public Display)
- Consultation with federal, state, and local agencies responsible for land use management, natural resources, environmental protection, conservation and historic preservation, and other environmental issues
- Consultation with parties that would have an interest in the planning and development of the transportation network including affected public agencies in the metropolitan planning area
- Private Freight Shippers
- Representatives of Public Transportation Employees
- Providers of Freight Transportation Services
- Private Providers of Transportation
- Representatives of Users of Public Transportation
- Bicycle and Walking Clubs
- Representatives of Pedestrian/Bicycle Facilities Users
- Representatives of the Disabled
- Representatives of Minority Agencies and Groups

Coordination Activities

In addition to consulting stakeholders throughout the development of the MTP, the MPO and the consultant team (Neel-Schaffer) coordinated with stakeholder groups to obtain relevant data (e.g., inventories of natural, historic, and community resources). This process also allowed for the review of existing plans, maps, and other information for consistency with the MTP.

2.5 Visioning Activities and Results

To gather public input for the development of the MTP, the MPO conducted an online survey, which could optionally be printed and submitted to the MPO, during the plan update process. This survey was intended to gain insight into the public's desired future of transportation in the Clarksville MPA. Using the survey, stakeholders and members of the general public shared their concerns, ideas, values, and visions regarding the state of both the current transportation system and future transportation needs for the region.
The following sections describe the visioning activities and its outcomes. In particular, the results suggest several major themes within the MPA:

- **INCREASED EMPHASIS ON ROADWAY MAINTENANCE AND PRESERVATION, PARTICULARLY ROADWAY SURFACE CONDITION;**
- **REDUCING CONGESTION WITH A COMBINATION OF CAPACITY IMPROVEMENTS, SIGNAL RE-TIMINGS, AND ACCESS CONTROL;**
- **INCREASED EMPHASIS ON PROJECTS AND PROGRAMS IMPROVING CONDITIONS FOR PEDESTRIANS, BICYCLISTS, AND TRANSIT RIDERS; AND**
- **INCREASED EMPHASIS ON REDUCING SPEEDING AND POOR DRIVER BEHAVIOR.**

Comments received outside of these activities can be found in the Appendix.

Survey Distribution

From February 19, 2018, through March 23, 2018, the CUAMPO conducted a community-wide survey for the MTP 2045. This survey captured the opinions of the general public and stakeholders regarding the current transportation system in the Clarksville Urbanized Area. The survey is shown in the Appendix and was conducted using SurveyMonkey. The MPO distributed announcements about the survey through:

- County websites,
- the City of Clarksville website,
- city and county Facebook pages,

- local news media,
- fliers sent to local libraries, community centers, stores, etc.,
- the Clarksville Area Chamber of Commerce, and
- the MPO website.

E-mails containing the survey flier were sent to several organizations to be shared with their staff. These organizations were also encouraged to post the flier on their website or a public location within their building. These organizations are:

- the CUAMPO Executive Board,
- the CUAMPO TCC,
- the APSU African American Culture Center,
- the APSU Hispanic Culture Center,
- the APSU "Gov Says" daily announcement,
- Fort Campbell,
- the City of Oak Grove, and
- the City of Hopkinsville.

Copies of the information distributed for the survey are included in the Appendix.

Survey Results

Notable survey findings are outlined below and shown in Figures 2.2 through 2.8. During the survey, respondents were encouraged to express how their concerns with the transportation system could be addressed. Through these comments, additional test projects, shown in Table 2.1 were analyzed in the MTP. These projects are shown in Figure 2.9 and represent test projects that were not analyzed in the previous MTP or the TIP.

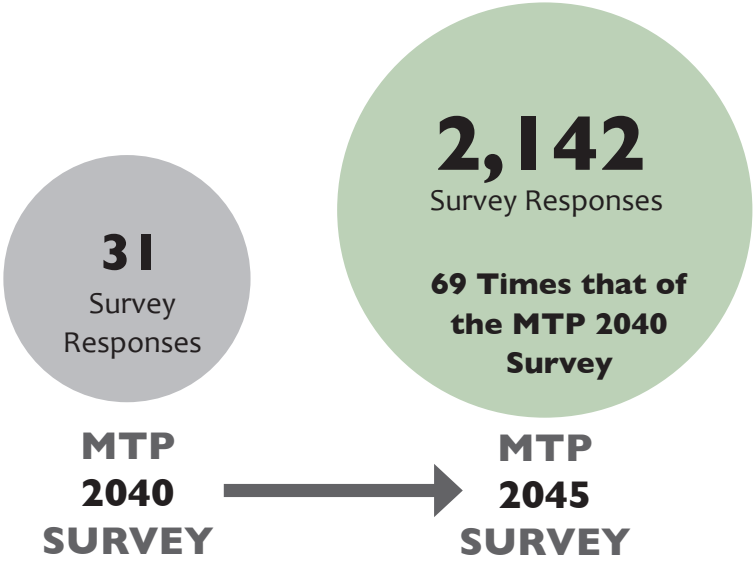


TABLE 2.1- MTP TEST PROJECTS FROM THE PUBLIC SURVEY

Location	Project Limits	Improvement
College St (SR 48)	N 2nd St (US 41A) to Kraft St	Widen to 6 Lanes
Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes
Dunbar Cave Road	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	Widen to 4 Lanes
SR 13/48	River Road to Old Highway 48	Center Turn Lane
College St (SR 48)	Riverside Dr to N 2nd St (US 41A)	Widen to 4 Lanes
Providence Blvd (US 79)	US 41 to Red River Providence	Widen to 6 Lanes
I-24	@ Dixie Bee Road	New interchange
I-24	@ Exit 8 WB Off Ramp	Widen to 2 Lanes
Madison Street	10th Streetreet to Pageant Lane	Widen to 4 Lanes
Needmore Road	Wilma Rudolph Road to Trenton Road	Widen to 4 Lanes
Riverside Drive	Providence Blvd to Cumberland Dr	Road Diet
Rossview Road	Wilma Rudolpf Blvd (US 79) to Dunbar Cave Rd	Widen to 5 Lanes
Tiny Town Road	US 41A to Trenton Rd	Widen to 6 Lanes
Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes
Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes

Primary Means of Travel

- Nearly 97 percent of residents and workers in the MPA use a personal vehicle to travel.
- About 1.5 percent of residents and workers bike, walk, or use public transit for travel.
- Nearly 2 percent of Clarksville residents walk or bike for recreational and/or health purposes.
- Almost 40% of the school or work trips in the MPA take 16-30 minutes to complete.

These trends are similar to the findings of the 2010 Census, with exception to the percentage of residents and workers who walk, which is lower than the Census.

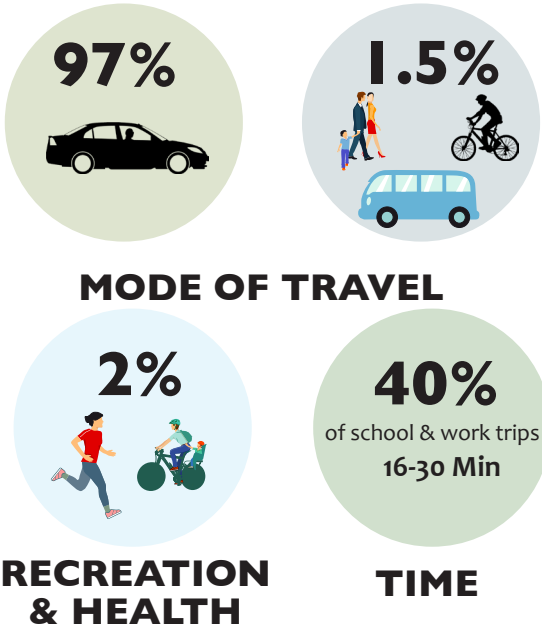


FIGURE 2.2 PRIMARY METHOD OF TRANSPORTATION

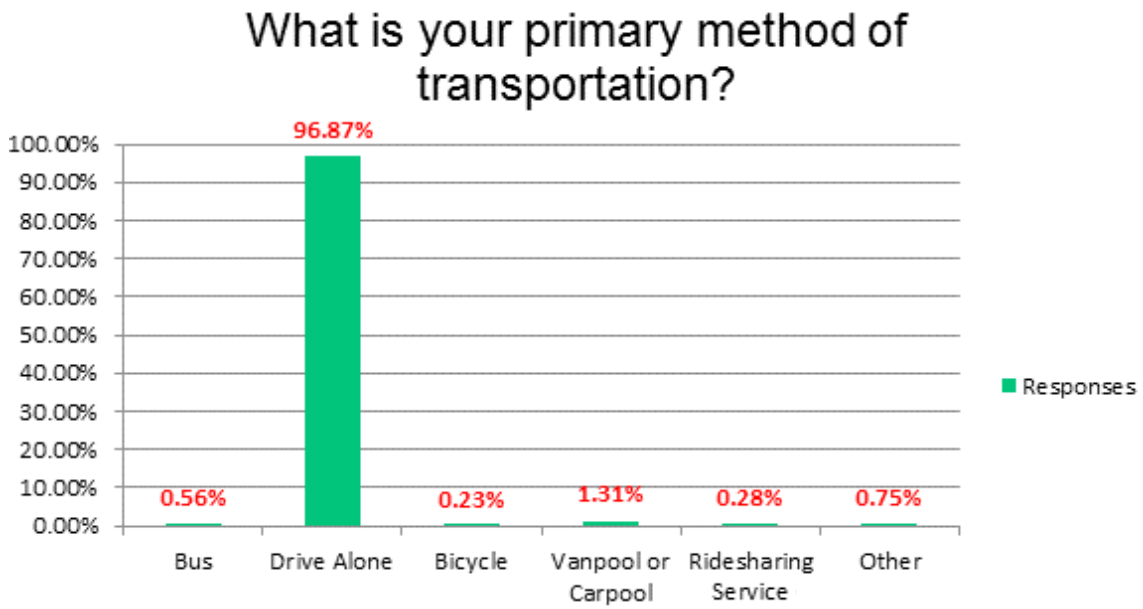
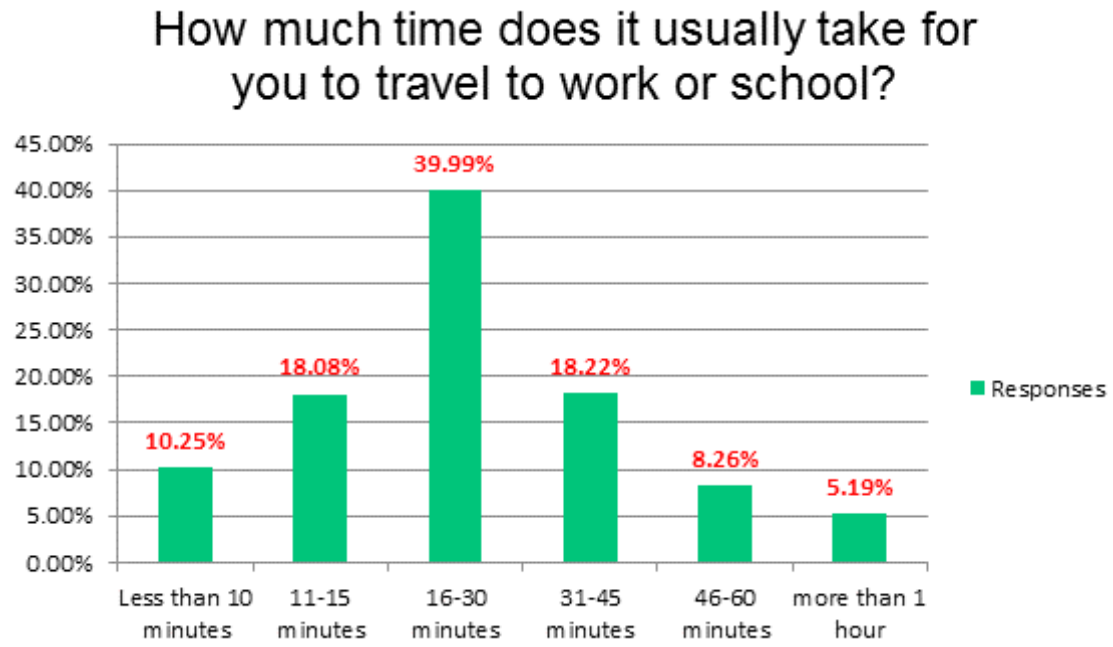


FIGURE 2.3 TRAVEL TIME TO WORK AND SCHOOL



Alternative Means of Transportation

- Fifteen percent of respondents don't use public transit, citing a lack of service to/from their destinations.
- Twenty percent of the responses stated that transit service is unsafe, unreliable, or inconvenient.
- Less than two percent of Clarksville travelers use transit more than once a week.
- Twenty percent of respondents don't walk or bicycle for travel due to the distance to/from their destinations.
- Forty-three percent are concerned about the lack of infrastructure and/or safety in walking/biking to their destinations.
- Less than eight percent of Clarksville travelers walk or bike more than once a week.

PUBLIC TRANSPORTATION

15% DO NOT USE PUBLIC TRANSPORT *CITING LACK OF SERVICE*

20% *CITE* UNSAFE UNRELIABLE INCONVENIENT

WALKING & BICYCLING

20% DO NOT WALK OR BIKE *CITING DISTANCE TO DESTINATIONS*

43% *CITE* LACK OF INFRASTRUCTURE & SAFETY

State of the Transportation System

- Most respondents feel that Clarksville's air quality is fair to good.
- Crash frequency, bicycle lane availability, sidewalk availability, access to rail service for freight, and congestion were rated poor or worse by more than two-thirds of respondents.
- The major concerns for traffic safety are distracted driving, congestion, and inadequate sidewalks.
- Increased law enforcement was commonly cited as a means to combat distracted driving and speeding.
- More than one-third of respondents stated that Wilma Rudolph Boulevard is the most congested roadway in the MPA.
- Twenty-nine percent of respondents expressed that Wilma Rudolph Boulevard is the roadway of greatest safety concern.
- There is interest in the addition of lighting and traffic signals for the I-24 Ramps at Exit 4.

FIGURE 2.4 RATING OF CLARKSVILLE REGIONAL TRANSPORTATION SYSTEM

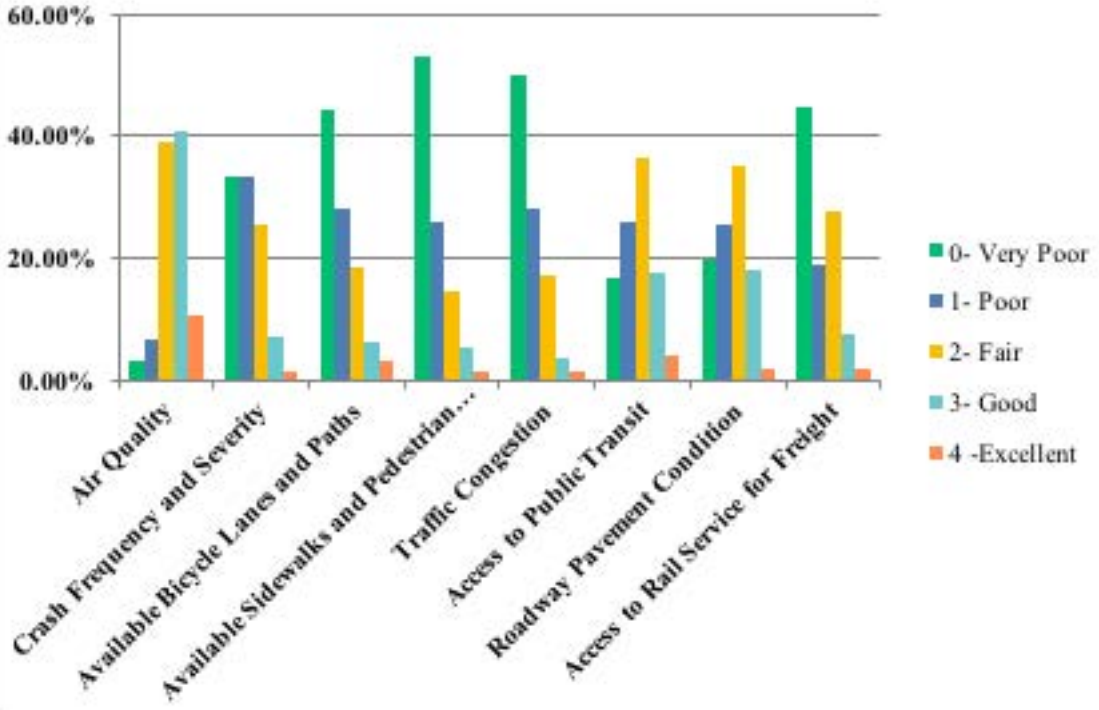


FIGURE 2.5 RATING OF CLARKSVILLE SAFETY CONCERNS

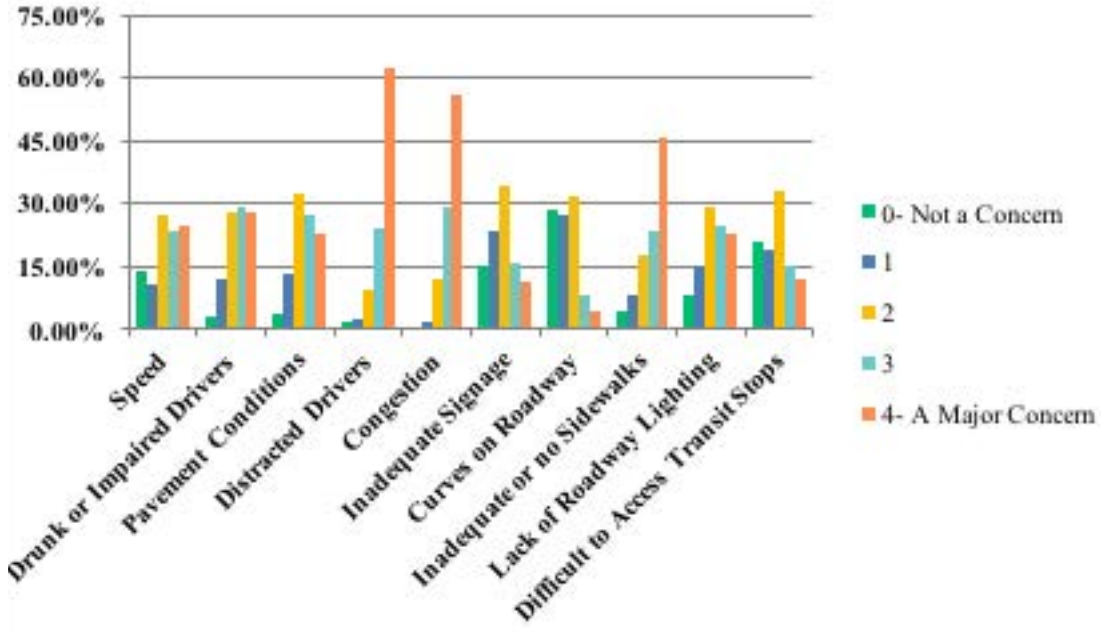


TABLE 2.2 PRIORITY ROAD NEEDS IDENTIFIED BY SURVEY RESPONDENTS

ROADWAY	PERCENTAGE OF RESPONDENTS	
	CONGESTION	SAFETY
Wilma Rudolph Boulevard	38.1%	28.9%
Trenton Road	11.6%	13.6%
Warfield Boulevard	10.9%	5.9%
Tiny Town Road	8.5%	7.3%
Madison Avenue	5.7%	4.5%
Fort Campbell Boulevard	4.8%	5.8%
Riverside Drive	4.8%	2.7%
US 41A Bypass	3.0%	2.9%
Needmore Road	1.9%	2.7%
I-24	1.7%	2.0%

WILMA RUDOLPH BLVD.

!

38.1%
CONGESTION

28.9%
SAFETY

Investment and Funding

- Participants were given a theoretical 100 dollars for transportation improvements and indicated that over a quarter of funding should be used to add lanes to existing roadways in the future.
- The respondents also indicated that nearly 19 percent of funding should be allocated to sidewalk infrastructure.
- Respondents do not support efforts that would keep transportation project funding at current levels.
- Increased hotel/motel, car rental, and/or business and excise taxes would be supported to increase transportation project revenue.
- Respondents ranked the reduction of congestion and traffic crashes as their top priorities for future roadway projects.

Figure 2.6 Desired Funding Allocation

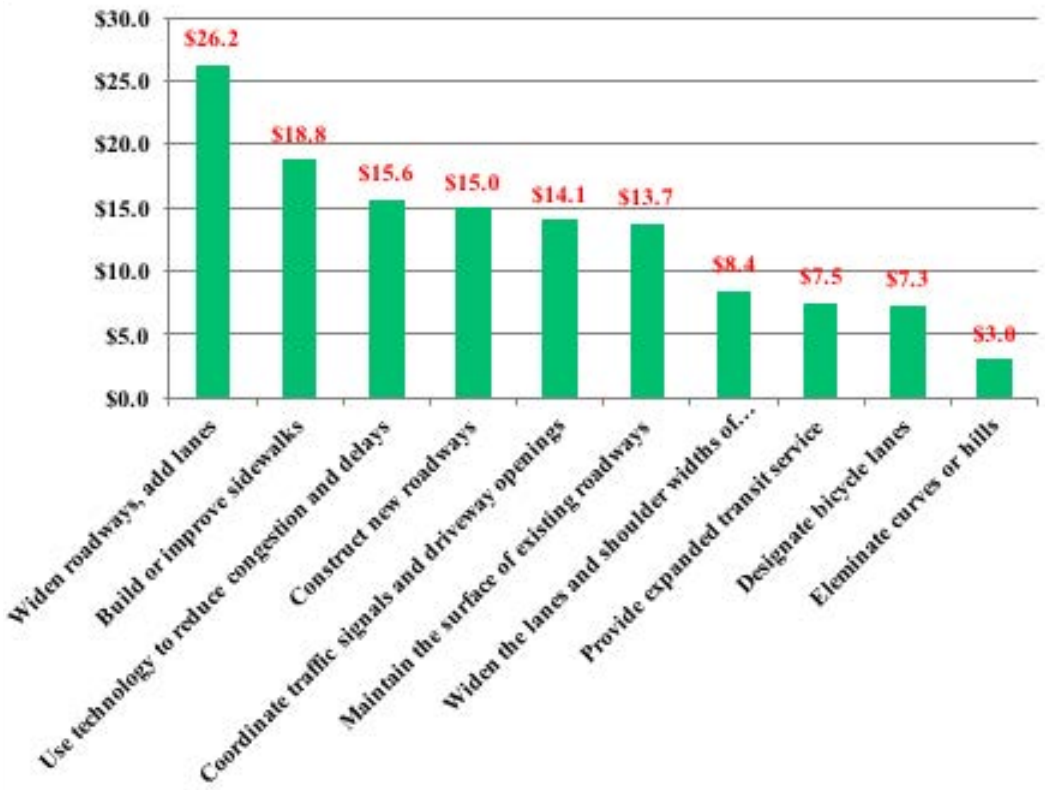


Figure 2.7 Support for Increase in Transportation Revenue by Source

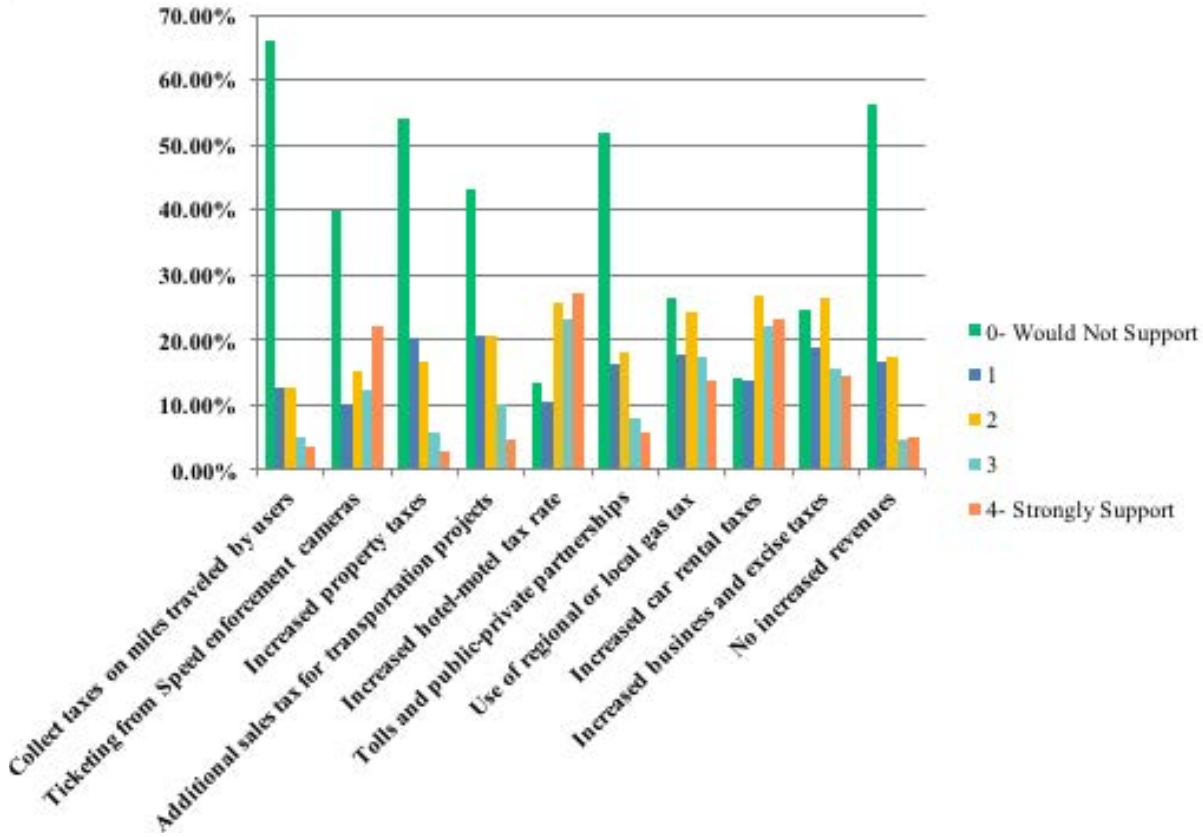
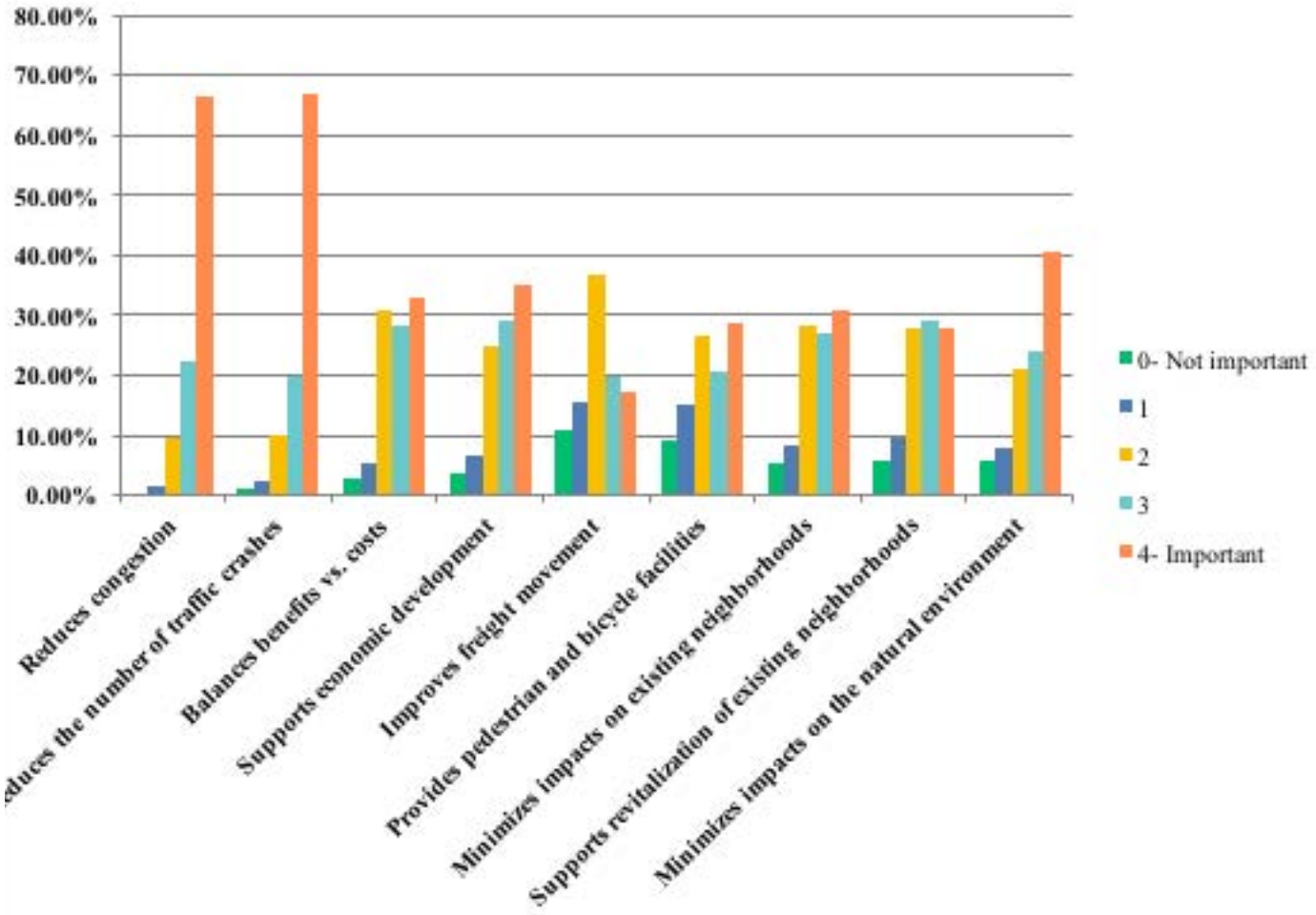


FIGURE 2.8 RANKING OF TRANSPORTATION PRIORITIES



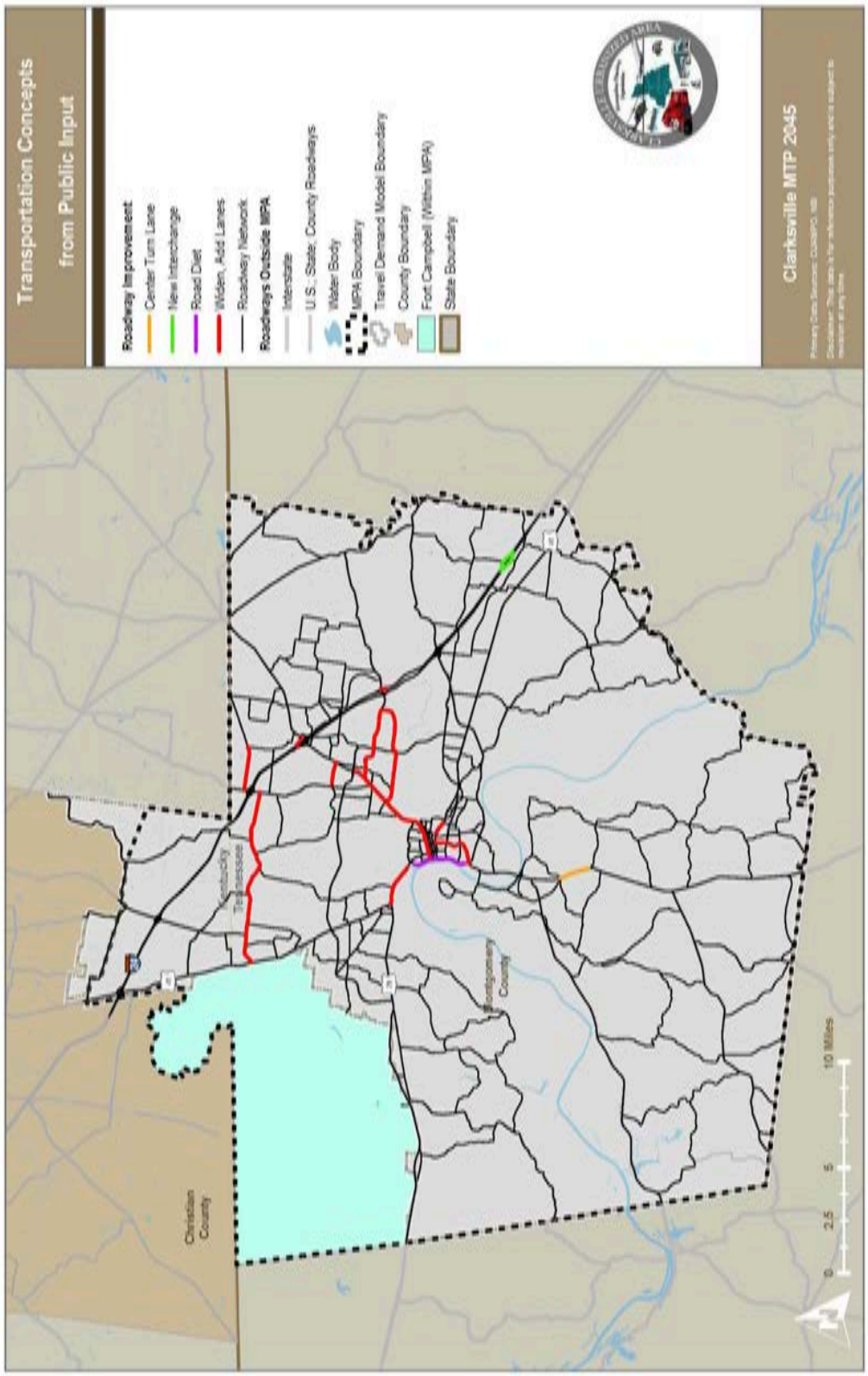


FIGURE 2.9 TRANSPORTATION PROJECTS FROM PUBLIC INPUT

2.6 Public Comments

The draft MTP was released to the general public for commenting and review on November 30th, 2018. The release of the draft MTP followed the MPO's PPP and allowed for a 30-day calendar period to provide comments and review.

3.0 | Visioning and Performance Measures

3.1 | Public Vision

Results from the public outreach survey, which include the stakeholders within the MPA, indicate a need for a more balanced transportation system that provides viable alternatives to driving alone or carpooling.

THE SURVEY HAS SHOWN DESIRE WITHIN THE REGION FOR BIKE AND PEDESTRIAN OPPORTUNITIES TO INCREASE CONNECTIVITY AND SAFETY.

These needs are reflected in the Vision Statement below. This statement guided the development of the MTP's goals and objectives.

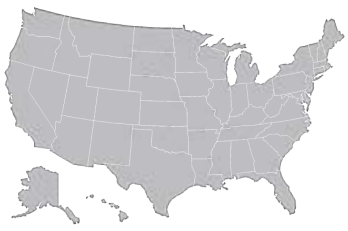
VISION STATEMENT

In 2045, the residents and workers of the Clarksville Urbanized Area will be able to travel within a safe, well-maintained, and multimodal transportation system. This sustainable system will provide reliable transportation, with multiple travel options, that support a higher quality of life.

3.2 | Goals and Objectives

National Emphasis

The FAST Act is the federal law that governs national transportation planning. It also provides guidance on transportation decision-making for metropolitan areas. The national emphasis is defined by the ten planning factors listed in Chapter 1, Section 1.2. These planning factors, and the need to meet federal performance measures, form the basis of the regional goals and objectives developed for the MTP 2045.



Local Emphasis

The development of goals and objectives are often discussed simultaneously in transportation planning. However, it is important to make a critical distinction between goals and objectives.

A goal is a broad statement that describes a desired end state. Goals should be consistent with the stated Vision. They should form the basis for selecting investments and activities that will effectively bring about that Vision. The MTP 2045's goals are to provide a transportation system that is:

SAFE	WELL-MAINTAINED	MULTIMODAL	SUSTAINABLE	RELIABLE

An objective is a specific, measurable statement that supports achievement of a goal. A good objective should result in a performance measure, or in meeting the established FAST Act performance measures and targets. Objectives can be broken down into outcome, output, and activity-based objectives, as explained in Table 3.1. Outcome-based objectives are preferred for long-range planning since they are the most likely to address public concerns. Output and activity-based objectives should support the outcome-based objectives.

The MTP 2045 goals and objectives are consistent with public/stakeholder input, the national transportation goals, and the planning factors specified in the FAST Act.

Table 3.1 Outcome, Output, and Activity-based Objectives

TYPE	DESCRIPTION	EXAMPLE
Outcome	Reflect concerns of the public, customers, or stakeholders; these objectives are often the most meaningful to the public and relate most directly to system goals; however, they may be influenced by a range of factors beyond the control of transportation agencies.	Reduce hours of incident-based delay experienced by travelers.
Output	Reflect quantity of activities that affect outcomes and may be more directly influenced by a transportation agency (although they also may not be entirely in the control of the agency).	Reduce the clearance time for traffic incidents.
Activity	Reflect actions that are taken by transportation agencies. These are less directly tied to the outcome, and often directly relate to a strategy being implemented.	Increase the number of cameras tracking system conditions.

Source: FHWA and FTA, "Advancing Metropolitan Planning for Operations: The Building Blocks of a Model Transportation Plan Incorporating Operations - A Desk Reference," April 2010.

GOAL #1: Provide a Safe Transportation System

Objectives:

1.1 Pursue state and federal funding for transportation improvements that can reduce the number of vehicle crashes resulting in fatalities or serious injuries for roadway users (including cyclists, pedestrians, and transit riders) and the respective rates per 100 million vehicle miles traveled.

1.2 Cooperate with local and state police agencies to continue, and improve, the management and analysis of crash records to identify focus areas for engineering, education, enforcement, and emergency response efforts.

1.3 Increase the redundancy and diversity of the transportation network by increasing the number of emergency evacuation alternatives for multiple modes of transportation.

1.4 Improve the ability to provide timely traveler information and emergency response support concerning incidents within the transportation system by increasing the number of intersections and corridors managed by Intelligent Transportation Systems.

GOAL #2: Provide a Well-maintained Transportation System

Objectives:

2.1 Reduce the percentage of roadway miles functionally classified as interstates, arterials, and collectors with a pavement condition of "Poor" or worse.

2.2 Decrease the number of bridges on public roads that are classified as Structurally Deficient or Functionally Obsolete.

2.3 Ensure that all transit facilities and vehicles are in a State of Good Repair, as required by the Federal Transit Administration.

2.4 Reduce the length of sidewalk and crosswalk infrastructure along arterials and collectors that require replacement or rehabilitation.

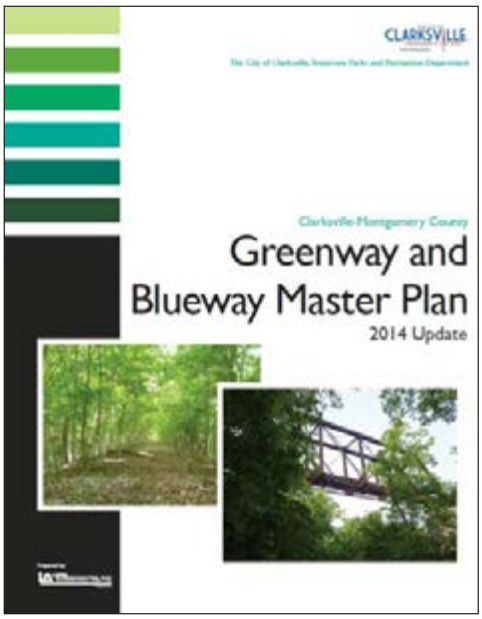
2.5 Reduce the length of bicycle facility and multi-use path infrastructure that require replacement or rehabilitation.

2.6 Ensure that airport equipment, facilities, and pavement on runways, taxiways, and aprons are in good condition.

2.7 Ensure that active railroad infrastructure is in good condition; especially tracks, vehicles, bridges, and roadway crossings.

GOAL #3: Provide a Multimodal Transportation System

Objectives:



Blueways are also known as water trails. They allow access to waterways for non-motorized boats and sometimes motorized vessels, innertubes, and other craft.

3.1 Emphasize transportation improvements that enable a regional network of bicycle and pedestrian facilities that connect residents to activity centers throughout the MPA in accordance with the Greenway and Blueway Master Plan and Clarksville Urbanized Area sidewalk plan.

3.2 Increase the percentage of population and employment within a half mile of marked bicycle facilities.

3.3 Increase the percentage of collector and arterial roadway centerline miles in urban areas with sidewalk on both sides.

3.4 Increase the percentage of the population and employment, including job centers in suburban areas, within a half mile of a transit route.

3.5 Increase amenities at major transit stops and improve on-time performance to increase transit service convenience, safety, and security for all transit users.

3.6 Continue the use of strategic plans, operational analyses, and public hearings and surveys to aid in route and service planning for transit.

3.7 Increase the use of incentives and programs that help local businesses encourage their employees to use transit.

3.8 Increase transit service connectivity to locations that the public deems desirable.

3.9 Increase fixed route and paratransit/demand response transit passenger trips while reducing the operating cost per passenger trip.

3.10 Analyze and revise transit routes as the population and destinations change.

3.11 When economically feasible or demand requires, expand fixed-route and paratransit/demand response transit service hours on weekdays, and add weekend service.

3.12 Increase the percentage of para-transit/demand-response trips that pick up passengers within two hours of request.

3.13 Promote the collaborative development of public intermodal facilities that complement the existing private intermodal facilities.

3.14 Support the development of commercial flights to and from the Clarksville Regional Airport.

3.15 Continue to monitor opportunities to be involved in the development of high-speed passenger rail service.

GOAL #4:
Provide a Reliable Transportation System by Reducing Travel Delay Times and Improving Mobility

Objectives:

4.1 Encourage the coordination of land use and transportation planning to ensure that industrial, commercial, service center, and housing concentrations have adequate roadway connections while preserving quality of life.

4.2 Emphasize transportation improvements that can increase the percentage of the population with an average in-vehicle travel time of 20 minutes or less for all trips during peak hours.

4.3 Emphasize transportation improvements which can reduce annual vehicle miles traveled per capita and vehicle hours traveled per capita, including Transportation Demand Management strategies and Intelligent Transportation Systems.

4.4 Promote and implement an integrated roadway network of arterials and collectors that creates efficient travel and reduces the inappropriate use of residential streets to avoid congestion.

4.5 Minimize railroad freight delay by improving operations and infrastructure that reduce railroad/roadway and land use conflicts.

4.6 Maintain a minimum average speed of 55 mph on Interstate facilities and other regional freight corridors for efficient freight travel.

4.7 Emphasize roadway improvements that increase travel time reliability on major freight corridors, including accommodations for anticipated truck volumes, weights, and connectivity to other freight modes.

GOAL #5:
Develop an Economically and Environmentally Sustainable Transportation System that Provides Equitable Participation and Benefits across the Diversity of the MPA

Objectives:

5.1 Avoid transportation projects in environmentally sensitive areas, flood plains, karst areas, natural or scenic vistas, and other natural wildlife or forested areas where a feasible and prudent alternative exists.

5.2 Ensure that no programmed transportation project has a significantly adverse impact to historic sites or park and recreation areas where a feasible and prudent alternative exists.

5.3 Ensure that no programmed transportation project has a significantly adverse impact to Environmental Justice communities or those who have been traditionally transportation disadvantaged.

5.4 Provide support for improvements that benefit communities that have been underserved by the existing transportation network within the MPA.

5.5 Pursue transportation improvements such as signal coordination, roundabouts, and programs such as ridesharing or transit incentives that result in a decrease in vehicle emissions.

5.6 Reduce the number of days of poor air quality in the region.

5.7 Ensure the appropriate design of new or reconstructed transportation facilities to protect water quality in the region.

5.8 Promote transportation improvements that include enhancements to the natural environment and the MPA's sense of place such as landscaping, public art, and design elements in context with the affected neighborhoods.

5.9 Encourage mixed use and infill development within the MPA's future land use to reduce urban sprawl and longer trips.

5.10 Ensure that projected revenues through 2045 are greater than or equal to the projected cost of all programmed projects and maintenance.

5.11 Ensure that the majority of programmed projects demonstrate a high benefit-cost ratio, regardless of mode.

5.12 Provide meaningful participation in the transportation decision-making process that is inclusive in such a way as to ensure that the socioeconomic composition of public participants resembles that of the MPA and includes representation from a variety of urban, suburban, and rural communities.

Through MAP-21 and the FAST Act, the FHWA and FTA have created a data driven and accountable transportation planning process. Planning projects must be feasible and benefit the citizens they are meant to serve.

EACH OF THE GOALS OUTLINED ABOVE ADDRESS THE MPA'S VISION AND RELATE TO THE REQUIRED FEDERAL PERFORMANCE MEASURES.

Table 3.2 displays how the MTP's goals and objectives address the federal performance measures.

TABLE 3.2 RELATIONSHIP OF MTP 2045 GOALS TO FAST ACT TPMS

CATEGORY	PERFORMANCE MEASURE	ADDRESSED BY:
Transit	Percent of revenue vehicles exceeding ULB (Useful Life Benchmark). This is the percentage of vehicles that exceed the ULB by age. The classes of rolling stock are defined by the National Transit Database. Each mode/ class/asset type must have its own target.	Objective 2.3
	Percent of non-revenue service vehicles exceeding ULB. This is the percentage of vehicles that exceed the ULB by age.	Objective 2.3
	Percent of facilities rated under 3.0 on the TERM (Transit Economic Requirements Model) Scale. Of the four types of facilities reported to the National Transit Database, only the Administrative and Maintenance and Passenger and Parking types are applied to target setting.	Objective 2.3
	Percent of track segments under performance restriction. A performance restriction is defined as a segment of guideway track miles where the maximum permissible speed of transit vehicles is set to a value that is below the guideway's full service speed. Each mode must be tracked separately and have its own target. The BRT and Ferry modes are excluded from this TPM. The NTD lists 9 different modes.	Objective 2.1
Safety Performance Management	Number of fatalities	Objectives 1.1 and 1.2
	Rate of fatalities	Objectives 1.1 and 1.2
	Number of serious injuries	Objectives 1.1 and 1.2
	Rate of serious injuries	Objectives 1.1 and 1.2
	Number of non-motorized fatalities and non-motorized serious injuries	Objectives 1.1, 1.2, and 3.1
Pavement Condition	Percentage of pavements of the Interstate System in Good condition	Objective 2.1
	Percentage of pavements of the Interstate System in Poor condition	Objective 2.1
	Percentage of pavements of the non-Interstate NHS in Good condition	Objective 2.1
	Percentage of pavements of the non-Interstate NHS in Poor condition	Objective 2.1

Source: CUAMPO, NSI

continued

Table 3.2 Relationship of MTP 2045 Goals to FAST Act TPMs

CATEGORY	PERFORMANCE MEASURE	ADDRESSED BY:
Bridge Condition	Percentage of NHS bridges classified as in Good condition	Objective 2.2
	Percentage of NHS bridges classified as in Poor condition	Objective 2.2
Freight	Truck Travel Time Reliability (TTTR) Index on Interstate System	Objectives 4.1, 4.3, 4.6, and 4.7
System Performance	Percent of Person-Miles Traveled on the Interstate That Are Reliable	Objectives 4.1, 4.2, 4.3, and 4.4
	Percent of Person-Miles Traveled on the Non-Interstate NHS That Are Reliable	Objectives 4.1, 4.2, 4.3, and 4.4

Source: CUAMPO, NSI

3.3 | System Performance Measures

The USDOT, through the FHWA, has finalized the national performance measures required by MAP-21 and the FAST Act. The state DOTs were required to set state targets for these measures within a year of their effective date. The MPOs were required to set their own regional targets, or support state targets, within 180 days of the state targets being set.

FOR THE MTP 2045, THE CUAMPO WILL SUPPORT THE KYTC AND TDOT TARGETS.

The FHWA provided the minimum performance measures and metrics required for transportation planning, as shown in Chapter 1, Table 1.3. The targets for each of the established transportation performance measures are discussed later in the report. The MPO may add additional performance measures, or adjust the performance measure targets in the future, if desired.

The FTA has also provided performance measures and metrics for transit agencies to report during the transportation planning process. The CTS maintains a Transit Asset Management Plan that contains the assets of the service, their current state of repair, and a prioritized list of investments. The CTS plan's approach to monitor and manage the agency's assets is defined in the Management Approach.

"Management's approach to transit asset management and investment prioritization is characterized by mitigating safety risks, ensuring accessibility, providing a pleasant/productive work environment, and increasing ridership through improvements in riders' experience and providing a reliable/timely service. This approach drives investment decisions through the entire lifecycle of assets- from identification of need, procurement, maintaining assets, to eventual disposal/disposition. Safety strategies focus on reducing risk for both passengers and transit system employees. Accessibility considerations occur in all asset procurement and maintenance decisions. Taking care of our employees, our greatest asset, consistently influences procurement decisions. Finally, improving and enhancing passengers' experience remains at the forefront of investment decisions as our passengers are exposed to every aspect of the transit system's assets during their journey- from bus stop to rolling stock to transit center condition and available amenities."

The MTP 2045 includes a baseline analysis of the established metrics, which will be monitored over time by the MPO through reports submitted to the state. Future versions of the MTP must report the MPO's progress on their performance measures and targets.

Figure 3.1 displays the support tools used by CTS evaluate and monitor the condition of the transportation system.

DECISION SUPPORT TOOLS	
The table below describes analytical processes and tools used to support investment decision-making. These processes and tools are composed of written procedures, plans, reports, best practices, spreadsheets and software programs that enable management to apply data analysis to asset lifecycle decision making.	
Processes and Tools	**Description**
Fleet Maintenance Plan	The Fleet Maintenance Plan establishes the maintenance department's guidelines, goals and objectives in maintaining rolling stock throughout the lifecycle process. It establishes preventative maintenance standards, warranty management requirements, mid-life overhaul practices, maintenance campaigns, predictive maintenance guidelines, maintenance standards for accessibility components, parts inventory controls, and quality assurance.
Facility and Equipment Maintrenance Plan	The Facilities and Equipment Maintenance Plan establishes the maintenance department's guidelines, goals and objectives in maintaining facilities, shop equipment, and amenities.
Fleet PM Inspection Report	A monthly report detailing compliance with rolling stock preventative maintenance requirements
Amenities Quality Assurance Inspections	The Quality Assurance Program establishes condition standards, inspection procedures and condition reporting of fixed route passenger amenities. This report drives maintenance employee work tasks and purchasing requirements needed to maintain fixed route passenger amenities to published standards.
Monthly Facility Inspection Checklist	A checklist used by the Facilities Staff to identify facility condition deficiencies. This checklist is used to identify areas of need.
Shop Equipment Inspection Tags	Visible indication that equipment has been inspected and is in proper working order.
Shop OSHA Compliance Inspections	Periodic, consultant or City Risk Management staff performed inspections resulting in a report identifying required corrective actions and needed investments for OSHA safety program compliance.
5-Year Transit System Strategic Plan	A five-year transit system plan. This plan focuses on the full-spectrum of investment needs to effectively support improved and/or expanded transit service to achieve increased ridership.
Clarksville Transit System Procurement Policies and Procedures	This document provides policies and procedures for all aspects of procurements and how to keep them compliant with federal requirements, state law, and local procurement code.
RTA Maintenance Software	RTA is the Maintenance Department's maintenance management software. This system enables the maintenance department to track, schedule, and record all vehicle and equipment maintenance activities throughout each asset's life cycle. The system also contains a robust parts inventory module that assists in maintaining accountability of each line item, determine reordering requirements, and provide detailed parts usage and ordering histories.
MUNIS ERP Software	MUNIS is CTS' accounting, payroll, and asset management software system. Some details of an asset's procurement, life, and disposition are contained here.
Leadership Meetings	Periodic meetings held by executive level staff from which recommendations to the CEO are made for decisions on funding allocations for major projects and other projects requiring leadership team involvement.

FIGURE 3.1 - DECISION SUPPORT TOOLS

4.0 | The Environment

4.1 | The Environment and the MTP

Transportation planning must account for the impacts of transportation on both the natural and human environment. By considering environmental impacts early in the planning process, the MTP increases opportunities for inter-agency coordination and enables an expedited project delivery process.

EARLY CONSIDERATION OF THE ENVIRONMENTAL IMPACTS WILL PROMOTE OUTCOMES THAT ARE MORE ENVIRONMENTALLY SUSTAINABLE.

Federal Requirements

Federal regulations require that the MTP addresses environmental concerns through two particular actions.

First, the development of the MTP must involve consultation with state and local agencies responsible for:

- land use management,
- natural resources,
- environmental protection,
- conservation, and
- historic preservation.

This should include a comparison of the MTP with state conservation plans or maps, as well as inventories of natural or historic resources, if this information is available.

Next, the MTP must discuss the types of potential environmental mitigation activities related to the implementation of the MTP. This includes potential areas for these activities to occur and activities which may have the greatest potential to mitigate the effects of the MTP projects and strategies. Mitigation activities do not have to be project-specific and can instead focus on broader policies, programs, and strategies.

The discussion must involve consultation with:

- federal,
- state,
- tribal land management,
- wildlife, and
- regulatory agencies.

THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) (1970) ESTABLISHED THE BASIC FRAMEWORK FOR INTEGRATING ENVIRONMENTAL CONSIDERATIONS INTO FEDERAL DECISION-MAKING.

Federal regulations relating to NEPA (40 C.F.R. 1508) define mitigation as:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Section 4(f) of the U.S. Department of Transportation Act of 1966 provides additional environmental protection for property in:

- **publicly owned parks,**
- **recreational areas,**
- **wildlife and waterfowl refuges, and**
- **historic sites.**

It protects these properties by preventing them from being used for transportation purposes unless there is no feasible and prudent alternative, or a ***de minimis*** impact determination is made. When such an action is necessary, it must include all possible planning to minimize harm to the property.

In 1994, President Clinton signed Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. The Executive Order seeks to reaffirm the intent of Title VI of the Civil Rights Act of 1964; NEPA; and other federal laws, regulations, and policies. It establishes the following Environmental Justice (EJ) principles for all federal agencies and agencies receiving federal funds, such as MPOs:

- **To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects; including social and economic effects on minority and low-income populations.**
- **To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.**
- **To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.**

MTP Project Environmental Screening

Detailed, project-specific environmental impact evaluations are beyond the scope of an MTP. However, the 2045 MTP used an environmental screening process to evaluate the likelihood of significant environmental impacts for all of the considered MTP test projects (see Chapter 10). This process utilized inventories from various local, state, and federal sources for all of the relevant natural and cultural resources. Socioeconomic and demographic data from the U.S. Census Bureau was used to conduct the EJ analysis.

Table 4.1 shows the resources and issues typically considered in environmental impact evaluations. The environmental screening process utilized by the 2045 MTP will be described in detail later.

TABLE 4.1 TYPICAL ENVIRONMENTAL RESOURCES AND ISSUES EVALUATED

RESOURCE	IMPORTANCE	RELEVANT REGULATIONS
HAZMAT Sites	Health hazards, costs, delays, liability for both State & federal projects on either existing or acquired right-of-way	Various federal regulations
Air Quality	Public health, welfare, productivity, and the environment are degraded by air pollution	Clean Air Act of 1970; 40 CFR Parts 51 & 93; State Implementation Plan
Noise	Noise can irritate, interrupt, and disrupt, as well as generally diminish the quality of life	Noise Control Act of 1972; 23 CFR 772
Wetlands	Flood control, wildlife habitat, water purification; applies to both State and federally funded projects	Clean Water Act of 1977; Executive Order 11990; 23 CFR 777
Threatened and Endangered Species	Loss of species can damage or destroy ecosystems, to include the human food chain	Endangered Species Act of 1973; 7 CFR 355
Floodplains	Encroaching on or changing the natural floodplain of a water course can result in catastrophic flooding of developed areas	Executive Order 11988; 23 CFR 650; 23 CFR 771
Farmlands	Insure conversion compatibility with State and local farmland programs and policies	Farmland Protection Policy Act of 1981; 7 CFR 658
Recreation Areas	Quality of life; neighborhood cohesion	Section 6(f) of the Land and Water Conservation Fund Act; Section 4(f) of the DOT Act of 1966 (when applicable); 23 CFR 771; 23 CFR 774
Historic Structures	Quality of life; preservation of the national heritage	National Historic Preservation Act of 1966 (Section 106); the DOT Act of 1966 [Section 4(f)]; 23 CFR 771; 36 CFR 800; 23 CFR 774
Archaeological Sites	Quality of life; preservation of national and Native American heritage	National Historic Preservation Act of 1966 (Section 106); the DOT Act of 1966 [Section 4(f)]; 23 CFR 771; Executive Order 13175; 23 CFR 774
Environmental Justice	To avoid, minimize, or mitigate disproportionately high impacts on minorities and low-income populations; basic American fairness	Title VI, Civil Rights Act of 1964; Executive Order 12898

4.2 | Regional Context

Climate, Topography, Soils, and Vegetation

Climate, topography, soils, and vegetation are all factors that must be considered during project and program design. While these characteristics vary within any area, areas with similar characteristics are grouped into ecoregions. In this manner, understanding the characteristics of the region's ecoregions provides insight into potential environmental issues to consider when developing transportation projects or programs.

The climate in the MPA is classified as Humid, Subtropical (Cfa) according to the Köppen Climate Classification System. According to the National Oceanic & Atmospheric Administration data at the Clarksville Sewage Plant, from 1971 to 2000, the average July high temperature was approximately 90 degrees Fahrenheit. The region's average January low temperature was approximately 25 degrees Fahrenheit. The average annual precipitation during this period was approximately 52 inches.

The MPA is considered part of the Inner Plateau, and is located within two of the Level IV ecoregions defined by the EPA: the Western Highland Rim ecoregion and the Western Pennyroyal Karst. The characteristics of these ecoregions are described in Table 4.2.

Table 4.2 Ecoregion Characteristics in the Metropolitan Planning Area

LEVEL IV ECOREGION	EPA DESCRIPTION
Western Highland Rim	The Western Highland Rim is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco
Western Pennyroyal Karst	The Western Pennyroyal Karst is a flatter area of irregular plains, with fewer perennial streams, compared to the open hills of the Western Highland Rim (71f). Small sinkholes and depressions are common. The productive soils of this notable agricultural area are formed mostly from a thin loess mantle over residuum of Mississippian-age limestones. Most of the region is cultivated or in pasture; tobacco and livestock are the principal agricultural products, with some corn, soybeans, and small grains. The natural vegetation consisted of oak-hickory forest with mosaics of bluestem prairie. The barrens of Kentucky that extended south into Stewart, Montgomery, and Robertson counties, were once some of the largest natural grasslands in Tennessee.

Source: EPA, Ecoregions of Tennessee, Ecoregions of Kentucky

Land Cover

The land cover of the MPA is illustrated in Figure 4.1 and summarized in Figure 4.2. According to this information, developed areas only account for just above 14 percent of the land in the MPA. Forested lands dominate the landscape, making up nearly 46 percent of the land area. The portion of the MPA in Christian County is mostly pasture/hay and cultivated crops, while the bulk of the MPA in Montgomery County is pasture/hay, cultivated crops, and forested lands.

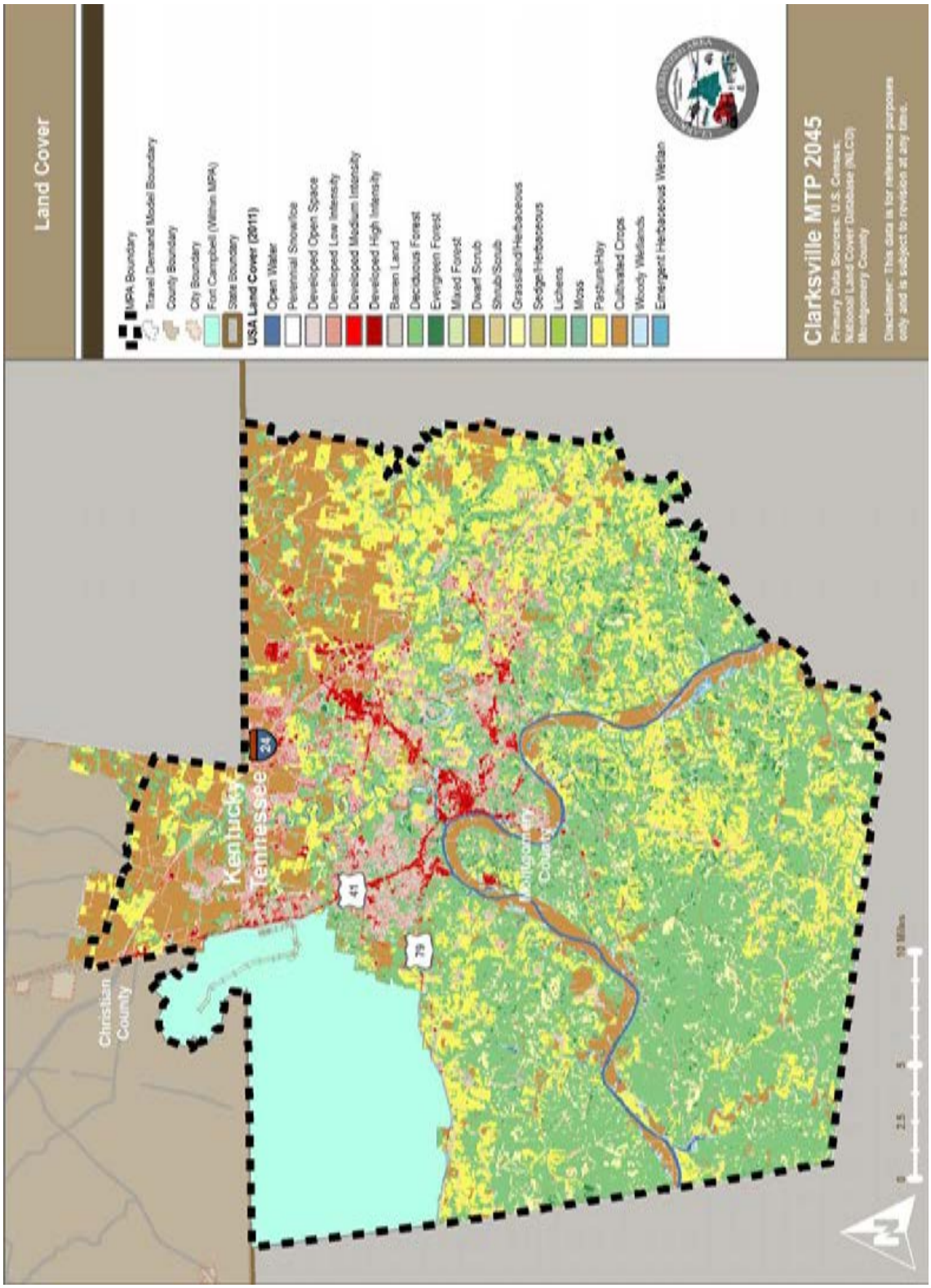
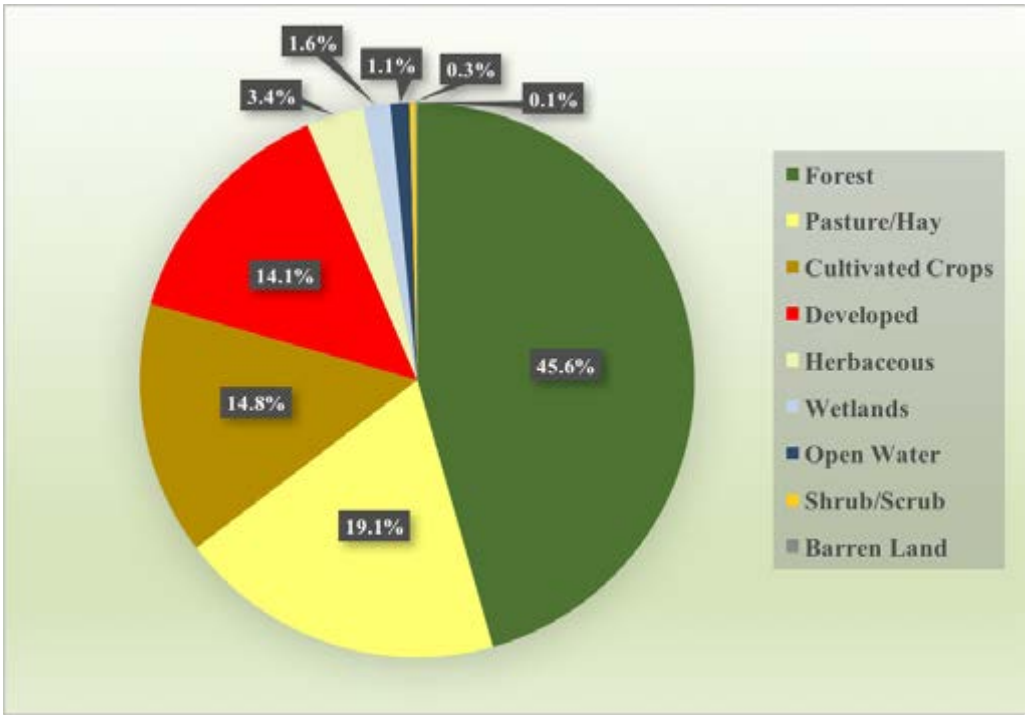


Figure 4.1 Study Area Land Cover

FIGURE 4.2 LAND COVER CLASSIFICATION BREAKDOWN



Source: USGS, 2011 National Land Cover Database

HISTORICAL URBAN DEVELOPMENT

The historical urban development of the MPA offers insights into the likely distribution of historic and other cultural resources. Figure 4.3 shows that the areas with the greatest concentrations of historical housing structures are in the center of the City of Clarksville and in the Bel-Air Estates area. Historical housing structures are those that are at least 50 years old. There are likely smaller concentrations that are not revealed by this information in the historic centers of many of the smaller municipalities within the MPA. This information is merely intended to illustrate general patterns.

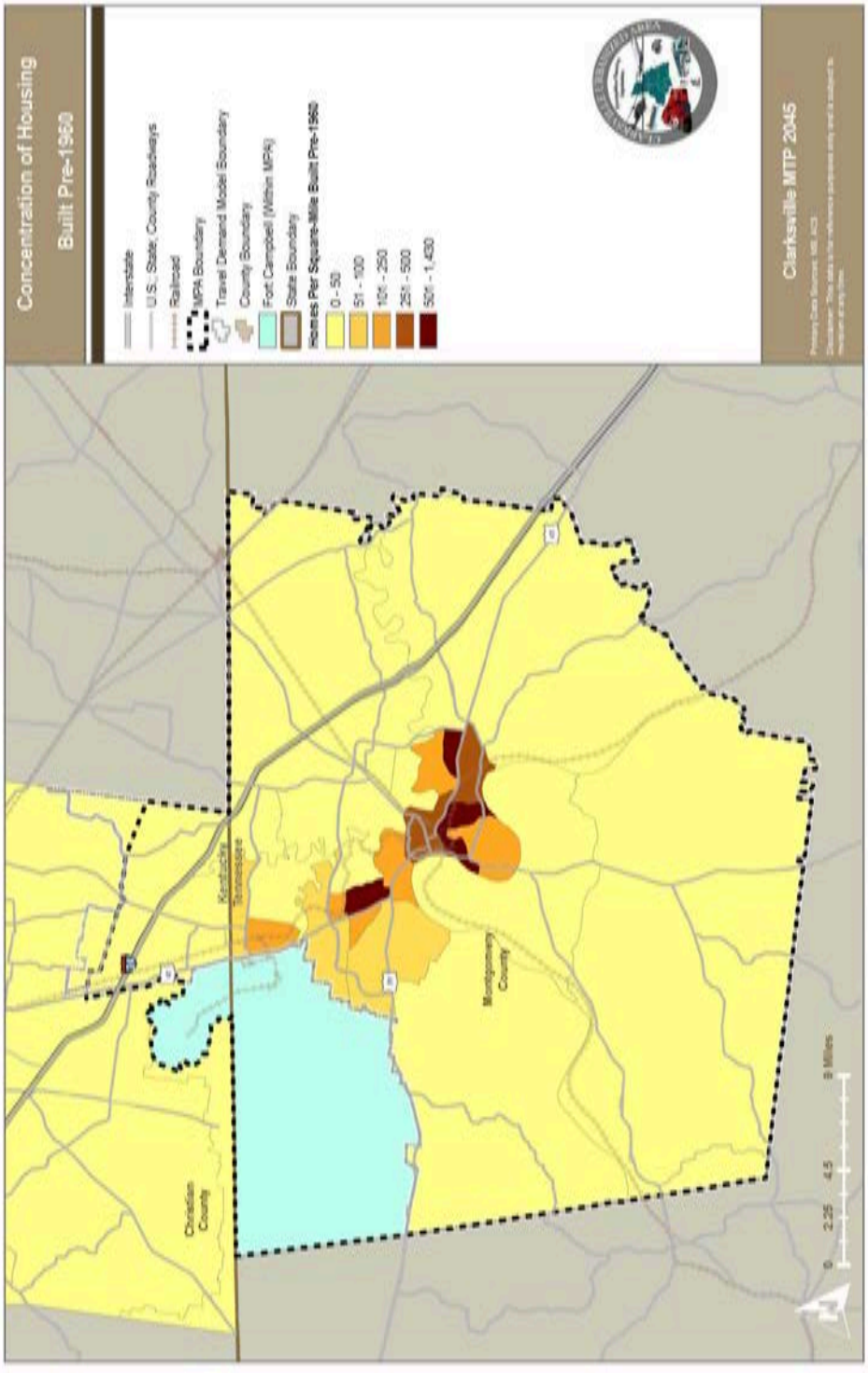


Figure 4-3 Concentration of Housing Built Pre-1960

4.3 | Air Quality and Emissions

Air Quality and Transportation

Highway vehicles and non-road equipment are mobile sources of air toxins. These are compounds which are known, or suspected, by the EPA to cause cancer or other serious health and environmental effects. Mobile sources of emissions, via the combustion of fossil fuels, release nitrogen dioxide and Volatile Organic Compounds (VOC). These agents chemically react in the presence of heat and sunlight to form ground-level ozone. Ground-level ozone can trigger a variety of health problems, such as asthma, and can also have harmful effects on sensitive vegetation and ecosystems.

The EPA regulates vehicle emissions and fuel efficiency through its vehicle Greenhouse Gas Emissions standards. Vehicle emissions are also controlled by the National Highway Traffic and Safety Administration's Corporate Average Fuel Economy (CAFE) standards. The EPA also regulates and monitors pollutants considered harmful to public health and the environment. This is accomplished through the National Ambient Air Quality Standards (NAAQS), authorized by the Clean Air Act (1970). The EPA has set NAAQS for six "criteria" pollutants. These are listed in Table 4.3 along with the current standards.

The MPA is currently designated as an attainment areas under the NAAQS, but is required to conduct conformity analysis as an anti-backsliding measure.

TRANSPORTATION CONFORMITY IS A PROCESS THAT IS REQUIRED OF MPOS PURSUANT TO THE CLEAN AIR ACT AMENDMENTS OF 1990 (CAAA OF 1990).

This process ensures that federal funding and approval are given to those transportation activities that are consistent with air quality goals. The CAAA requires that FHWA funded or approved transportation plans, programs, and projects in nonattainment or maintenance areas be in conformity with the State Implementation Plan (SIP). The SIP represents the state's plan to either achieve or maintain the NAAQS for a particular pollutant.

On July 18, 1997, the Environmental Protection Agency (EPA) developed a revised 8-hour ozone standard of 0.08 parts per million (ppm), which was more stringent than the previous ozone standard. As a result of the change, the EPA designated the Clarksville-Hopkinsville area (which is made up of Montgomery County, Tennessee and Christian County, Kentucky) as nonattainment for the 8-hour average ozone NAAQS, and designated a basic ozone nonattainment area.

However, both counties have since been redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. The Travel Demand Model, which forms the basis of transportation decision-making, provides numeric outputs that are be utilized in regional air quality modeling. The FHWA and FTA are the agencies responsible for determining if the MTP complies with air quality conformity regulations.

TABLE 4.3 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AS OF 2017

POLLUTANT		PRIMARY/ SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 µg/m3	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual mean
Ozone		primary and secondary	8-hour	70 ppb	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	PM2.5	primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
		secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
	PM10	primary and secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA

4.4 | Public Health

There is a growing number of local and state governments that are performing health impact assessments for transportation projects and programs in order to more comprehensively address public health outcomes. Transportation can affect public health in many ways, but the most commonly discussed include:

- **Safety:** Roadway design can affect the risk for traffic related injuries and fatalities.
- **Air Quality:** Air pollution from vehicle emissions worsens chronic respiratory diseases, such as asthma.
- **Noise Pollution:** Noise pollution can cause hearing loss, stress related illnesses, high blood pressure, speech interference, and sleep disruption.
- **Physical Activity:** A lack of sufficient bicycle and pedestrian infrastructure can limit opportunities for physical activity.
- **Accessibility:** Transportation can limit access to healthy food, recreational opportunities, and healthcare facilities.

Transportation-Related Health Statistics in the Region

The role of transportation in public health outcomes is especially important in the MPA. Table 4.4 shows county public health indicators that are influenced by the transportation system. For the most part, the counties in the MPA lag far behind the 90th percentile of U.S. counties in all selected measures.

Table 4.4 Selected County Public Health Indicators

Place	Percentage of Adults Reporting Poor or Fair Health	Average Number of Physically Unhealthy Days in Last 30 Days	Average Number of Mentally Unhealthy Days in Last 30 Days	Percentage of Adults that are Obese	Percentage of Adults Reporting as Physically Inactive	Percentage of Population With Access to Exercise Opportunities
Montgomery County	22.0%	4.8	4.3	29.0%	26.0%	51.0%
Christian County	23.0%	4.7	4.2	37.0%	30.0%	62.0%
Top U.S. Performers*	12.0%	3.0	3.0	26.0%	19.0%	91.0%

Note: * 90th percentile, i.e., only 10% are better.
Source: 2017 County Health Rankings, University of Wisconsin Population Health Institute

Transportation and Physical Activity

Historically, transportation planning typically focused on mobility, safety, air quality, noise pollution, and accessibility.

The planning process has recently begun to consider the impact of transportation on physical activity.

Of particular focus in transportation planning is the impact of the built environment on walking and biking.

Walking and cycling are important physical activities because they are regular, light to moderate, physical activities which can significantly decrease a person's risk for severe health issues. These include:

- cardiovascular disease,
- colon cancer,
- type 2 diabetes,
- obesity,
- osteoporosis, and
- depression.

Walking and cycling can also improve psychological well-being and quality of life. Therefore, providing convenient and attractive pedestrian and bicycle infrastructure and encouraging walking and biking can improve public health outcomes for a community.

4.5 | Project Development Considerations

This section outlines how the MTP addresses environmental mitigation of proposed transportation projects.

Wetlands, Waterways, and Flooding

The transportation projects were evaluated for their proximity to wetlands, impaired waters, flood zones, and navigable waters. While transportation projects should be sensitive to all bodies of water, these water bodies merit special attention for the following reasons:

- water purification,
- flood protection,
- shoreline stabilization,
- groundwater recharge,
- streamflow maintenance, and
- fish and wildlife habitats.

Wetlands are protected by the Clean Water Act. They have many environmental protection needs, notably:

- Impaired waters are already too polluted, or otherwise degraded, to meet the state water quality standards.
- Encroaching on or changing the natural floodplain of a water course can result in catastrophic flooding of developed areas. This can be particularly problematic in the MPA due to its karst terrain.
- Structures built across navigable waterways must be designed in consultation with the Coast Guard, as required by the Coast Guard Authorization Act of 1982.

Figure 4.4 displays the proposed MTP transportation projects along with the location of wetlands. Figure 4.5 displays the proposed MTP transportation projects and flood zones.

Preliminary findings indicate that there are no impaired waterways within the MPA, though many of the Cumberland River's tributaries have been affected in the past. The Cumberland River is part of the U.S. Army Corps of Engineers Navigable Waterway Network. Navigable waterways are defined as waters that have been used in the past, are now used, or are susceptible to use, as a means to transport interstate or foreign commerce up to the head of navigation. Projects that cross or affect this waterway must be coordinated with the Coast Guard.

Mitigation

This early in the planning stage, there are not enough resources available to assess project level impacts to specific wetlands. As individual projects proceed through a state's project delivery process and the NEPA process, it is anticipated that project sponsors will:

- Ensure that transportation facilities constructed in floodways will not increase flood heights.
- Take steps to avoid wetland and flood zone impacts where practicable.
- Consider strategies which minimize potential impacts to wetlands and flood zones.
- Provide compensation for any remaining unavoidable impacts through activities to restore or create wetlands.
- Projects near impaired waters should consider measures to improve the quality of these waters.

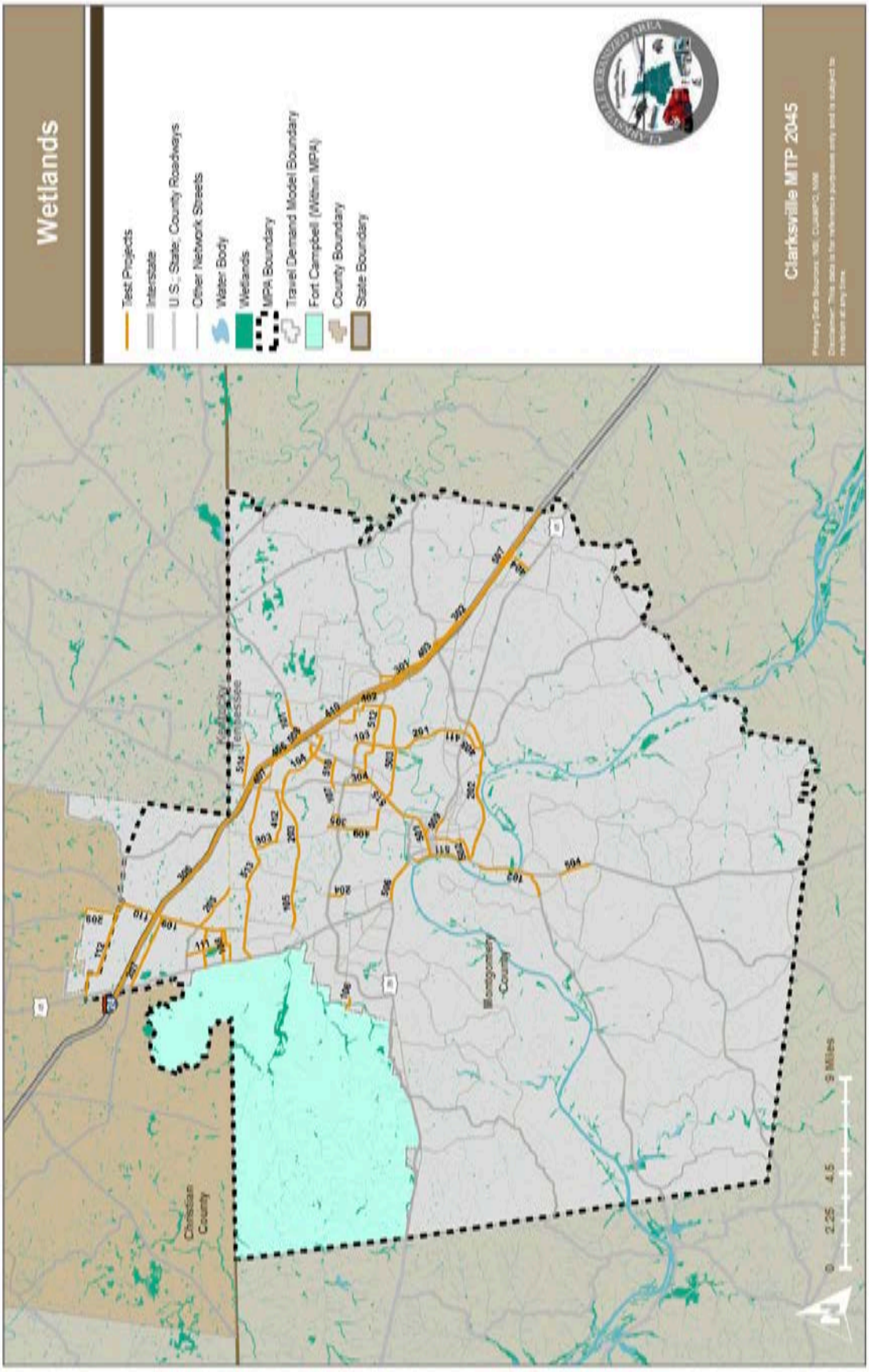


FIGURE 4.4 WETLANDS

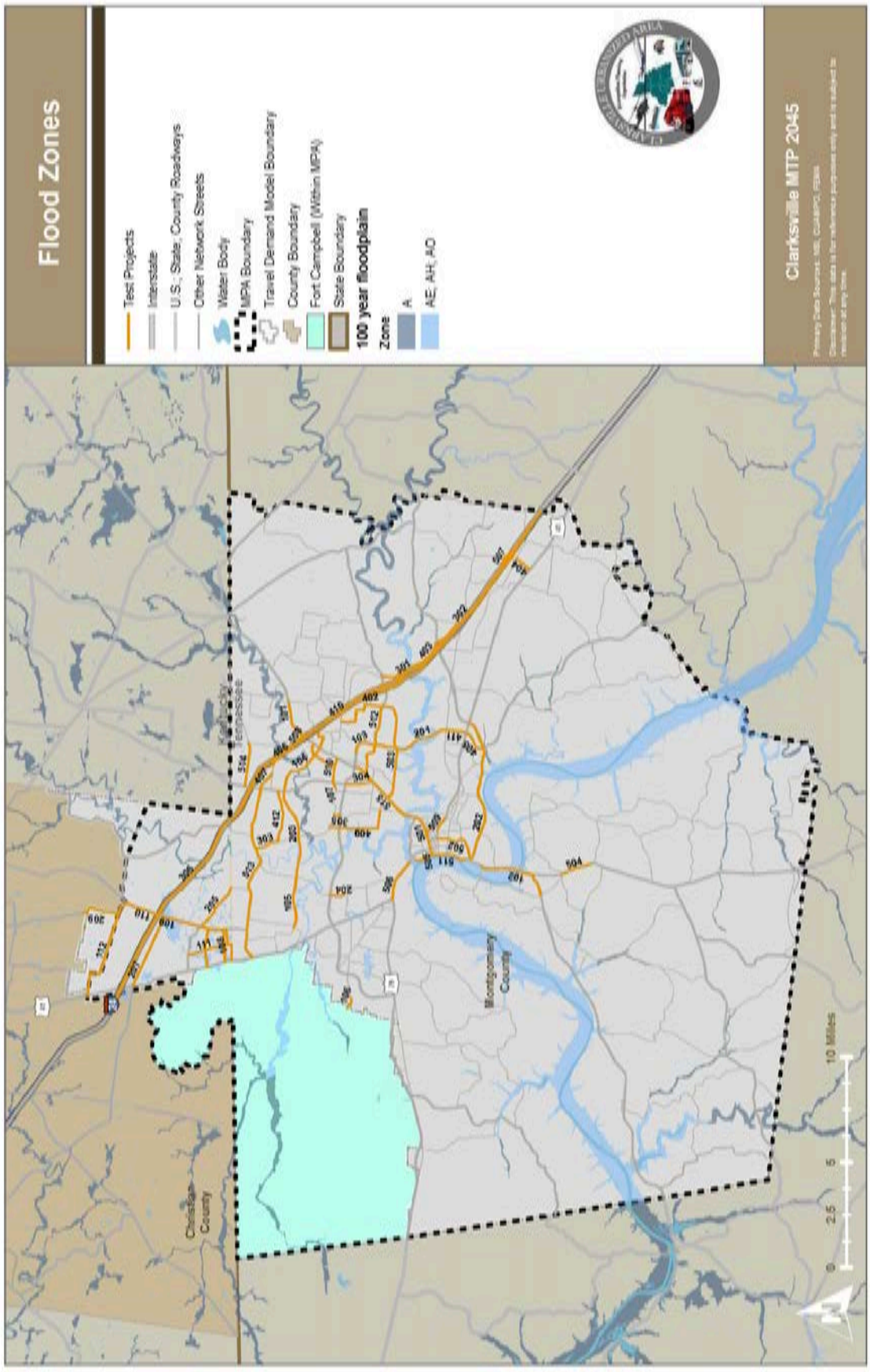


FIGURE 4.5 FLOOD ZONES

Table 4.5 displays the MTP test projects that would impact wetlands and/or flood zones within the study area. The MTP test projects are those that were analyzed for potential inclusion in the Staged Improvement Program.

TABLE 4.5 TEST PROJECTS IMPACTING WETLANDS OR FLOOD ZONES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
101	US 79/SR-13 (Guthrie Hwy	Widen from 2/3 to 5 Lanes	Cracker Barrel Dr to International Blvd	Yes	No
102	SR-149/SR-13	Widen from 2/3 to 5 Lanes	River Rd to Zinc Plant Rd	Yes	Yes
103	SR 374 (Warfield Blvd)	Widen from 2 to 5 Lanes	Dunbar Cave Rd to Stokes Rd	No	Yes
104	North-East Connector Ph 1	New 4/5 Lane Roadway	Ted Crozier Blvd to Wilma Rudolph Blvd to Trenton Rd	Yes	Yes
105	Jack Miller Blvd Ext	New 4 Lane Roadway	Tobacco Rd to Peachers Mill Rd	Yes	Yes
106	Lafayette Rd	Widen from 2 to 5 Lanes	Walnut Grove Rd to Ft Campbell Gate	Yes	No
111	Oatts-Riggins Rd	New 3 Lane Roadway	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	Yes	Yes
201	SR-374 (Warfield Blvd)	Widen from 2 to 4 Lanes	Memorial Dr to Dunbar Cave Rd	Yes	Yes
202	US 41A Bypass (Ashland City Rd)	Widen from 2/3 to 5 Lanes	US 41A/SR-112 to SR-13	Yes	Yes
203	North-East Connector Ph 2	New 4 Lane Roadway	SR-48 (Trenton Rd) to Peachers Mill Rd	Yes	Yes
204	Peachers Mill Rd	Widen from 3 to 4 Lanes	Pine Mountain Rd to Stonecrossing Dr	Yes	No

Continued

TABLE 4.5 TEST PROJECTS IMPACTING WETLANDS OR FLOOD ZONES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
206	Ft Campbell Gate 4 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	No	Yes
207	KY-117	New 5 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Yes	Yes
208	Ft Campbell Gate 5 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Yes	Yes
301	I-24	Widen from 4 to 6 Lanes	KY/TN State Line to SR-76	Yes	Yes
302	I-24	Widen from 4 to 6 Lanes	SR-76 to SR-256 in Robertson County	Yes	No
304	SR-48 (Trenton Rd)	Widen from 2 to 5 Lanes	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Yes	No
306	I-24	Widen from 4 to 6 Lanes	US 41A (Ft Campbell Blvd) to TN State Line	Yes	Yes
401	New Roadway	New 3 Lane Roadway	Fair Brook Place to Needmore Rd	Yes	No
402	Professional Park Dr Ext	New 2 Lane Roadway	Extension to Cardinal Ln	Yes	No
403	International Blvd Ext	New 2 Lane Roadway	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	Yes	Yes
405	SR-374 (Richview Rd) Ext	New 4 Lane Roadway	SR-112 (Madison St) to US 41A Bypass	Yes	No
406	Kennedy Ln Ext	New 2 Lane Roadway	Extension to Meriwether Rd	Yes	Yes
409	8th St connector	New 2 Lane Roadway	Needmore Rd to Peterson Ln	Yes	Yes

Continued

Table 4.5 Test Projects Impacting Wetlands or Flood Zones

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
411	SR-374 (Richview Rd)	Widen from 3 to 5 Lanes	Memorial Dr to US 41A (Madison St)	Yes	No
412	Hazelwood Rd	Widen from 2 to 5 Lanes	Trenton Rd to Needmore	Yes	No
502	Cumberland Dr	Widen to 4 Lanes	Ashland City Rd (SR 12) to Madison St (SR 76)	Yes	Yes
503	Dunbar Cave Road	Widen to 4 Lanes	Wilma Rudolph Rd (US 79/SR 13) to Rossview Rd (SR 237)	Yes	Yes
505	College St (SR 48)	Widen to 4 Lanes	Riverside Dr to N 2nd St (US 41A)	No	Yes
511	Riverside Drive	Road Diet	Providence Blvd to Cumberland Dr	Yes	No
513	Tiny Town Road	Widen to 6 Lanes	US 41A to Trenton Rd	Yes	Yes
514	Tylertown Road	Widen to 4 Lanes	Trenton Rd to Oakland Rd	Yes	No
515	Wilma Rudolph Boulevard	Widen to 6 Lanes	Kraft St to SR 374	Yes	Yes

Wildlife

The transportation projects were evaluated for their proximity to identified critical habitat areas for threatened and endangered species and wildlife refuges.

The Endangered Species Act (ESA) [16 U.S.C. 1531 et. seq.] of 1973, as amended, was enacted to provide a program for the preservation of endangered and threatened species. The act also provides protection for the ecosystems upon which these species depend for their survival.

ALL FEDERAL AGENCIES, OR PROJECTS UTILIZING FEDERAL FUNDING, ARE REQUIRED TO IMPLEMENT PROTECTION PROGRAMS FOR DESIGNATED SPECIES AND TO USE THEIR AUTHORITIES TO FURTHER THE PURPOSES OF THE ACT.

An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those which have been formally submitted to Congress for official listing as threatened or endangered.

Species may be considered endangered or threatened when any of the five following criteria occur:

1. The current/imminent destruction, modification, or curtailment of their habitat or range
2. Overuse of the species for commercial, recreational, scientific, or educational purposes
3. Disease or predation
4. The inadequacy of existing regulatory mechanisms
5. Other natural or human-induced factors affect continued existence.

Section 4(f) of the Department of Transportation (DOT) Act of 1966 affords protection to wildlife or waterfowl refuges when USDOT funds are invested in a project. There are no wildlife management areas or refuges within the MPA.

Table 4.6 lists species classified as endangered or threatened within the MPA counties. Species with ranges unrefined beyond the state level are not included.

Table 4.6 Species Identified under Endangered Species Act in Region

GROUP	NAME	STATUS	MONTGOMERY COUNTY	CHRISTIAN COUNTY
Clams	Yellow blossom (pearlymussel) (Epioblasma florentina florentina)	Endangered	Yes	No
Clams	Tan riffleshell (Epioblasma florentina walkeri (=E. walkeri))	Endangered	Yes	No
Clams	Slabside Pearlymussel (Pleuronaia dolabelloides)	Endangered	Yes	Yes
Clams	Rabbitsfoot (Quadrula cylindrica cylindrica)	Threatened	Yes	No
Flowering Plants	Short's bladderpod (Physaria globosa)	Endangered	Yes	No
Flowering Plants	Price's potato-bean (Apios priceana)	Threatened	Yes	No
Insects	Coleman Cave beetle (Pseudanophthalmus colemanensis)	Under Review	Yes	No
Mammals	Indiana bat (Myotis sodalis)	Endangered	Yes	Yes
Mammals	Gray bat (Myotis grisescens)	Endangered	Yes	Yes
Mammals	Northern Long-Eared Bat (Myotis septentrionalis)	Threatened	Yes	Yes

Source: U.S. Fish and Wildlife Service, Environmental Conservation Online System

Mitigation

Preliminary planning undertaken within the context of the development of the MTP does not include resources sufficient to assess project specific impacts to species habitats. Table 4.6 is incorporated in order to establish the potential need for further study as projects are carried forward through each state's project delivery process, the NEPA process, design, and construction. Projects will be developed in consultation with U.S. Fish and Wildlife Service, the Kentucky Department of Fish & Wildlife Resources, and the Tennessee Wildlife Resources Agency (TWRA). To the extent practicable, actions which impact critical habitats will be avoided.

In addition to the federally protected species, transportation projects should be sensitive to species that are protected by state law. Both Kentucky and Tennessee maintain a statewide database of threatened and endangered species. The Kentucky Department of Fish & Wildlife Resources displays all federally and state listed species on their website[1]. The TWRA lists all endangered species as well as providing a list of those in need of management[2].

Historic and Recreational Resources

The transportation projects were evaluated for their proximity to historic sites and publicly owned recreational facilities. Section 4(f) of the Department of Transportation (DOT) Act of 1966 affords protection to publicly owned parks and recreation areas, and all historic sites listed or eligible for listing on the National Register of Historic Places when USDOT funds are invested in a project.

In order to be eligible for the National Register of Historic Places (NRHP), a district, site, building, structure, or object must possess:

- integrity of location,
- design,
- setting,
- materials,
- workmanship,
- feeling, and
- association.

1 http://app.fw.ky.gov/speciesinfo/speciesList.asp?strGroup=3&strSort1=Class&strSort2=CommonName

2 https://www.tn.gov/twra/topic/species-list

Generally, these locations must be at least 50 years old. Locations will also be evaluated by the following criteria:

- Association with events that have made a significant contribution to the broad patterns of our history; or
- Association with the lives of significant persons in or past; or
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or representative of the work of a master, or possession of high artistic values, or representative of a significant and distinguishable entity whose components may lack individual distinction; or
- Provision or likelihood to provide information important in history or prehistory.

Figure 4.6 shows the historic sites and districts within the MPA listed on the National Register, as well as local historic districts. It is important to note that the local historic districts are not necessarily protected by 4(f) regulations unless they meet NRHP eligibility. Furthermore, there may be additional properties not listed on either register which are eligible for the NRHP. There are six historic districts within the MPA area, which are shown in Table 4.7.

Table 4.7 MPA Historic Districts

DISTRICT	YEAR ADDED	LOCATION	COMPOSITION
Clarksville Architectural District	1976	Public Square, Legion, 3Rd., Franklin, and Commerce Streets	174 acres, 26 buildings
Clarksville Industrial District	1976	Bounded by Washington St, Crossland Ave, the ICG railroad (abandoned), and the Cumberland River)	213 acres, 3 buildings, 2 structures
Dog Hill Architectural District	1980	Washington St., 1st St, Union St, Madison St, and 2nd St	130 acres, 36 buildings
Glenwood Historic District (Glenwood Park)	1996	101-109 Glenwood Dr., 110-182 E Glenwood Dr., 111-179 W Glenwood Dr.	260 acres, 67 buildings
Madison Street Historic District	1999	Address Restricted	170 acres, 27 buildings
McCauley Hill Farm	1995	1535 Harville Road	5,180 acres, 18 buildings, 8 structures

Source: City of Clarksville

Figure 4.6 excludes historic features that have been deemed 'restricted' or 'sensitive', such as sensitive archaeological sites. The figure also displays the major publicly owned parks and recreation areas.

Mitigation

Roadway projects will be developed in consultation with the State Historic Preservation Office (SHPO). To the extent practicable, actions which adversely impact NRHP properties and publicly owned recreation areas will be avoided. When historic properties are adversely affected, mitigation will include data recovery, as appropriate, to document the essential qualities of the historic resources. When publicly owned recreation areas are adversely affected, appropriate compensation will be provided.

Table 4.8 displays the test projects that will likely impact local recreational resources or historic sites or districts.

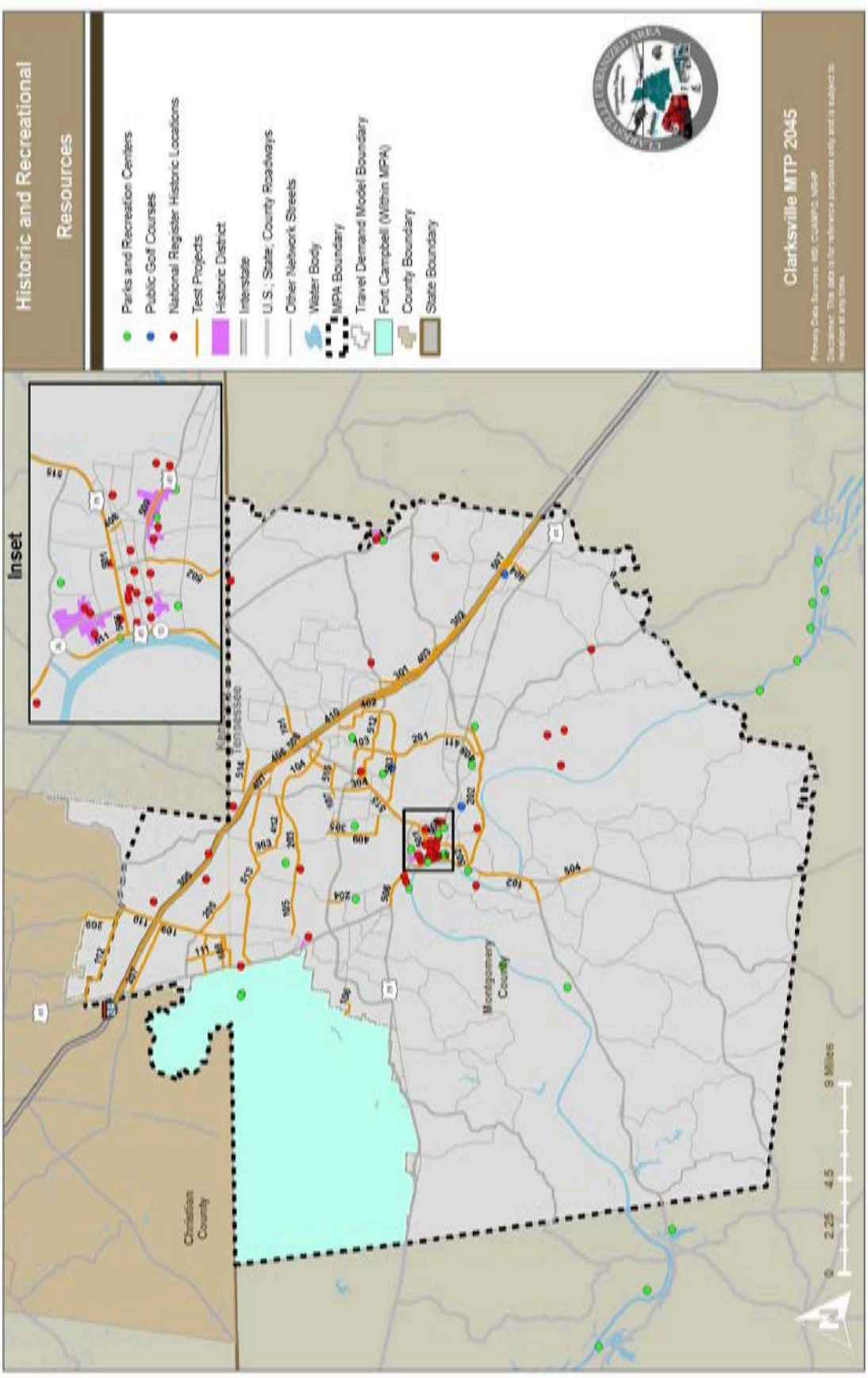


FIGURE 4.6 HISTORIC AND RECREATIONAL RESOURCES

TABLE 4.8 TEST PROJECTS IMPACTING HISTORICAL OR RECREATIONAL RESOURCES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	HISTORIC SITE/ DISTRICT	REC AREA
202	US 41A Bypass (Ashland City Rd)	Widen from 2/3 to 5 Lanes	US 41A/SR-112 to SR-13	Yes	No
203	North-East Connector Phase 2	New 4 Lane Roadway	SR-48 (Trenton Rd) to Peachers Mill Rd	Yes	No
306	I-24	Widen from 4 to 6 Lanes	US 41A (Ft Campbell Blvd) to TN State Line	Yes	No
402	Professional Park Dr Ext	New 2 Lane Roadway	Extension to Cardinal Ln	No	Yes
409	8th St Connector	New 2 Lane Roadway	Needmore Rd to Peterson Ln	No	Yes
501	College St (SR 48)	Widen to 6 Lanes	N 2nd St (US 41A) to Kraft St	Yes	No
502	Cumberland Dr	Widen to 4 Lanes	Ashland City Rd (SR 12) to Madison St (SR 76)	Yes	No
503	Dunbar Cave Road	Widen to 4 Lanes	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	No	Yes
505	College St (SR 48)	Widen to 4 Lanes	Riverside Dr to N 2nd St (US 41A)	Yes	No
506	Providence Blvd (US 79)	Widen to 6 Lanes	US 41 to Red River Providence	Yes	No
509	Madison Street	Widen to 4 Lanes	10th Streetreet to Pageant Lane	Yes	Yes
511	Riverside Drive	Road Diet	Providence Blvd to Cumberland Dr	Yes	Yes
512	Rossview Road	Widen to 5 Lanes	Wilma Rudolpf Blvd (US 79) to Dunbar Cave Rd	Yes	No

Potentially Hazardous Properties

The transportation projects were evaluated for their proximity to potentially hazardous sites identified by the Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), commonly known as Superfund. Addressing these early on in the process can reduce costs, delays, and liabilities.

CERCLA was enacted in 1980 and established prohibitions and requirements concerning closed and abandoned hazardous waste sites. It provided for liability of persons responsible for the release of hazardous waste at these sites, and established a trust fund to provide for the cleanup when no responsible party could be identified. CERCLA also enabled the revision of the National Contingency Plan, which established the National Priorities List (NPL).

The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is primarily intended to guide the EPA in determining which sites warrant further investigation.

Using the NPL website, it was determined that there are no sites in the MPA listed on the NPL or proposed to be listed on the NPL.

Mitigation

At this stage in project development, not enough information is available to determine any potential impacts and mitigation. However, transportation projects affected by or affecting potentially hazardous properties will be evaluated during a state's project delivery process, the NEPA process, design, and construction.

Karst Areas

As noted in Section 4.2, the MPA is located within two ecoregions identified by the MPA: the Western Highland Rim ecoregion and the Western Pennyroyal Karst. The MPA is heavily influenced by karst terrain and has a larger presence of caves and sinkholes due to these unique areas. Karst terrain is a topology that

is formed as a result of soluble rock such as limestone, dolomite, and gypsum. This soluble rock is worn away by water, which leads to the formation of the caves and sinkholes in the area.

These regions experience unique problems with sinkhole collapses and flooding. Groundwater pollution is also a major concern since the springs in karst areas can be a major source of groundwater.

FIGURE 4.7 DISPLAYS THE KARST AREAS NEAR THE MPA, WHICH SHOWS THAT ALMOST THE ENTIRE MPA AND THE SURROUNDING AREA ARE IN A POTENTIAL KARST TOPOLOGY. ANY PROJECTS CONSTRUCTED WITHIN THE MPA WILL NEED TO BE AWARE OF THESE UNIQUE CHALLENGES AS THEY GO THROUGH THE PROJECT DELIVERY PROCESS

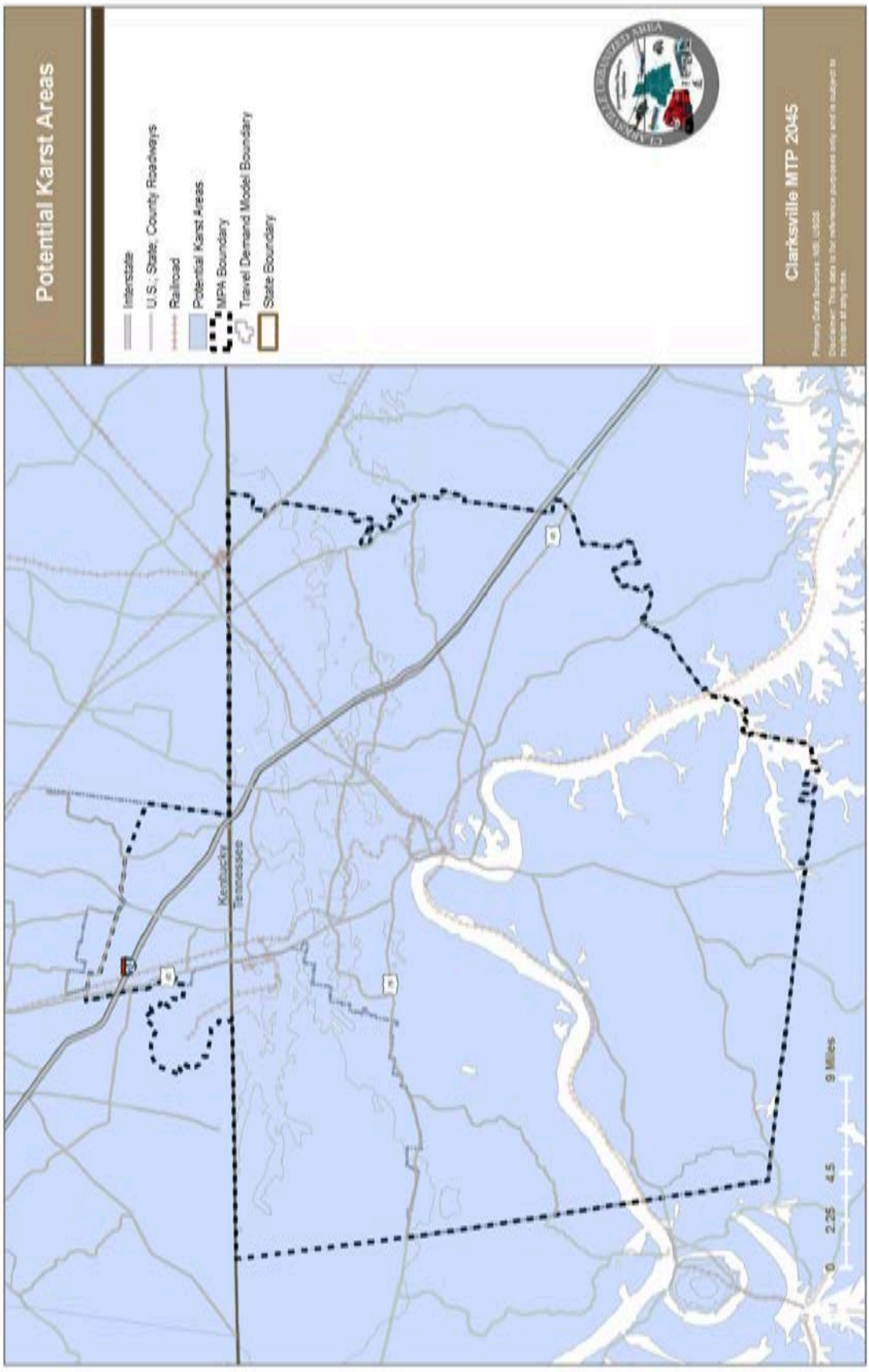


FIGURE 4.7 POTENTIAL KARST AREAS

Community Impacts

A transportation project may produce various impacts to public spaces, residences, and businesses. Each project possesses its own individual challenges and is beyond the scope of the MTP process.

Mitigation

Impacts associated with specific projects will be assessed in conformance with local, state, and federal regulations, NEPA guidance, and each state's project delivery process.

Certain impacts, such as those associated with an increase in traffic related noise, can potentially be mitigated. Also, to the extent practicable, projects should be developed using Context Sensitive Solutions.

Environmental Justice

Executive Order 12898 establishes guidance on federal actions, which includes projects receiving federal funds, to address EJ for minority and/or low-income populations (February 11, 1994). The order specifies actions to be taken on a range of issues that are intended to:

- promote nondiscrimination in federal actions,
- provide minority and low-income communities equal access to public information regarding a federal action, and
- provide an opportunity for public participation in the evaluation of a federal action in matters relating to human health and the environment.

In particular, the order stipulates that:

"To the greatest extent practicable and permitted by law… each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations… (Order Section I-101)

Each Federal Agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons… from participation in, denying persons the benefits of, or subject persons… to discriminations under such programs, policies, and activities, because of their race, color, or national origin (Order Section 2-2)."

Figure 4.8 shows the block groups in the MPA with higher concentrations of minority persons. Figure 4.9 shows the block groups in the MPA with a higher concentration of low income persons. Projects near or passing through these block groups may not necessarily have a disproportionate impact on EJ populations. Such projects received additional analysis in order to ensure compliance with federal laws.

Mitigation

In order to prevent disproportionately high and adverse effects on EJ populations, the 2045 MTP determines the relative likelihood for EJ issues for all transportation projects. Projects with a comparatively higher likelihood for EJ issues were awarded fewer points in the project prioritization process. Using data from the American Community Survey, analysis was used to determine if these projects affect a disproportionately high concentration of minorities or persons living in poverty. The needs of the EJ community, and the desire of the EJ community for a project to be implemented, are also considered. This is a planning-level exercise, and is not intended to be as detailed as a project-specific environmental analysis.

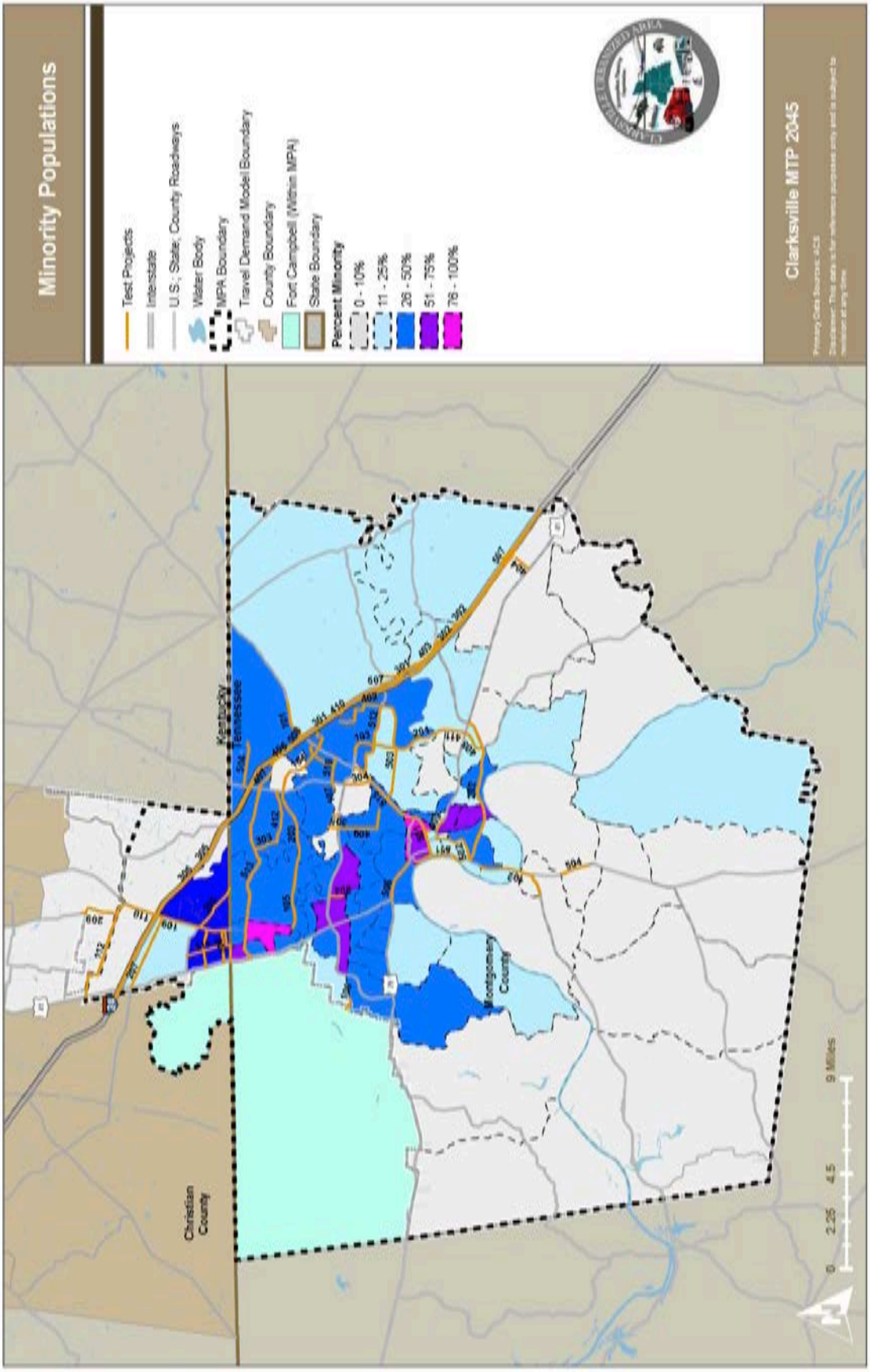


FIGURE 4.8 MINORITY POPULATIONS

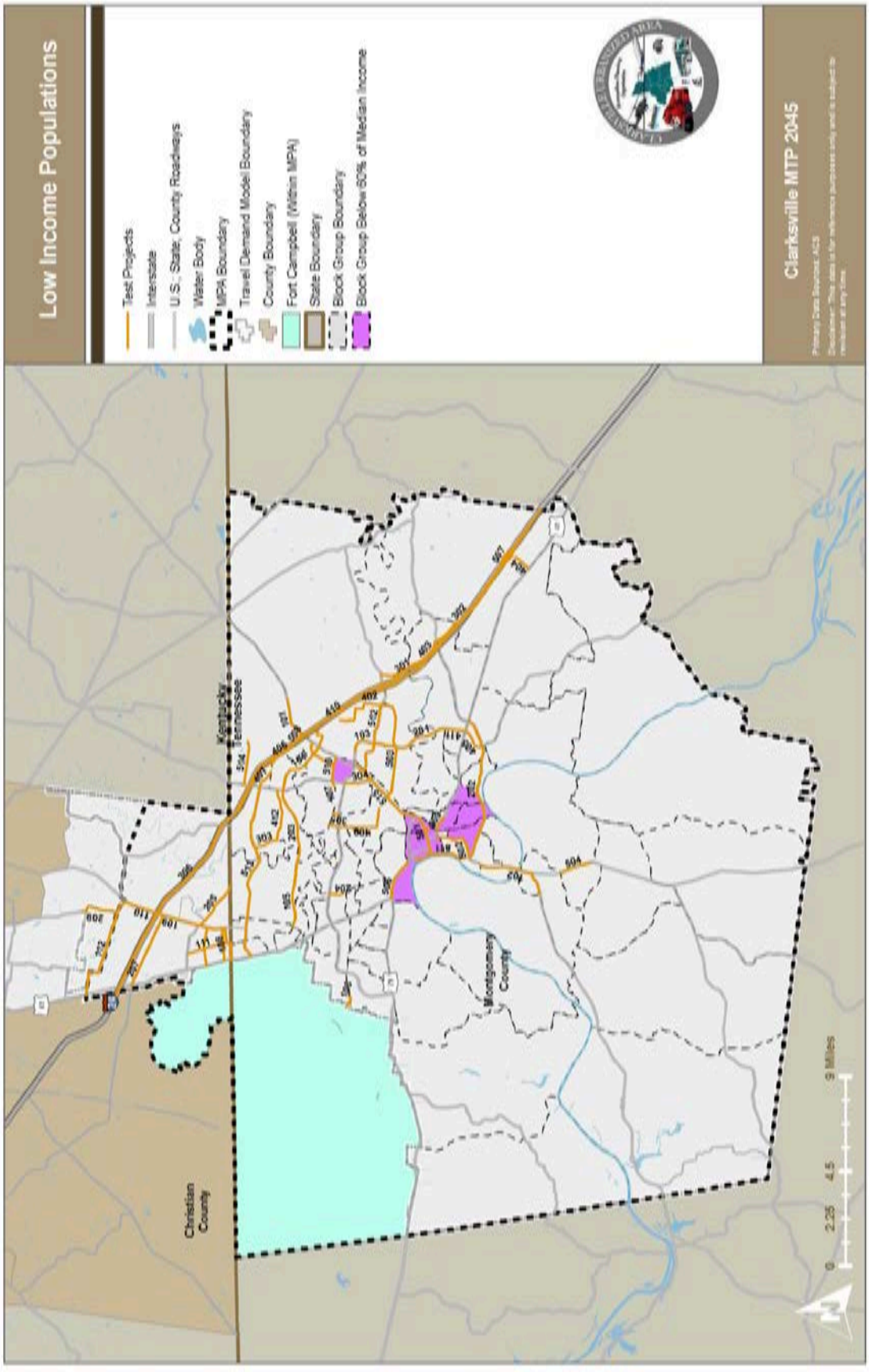


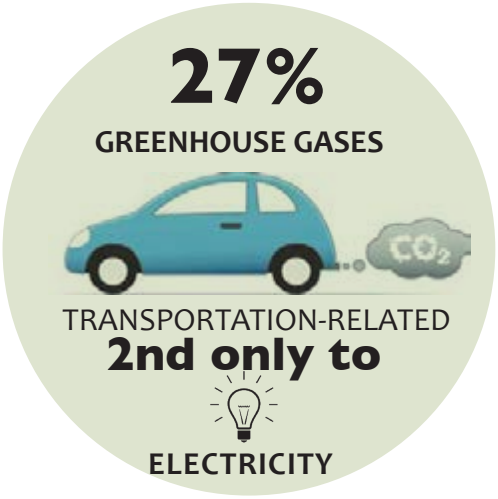
FIGURE 4.9 LOW INCOME POPULATIONS

4.6 | Climate Change and Extreme Weather Events

The current scientific belief holds that the planet is going through a period of warming. This changing trend in climate is believed to be caused by the increase in greenhouse gases (GHGs), which are also influenced by human behavior through the use of fossil fuels. According to the EPA, 27 percent of the GHGs released are from transportation purposes, second only to the use of electricity. The MPO understands the need for air quality within the area and is taking several steps to address this new challenge.

Climate Change Strategies

The transportation system is one of the largest contributors to GHGs, contributing over one-quarter of the total amount. These gases come from vehicle emissions and air conditioning. Vehicle emissions are increased when a vehicle is idling and less efficient. This contribution to GHGs makes the transportation sector a priority to address climate change. There are several strategies that may be employed in order to reduce the impact of transportation on climate change.



Introducing Low-Carbon Fuels

This strategy explores the use of fuels from alternative sources which produce less carbon and are more efficient. These fuels include ethanol, biodiesel, natural gas, and more. Additional low-carbon fuels include alternatives such as hybrids, electric vehicles, and hydrogen fuel. The CUAMPO provides a link to the U.S. Department of Energy Alternative Fueling Station Locator in an effort to promote this strategy. In an effort to reduce emissions, the local transit systems have been making the switch to hybrid buses.

Reduction of High-Carbon Activities

Single occupancy vehicles and motorcycles are comparatively inefficient modes of transportation that produce GHGs. Strategies can be implemented that encourage transportation users to choose alternative transportation modes which reduce the emissions on the transportation system. These include the use

of carpooling, increased transit ridership, and the reduction of unnecessary trips. The CUAMPO has made strides in the development of a cleaner transit system and has created a network between Clarksville and other cities that provides transportation users alternatives to single occupancy vehicle travel.

The construction and maintenance of the transportation system can also contribute to GHGs, as many of the products used in these processes are carbon-based. The use of lower-carbon materials during construction and maintenance would aid with this strategy.

Improving System Efficiency

The transportation network is the system by which people, goods, and services are moved through the area. This strategy encourages the use of an efficient transportation system to reduce travel time, reduce idling vehicles, and increase quality of traffic operations. This can be achieved through the use of:

- ITS,
- traffic signal retiming and coordination,
- TDM, and
- other means to reduce congestion and idling vehicles.

Additional Strategies

The strategies listed above cover the key methods that can be used to reduce the effect of GHGs from transportation sources. The following strategies may also be deployed:

- Reducing the amount of travel necessary for transportation users
- Increasing vehicle occupancies for all modes
- Establishing transportation pricing
- Encouraging non-vehicular travel
- Promoting trip-chaining
- Improved freight logistics
- Using LED lights in traffic signals

Adaptation to Climate Change

As the Clarksville MPA is inland and away from the coast, rising sea levels and hurricanes are not considered a direct concern of the area. However, these events can impact the area over time. The most obvious and immediate effect of climate change has been the increased global temperature, which has a large impact on the transportation system. The increased heat warps the steel of railroad tracks, stresses bridge joints, and affects pavement conditions. Pavement that has been softened by heat to which it was never designed can buckle and rut under high truck volumes. This in turn creates a need for further maintenance and the use of more material, which itself is carbon-based.

The rising temperatures are not the only major impact that has been observed with the recent climate change. Storms have been rising in intensity with the shift in the climate and "Superstorms" such as Katrina, Sandy, and Harvey are becoming a more regular occurrence. Localized flooding has also worsened across the United States and the Clarksville region was affected by a "Superflood" in 2010.

RECENT STORMS WITH A HIGH INTENSITY OVER A SHORT PERIOD OF TIME ARE BECOMING COMMON AND CAN RESULT IN FLASH FLOODS.

These flash floods trap motorists and deposit large amounts of water on the impervious surfaces of the roadways. This water eventually becomes surface runoff, which can pool and damage a roadway's substructure. This impact is worse in karst areas since the rock that composes them is soluble, leading to further potential for sinkholes and other potential disasters that can affect roadways and other infrastructure.

A strategy that the MPO can employ to deal with this need is the increased inspection of bridges and roadways. This will ensure that the infrastructure is structurally sound and that erosion from storms has not degraded it. Drainage for the infrastructure is also important, and should be inspected to ensure that roadways will not contribute to runoff that can damage karst areas or allow pooling.

4.7 | Stormwater Mitigation

As an area grows and changes, its land use and infrastructure change with it. These changes affect how precipitation events, the product of which is stormwater, within an area, affect roadways, homes, runoff, groundwater, and more. Stormwater can become ground water through runoff or evaporation. When stormwater becomes runoff, it ends up in nearby streams, rivers, or other water bodies as surface water.

The precipitation from a storm is heavily influenced by land use and impervious surfaces such as roadways. Any change in these factors will change how stormwater behaves within the area. As areas develop, they replace more pervious surfaces such as grass, wetlands, and wooded areas with impervious surfaces such as asphalt, concrete, and more. With climate change impacting the frequency and severity of storms, stormwater mitigation has become an important need for all communities.

In a developed, urban environment, unmanaged stormwater can create flooding and introduce pollutants and other contaminants to the areas that the water flows. The flooding can damage homes and roadways, while the contaminants create environmental hazards and affect nearby drinking water sources. The MPA's karst terrain is also particularly vulnerable to stormwater that leeches into the soluble rocks that make up the region. An increase in impervious area from new roadways or developments without proper drainage can significantly decrease the runoff time in an area. This would lead to increased flooding, while allowing contaminants from the roadways, such as oil on the surface, to mix with the water and be carried to other areas. These contaminants could eventually lead to water pollution and a violation of federal laws.

Current Policies

The State of Tennessee has a statewide stormwater mitigation plan that has been published through TDOT. This plan outlines the planning, design, construction, and maintenance of Tennessee state roadways in order to minimize stormwater impacts. Currently, no local jurisdictions within the MPA have their own stormwater mitigation plans. The development of a Standard Urban Stormwater Mitigation Plan

(SUSMP) by the CUAMPO would allow the MPA to mitigate the impacts from precipitation events, preserve the transportation system, reduce erosion, and promote health and safety. This development should be done in conjunction with the local jurisdictions, KYTC, and TDOT.

Additional Strategies

Additional strategies that can be taken in order to mitigate the effects of stormwater include:

- **A reduction of alterations to natural landscapes.**
- **Promote the use of "green infrastructure" and other low-impact development practices.**

  Examples include the use of rain barrels, rain gardens, buffer strips, bioswales, and replacement of impervious surfaces on property with pervious materials such as gravel or permeable pavers.
- **Develop a SUSMP at multiple levels; including state, region, and municipality.**

  Efforts should be made to coordinate these plans, even though multiple agencies would have them in place
- **Educate residents, business owners, elected officials, and developers on the impacts of stormwater and how they can assist with mitigation.**
- **Identify the area's most likely to flood during heavy storm events and prioritize mitigation efforts in that area and areas upstream from it.**
- **The adoption of open space preservation plans, which will balance land use and local developments with preservation and conservation of the existing open space.**
- **The establishment of stormwater fees to support the funding of stormwater management projects and practices.**
- **Reduce the amount of impervious surfaces on residential, commercial, and public properties and offer incentives to encourage the change.**
- **Adopt ordinances that include stormwater mitigation practices, including landscaping standards, tree preservation, and "green streets".**

5.0 | Current Land Use, Population, Economic, and Travel Patterns

5.1 | Regional Context

The U.S. Office of Management and Budget (OMB) is responsible for the definition of Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas. These areas are core-based statistical areas that include the county or counties containing a core urban area, and any adjacent counties that have a high degree of social and economic integration. For this reason, these geographic areas are useful for understanding the broader context of land use, population, economic, and travel patterns in a region.

The Clarksville MPA contains the Clarksville MSA's core urban area, the Clarksville urbanized area, and is situated entirely within the MSA. The Clarksville MSA consists of Montgomery and Stewart Counties in Tennessee, and Christian and Trigg Counties in Kentucky. These areas are illustrated in Figure 5.1.

Beyond the MSA, the Clarksville MPA is typically not considered to be a part of a U.S. megaregion, or a large geographic area encompassing multiple major and minor metropolitan areas. However, according to the America 2050 project by the Regional Plan Association, it is within the area of influence of the Piedmont Megaregion as illustrated in Figure 5.2.

While the definition and classification of megaregions varies, they are important for transportation planning. Megaregions indicate strong economic and social ties in a geographic area that is larger than MPAs. Because of this, regional planning coordination becomes increasingly important in the megaregions. In the future, the CUAMPO will more than likely begin to coordinate transportation planning efforts with nearby MPOs in the Piedmont Megaregion.

FIGURE 5.1 COMPONENTS OF CLARKSVILLE, TN METROPOLITAN STATISTICAL AREA

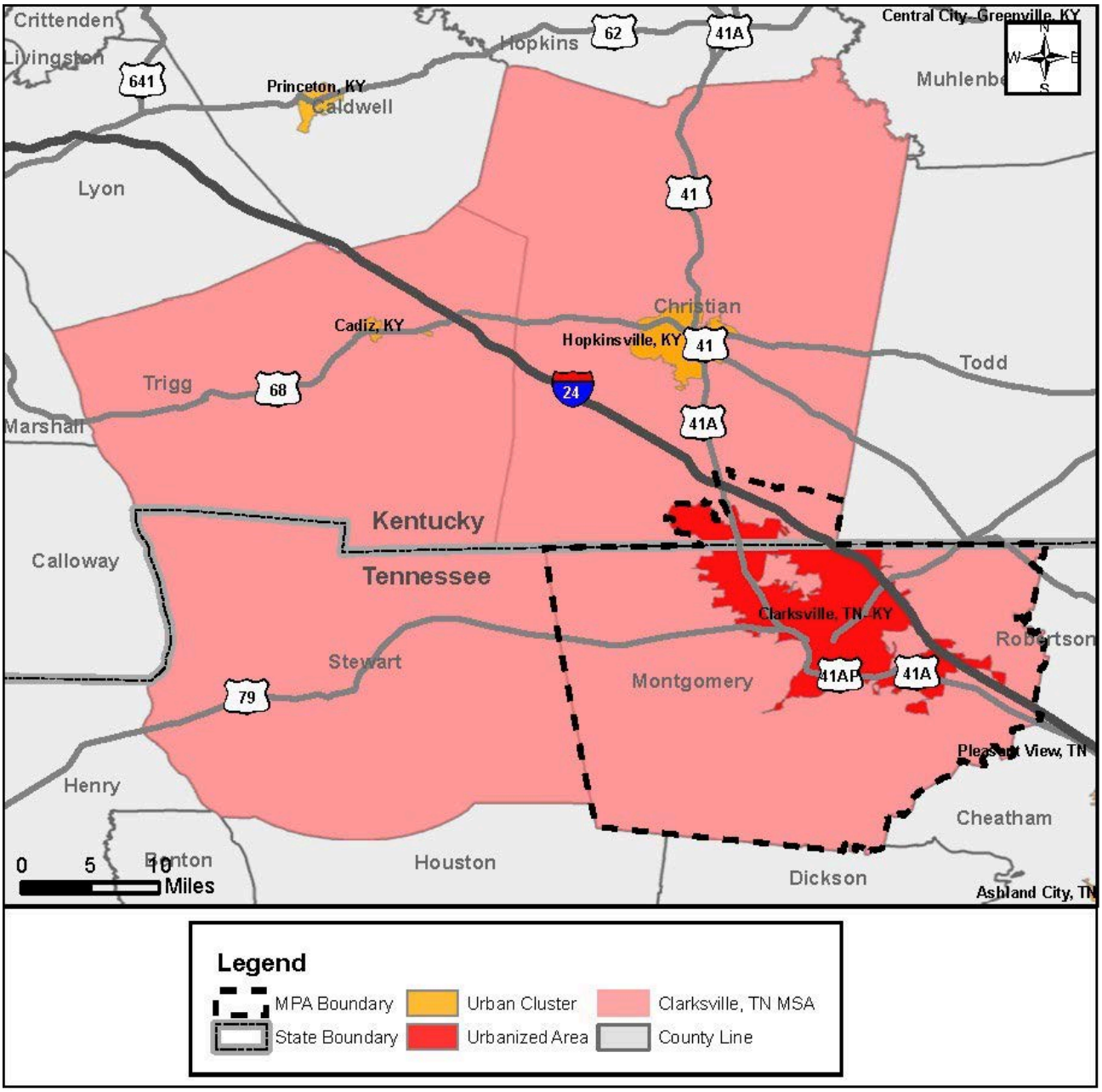
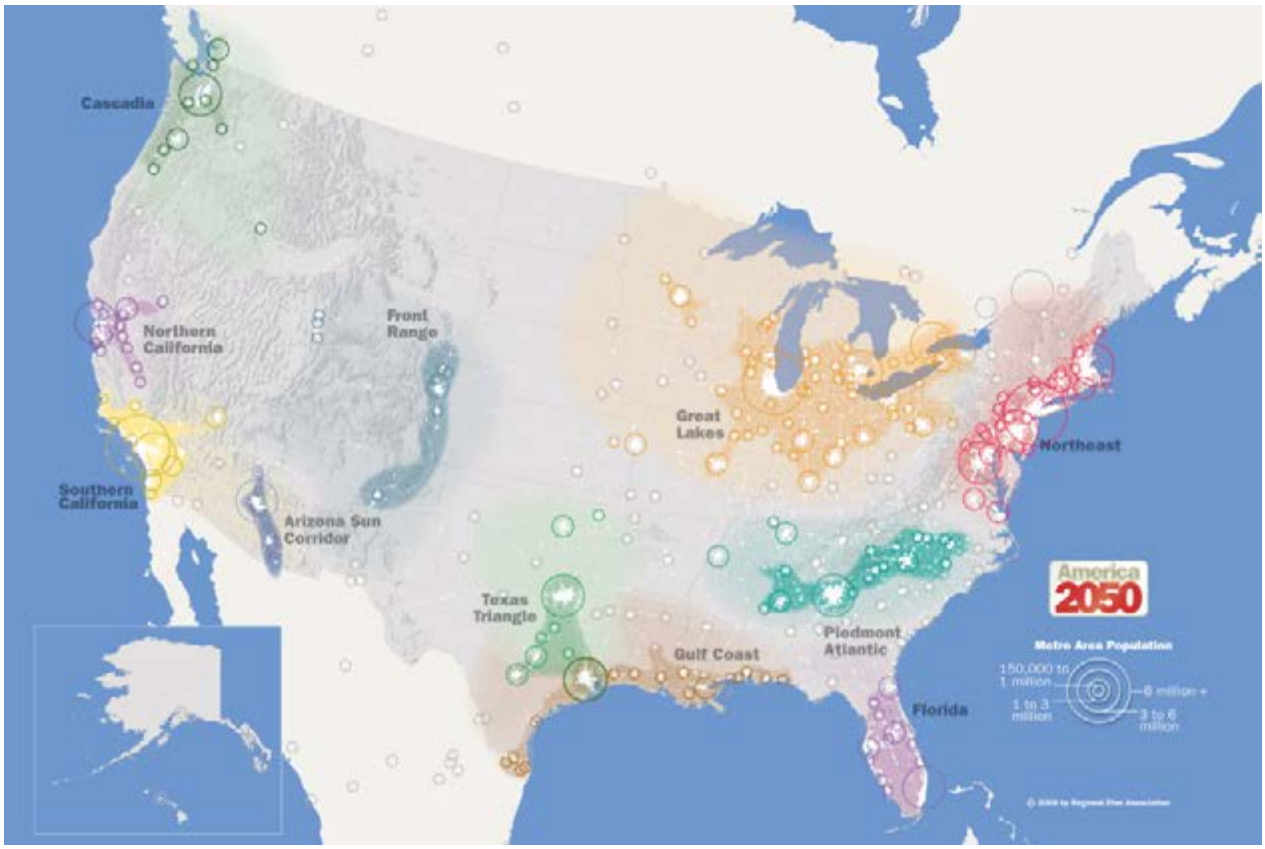


Figure 5.2 Megaregions in the United States



5.2 | Land Use Patterns

As indicated in Chapter 4, Figure 4.1, most of the developed land in the MPA is centered around the City of Clarksville. Areas that have been classified as urban by the Census Bureau are similarly concentrated around these cities, as illustrated in Figure 5.1 earlier.

The population densities, employment densities, and activity densities within the MPA are illustrated in Figures 5.3 through 5.5.

THE POPULATION DENSITIES IN THE MPA ARE THE GREATEST WITHIN THE DOWNTOWN AREA OF THE CITY OF CLARKSVILLE.

There are also smaller concentrations occurring near the City of Clarksville along US 41A going southeast, and the subdivisions near Fort Campbell at the state line.

The employment densities within the MPA are greatest in the Central Business District.

An area's activity density is based on the combined total of population and employment. This statistic reveals areas that may not have a significantly high population or employment density alone, but still generate significant activity overall. By looking at these two factors together, one gets a better understanding of the impact of mixed-use areas. The greatest activity densities in the MPA are the downtown area of the City of Clarksville and Austin Peay State University.

THE GREATEST ACTIVITY DENSITIES IN THE MPA ARE THE DOWNTOWN AREA OF THE CITY OF CLARKSVILLE AND AUSTIN PEAY STATE UNIVERSITY.

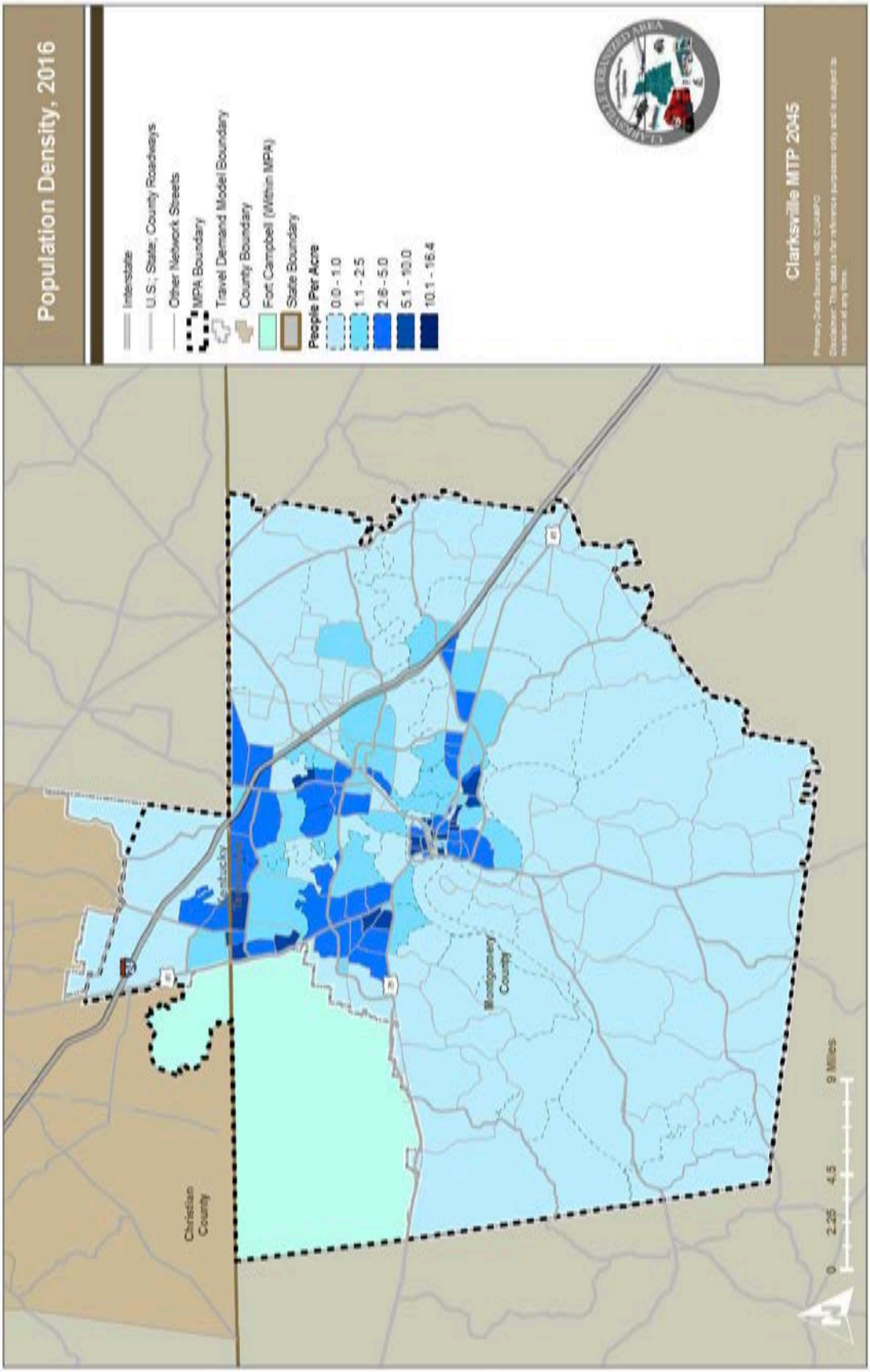


Figure 5.3 Population Density, 2016

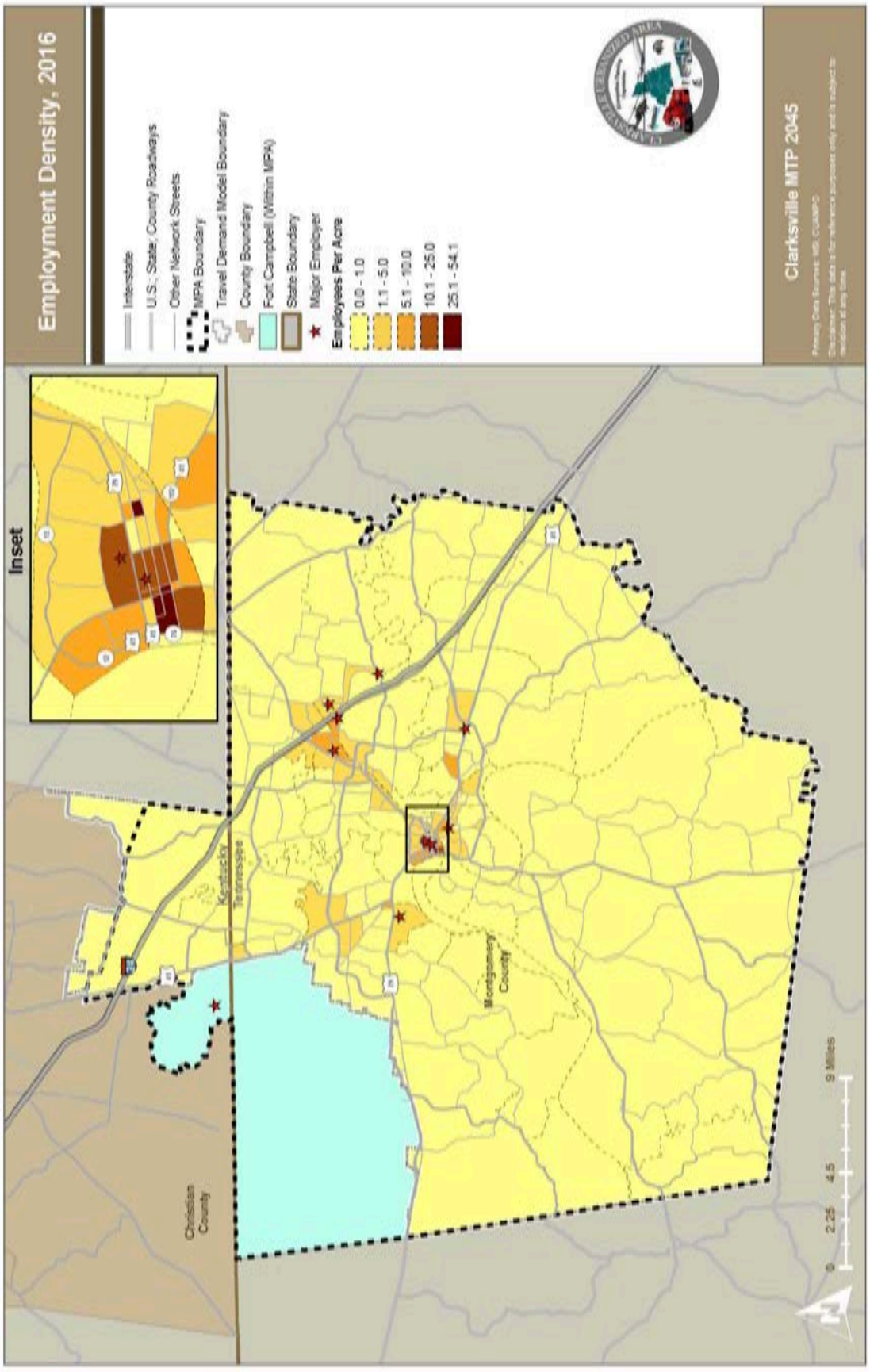


Figure 5-4 Employment Density, 2016

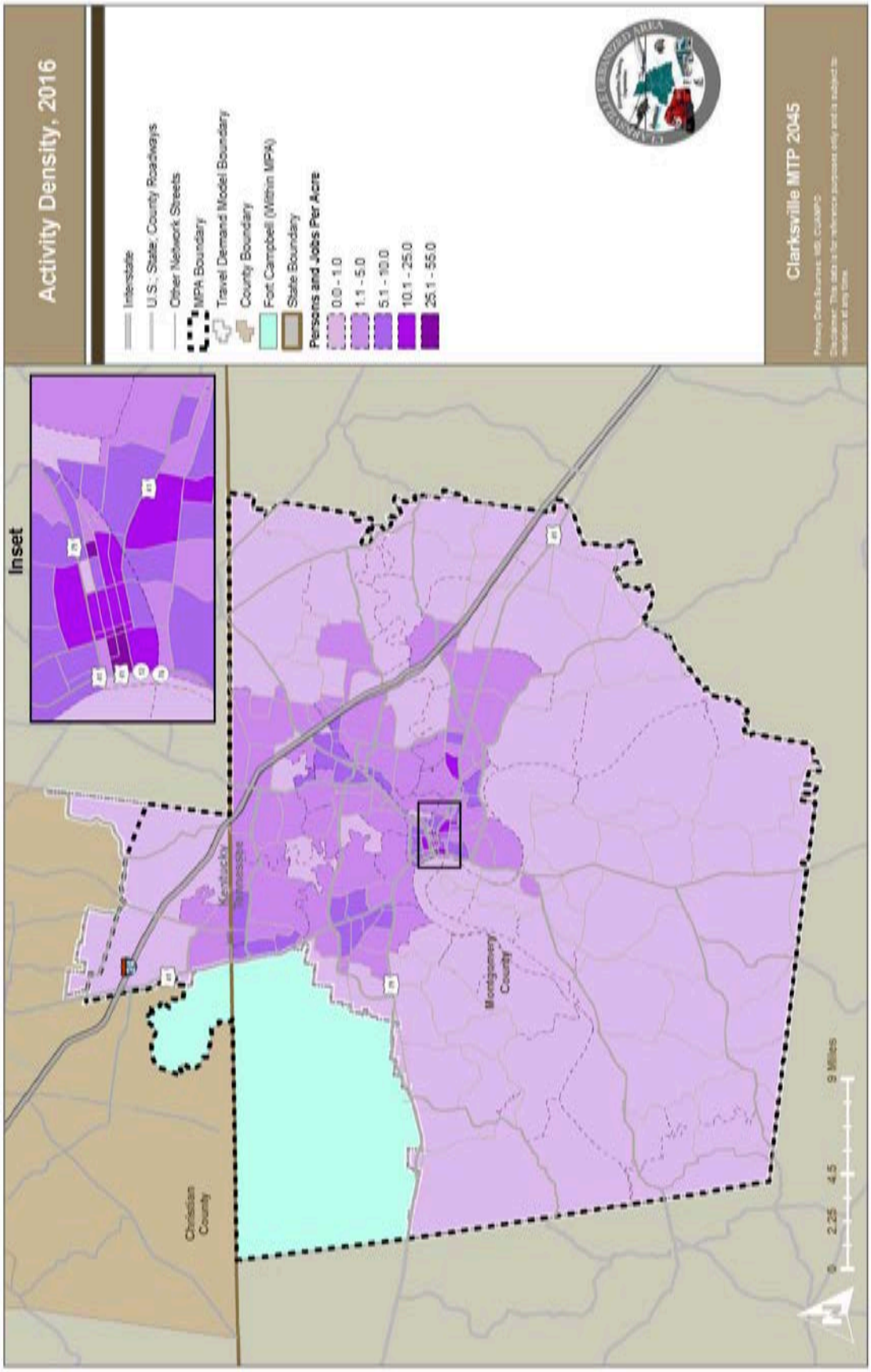


Figure 5.5 Activity Density, 2016

5.3 | Population and Economic Trends

Population Trends

Historical Trends

BETWEEN 2000 AND 2010, GROWTH IN THE MPA GREATLY OUTPACED KENTUCKY, TENNESSEE, AND THE COUNTRY AS A WHOLE.

However, population growth has been much more rapid in Montgomery County than in Christian County. Table 5.1 displays the population changes in the Clarksville MPA and associated jurisdictions.

Table 5.1 Population Change in MPA and Local Jurisdictions, 2000 to 2010

Place	2000	2010	Change 2000 to 2010		
			Number	Percent	Annualized Growth Rate
Clarksville	103,455	132,929	29,474	28.49%	2.85%
Hopkinsville	30,089	31,577	1,488	4.95%	0.49%
Christian County	72,265	73,955	1,690	2.34%	0.23%
Montgomery County	134,768	172,331	37,563	27.87%	2.79%
Metropolitan Planning Area	121,189	174,229	53,040	43.77%	4.38%
Kentucky	4,041,769	4,339,367	297,598	7.36%	0.74%
Tennessee	5,689,283	6,346,105	656,822	11.54%	1.15%
United States	281,421,906	308,745,538	27,323,632	9.71%	0.97%

Source: U.S. Census Bureau

Recent Trends

Population estimates from 2016 largely suggest a continuation of historical trends. Montgomery County is outpacing the U.S. in population growth while Christian County is experiencing a population decline. Figure 5.6 shows the change in households from 2010 to 2016 by TAZ. Table 5.2 displays the population change in the MPO jurisdictions from 2010 to 2016.

Table 5.2 Estimated Population Change in MPO Jurisdictions, 2010 to 2016

PLACE	2010	2016 (Estimate)	CHANGE 2010 TO 2016		
			Number	Percent	Annualized Growth Rate
Clarksville	132,929	150,287	17,358	13.06%	2.18%
Hopkinsville	31,577	31,811	234	0.74%	0.12%
Christian County	73,955	72,351	-1,604	-2.17%	-0.36%
Montgomery County	172,331	195,734	23,403	13.58%	2.26%
Metropolitan Planning Area	174,229	196,758	22,529	12.93%	2.16%
Kentucky	4,339,367	4,436,974	97,607	2.25%	0.38%
Tennessee	6,346,105	6,651,194	305,089	4.81%	0.80%
United States	308,745,538	323,127,513	14,381,975	4.66%	0.78%

Source: U.S. Census Bureau

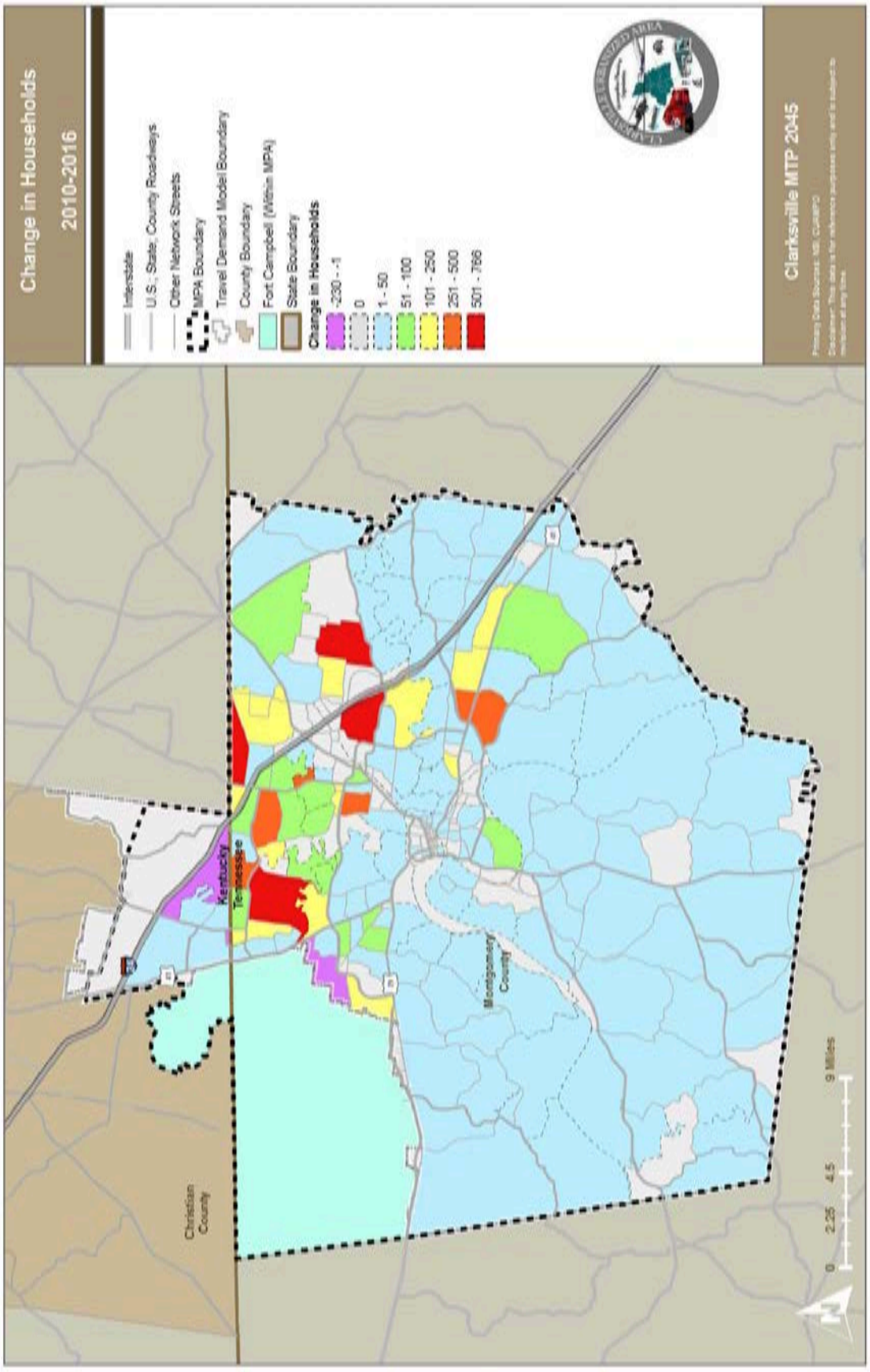
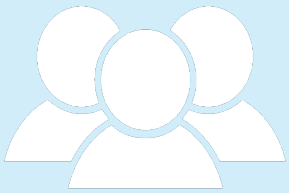


FIGURE 5.6 CHANGE IN HOUSEHOLDS, 2010-2016

Employment Trends

THROUGHOUT THE 2008 RECESSION, THE CLARKSVILLE AREA MAINTAINED A STRONG REGIONAL EMPLOYMENT GROWTH WHICH IS EXPECTED TO CONTINUE INTO THE FUTURE.



The study area had 66,205 employees in 2010.

This has grown to 68,326 employees in 2016.

Figure 5.7 shows the change in total employees from 2010 to 2016 by TAZ. Table 5.3 displays the ten largest employers within the MPA, which are shown in Figure 5.4.

Table 5.3 Top 10 Largest Employers in the MPA

EMPLOYERS	EMPLOYEES
Fort Campbell	27,600
Clarksville-Montgomery County School System	4,000
Tennova Healthcare	1,150
Trane Company	1,100
City of Clarksville	1,050
Austin Peay State University	860
Montgomery County Government	850
Agero	750
Convergys	600
Akebono	500

Source: Clarksville Area Chamber of Commerce, Bureau of Economic Analysis

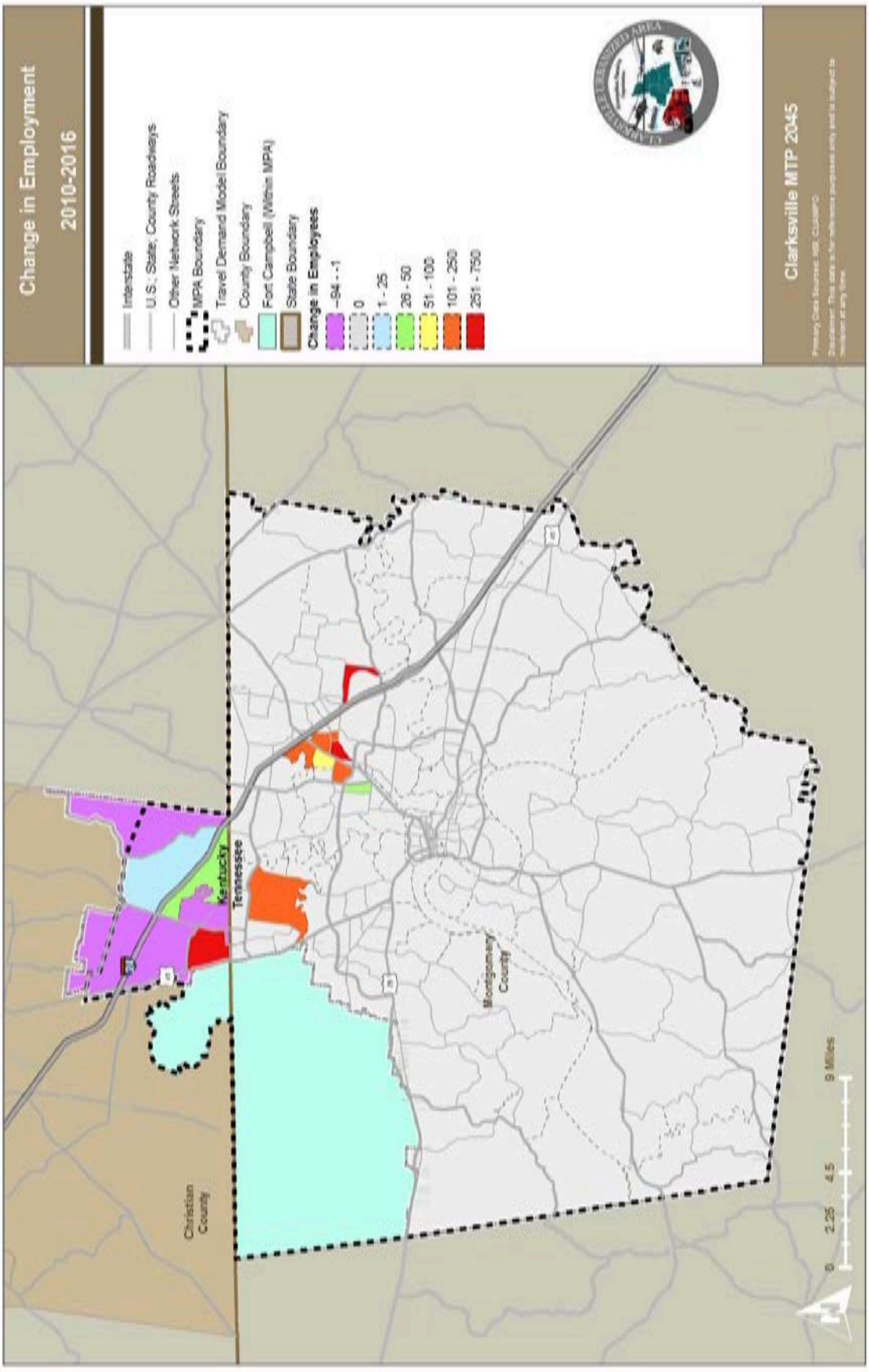


Figure 5.7 Change in Employment, 2010-2016

There is no additional historic employment data available at a geographic level that would allow for a more detailed analysis of employment trends within the MPA. However, county-level data from the Bureau of Economic Analysis (BEA) for select industries was obtained for Christian and Montgomery counties. The change in total employment (full-time and part-time) from 2010 to 2016 in the MPA counties by industry is shown in Table 5.4.

GENERAL TRENDS FROM THE BEA DATA SHOW THAT:

- ***The retail industry had the greatest absolute increase, with over 2,200 jobs added***
- ***The accommodation and food services industry added just over 2,000 jobs.***
- ***The military industry had the greatest decrease with a loss of approximately 5,300 employees. This is due to the fluctuating deployment levels of Fort Campbell.***

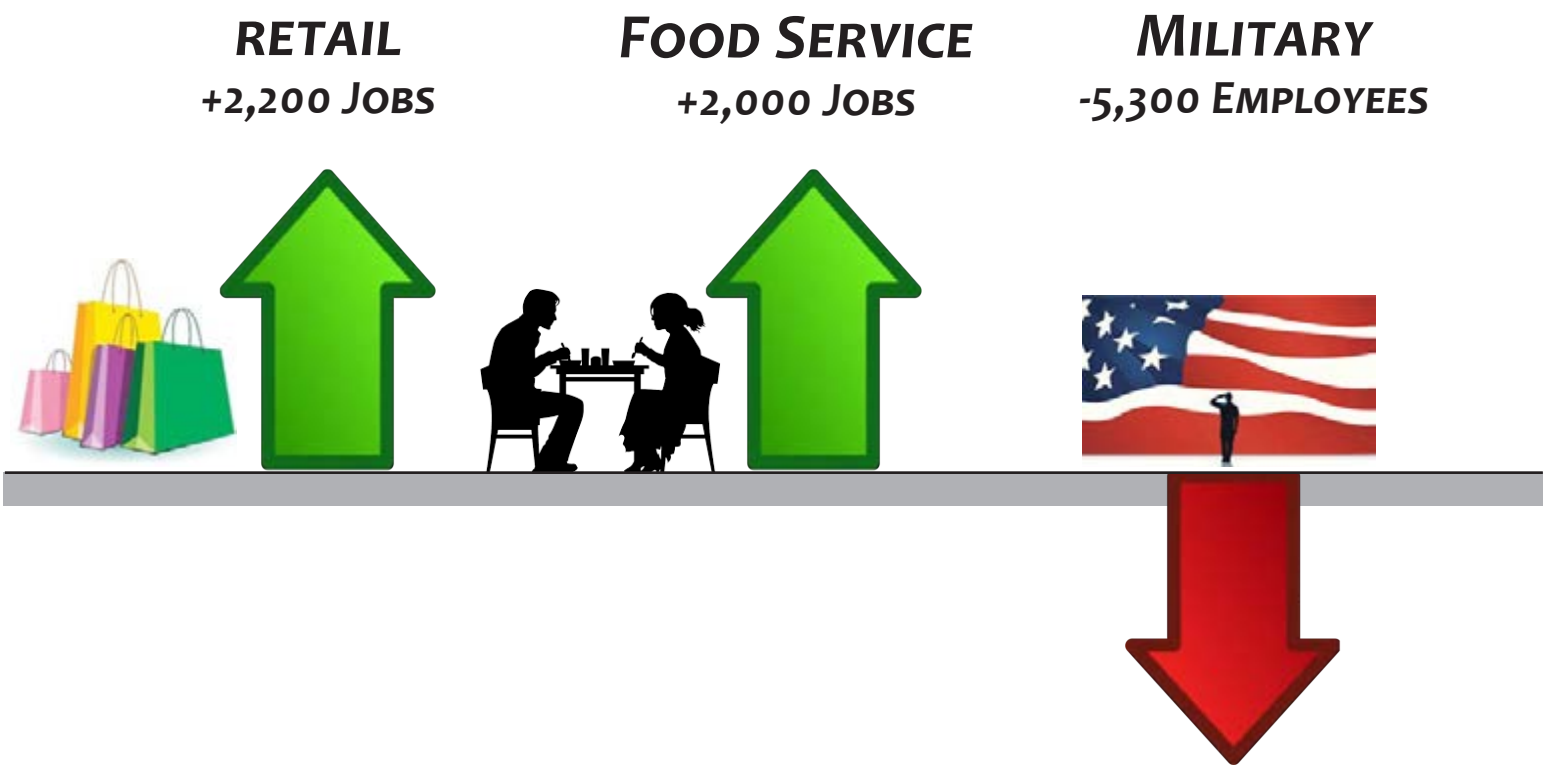


Table 5.4 Change in Employment in MPA Counties by Industry, 2010-2016.

DESCRIPTION	2010	2016	CHANGE	
			NUMBER	PERCENT
Total employment (number of jobs)	134,056	140,182	6,126	4.57%
Farm employment	2,263	2,204	-59	-2.61%
Forestry, fishing, and related activities	(D)	389	(D)	(D)
Mining, quarrying, and oil and gas extraction	(D)	427	(D)	(D)
Utilities	(D)	(D)	(D)	(D)
Construction	5,436	5,219	-217	-3.99%
Manufacturing	9,385	10,598	1,213	12.92%
Wholesale trade	(D)	(D)	(D)	(D)
Retail trade	12,530	14,770	2,240	17.88%
Transportation and warehousing	(D)	(D)	(D)	(D)
Information	1,074	1,369	295	27.47%
Finance and insurance	2,769	3,049	280	10.11%
Real estate, rental and leasing	3,830	4,610	780	20.37%
Professional, scientific, and technical services	4,786	3,847	-939	-19.62%
Management of companies and enterprises	262	404	142	54.20%
Administrative, support, waste management, and remediation services	6,206	7,656	1,450	23.36%
Educational services	1,761	1,962	201	11.41%
Health care and social assistance	10,307	11,932	1,625	15.77%
Arts, entertainment, and recreation	1,060	1,198	138	13.02%
Accommodation and food services	8,782	10,800	2,018	22.98%

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Continued

TABLE 5.4 CHANGE IN EMPLOYMENT IN MPA COUNTIES BY INDUSTRY, 2010-2016.

DESCRIPTION	2010	2016	CHANGE	
			NUMBER	PERCENT
Other services (except public administration)	6,510	7,339	829	12.73%
Federal, civilian	6,029	5,586	-443	-7.35%
Military	32,959	27,647	-5,312	-16.12%
State government	(D)	3,394	(D)	(D)
Local government	(D)	9,706	(D)	(D)

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

5.4 | Freight Demand

UNDERSTANDING THE LOCAL DEMAND FOR FREIGHT WITHIN THE MPA IS CRITICAL FOR ENSURING THAT THE REGION'S TRANSPORTATION SYSTEM IS MOVING GOODS IN AN EFFICIENT MANNER. IT ALSO ENABLES THE REGION TO BE ECONOMICALLY COMPETITIVE.

Specialized Freight Generating Industries

As a region that contains numerous manufacturing facilities, the Clarksville MPA contains several freight-generating establishments that have located within its boundaries. The development of an intermodal network that would create better access to these industries and move their goods would spur economic growth. However, in order to better understand the magnitude of certain freight-generating industries within the MPA, it is necessary to compare the relative size of freight-generating industries in the study area to that of Kentucky, Tennessee, and the United States as a whole.

The industries of particular interest to freight planning are the:

- mining,
- construction,
- manufacturing,
- wholesale trade,
- retail trade,
- transportation and warehousing, and
- accommodation and food services industries.

THE DEVELOPMENT OF AN INTERMODAL NETWORK THAT WOULD CREATE BETTER ACCESS TO THESE INDUSTRIES AND MOVE THEIR GOODS WOULD SPUR ECONOMIC GROWTH.

This section will focus on these industries and subsectors within these industries.

In order to identify the specialized freight-generating industries in the MPA, location quotients were calculated for the counties in the MPA. Location quotients are ratios that compare an industry's percentage of total employment in one area to that same industry's percentage of total employment in a larger, more all-encompassing area, such as a state or country. Location quotients highlight specialized industries by pointing out which industries employ a disproportionately high number of people when compared to the state or country as a whole. Typically, a location quotient of 1.2 or higher indicates a specialized industry.

Specialized Freight-Generating Industries

The location quotients for broadly defined freight-generating industries are provided in Table 5.5. The data source for this information is the Bureau of Economic Analysis' (BEA) Local Area Personal Income and Employment. The BEA data is the most complete, publicly available source for employment.

The data indicates that Christian County is specialized in the manufacturing industry when compared to the nation. Montgomery County is specialized in the mining industry when compared to the State of Tennessee. The county is also specialized in the retail trade and accommodation and food services industries when compared to the State of Tennessee and the nation. Aside from these industries, it does not appear that the MPA is specialized in any other broadly defined freight-generating industry.

TABLE 5.5 LOCATION QUOTIENTS FOR FREIGHT-GENERATING INDUSTRIES IN THE MPA, 2016

INDUSTRY	CHRISTIAN COUNTY EMPLOYMENT	MONTGOMERY COUNTY EMPLOYMENT	KY LOCATION QUOTIENT	TN LOCATION QUOTIENT	CHRISTIAN U.S. LOCATION QUOTIENT	MONTGOMERY U.S. LOCATION QUOTIENT
Mining (NAICS 21)	74	353	0.14	2.02	0.15	0.66
Construction (NAICS 23)	1,222	3,997	0.37	1.05	0.35	1.04
Manufacturing (NAICS 31-33)	6,211	4,387	0.91	0.65	1.38	0.88
Wholesale trade (NAICS 42)	(D)	1,644	(D)	0.63	(D)	0.62
Retail trade (NAICS 44-45)	3,838	10,932	0.55	1.41	0.57	1.49
Transportation and warehousing (NAICS 48-49)	1,796	(D)	0.56	(D)	0.73	(D)
Accommodation and food services (NAICS 72)	2,468	8,332	0.51	1.45	0.50	1.52
Total employment	66,699	73,483	N/A	N/A	N/A	N/A

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Bureau of Economic Analysis, Table CA25N

Major Commodities Transported

Commodity flows from the FHWA's Freight Analysis Framework tables are not available for the Clarksville area. However, TDOT purchases commodity flow data from Transearch.

ACCORDING TO THE DATA, IN 2012, APPROXIMATELY 50 PERCENT OF THE TOTAL FREIGHT TONNAGE GENERATED BY MAJOR FREIGHT-GENERATING ESTABLISHMENTS IN THE COUNTY CAME FROM:

- **gravel and crushed stone,**
- **soy beans,**
- **mixed freight,**
- **and other non-metallic mineral products.**

Generation of Freight Trips in MPA

There are many industrial, wholesale trade, and commercial establishments in the MPA that generate freight truck trips. Figure 5.8 illustrates the number of freight trips generated by TAZ.

THIS MAP SHOWS THAT THERE ARE SEVERAL CLUSTERS OF RELATIVELY HIGH FREIGHT DEMAND IN THE MPA. THESE AREAS INCLUDE:

- **the US 79 commercial and industrial corridor from 101st Airborne Division Parkway to Hampton Station Road,**
- **the area east of US 41A and 101st Airborne Division Parkway, and**
- **the US 41A commercial corridor in the Kentucky portion of the MPA**

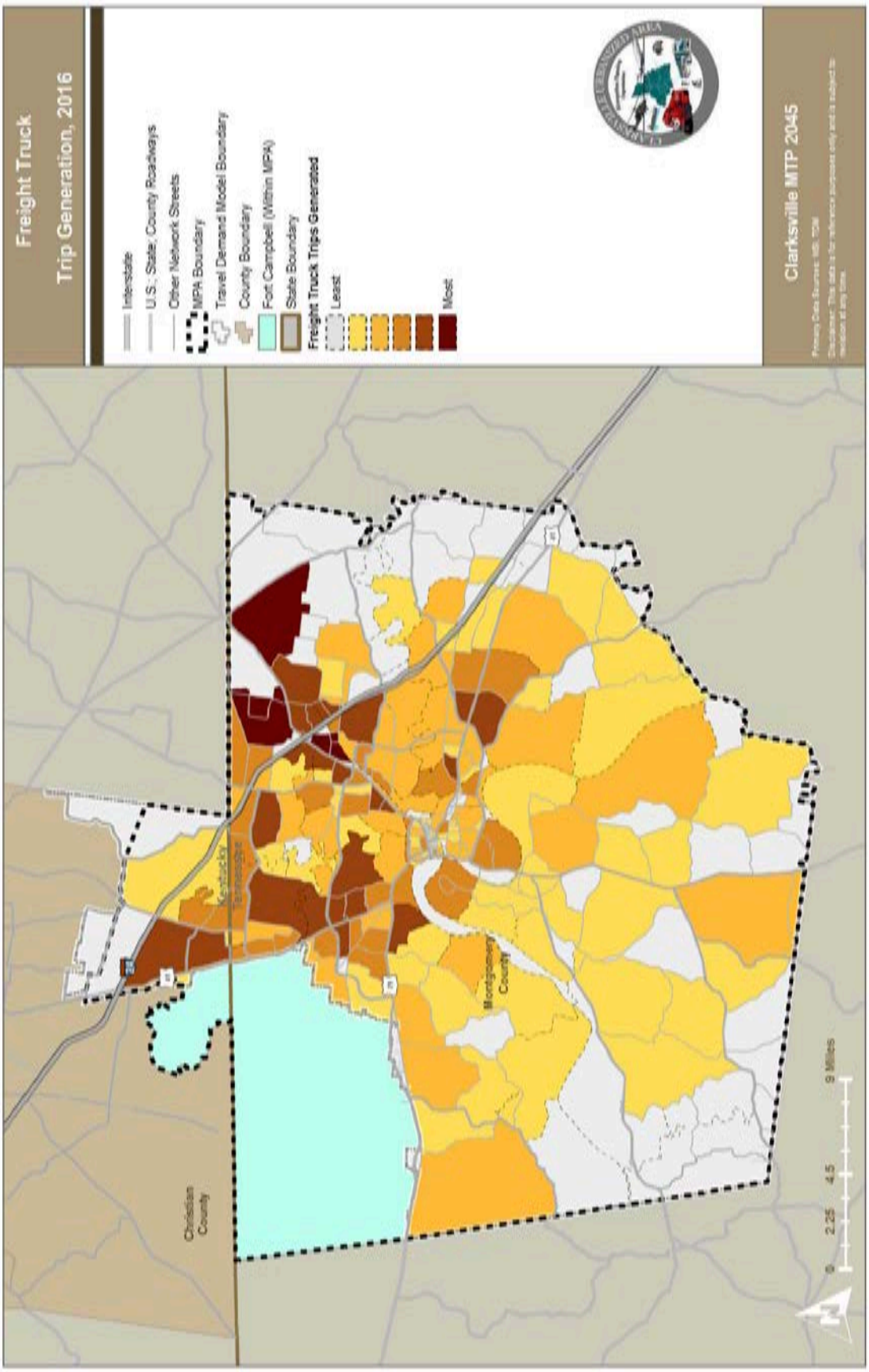


Figure 5.8 Freight Truck Trip Generation, 2016

5.5 | Travel Patterns

Commuting patterns shed some light on overall travel patterns. Data obtained from the American Community Survey (ACS) 5-Year Estimates shows that the travel time to work is relatively short within the MPA. Virtually all workers reside in tracts that have mean commute times under 30 minutes. The largest commute time within the MPA is in Montgomery County, Tract 1017 at just under 40 minutes.

The same data reveals that less than 10 percent carpooled. Walking or biking to work was uncommon, as was commuting by transit. However, there are areas where commuting by walking or by public transit are more likely to occur, as illustrated in Figure 5.9.

Areas with higher rates of commuting by transit and walking are mostly located around Austin Peay State University and the area immediately surrounding the City of Clarksville. These areas appear to somewhat relate to areas where a high percentage of households lack regular access to a vehicle, as shown in Figure 5.10. There are some areas in the MPA where over 20 percent of households do not have regular access to a vehicle.

TABLE 5.6 MEANS OF TRANSPORTATION TO WORK IN METROPOLITAN PLANNING AREA COUNTIES

	COMMUTERS	PERCENT OF TOTAL
Total	116,401	100.00%
Drove Alone	97,177	83.48%
Carpooled	9,181	7.89%
Public Transportation	915	0.79%
Taxi	132	0.11%
Motorcycle	359	0.31%
Bicycle	86	0.07%
Walked	4,637	3.98%
Other	1,298	1.12%
Worked at Home	2,616	2.25%

Source: Census Bureau, 2012-2016 ACS

Table 5.6 shows that, based on the 2016 5-year ACS, over 80 percent of commuters in the MPA counties drove alone to work.

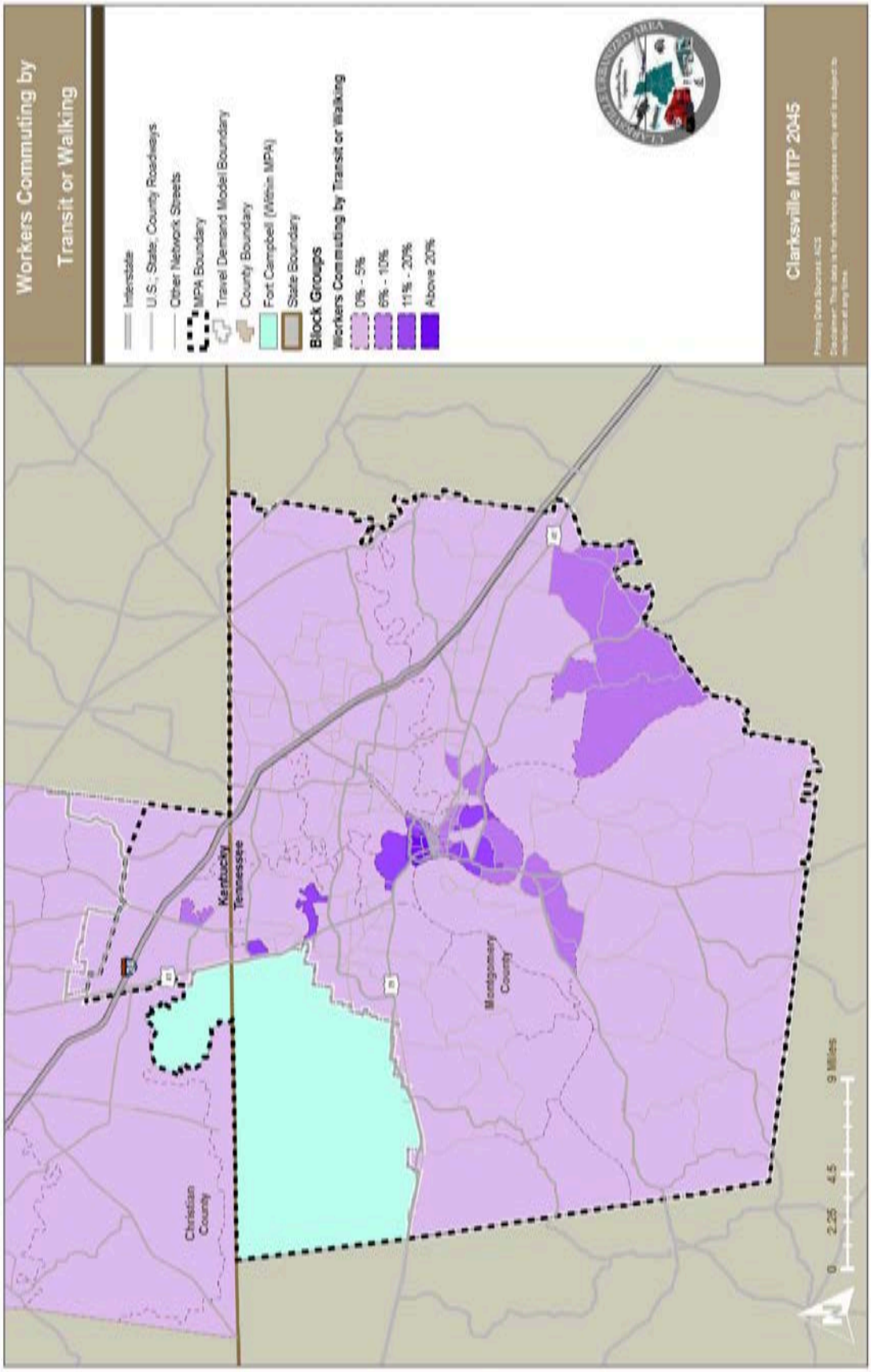


Figure 5.9 Workers Commuting by Transit or Walking

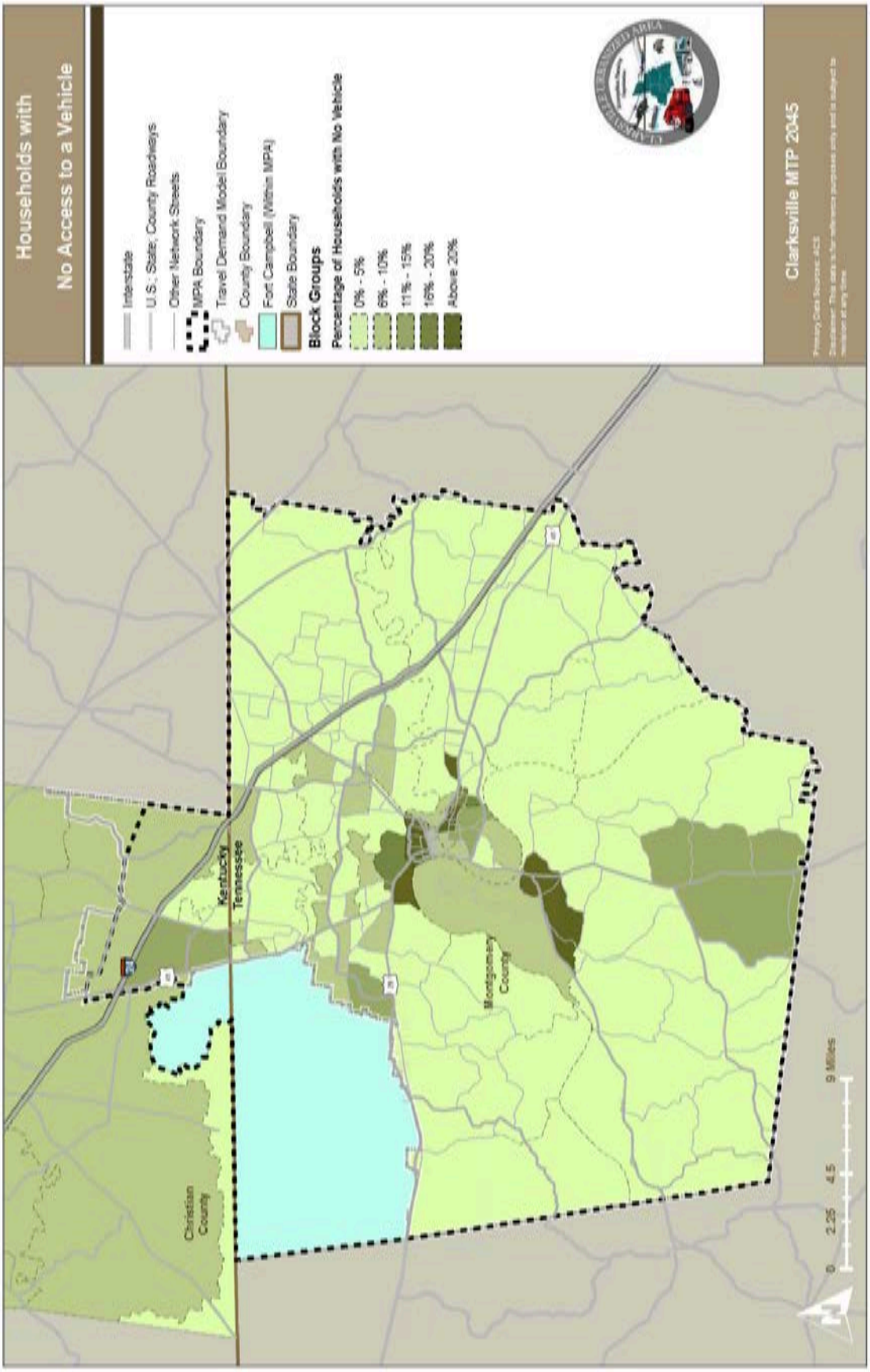


Figure 5.10 Households with No Access to a Vehicle

6.0 | The Existing Transportation System

PLANNING FOR THE FUTURE TRANSPORTATION SYSTEM AND ITS IMPROVEMENTS BEGINS WITH EVALUATING THE EXISTING TRANSPORTATION SYSTEM.

This chapter identifies the conditions and characteristics of the existing transportation system.

6.1 | Roadways and Bridges

The region's roadways and bridges are used by personal motor vehicles, public and private transportation providers, bicyclists, and freight trucks. This places great importance on the region's roadways and bridges.

For households in smaller urbanized areas, like Clarksville, traveling by motor vehicle is the primary means of transportation.

This means that the condition of the MPO's roadways and bridges affect the overwhelming majority of household travel. The needs of bicyclists, public transit, and freight will also be discussed in greater detail later in this chapter.

BASED ON THE 2016 ACS 5-YEAR ESTIMATES, THIS METHOD OF TRAVEL ACCOUNTS FOR OVER 91 PERCENT OF COMMUTING WITHIN THE MPA'S TWO COUNTIES.

THE ROADWAY NETWORK

Several federal and state highways serve the study area and constitute its main roadway network. The most significant of these facilities are described in Table 6.1.

TABLE 6.1 MAJOR ROADWAYS

ROADWAY	DESCRIPTION
I-24	I-24 begins at an intersection I-75 in Chattanooga, TN and travels northwest to I-57 near Pulleys Mill, IL. It travels through the study area from southeast to northwest on the northern side of the study area.
US 41A	US 41A proceeds from southeast to northwest through the study area and is an alternate route to US 41. This highway begins in Nashville, TN and ends in Hopkinsville, KY.
US 79	US 79 begins at an I-35 in Round Rock, TX and travels north to US 68 in Russellville, KY. It travels through the study area from southwest to northeast on the northern side of the study area
TN 12	TN 12 begins in Nashville at its intersection with US 41 and proceeds through the study area from southeast to northwest, ending at the Kentucky State Line. This route runs concurrently with a portion of US 41A in the study area.
TN 13	TN 13 begins at the Alabama State Line at the end of AL 17 and proceeds through the study area from southwest to northeast, ending at the Kentucky State Line. This route runs concurrently with portions of US 41A and US 79 in the study area.
TN 48	TN 48 begins at TN 13 in Wayne Country and travels from south to north through the study area to its end at the Kentucky State Line.

Roadways by Functional Classification

Each type of roadway serves a function in the overall roadway network. Roadways are divided into functional classes based on their intended balance of mobility (speed) and access to adjacent land. Their designs vary in accordance with this functional classification.

Interstates: Interstates are the highest classification of Arterials and were designed and constructed with mobility and long-distance travel in mind. These facilities are divided highways with full control of access and grade separations at all intersections. The controlled access character of interstates results in high-lane capacities, which are three times greater than the individual lane capacities of urban arterial streets.

Other Freeways and Expressways: These roadways have directional travel lanes, and are usually separated by some type of physical barrier. Usually, their access and egress points are limited to on- and off-ramp locations, or a very limited number of at-grade intersections. This category of roadway is designed and constructed to maximize their mobility function, and abutting land uses are not directly served by them.

Arterials: These facilities are important components of the overall transportation system. They serve as feeders to interstates and expressways, and as principal travel ways between major land use concentrations within the MPA. Arterials are typically divided facilities (undivided where right-of-way limitations exist) with relatively high traffic volumes and traffic signals at major intersections. The primary function of arterials is to move traffic; they are the main means of local travel. A secondary function of arterials is land access. Principal Arterials often serve major centers of metropolitan areas and longer trips. Minor Arterials provide service for trips of moderate length and are often smaller facilities. Minor Arterials also offer connectivity to the higher Arterial system.

Collectors: These facilities provide both land service and traffic movement functions. Collectors serve as intermediate feeders between arterials and local streets and primarily accommodate short distance trips. Since collector streets are not intended to accommodate long through trips, they are generally not continuous for any great length. Generally, Major Collector routes are longer, have lower driveway densities, higher speed limits, and larger traffic volumes than Minor Collectors.

Local Streets: The sole function of these facilities is to provide access to immediately adjacent land. Within the local street classification, three subclasses are established to indicate the type of area served: residential, industrial, and commercial. These streets are not included in the computer network, except those that provide connectivity in the model network and improve the reliability of the model.

More information, including how urban and rural facilities differ from each other, can be found at: https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm

Figure 6.1 illustrates the functional classification of the Clarksville MPA's roadways. Table 6.2 summarizes this information by centerline miles and lane miles.

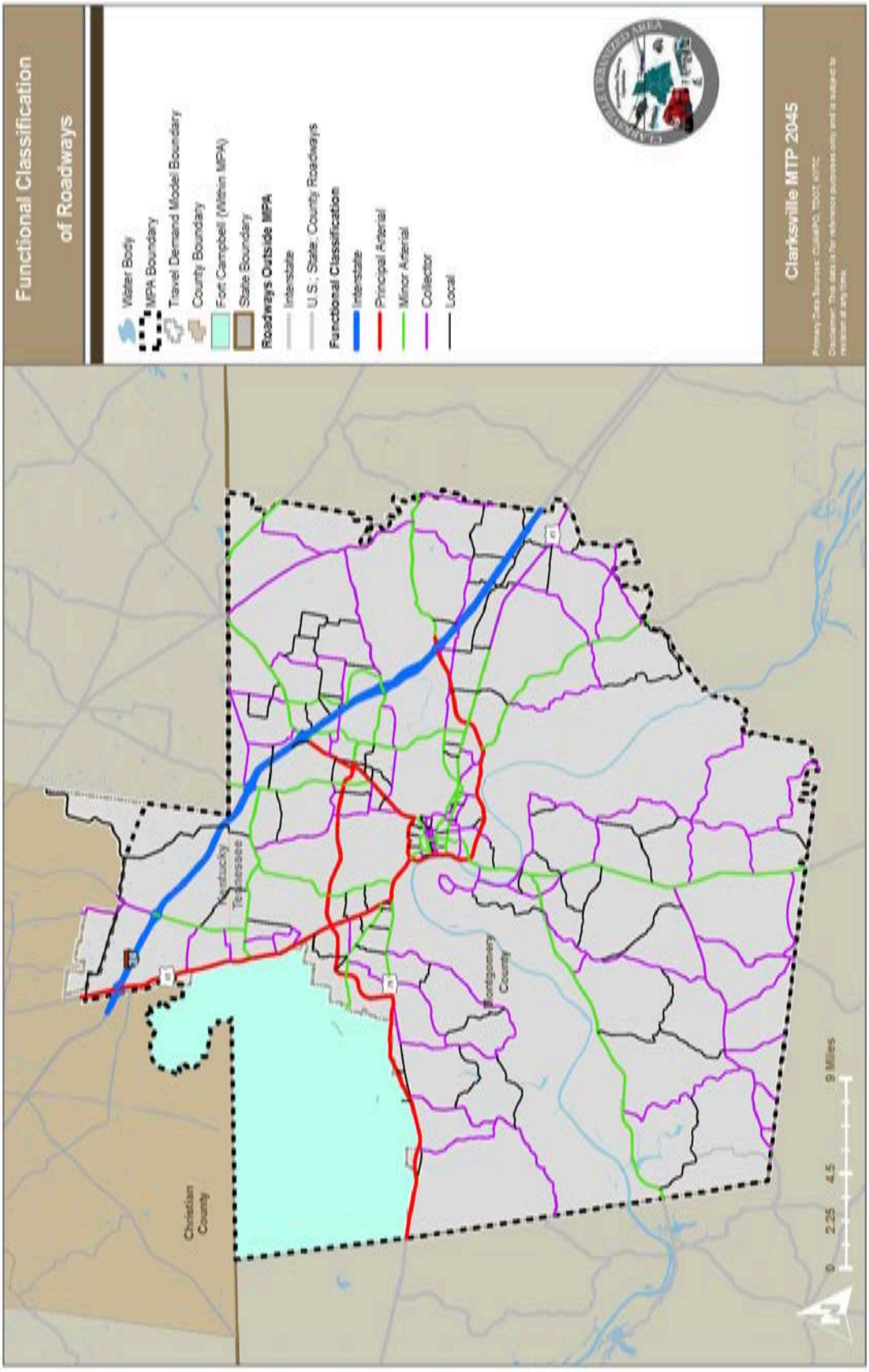


FIGURE 6.1 FUNCTIONAL CLASSIFICATION OF ROADWAYS

Table 6.2 Roadway Model Network Lane Mileage by Functional Class

Functional Class	Centerline Miles		Lane Miles	
	Miles	Percent	Miles	Percent
Interstate	25.6	6.11%	103.8	9.59%
Principal Arterial	54.5	13.01%	229.8	21.22%
Minor Arterial	115.7	27.63%	298.2	27.54%
Collector	223.0	53.25%	451.1	41.66%
Total	**418.8**	**100.00%**	**1082.9**	**100.00%**

Note: Does not include local roads

Source: Clarksville Regional Travel Demand Model

Roadways by Maintenance Responsibility

Within the MPA, excluding Fort Campbell, just over 55 percent of roadways in the model network are maintained by state agencies. These results are shown in Table 6.3 and illustrated in Figure 6.2. All of the principal arterials and many of the minor arterials are state or federal highways and are state-maintained roadways. The majority of the roadways classified functionally as local are maintained by a county or municipal agency. Most collectors within the MPA are also maintained by a county or municipal agency.

Table 6.3 Roadway Network Centerline Mileage by Maintenance Responsibility

Functional Class	Centerline Miles		Lane Miles	
	Miles	Percent	Miles	Percent
State	243.7	55.4%	710.5	62.7%
County or Municipality	196.0	44.6%	422.7	37.3%
Total	**439.7**	**100.0%**	**1,133.2**	**100.0%**

Note: Excludes local roads

Source: Clarksville Regional Travel Demand Model, HPMS

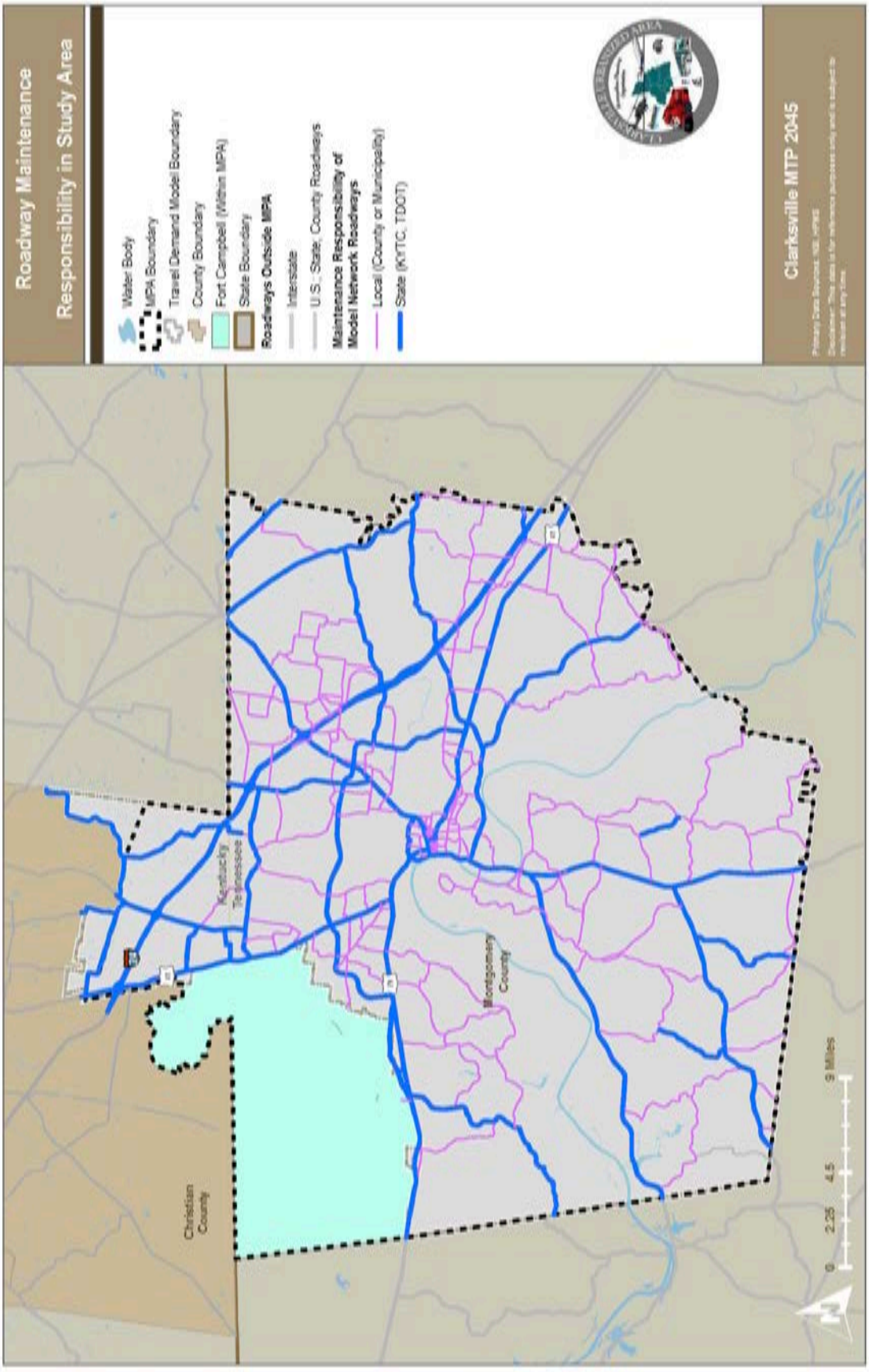


Figure 6.2 Roadway Maintenance Responsibility in MPA

Pavement Conditions

Maintaining sufficient pavement conditions ensures that roadways operate at their full capacity. Good pavement conditions provide roadway users with safe, comfortable travel experiences, while minimizing vehicle wear and tear.

Roadway projects that improve or maintain pavement conditions help to maintain roadway safety, one of the project scoring criteria discussed in Chapter 10.

Results from the public participation survey showed that road and bridge conditions were one of the public's top priorities. In a funding allocation exercise where the public was asked to allocate future transportation dollars by improvement type, the public allocated about 30 percent of all funding to maintaining roads through regular maintenance or due to safety concerns with the current roadway surfaces. On average, the public rated their current satisfaction with road and bridge conditions as fair to poor.

Pavement Conditions on National Highway System

Pavement condition ratings for the **MPA's** roadways were obtained from data submitted by KYTC and TDOT to the FHWA. This data is found in the Highway Performance Monitoring System (HPMS). The HPMS is a national level highway information system that includes data on the:

- extent,
- condition,
- performance, and
- use and operating characteristics of the nation's highways.

The HPMS data is sample dataset that is collected across the entire federal-aid eligible system for interstate, arterial, and collector networks. The pavement condition in the HPMS is based on the International Roughness Index (IRI), cracking, rutting, and faulting. The monitoring of pavement condition performance is a requirement of the FAST Act. All pavements on the Interstate or NHS will be classified as either in good, fair, or poor condition.

THE PERFORMANCE MEASURES ESTABLISHED BY THE FHWA ARE:

- Percentage of pavements of the Interstate System in Good condition
- Percentage of pavements of the Interstate System in in Poor condition
- Percentage of pavements of the non-Interstate NHS in Good condition
- Percentage of pavements of the non-Interstate NHS in Poor condition

Table 6.4 shows the percentage of the Clarksville MPA's Interstate and NHS roadways that are currently in good, fair, or poor condition based on the HPMS data available. The data was provided in roadway increments that are one-tenth of a mile long.

ALL OF THE INTERSTATE ROADWAYS IN THE MPA ARE IN FAIR CONDITION OR BETTER.

LESS THAN ONE PERCENT OF THE NON-INTERSTATE NHS ROADWAYS IN THE MPA ARE IN POOR CONDITION.

Figure 6.3 displays the available pavement condition data for the MPA. The figure shows that the worst pavement conditions are on US 79 from McClure Street to Rossview Road. Conditions on US 41A from US 79 to the Tennessee/Kentucky State Line should also be monitored.

Table 6.4 Pavement Condition for Roadways

Pavement Condition	Interstate NHS Routes			Non-Interstate NHS Routes		
	MPA Percent	TN Baseline Percent	KY Baseline Percent	MPA Percent	TN Baseline Percent	KY Baseline Percent
Good	98.80%	75.60%	66.20%	53.40%	44.80%	78.90%
Fair	1.20%	24.26%	33.80%	46.20%	51.96%	16.80%
Poor	0.00%	0.14%	0.00%	0.40%	3.24%	4.30%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: KYTC, TDOT

Pavement Condition Targets

The pavement condition performance measures were finalized by the FHWA with an effective date of May 20, 2017. This requires the states to set their targets by May 20, 2018 and report them to the FHWA in the Baseline Performance Period Report by October 1, 2018. These targets are to be reported every 4 years afterwards. Each state is required to establish 2-year and 4-year targets for non-Interstate NHS routes, and 4-year targets for Interstate routes for the first performance period (2018-2022). The CUAMPO may either support the targets established by KYTC and TDOT or establish their own. The MPO is required to establish 4-year targets for both non-Interstate NHS and Interstate routes. For the 2045 MTP, the CUAMPO has chosen to support the state targets established by KYTC and TDOT. Table 6.5 displays the TDOT and KYTC 2-year and 4-year pavement condition targets.

Table 6.5 TDOT and KYTC Pavement Condition Targets

Percent of Pavement Condition	Interstate NHS Routes		Non-Interstate NHS Routes	
	2-year Target	4-year Target	2-year Target	4-year Target
Tennessee				
Good	N/A	60.0%	42.0%	40.0%
Poor	N/A	1.0%	4.0%	4.0%
Kentucky				
Good	N/A	50.0%	35.0%	35.0%
Poor	N/A	3.0%	6.0%	6.0%

Source: KYTC, TDOT

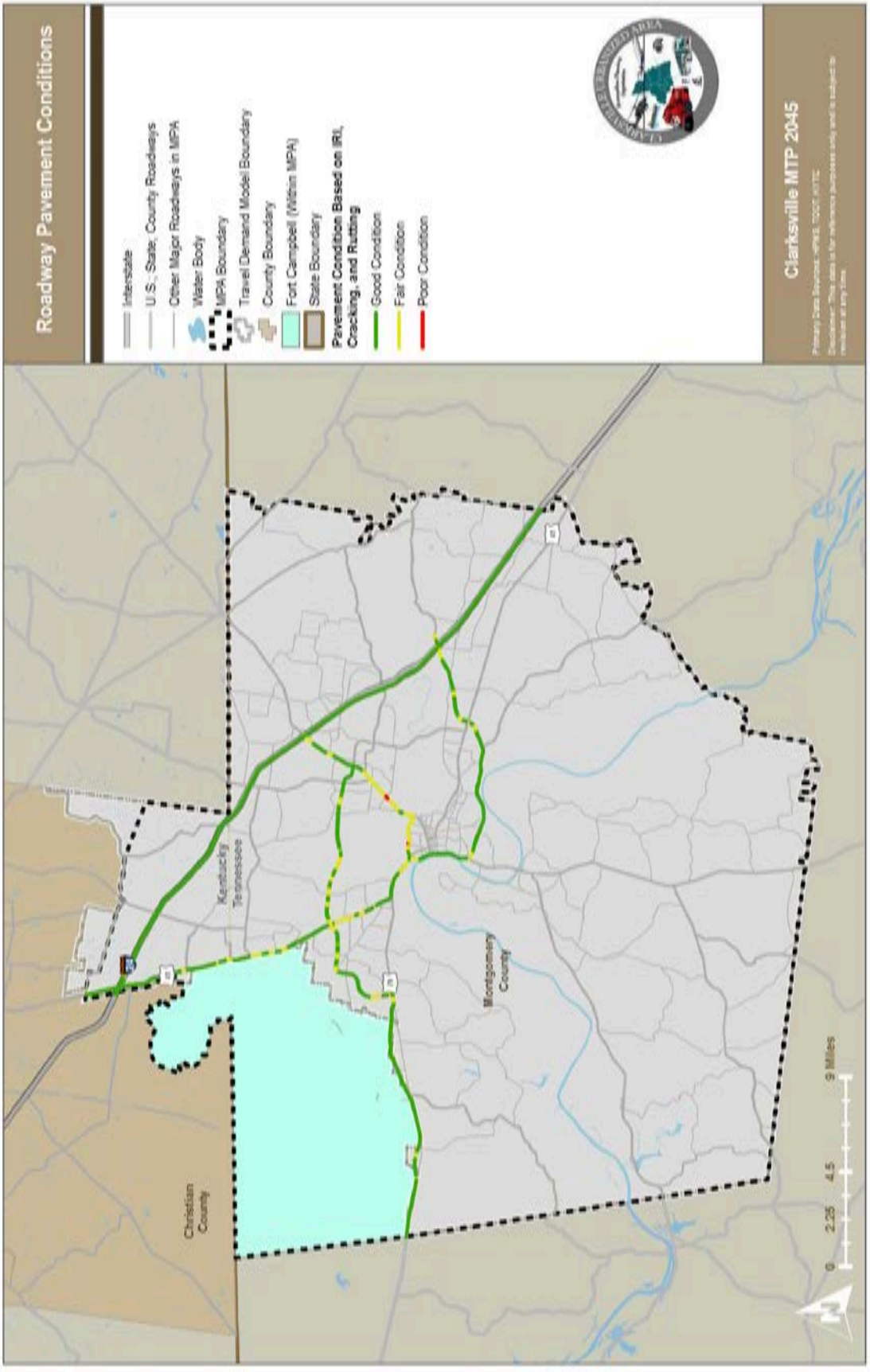


Figure 6.3 Roadway Pavement Conditions

Bridge Conditions

Bridges are a critical part of the overall transportation network. They serve as important connections over waterways, provide grade separation between roadways and other transportation facilities, and connect transportation facilities to each other. Bridges must be maintained and upgraded as needed in order to ensure that they are not safety or environmental hazards, bottlenecks, or limitations to freight movement.

As previously mentioned, results from the public outreach survey showed that the public places a high priority on maintaining the current transportation system and increasing its safety. In a funding allocation exercise where the public was asked to allocate future transportation dollars by improvement type, the public allocated 13 percent of all funding to maintaining roads, which includes bridges. A further 17 percent was allocated to project types that would increase roadway safety through wider lanes and shoulders. This indicates the need to maintain roadways that are necessary, but include safety issues that outweigh maintenance needs at this time. On average, the public rated their current satisfaction with road and bridge conditions as fair to poor.

There are nearly 200 bridges within, or in close proximity, to the Clarksville MPA.

Most of these cross waterways. However, there are many structures crossing over other roadways and railroads. One bridge in the MPA, the Port Royal Road Bridge, is listed on the NRHP.

Bridge Conditions and Scoring

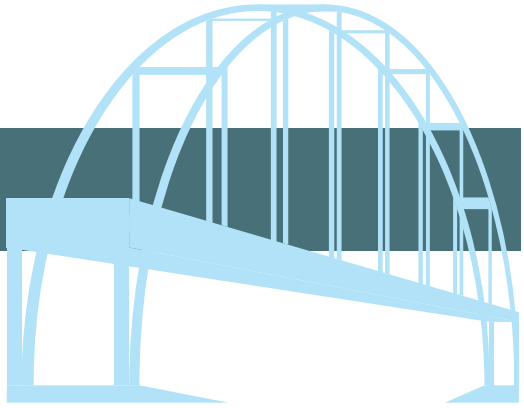
The National Bridge Inventory (NBI) provides bridge conditions for all bridges in the United States with public roads passing above or below them. This source also defines bridges to include bridge-length culverts. The FAST Act requires the performance monitoring of bridge conditions by the states and MPOs.

THE PERFORMANCE MEASURES ESTABLISHED BY THE FHWA ARE:

The percentage of NHS bridges classified as being in good condition.

The percentage of NHS bridges classified as being in poor condition.

The condition of the bridge is determined by the lowest rating of deck, superstructure, substructure, or culvert. If the lowest rating of these categories is greater than or equal to seven (7), the bridge is classified as good. If the score of the bridge is less than or equal to four (4), the classification is poor.



THERE ARE 16 BRIDGES IN THE CLARKSVILLE MPA THAT ARE DEFINED AS POOR BY THE FHWA STANDARDS.

Table 6.6 displays the available bridge condition data for the MPA. All of the bridges on the NHS system in the MPA are in fair or good condition.

Figure 6.4 shows the locations of the bridges within the MPA, except for Fort Campbell, and their condition. None of the bridges in poor condition are on NHS routes.

TABLE 6.6 BRIDGES BY CONDITION

Pavement Condition	NHS Bridges			Non-NHS Bridges		
	MPA Percent	TN Baseline Percent	KY Baseline Percent	MPA Percent	TN Baseline Percent	KY Baseline Percent
Good	57.90%	39.50%	34.80%	37.50%	N/A	N/A
Fair	42.10%	55.60%	61.40%	51.50%	N/A	N/A
Poor	0.00%	4.90%	3.80%	11.00%	N/A	N/A
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**0.00%**	**0.00%**

Source: KYTC, TDOT, National Bridge Inventory

Structurally Deficient and Functionally Obsolete Bridges

All bridges that were constructed more than ten (10) years ago are evaluated to determine if they are either "structurally deficient" or "functionally obsolete." However, neither of these designations necessarily means that a bridge is unsafe.

Structural deficiency is characterized by deteriorated conditions of significant bridge elements and potentially reduced load-carrying capacity. A structurally deficient bridge typically requires significant maintenance and repair to remain in service. These bridges would eventually require major rehabilitation or replacement to address the underlying deficiency.

A bridge is considered functionally obsolete when it does not meet current design standards (for criteria such as lane width). This can occur when either the volume of traffic carried by the bridge exceeds the level anticipated when the bridge was constructed and/or the relevant design standards have been revised. Addressing functional obsolescence may require the widening or replacement of the structure.

There are 15 structurally deficient bridges in the Clarksville MPA, none of which are on the NHS. There are also an additional 10 functionally obsolete bridges in the MPA, none of which are on the NHS.

In addition to the two bridge condition performance measures which MPOs must track, all states must ensure that no more than ten (10) percent of the total deck area of NHS bridges in the state is classified as structurally deficient.

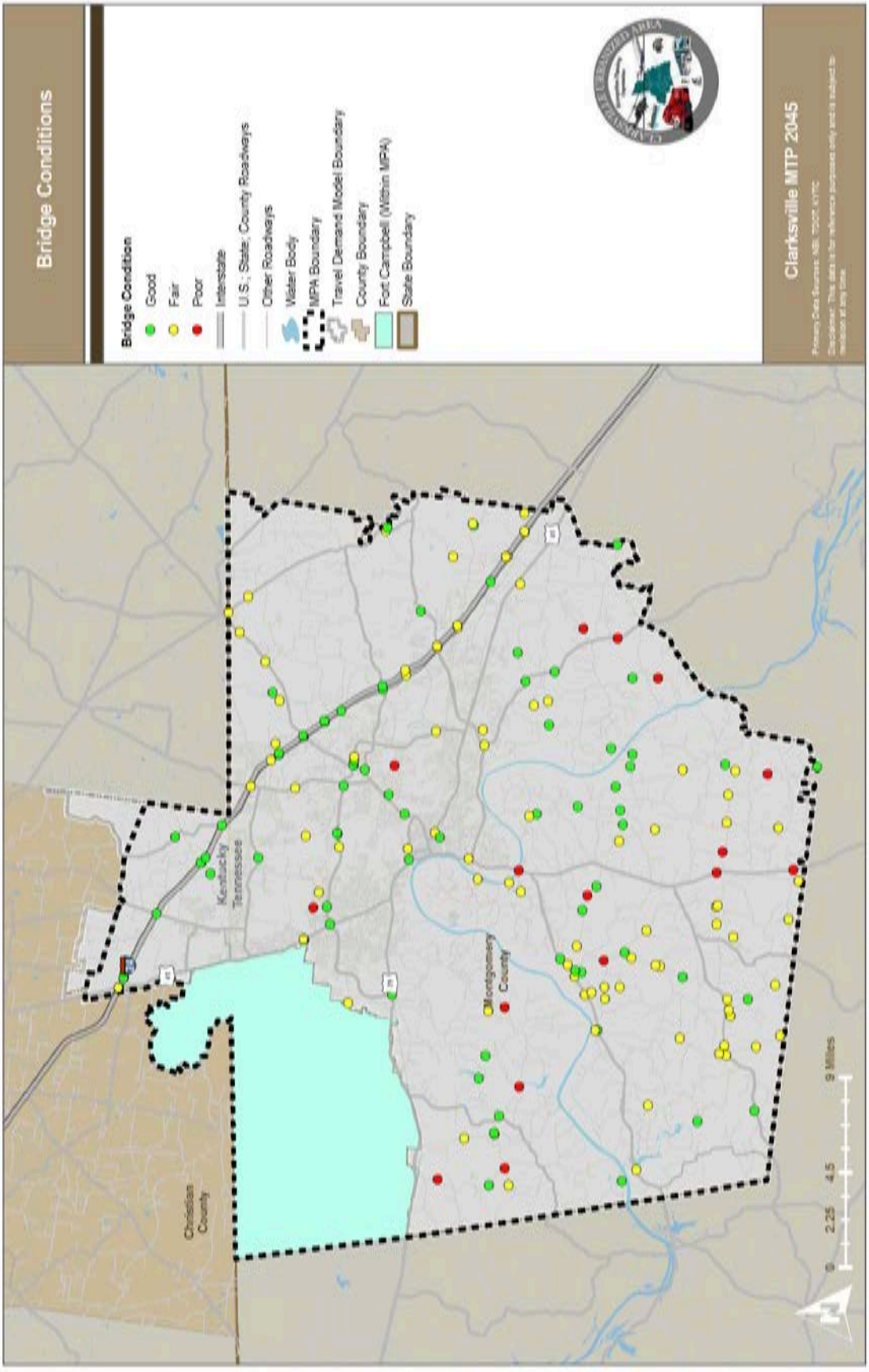


FIGURE 6.4 BRIDGE CONDITIONS

Bridge Condition Targets

Like the pavement condition performance measures, the bridge condition performance measures were finalized by the FHWA with an effective date of May 20, 2017. This requires the states to set their targets by May 20, 2018, and report them to the FHWA in the Baseline Performance Period Report by October 1, 2018. These targets are to be reported every 4 years afterwards. Each state is required to establish 2-year and 4-year targets. The MPO may either support the targets established by KYTC and TDOT or establish their own. The MPO is required to establish 4-year targets for the bridge performance measures. For the 2045 MTP, the CUAMPO has chosen to support the state targets established by KYTC and TDOT. Table 6.7 displays the TDOT and KYTC 2-year and 4-year bridge condition targets.

TABLE 6.7 TDOT AND KYTC BRIDGE CONDITION TARGETS

PERCENT OF BRIDGE CONDITION	NHS ROUTES	
	2-YEAR TARGET	4-YEAR TARGET
Tennessee		
Good	36.0%	36.0%
Poor	6.0%	6.0%
Kentucky		
Good	35.0%	35.0%
Poor	3.7%	3.2%

Source: KYTC, TDOT

Level of Service (LOS) Analysis

The HCM defines the concept of LOS as a qualitative measure describing operational conditions within a traffic stream for a specific time period. These conditions are generally described in terms of factors such as:

- speed and travel time
- freedom to maneuver
- traffic interruptions
- comfort
- convenience
- safety

Six (6) levels of service have been defined for each type of facility, and given letter designations, from A to F. Level of service A represents the best operating conditions, while level of service F represents the worst operating conditions. For urban areas such as the Clarksville MPA, the goal of many state and local governments is to reach an overall level of service D. The CUAMPO has adopted this goal. Figure 6.5 displays the different LOS categories and provides a brief description of each.

The LOS is often determined based on the volume-to-capacity ratio (V/C) of a roadway. The V/C is the relationship of the roadway's volume compared to its maximum capacity. Roadway capacities are a function of several factors, including roadway functional classification, number of lanes, travel speeds, and percent of truck traffic. Table 6.8 displays the V/C thresholds based on roadway functional classification and location.

Table 6.8 V/C Ratios by Functional Classification

Urban					
Level of Service	Interstates	Principal Arterials	Minor Arterials	Collectors	Local
A	0.30	0.30	0.30	0.30	0.30
B	0.50	0.50	0.50	0.50	0.50
C	0.70	0.70	0.70	0.65	0.65
D	0.90	0.85	0.85	0.80	0.80
E	1.00	1.00	1.00	1.00	1.00
F	>1.00	>1.00	>1.00	>1.00	>1.00

Rural						
Level of Service	Interstates	Principal Arterials	Minor Arterials	Major Collectors	Minor Collectors	Local
A	0.30	0.30	0.30	0.35	0.35	0.35
B	0.45	0.50	0.50	0.55	0.55	0.55
C	0.70	0.70	0.70	0.75	0.75	0.75
D	0.90	0.85	0.85	0.85	0.85	0.85
E	1.00	1.00	1.00	1.00	1.00	1.00
F	>1.00	>1.00	>1.00	>1.00	>1.00	>1.00

FIGURE 6.5 LEVEL OF SERVICE

	A	Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream. The general level of physical and psychological comfort provided to the driver is high.
	B	Reasonable free flow operations. The ability to maneuver with the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to the driver is high.
	C	Flow with speeds at or near free flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more vigilance on the part of the driver. The driver notices an increase in tension.
	D	Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is more noticeably limited. The driver experiences reduced physical and psychological comfort levels.
	E	At lower boundary, the facility is at capacity. Operations are volatile because there are virtually no gaps in the traffic stream. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.
	F	Breakdowns in traffic flow. The number of vehicles entering the highway section exceeds the capacity or ability of the highway to accommodate that number of vehicles. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.

Traffic, Congestion, and Reliability

The number of daily trips estimated by the Travel Demand Model, by trip purpose, in 2016 is summarized in Table 6.9. Nearly seven (7) percent of vehicle trips pass through the MPA. Internal commercial and freight vehicle trips (e.g., truck, taxi, etc.) account for about one in seven vehicle trips. The majority of vehicle trips in the MPA (57 percent) begin or end at home.

Table 6.9 Daily Vehicle Trips by Purpose, 2016

Trip Purpose	Vehicle Trips	Percent
Home-Based Work	111,652	21.16%
Home-Based Other	190,402	36.09%
Non-Home Based	113,353	21.48%
Commercial Vehicle	63,214	11.98%
Freight	12,366	2.34%
External-External	36,673	6.95%
Total	**527,659**	**100.00%**

Source: Clarksville Travel Demand Model, NSI

Table 6.10 shows how these trips are distributed onto the modeled transportation network. Most of the delay (nearly 61 percent) is estimated to occur on the principal and minor arterials. This coincides with where the most vehicle miles traveled and vehicle hours travelled occur. There is comparatively little delay estimated to occur on collectors. This is in large part due to travel on these roadways accounting for only 12 percent of vehicle miles traveled and 13 percent of vehicle hours traveled.

Table 6.10 Roadway System Travel Characteristics, 2016

	Daily Vehicle Miles Traveled (VMT)		Daily Vehicle Hours Traveled (VHT)		Daily Vehicle Hours Per Day (VHD)	
Functional Class	Number	Percent	Number	Percent	Number	Percent
Interstate	1,210,751	28.35%	33,294	24.48%	13,832	29.61%
Principal Arterial	1,258,285	29.46%	40,998	30.15%	14,181	30.36%
Minor Arterial	1,272,585	29.80%	43,326	31.86%	14,131	30.25%
Collector	528,892	12.38%	18,375	13.51%	4,564	9.77%
Total	**4,270,513**	**100.00%**	**135,993**	**100.00%**	**46,708**	**100.00%**

Source: Clarksville Travel Demand Model, NSI

Figure 6.6 confirms that vehicular traffic in the Clarksville MPA is greatest on I-24, US 41A, and US 79/SR-13, and SR-374 from US 41A to US 79. These areas have estimated average daily volumes exceeding 30,000 vehicles.

Figure 6.7 shows the LOS for the major roadways in the Clarksville MPA. Currently, there are 20 roadway segments in the MPA (summarized in Table 6.11) that experience a LOS of F. Most of these segments are near the intersections of roadways and/or at interstate interchanges with high traffic volumes. This suggests that peak period congestion is currently an issue in the Clarksville MPA.

Table 6.11 Roadway Corridors with Volumes Exceeding Capacity, 2016

Roadway	From/To	Length (miles)
US 41A/US 79	0.30 miles west of Peacher's Mill Road to US 79/Kraft Street	1.50
US 41A/Madison Street	10th Street to 0.23 miles east	0.23
US 41A Bypass	Old Ashland City Road to SR-12	0.45
US 79/SR-13	Kraft Street to Old Trenton Road	0.73
US 79/SR-13	I-24 Ramps	0.27
US 79/SR-13	Jim Johnson Rd to 1.63 miles east	1.63
SR-13/SR-48	Old Hwy 48 to US 41A Bypass	4.93
SR-374/Richview Road	0.38 miles west of Ted Crozier Boulevard to SR-237	1.00
SR-374/Richview Road	0.32 miles north of Dunbar Cave Road to Memorial Drive	2.32
SR-48/Trenton Road	Needmore Road to 0.99 miles north	0.99
SR-48/Trenton Road	SR-236 to SR-249	0.62
SR-236/Tiny Town Road	Peacher's Mill Road to Needmore Road	0.69
Hornerger Lane	Franklin Street to SR-48	0.10
Zinc Plant Road	Briarwood Road to SR-13	0.97
Peacher's Mill Road	0.12 miles south of SR-374 to 0.56 miles south of SR-374	0.44
Needmore Lane	SR-48 to US 79	0.95
Old Trenton Road	W Dunbar Cave Road to Whitfield Road	0.39
Whitmore Road	0.25 miles south of SR-374 to Needmore Road	0.47
Dunbar Cave Road	US 79 to 0.32 miles east	0.32
Dunlop Lane	Ted Crozier Boulevard to International Boulevard	1.03

Source: Clarksville Travel Demand Model, NSI

While most of the region's roadways do not have daily volumes that exceed their daily capacities, there may still be congestion issues at specific times, notably peak periods. Travel time reliability addresses this issue by evaluating how travel times vary by time of day. For the purposes of the MTP, the travel time reliability analysis focused on peak periods. Reliability issues related to traffic incidents, construction, special events, or other events would require a more detailed analysis.

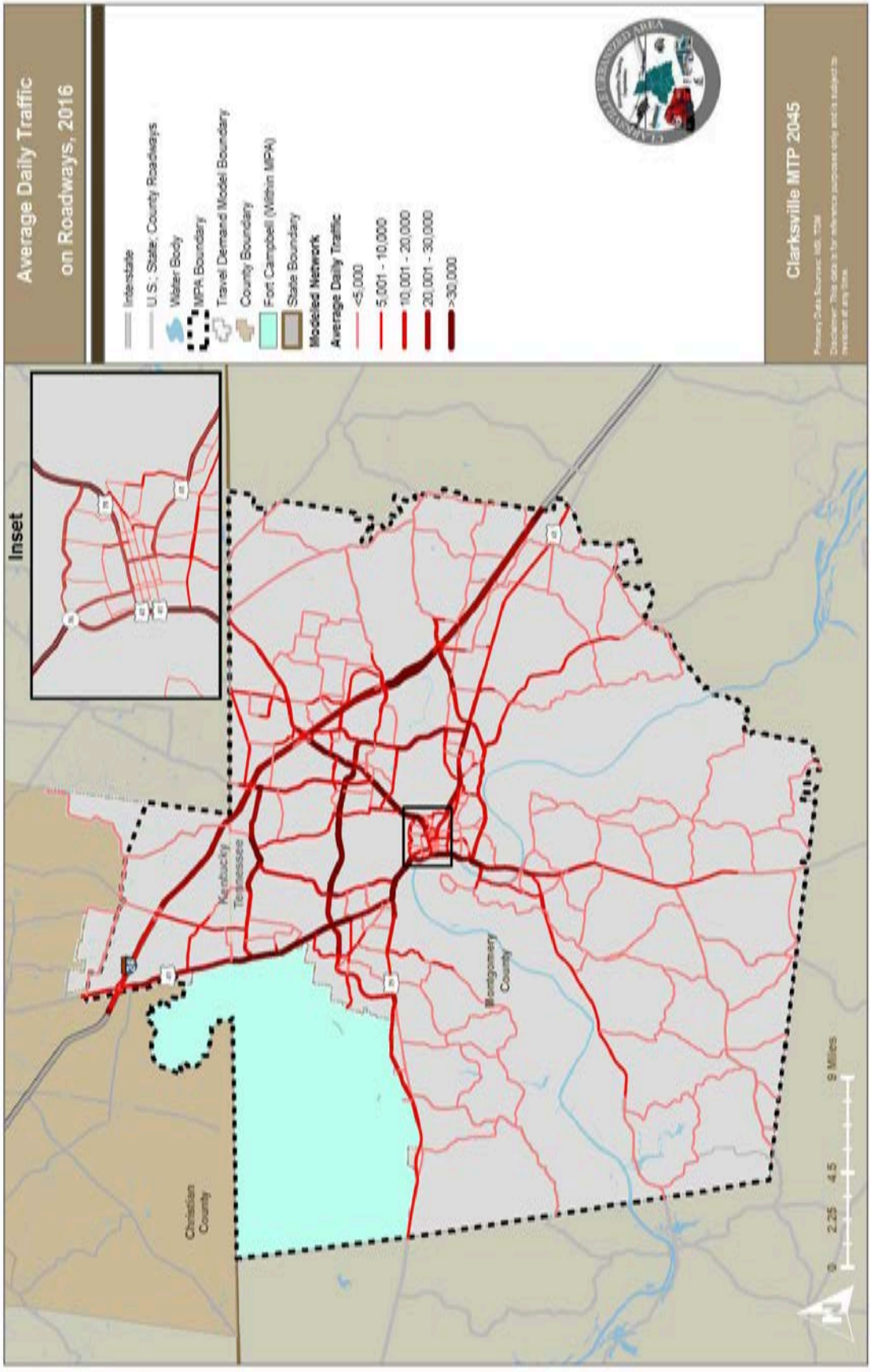


Figure 6.6 Average Daily Traffic on Roadways, 2016

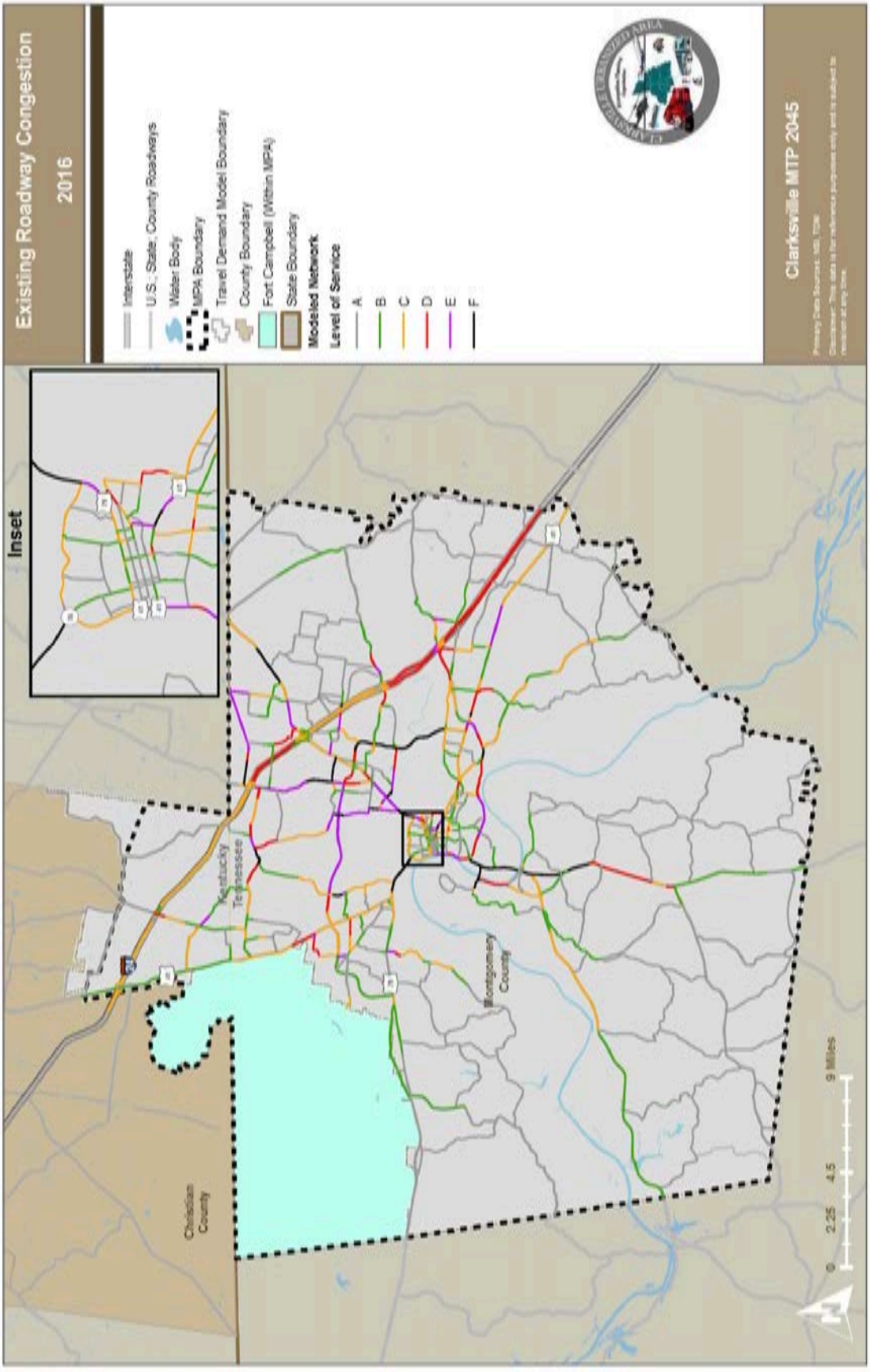


Figure 6.7 Existing Roadway Congestion, 2016

The Level of Travel Time Reliability (LOTTR) is defined as a roadway segment's ratio of a longer travel time (80th percentile) to a "normal" travel time (50th percentile.) The MPA's LOTTR data was obtained from the FHWA's National Performance Management Research Data Set (NPMRDS.) Roadway segments with an LOTTR less than 1.5 are defined by the FHWA as reliable.

The established performance measures for system reliability are:

- Percent of Person-Miles Traveled on the Interstate that are reliable.
- Percent of Person-Miles Traveled on the Non-Interstate NHS that are reliable.

Table 6.12 displays the baseline reliability conditions of the MPA's Interstate and non-Interstate NHS routes.

LESS THAN EIGHT (8) PERCENT OF THE MPA'S NHS ROADWAYS ARE NOT CONSIDERED RELIABLE.

Figure 6.8 shows the LOTTRs for the NHS routes in the MPA.

TABLE 6.12 MPA NHS ROADWAY RELIABILITY

Pavement Condition	Interstate			Non-Interstate		
	MPA Percent	TN Baseline Percent	KY Baseline Percent	MPA Percent	TN Baseline Percent	KY Baseline Percent
Reliable	100.00%	87.70%	65.69%	92.40%	N/A	N/A
Not Reliable	0.00%	12.30%	4.31%	7.60%	N/A	N/A
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**N/A**	**N/A**

Source: NPMRDS, RITIS

System Performance Targets

Performance measures for overall system performance were finalized by the FHWA with an effective date of May 20, 2017. This requires the states to set their targets by May 20, 2018, and report them to the FHWA in the Baseline Performance Period Report by October 1, 2018. These targets are to be reported every 4 years afterwards. Each state is required to establish 2-year and 4-year targets for the Interstate performance measures, and a 4-year target for the non-Interstate performance measures. The CUAMPO may either support the targets established by KYTC and TDOT or establish their own. Following the 2022 reporting period, both Interstate and non-Interstate NHS targets will be on the same cycle. The CUAMPO is required to establish 4-year targets for both the Interstate and non-Interstate NHS performance measures. For the 2045 MTP, the CUAMPO has chosen to support the state targets established by KYTC and TDOT. Table 6.13 displays the TDOT and KYTC 2-year and 4-year system performance targets.

Table 6.13 TDOT and KYTC System Performance Targets

Percent of Pavement Condition	Interstate NHS Routes		Non-Interstate NHS Routes	
	2-year Target	4-year Target	2-year Target	4-year Target
Tennessee				
Reliable	85.3%	83.0%	N/A	87.5%
Kentucky				
Reliable	**93.0%**	**93.0%**	**N/A**	**82.5%**

Source: KYTC, TDOT

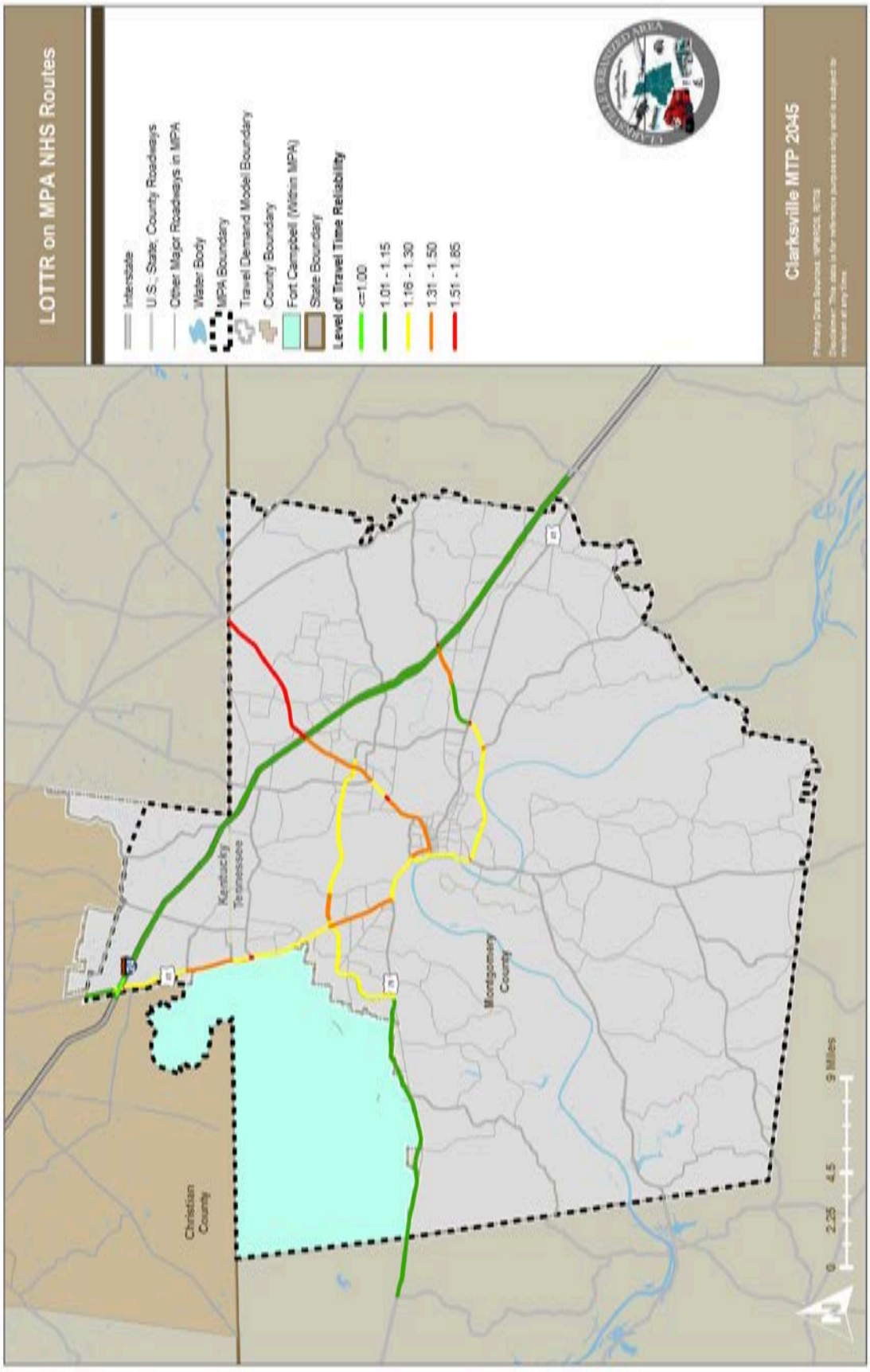


FIGURE 6.8 LOTTR ON MPA NHS ROUTES

Alternative Fuel Vehicles and Stations

Alternative Fuel Vehicles (AFVs) are vehicles which rely on fuels that are substantially non-petroleum, yield substantial energy security benefits, and offer substantial environmental benefits. These include fuels such as:

- liquefied petroleum gas (propane)
- Compressed Natural Gas (CNG)
- Liquefied Natural Gas (LNG)
- 85% and 100% Methanol (M85 and M100)
- 85% and 95% Ethanol (E85 and E95)
- electricity
- hydrogen

E85 and E95 should be distinguished from the more universal E10 and E15 fuels. E10 and E15 fuels have lower concentrations of ethanol and thus are not considered low-carbon. Hybrid vehicles are also considered AFVs.

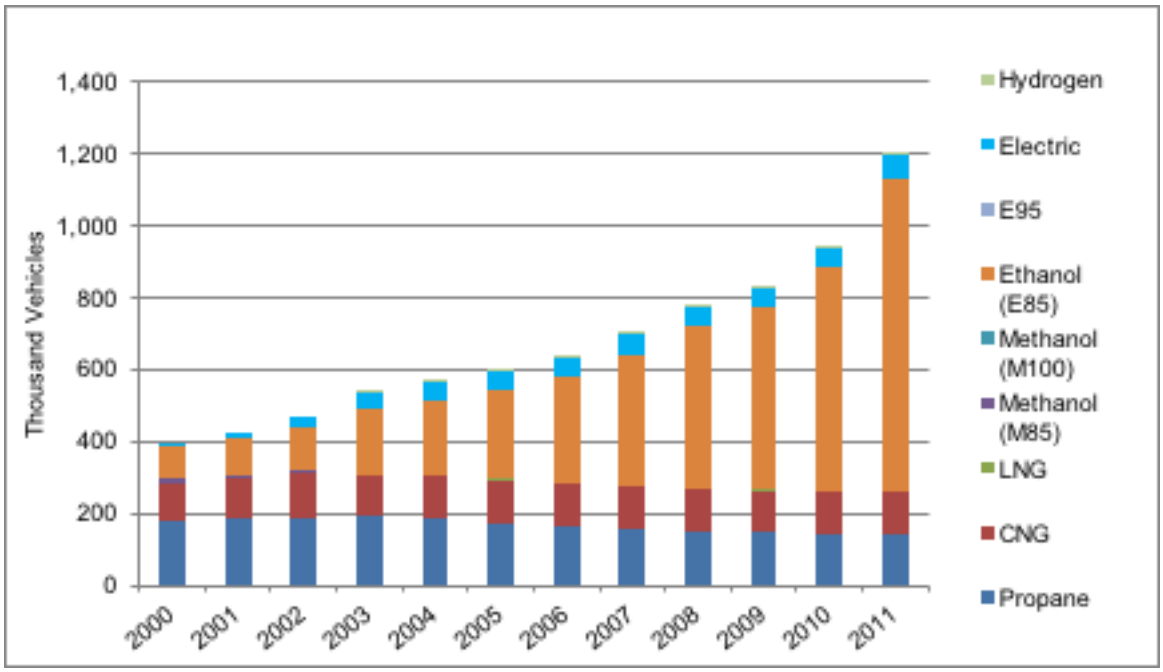
Existing Stock of AFVs

Data from the U.S. Department of Energy's Alternative Fuels Data Center indicates that the most used AFVs today use E85, propane, CNG, and electricity. The Alternative Fuels Data Center locator shows that the Clarksville area makes use of several AFV fuels. These are:

- electric
- ethanol
- hydrogen
- propane

The number of AFVs in use across the county has increased steadily from 1995 to 2011. This is largely due to federal policies that encourage and incentivize the manufacture, sale, and use of vehicles that use non-petroleum fuels. The popularity of ethanol vehicles grew widely during this time period. However, with the exception of electric vehicles, the number of other AFVs remained relatively constant.

FIGURE 6.9 ALTERNATIVE FUEL VEHICLES IN USE IN UNITED STATES, 2000-2011

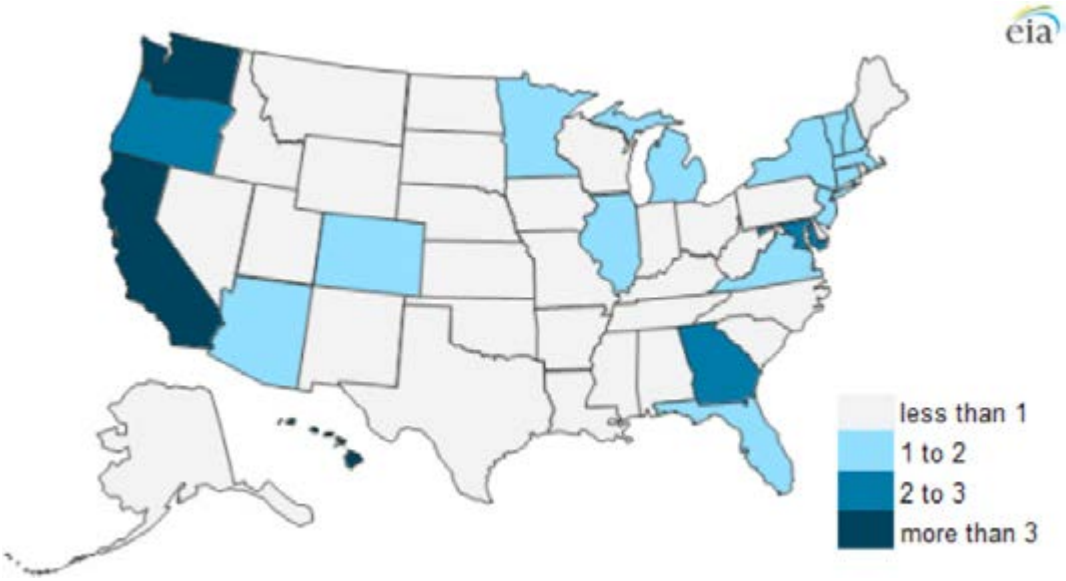


Recent data from other sources show that the number of electric vehicles has begun to steadily increase. There is also a growing concern that biofuels, such as ethanol, may have an overall environmental impact that is worse than petroleum-based fuels. This is once indirect emissions and land use impacts are taken into account.

According to 2013 data from the U.S. Energy Information Administration's Annual Energy Outlook, the most popular alternative fuel sources for cars and light-duty trucks in the U.S. are E85 (flex-fuel vehicles) and electricity (hybrid electric vehicles and plug-in electric vehicles). **In 2013, ethanol AFVs accounted for slightly over five percent of all cars and light-duty trucks, which includes fleet vehicles.** Electric AFVs accounted for slightly over one percent.

It should be noted that the popularity of different AFVs varies greatly by region. E85 AFVs are more popular in the Midwest, while electric AFVs are more popular on the West Coast. The use of electric AFVs across the nation is shown in Figure 6.10.

FIGURE 6.10 PLUG-IN ELECTRIC VEHICLES PER 1,000 REGISTERED VEHICLES



AFV Stations

At the national level, over 60 percent of all AFV stations are for electric vehicles. Approximately 18 percent of the AFV stations are for propane vehicles, while E85 accounts for 15 percent. In the Clarksville MPA area, the Alternative Fuels Data Center shows that there are 12 alternative fueling stations in the MPA. More than half of those stations are for ethanol fuel. It is important to note that publicly accessible AFV stations are constructed and managed both by private entities and local governments.

CLARKSVILLE MPA AREA

12

ALTERNATIVE FUELING STATIONS

6.2 | Bicycle and Pedestrian

Personal vehicles are the primary mode of transportation in the Clarksville MPA. The use of alternative modes of transportation, such as walking and bicycling, decrease the load on infrastructure, reduce emissions, and increase health and livability. To optimize utilization, alternative transportation networks should be interconnected and integrated with vehicular thoroughfares.

CITIZENS AND POLICYMAKERS IN THE REGION HAVE SHOWN A DESIRE TO IMPROVE BICYCLE AND PEDESTRIAN INFRASTRUCTURE.

SEVERAL PLANS EXIST THAT ADDRESS THE NEEDS OF THE COMMUNITY, INCLUDING THE:

- Tennessee's State Bicycle Route Plan
- TDOT's 25-Year Long-Range Transportation Policy Plan
- Middle Tennessee Connected 2016-2040 Regional Transportation Plan
- Montgomery County, TN Zoning Code
- Clarksville, TN Zoning Code
- Clarksville Montgomery County Subdivision Regulations (2015)
- Clarksville-Montgomery County Greenway and Blueway Master Plan (2014)
- Downtown Clarksville Parking and Street Network Study (2010)
- Clarksville Smart Growth Plan 2030
- Clarksville Sidewalk Construction Priority Map (2016)
- Clarksville Strategic Transit Plan (2016)
- Clarksville Comprehensive Operations Analysis (2016)
- Oak Grove Zoning Ordinance

Classification of Bike/Ped Facilities and Bicycle Users

Types of Facilities

There are several ways that bicycle and pedestrian facilities can be designed to provide adequate accommodations for non-motorized travel needs. The American Association of State Highway and Transportation Officials (AASHTO) Guide to Bicycle Facilities, provides guidance on the type(s) of bicycle facilities that are most appropriate for specific roadway settings. Additionally, the KYTC published a Lane Configuration Guide to Support Safe Bicycling and Vehicular Travel based on the Manual on Uniform Traffic Control Devices (MUTCD).

Below is a brief description of each type of facility:

Shared Lane (or Shared Roadway) – This type of facility does not designate a separate area for bicycle traffic. Cyclists travel in the same lane as motorized vehicles, with no increase in lane width. Shared lanes can either be marked or unmarked. Under Tennessee and Kentucky state law, bicycles have the same rights and responsibilities as motorized vehicles. This effectively makes all public roads shared lane facilities, unless marked otherwise. Shared lanes may be marked by posting "Share the Road" signs that promote motorist awareness of bicyclists. The use of "sharrow" marking is a recently adopted alternative for roads with a speed limit of 35 mph or less.

Wide Outside Lane – These lanes are a modification of a shared lane, in which the roadway lane is wider than standard (typically 14 feet instead of 11 or 12 feet). The increased width allows bicycles and motor vehicles to operate with fewer potential conflicts. The facilities allow motor vehicles to pass a bicyclist and maintain the required 3-foot distance while remaining in the same lane.

Bicycle Boulevard – This type of facility is a designated alternative to a roadway with high traffic volumes or limited space for bicycles. Bicycle boulevards provide travel in the same direction as the roadway, and often travel parallel to the roadway.

Bike Lane – These facilities are solely used by cyclists. They are designated using pavement markings, striping, and special signing.

Buffered Bike Lane- These facilities are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

Shared-Use Path – This type of facility may be used by cyclists and pedestrians. It is physically separated from motorized vehicles, and can be constructed adjacent to a street or highway. When these facilities are built near roadways, there are adequate safeguards designed to keep motorized vehicles from entering the path.

Shoulder – Roadway shoulders provide a safe area for cyclists, while lessening the chance that motorists must enter the opposite lane to avoid them. Typically, shoulder widths are at least four feet and are not marked as a bike lane.

Multi-Use Paths – This type of facility can be paved or unpaved. It is intended for use by cyclists, pedestrians, rollerbladers, and horseback riders.

Greenways are a type of multi-use path that are developed within a natural corridor. Their purpose is conservation, as well as non-motorized transportation and recreation.

Sidewalks – This type of facility is solely used for pedestrians. Sidewalks are often located along roadways, separated with a curb and/or planting strip, and have a hard, smooth surface. All sidewalks must meet the requirements of the Americans with Disabilities Act (ADA). The ADA requires public rights-of-way to be accessible to people with disabilities, including those with visual impairments.

Types of Bicycle Users

Bicycle travel varies with trip purpose and/or rider proficiency. A 1994 report by the FHWA outlines three general categories of cyclists. These categories assist highway designers in selecting the appropriate types of facilities. These guidelines have been adopted by the AASHTO Guide to Designing Bicycle Facilities (2012).

Group A cyclists: These are advanced or experienced cyclists who generally use their bicycle as they would a motor vehicle. They typically prefer direct access to destinations, with a minimum of detour or delay. They are generally comfortable riding with traffic, and prefer to have sufficient operating space on the travelway or shoulder; eliminating the need for the cyclist or a passing motor vehicle to shift position.

Group B cyclists: This category includes basic or less confident adult riders. They might use their bicycles for transportation purposes, such as traveling to work or shopping. They prefer avoiding roads with fast or busy traffic unless there is ample separation between them and the traffic. They are comfortable riding on neighborhood streets and separated pathways, and prefer designated facilities such as pathways and striped bicycle lanes.

Group C cyclists: Children riding on their own or with parents are included in group C. They may not travel as far as Group A or B cyclists, but require access to key destinations in their community (e.g. schools, recreational facilities or convenience stores). Appropriate facilities for group C bicyclists include:

- separated pathways,
- residential streets with low vehicle speeds, and
- other streets with well-defined separation between bicyclists and motor vehicles.

No single type of facility meets the needs or desires of all cyclists. Typically, the needs of Groups B and C are combined to create two broad classes of cyclists for design consideration. Group A cyclists are best served by sufficient operating space on all roadways. Group B and C bicyclists are better served by designated bicycle routes and/or separated pathways. Table 6.14 displays the types of bicycle facilities that are best applied to the given conditions.

Table 6.14 Design of Bicycle Facilities for Given Conditions

Bike Facility Type	Best Use	Motor Vehicle Design Speed	Traffic Volume	Classification or Intended Use
Shared Lanes (unmarked)	Minor roads with low volumes, where bicyclists can share the road with no special provisions.	Variable (rural or urban)	Generally less than 1,000 vehicles per day	Rural roads, or neighborhood/local streets.
Bicycle Boulevards	Local roads with low volumes and speeds, offering an alternative to, but running parallel to, major roads.	Use where the speed differential between motorists and bicyclists is typically 15 mph or less. Generally posted limits of 25 mph or less.	Generally less than 3,000 vehicles per day.	Residential roadways.
Marked Shared Lanes	Space-constrained roads with narrow travel lanes, or road segments for which bike lanes are not selected, due to space constraints or other limitations.	Variable. Use where the speed limit is 35 mph or less.	Variable. Useful where there is high turnover in onstreet parking.	Collectors or minor arterials.
Shared Lanes (wide outside lanes)	Major roads where bike lanes are not selected due to space constraints or other limitations.	Variable. Generally, any road where the design speed is more than 25 mph.	Generally more than 3,000 vehicles per day.	Arterials and collectors intended for major motor vehicle traffic movements.
Bike Lanes	Major roads that provide direct, convenient, quick access to major land uses. Also can be used on collector roads and busy urban streets with slower speeds.	Generally, any roadway where the design speed is more than 25 mph.	Variable. Speed differential is generally a more important factor in the decision to provide bike lanes than traffic volumes.	Arterials and collectors intended for major motor vehicle traffic movements.
Paved Shoulder	Rural highways that connect town centers and other major attractions.	Variable. Typical posted rural highway speeds (generally 40-55 mph)	Variable.	Rural roadways; intercity highways

Source: AASHTO Guide to Bicycle Facilities 2012

continued

TABLE 6.14 DESIGN OF BICYCLE FACILITIES FOR GIVEN CONDITIONS

BIKE FACILITY TYPE	BEST USE	MOTOR VEHICLE DESIGN SPEED	TRAFFIC VOLUME	CLASSIFICATION OR INTENDED USE
OFF-ROAD FACILITIES				
Shared use path adjacent to roadway	Adjacent to roadways with no or very few intersections or driveways. The path is used for a short distance to provide continuity between sections of path on independent rights of way.	Use where the adjacent roadway has high- speed motor vehicle traffic, such that bicyclists might be discouraged from riding on the roadway.	Use where the adjacent roadway has very high motor vehicle traffic volumes, such that bicyclists might be discouraged from riding on the roadway.	Provides a separated path for bicyclists and pedestrians. Intended to supplement a network of on-road bike lanes, bicycle boulevards, and paved shoulders. Not intended to substitute or replace on road accommodations for bicyclists, unless bicycle use is prohibited.
Shared use path on independent right-of-way (greenway)	Linear corridors in greenways, or along waterways, freeways, active or abandoned rail lines, utility right of way, or unused right of way.	N/A	N/A	Provides a separated path for bicyclists and pedestrians. Intended to supplement a network of on-road bike lanes, bicycle boulevards and paved shoulders.

Source: AASHTO Guide to Bicycle Facilities 2012

Existing Conditions

Bicycle Facilities

The Update of Tennessee's State Bicycle Route Plan inventories the State's bicycle routes. The state bicycle routes in Montgomery County are shown to the right. The state bicycle routes within the MPA are the Kentucky to Alabama Midstate, and the Reelfoot Lake to Nashville Route.

The routes identified in the Update of Tennessee's State Bicycle Route Plan are state, county, and city streets and highways. These roadways are used by trucks and cars, with no special lanes provided for bicycles. Currently, the routes are not signed.

Source: Update of Tennessee's State Bicycle Route Plan

The City of Clarksville maintains approximately 24.6 miles of separate lane bike paths. The paths are primarily focused in the downtown area. The existing paths, and proposed paths within the City of Clarksville from the Clarksville-Montgomery County Greenway and Blueway Master Plan are shown in Figure 6.11. Additional paths depicting the outlying areas can be found in the full plan document[1].

City of Clarksville

24.6

Miles of Separate Bike Lanes

1 http://www.cuampo.com/files/GreenwayBluewayMasterPlan2015-05-07.pdf

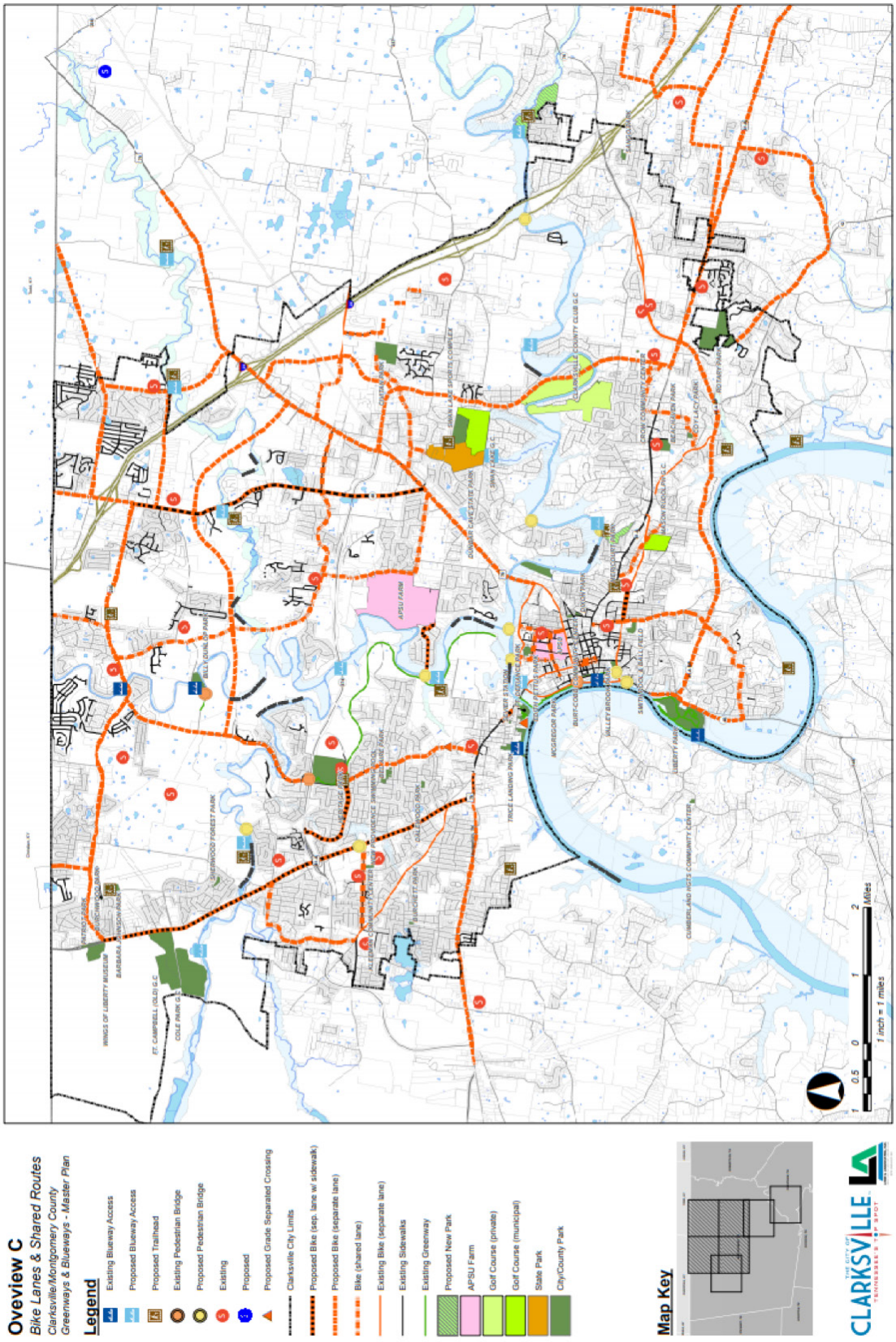


FIGURE 6.11 EXISTING AND PROPOSED BICYCLE PATHS IN CLARKSVILLE

Source: Clarksville Montgomery County Blueway and Greenway Master Plan

In 2016, a bike sharing service (BCycle) was launched in Clarksville and expanded to include the Austin Peay State University in 2018. This service operates at five (5) strategic locations, shown in Figure 6.12. The service provides access to 44 bicycles, displayed in Table 6.15.

6.15 BCycle Locations

Name	Address	Bikes	Docks
Pollard Trailhead (Greenway)	1011 Pollard Rd	10	5
Cumberland Riverwalk	640 N Riverside Drive	8	6
Public Square + Franklin	1 Public Square	10	4
Liberty Park	1451 Zinc Plant Road	6	8
Austin Peay State University	Foy Recreation Center	10	--

Source: BCycle.com

The City of Clarksville Parks and Recreation is considering a bike and pedestrian advocacy group and has conducted initial meetings to gauge interest.

In the City of Oak Grove, the Southern Lakes Bike Tour route passes through the northeastern part of the Plan area. This route uses Bradshaw Road (KY-109) and Barkers Mill Road (KY-1881).

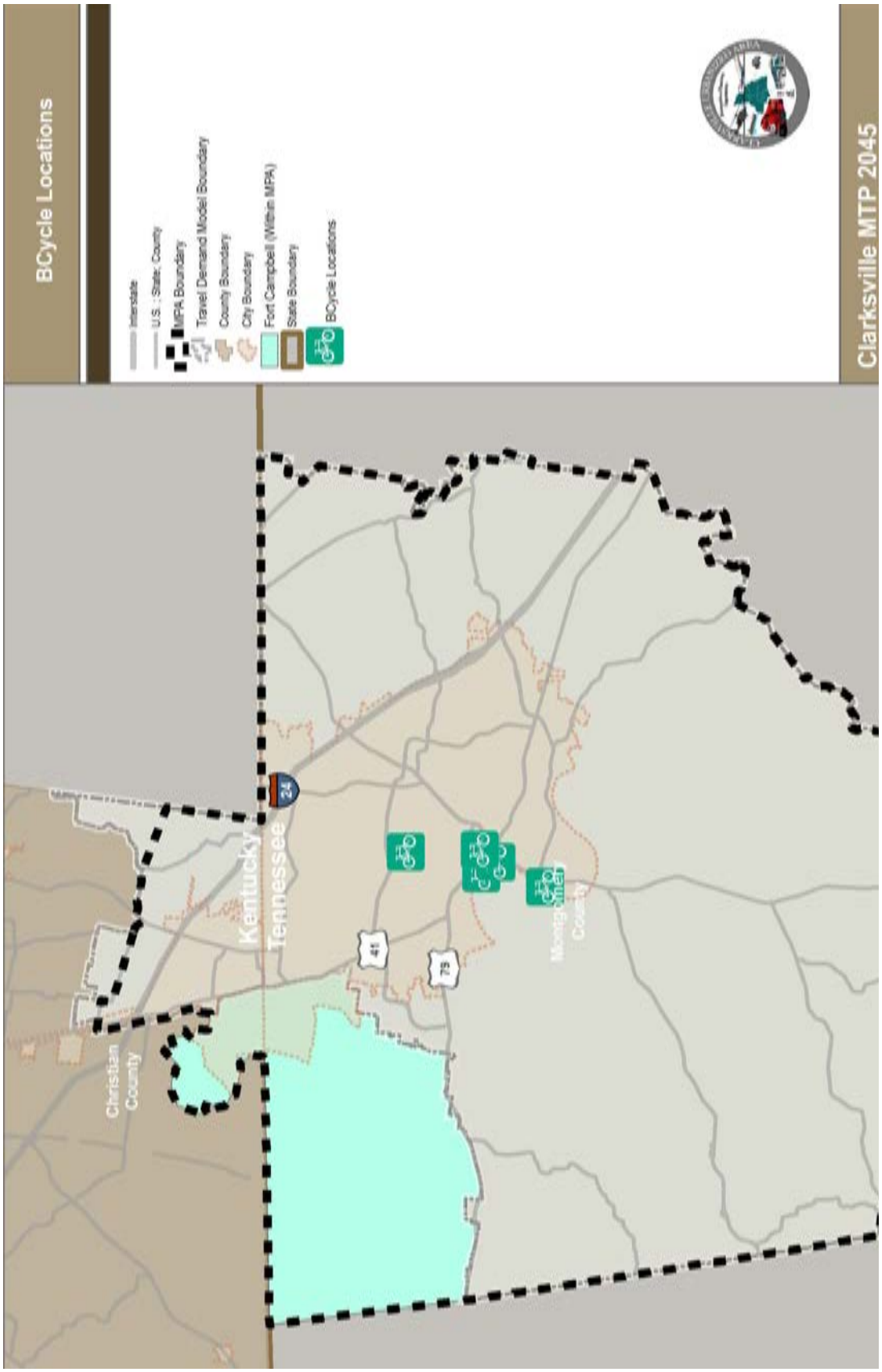
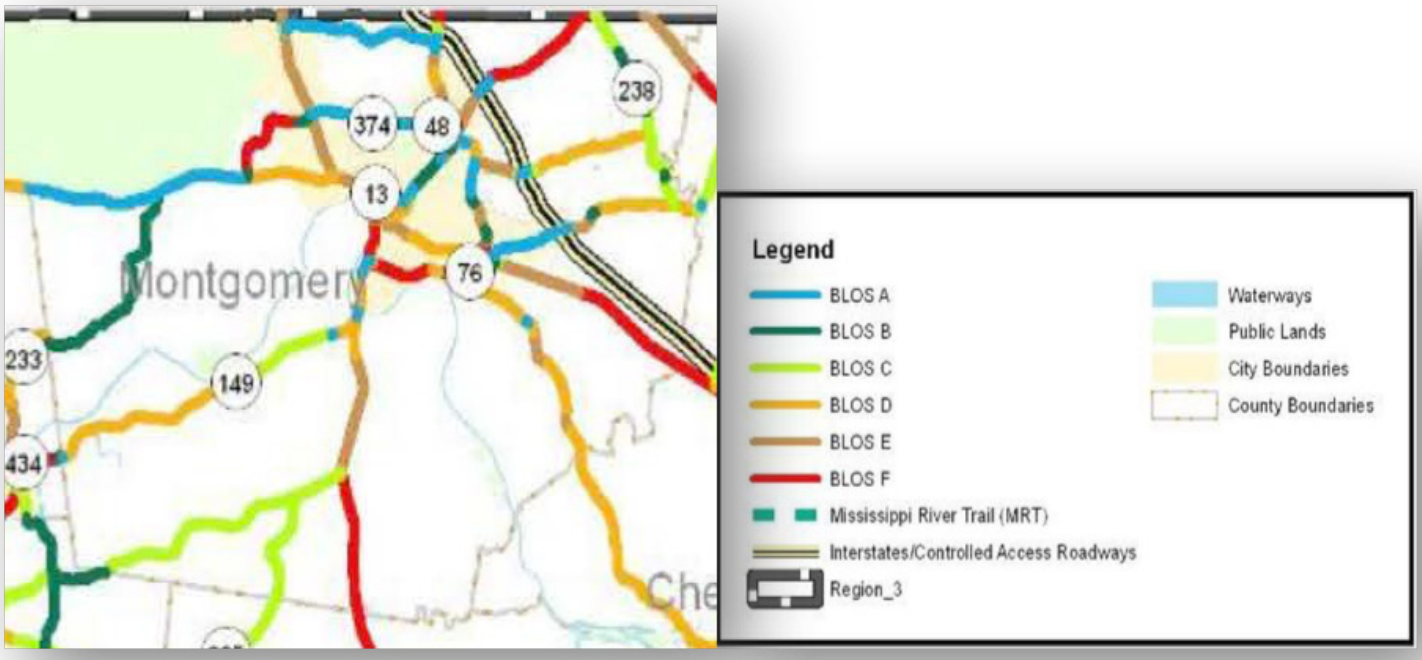


FIGURE 6.12 BCYCLE LOCATIONS

As part of the 2005 PLAN Go TDOT Long Range Transportation Plan bike and pedestrian element, an analysis was conducted showing a Bicycle Level of Service (BLOS) on state roads in Tennessee. The BLOS of state roads in Montgomery County is shown in Figure 6.13. The BLOS is an evaluation of cyclists' perceived safety and comfort with respect to motor vehicle traffic while traveling in a roadway corridor. **The analysis shows that about half of the MPA experiences a BLOS of D or worse.**

Improvements to corridors since the completion of the study in 2005 have altered some of these findings; however, the impacts are unknown at this time.

FIGURE 6.13 STATEWIDE BICYCLE LEVEL OF SERVICE (BLOS)



Source: PLAN GO TDOT Long Range Transportation Plan

Pedestrian Facilities

Clarksville MTP 2045 Transportation Survey 2017:

"All neighborhoods need sidewalks. For exercise, dog walking, children on bicycles and getting to know your neighbors. This would truly impact our city as being one that is forward thinking; one that values and believes in health, community and the well-being of the population."

The Clarksville-Montgomery County Greenway and Blueway Master Plan contains an inventory of the existing pedestrian infrastructure in Montgomery County. The KYTC maintains a sidewalk inventory for the City of Oak Grove and the Christian County portion of the MPA.

The existing sidewalks in the City of Clarksville, and proposed pedestrian facilities, are shown in Figure 6.14. The existing sidewalks in Montgomery County are concentrated around downtown Clarksville, and newer subdivisions built after the passage of the City of Clarksville and Montgomery County Subdivision Ordinance in 2004.

THERE IS A LACK OF SIDEWALKS ALONG MAJOR CORRIDORS OUTSIDE OF THE DOWNTOWN AREA. THIS DEFICIENCY GREATLY IMPACTS SCHOOL CHILDREN AND PUBLIC TRANSIT RIDERS, AND HAS BEEN NOTED IN PREVIOUS PLANS AND STUDIES FOR THE MPA.

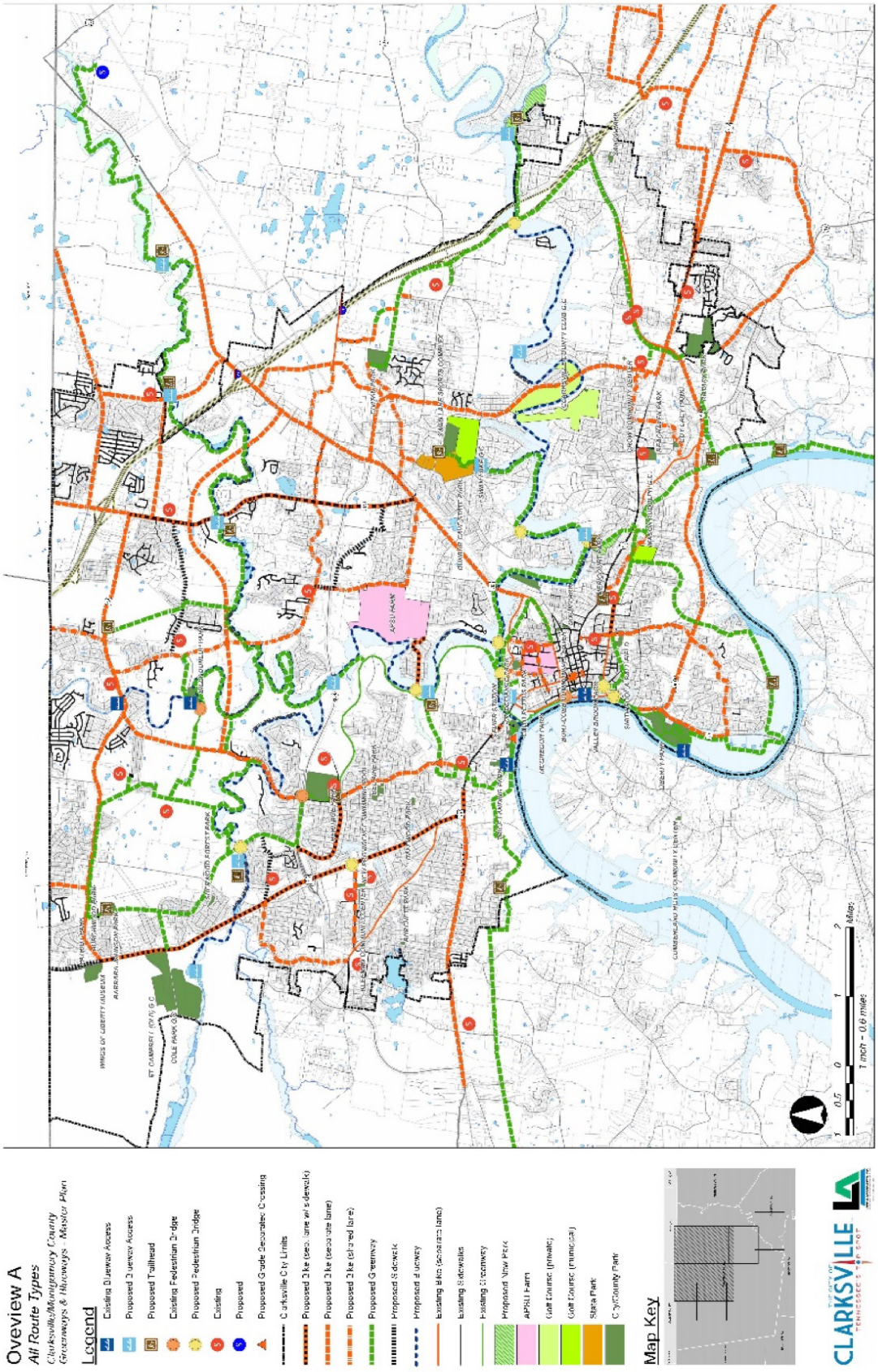


FIGURE 6.14 EXISTING AND PROPOSED PEDESTRIAN IMPROVEMENTS

Source: Clarksville-Montgomery County Blueway and Greenway Master Plan

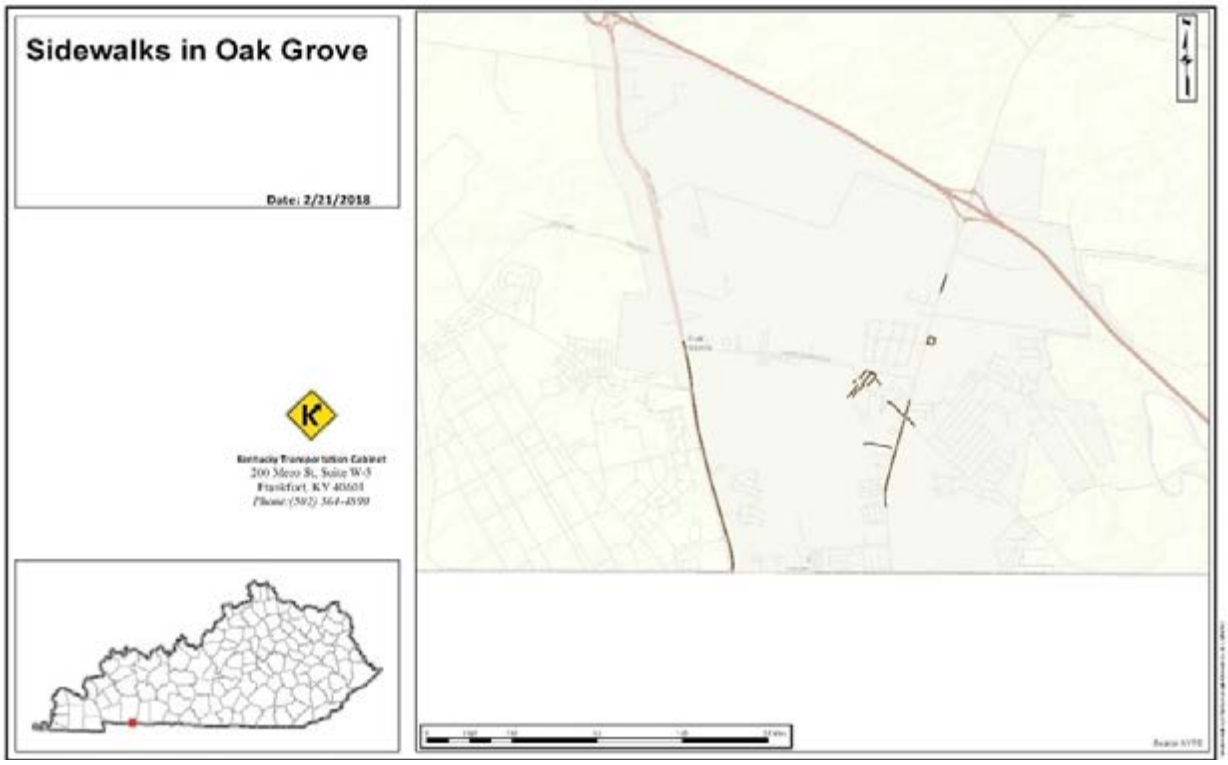
Other priority areas for the installation of sidewalks are near public transit stops. The Clarksville Transit System (CTS) has identified the need for sidewalks near transit stops in both the Comprehensive Operations Analysis (COA) and the Strategic Plan. Over half of all persons riding the bus walk to the bus stop[2]. Many of the stops are located along streets with high levels of vehicular traffic, posing a safety risk for pedestrians.

Sidewalks within the City of Oak Grove are shown in Figure 6.15. The following observations about the sidewalk infrastructure within the Kentucky portion of the MPA are as follows:

- Fort Campbell Boulevard (US-41A) has sidewalks on the east side between the state line and Morgan Road.
- There are sidewalks on both sides of Fort Campbell Boulevard (US-41A) between Morgan Road and Thompsonville Lane (KY-911).
- Pembroke-Oak Grove Road (KY-115) has sidewalks between Thompsonville Lane (KY-911) and Nick Lane.
- There are no sidewalks in the more populated southern end of the City of Oak Grove, adjacent to the state line.
- There are no sidewalks adjacent to the CTS bus route that is near the city.

2 Who's on Board: What Today's Riders Teach Us about Transit that Works. 2016. Transit Center. www.transitcenter.org.

FIGURE 6.15 SIDEWALKS IN OAK GROVE



Source: Kentucky Transportation Cabinet

Trails and Greenways

The City of Clarksville maintains approximately 11.6 miles of paved trails. These trails are along the Little Red River and the downtown riverfront along the Cumberland River. Plans for multi-use paths for Clarksville-Montgomery County are contained within the Clarksville-Montgomery County Greenway and Blueway Master Plan.

The City of Clarksville has almost 10 miles of paths that connect to parks, schools, and the downtown riverfront. These include:

- The Upland Trail runs 1.7 miles from Valleybrook Park along Spring Street, to College Street, where it connects to the Clarksville Riverwalk.
- The Riverwalk and its North Extension form a mile-long trail running along the Cumberland River.
    - This trail provides access to McGregor Park.

CITY OF CLARKSVILLE

11.6

MILES OF PAVED TRAILS

- The Fort Defiance Trail is an 0.85-mile trail that is located between Providence Boulevard and the Cumberland River.
    - It begins at Fort Defiance Civil War Park and Interpretative Center and ends at a former Civil War outpost overlooking the Cumberland and Red Rivers.
- The Clarksville Greenway is a 9-mile pathway through wooded areas.
    - This trail is part of the Rails to Trails initiative.
    - A trailhead is located on Marys Oak Drive, with a marked pedestrian crossing from the Kenwood High School campus that allows users to cross East Pine Mountain Road.
    - A second trailhead is located further east at the end of Pollard Road.
    - From the end of Pollard Road, the greenway follows along the west side of the Red River for another 2.75 miles, where it ends at the sewer treatment plant.
    - A third trailhead exists at Heritage Park with ample parking.
    - The trailheads were coordinated with the BCycle location at the Pollard Road Trailhead and the bike sharing service provides a convenient way to ride the trails.
- The recently opened Liberty Park provides a 1.8-mile path around a 10-acre community fishing pond.
    - The park is located on the south end of the downtown riverfront, bordered by Cumberland Drive and Zinc Plant Road.
- The City of Clarksville is beginning Segment 1 of the Clarksville River Trail.
    - This trail extends from the junction of the Cumberland and Red Rivers and continues north along the Red River for about a quarter of a mile.
    - With the addition of Segment 2, the path will reach the sewer treatment plant where the Clarksville Greenway currently ends.
- Rotary Park offers five miles of recreational hiking and biking trails in a nature preserve.
    - The park is maintained by Montgomery County, and is located at the US-41A Bypass (Ashland City Road) and E. Old Ashland City Road.

In the City of Oak Grove, there is a bicycle/pedestrian trail that is part of a four-acre development near Walter Garrett Lane and US-41A.

Existing Plans

Bicycle Plans and Policies

There are no requirements or incentives for bicycle facilities in the *Montgomery County, TN Zoning Code, Clarksville Zoning Code*, or the *Oak Grove Zoning Code*. There are also no requirements or incentives for bicycle parking, or bicycle route connections, as part of a development.

The *Clarksville-Montgomery County Greenway and Blueway Plan* provides an in-depth evaluation of existing bicycle and pedestrian facilities within Montgomery County.

The KYTC has a policy that requires consideration of incorporating pedestrian and bicycling facilities on any new, or reconstructed, state-maintained roadways. This policy applies to all existing and planned urban or suburban areas. TDOT's Multimodal Access Policy requires the same consideration on Tennessee roadways.

Pedestrian Plans and Policies

In Montgomery County, and the City of Clarksville, roadway projects are required to incorporate sidewalks (except for routine resurfacing). Each municipality assumes responsibility for sidewalk maintenance and repair in their respective jurisdictions. Per the *Clarksville-Montgomery County Subdivision Regulations*, sidewalks are required on both sides of the dedicated public right-of-way or dedicated road easement. Sidewalks must also meet ADA standards. Sidewalks outside the City limits are required to be maintained by homeowner associations, not the County Highway Department. Future site plans are required to include pedestrian circulation plans.

The State of Tennessee recently adopted an access management policy[3] for new developments along state highways. The policy requires increased use of shared driveways and internal access for developments. This will create fewer points of conflict between vehicles and pedestrians, increasing safety.

In Oak Grove, sidewalk requirements are limited to the following zoning categories:

- Enhanced commercial district
- Central business district
- Planned unit developments (PUD)

3 Manual for Constructing Driveway Entrances on State Highways. 2015. TDOT

In the enhanced commercial district and central business district:

"All lots adjacent to a residentially zoned […] shall be connected via sidewalk to the residential area wherever possible to create a pedestrian friendly environment"

"Sidewalks at least five (5) feet wide shall be used to connect all primary businesses in this zone". (7.5 B-4; 7.5 B-4).

In a PUD:

"The developed areas shall have a sidewalk on at least one side of the street. In the event the required open space is on one side of the street and the built-out area is on the other, the required sidewalk shall be placed on the same side as the developed areas."

The projected growth in the MPA over the next 25 years will require substantial residential development. It is notable that there are no requirements for sidewalks as part of residential development.

6.3 | Public Transit

In the past, public transportation rhetoric split potential riders into two categories, "choice riders" and "captive riders". Choice riders can afford to drive a personal vehicle and are physically able to drive, but prefer to use public transportation for a variety of reasons. The captive riders' population is diverse; however, they do not have transportation options, and rely on public transportation for their daily needs.

New research into transit use suggests there are three common patterns which have created new ridership groups. Each of these groups require a different approach to providing transit service and increasing ridership.

The Three Patterns Are:

1. Occasional riders who take transit once in a while.
2. Commuters who take transit regularly but only for work.
3. All-purpose riders who take transit regularly for multiple purposes.

The goal is to engineer a transit system that encourages the creation of "all-purpose riders" by improving transit services. Improvements in luxury amenities, such as Wi-Fi, have been used to stimulate choice ridership increases in the past. The new research suggests that strategies targeting the three ridership groups are more successful, and the goal should be to not only bring new riders into the system, but to encourage riders to become all-purpose riders.

To do this, an emphasis is placed on increasing the core system's strength and reliability to make the system more attractive to everyone. This can be achieved by fostering reliable, frequent service. The research identifies walkability, frequency, and travel time improvements as something all ridership groups value. Without good, reliable transit systems, even captive riders will find alternative transportation at the first opportunity.

It is important to note that riders in all three categories will supplement their use of the transit system with other modes of transportation, including using ride-sharing services, walking, cycling, or using an automobile.

Special Concerns within the MPA

Age 18-34

The presence of Fort Campbell means that there are a higher than average number of people aged 18-34 within the MPA. Recent studies have shown a decline in vehicle miles traveled for this age group. Data from the National Household Travel Survey in 2009 found that this age group is more willing to walk, use a bicycle, or use public transit.

Trend **Decline in Vehicle Miles Traveled**
From 2001 to 2009:
The number of vehicle miles traveled by persons aged 16-34 **dropped 23 percent, from 10,300 to 7,900.**
During this same time:
The number of bike trips by this age group **increased 24 %**
The number of walking trips to destinations **increased 16 %**
The number of passenger miles traveled on public transit **increased 40 %**

These trends are expected to continue. Forty-five (45) percent of the respondents aged 18-34 said they have consciously made an effort to replace driving with transportation alternatives[4]. Existing data on transportation use and mode preferences indicates an opportunity, and a need, to increase active transportation and public transportation use.

Fort Campbell

In the MPA, a large contingent of soldiers, families, spouses of soldiers, and civilian support staff at Fort Campbell provide an additional source of ridership that do not follow traditional ridership patterns. Fort Campbell operates as its own city within the MPA. The base is given consideration in transportation planning efforts in the region due to its large impact on travel patterns.

4 "Transportation and the New Generation: Why young people are driving less and what it means for transportation policy." 2012. Frontier Group & U.S. PIRG Education Fund.

The demographic makeup of Fort Campbell's population is supportive of increases in ridership, as mentioned in the previous section. These challenges and opportunities require a close, working relationship with the leadership of Fort Campbell to implement proposed improvements to transit service that are affected by the base's presence.

Local Public Transit Providers

The public transportation network in the MPA is comprised of fixed route and demand responsive services. Fixed route services are offered within the City of Clarksville, and to a couple key destinations, by the Clarksville Transit System (CTS). CTS operates a route to Fort Campbell. CTS and the Regional Transit Authority (RTA) operate a regional commuter bus route between Clarksville and Nashville. Currently there is no fixed route public transportation serving the Christian County portion of the MPA; although some CTS routes do operate in the area.

The surrounding areas are served by demand responsive public transit services operated by:

- CTS's Lift service within the City of Clarksville.
- Mid-Cumberland Human Resource Agency (MCHRA) in Tennessee.
- Pennyrile Allied Community Services (PACS) in Kentucky.

The region is also served by a Greyhound bus station in downtown Clarksville, which provides access outside the region.

KEY PERFORMANCE STATISTICS AS NOTED IN THE RECENT (2016) COMPREHENSIVE OPERATIONS ANALYSIS (COA) OF CTS ARE:

- Since the 2010 Census, CTS has transported over 5,275,000 passengers, averaging approximately 64,300 passenger trips per month.
- Since the 2010 Census, CTS has transported over 200,000 passengers on The Lift service, averaging approximately 2,440 passenger trips per month.
- CTS transports approximately 5,800 APSU students monthly.
- CTS transports approximately 4,500 senior citizens monthly.
- Senior citizen ridership has increased by 102 percent since the start of the Senior Ride Free Program.
- CTS transports approximately 1,500 children under age four monthly.
- Commuter bus service to Nashville carries approximately 4,600 passengers monthly.

Clarksville Transit System Fixed Routes

In January 2016, CTS completed a Strategic Transit Plan with the stated goal

"to develop operational and policy recommendations that can be implemented in the next one to five years that will allow CTS to make measurable gains in terms of safety, quality and efficiency of transit service delivery in Clarksville. Objectives of the plan addressed service delivery and operations, maintenance and state of good repair (SGR), service quality and customer service and efficiency and effectiveness"

In August 2016, CTS completed their COA "to assess the public transportation services for the City of Clarksville, TN, Fort Campbell Military Installation and the City of Oak Grove, KY."

A MAJOR OBJECTIVE OF THE COA INVOLVED A CONSTRUCTIVE ANALYSIS OF THE TRANSIT SYSTEM AND RECOMMENDATIONS FOR AN APPROPRIATE ALLOCATION OF RESOURCES.

The Strategic Transit Plan and the COA provide data, analysis, and recommendations for the CTS. The plans incorporate solid public input and stakeholder input.

The stated mission of CTS is to "plan, implement, maintain and manage a public transportation system that allows for maximum mobility for the community with emphasis on safety, quality and efficiency." The CTS is the only fixed-route system in the MPA. It operates in a "hub and spoke" pattern, with all buses leaving and returning to the Transit Center, located at 200 Legion Street. The CTS routes are shown in Figure 6.16. The buses circulate throughout the community and return to the centralized Transit Center enabling passengers to transfer from one route to another route to reach their final destination. There are additional transfer points along each route for quicker transport.

CTS OPERATES EIGHT ROUTES, WITH MOST OPERATING FROM 4:30 A.M. TO 9 P.M. MONDAY THROUGH SATURDAY. THE TRANSIT CENTER IS OPEN MONDAY THROUGH FRIDAY FROM 5:30 A.M. - 8 P.M., AND SATURDAY FROM 6:30 A.M. - 8 P.M.

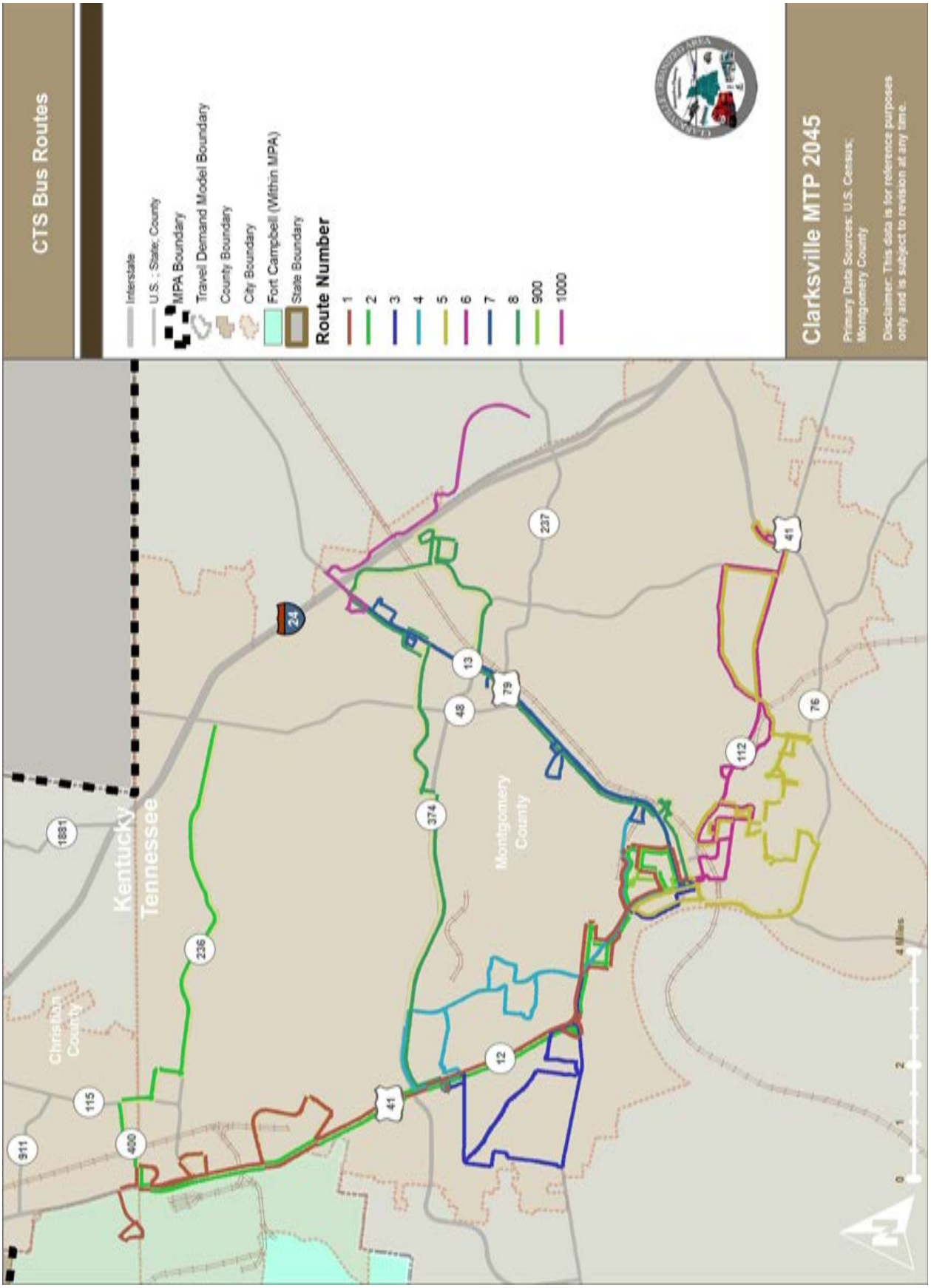


FIGURE 6.16 BUS ROUTES

In April of 2016, CTS began operating Route 1000. The route is a circulator that runs on 30-minute loops, connecting targeted employment areas including the Walmart on Wilma Rudolph Boulevard and major employers east of the Interstate. This route also connects with the new Hankook tire facility. The service runs from 6:30 a.m. to 6:30 p.m.

The base bus fare for CTS is $1.50. Reduced fares are available for specific members of the community. A breakdown of the fares is displayed in Table 6.16.

Table 6.16 CTS Fare Rates

Type	Fare	Passes
Fixed Route		
Full Fare	$1.50	One-Day: $4 10-ride: $15 31-day (Liberty Pass): $50
Student (with I.D. card):	$1.00	10-ride: $10
65 & Over (with CTS Photo I.D.)	Free	N/A
Disabled (with CTS Photo I.D. card or Medicare card)	$0.75	10-ride: $7.50 31-day (Liberty Pass): $25
City Employee (with City of Clarksville I.D.)	$0.75	N/A
Children (age 4 and under)	Free	N/A
"The Lift" Paratransit		
Eligible Riders	$2.50	N/A

Source: CTS

The CTS recently reinstated transfers on their system. This allows riders to complete one continuous trip for a $0.25 transfer fee. The approved transfer locations are:

- the CTS Transit Center
- the WalMart on Ft. Campbell Blvd
- the St. B Walmart on Wilma Rudolph Blvd
- Sango Wal-Mart on Madison St.

Daily ridership for CTS is highest along Route 6-Madison Street, Route 1-Fort Campbell, Route 7-Governors Square Mall, and Route 3-Cunningham Loop. These routes also serve the highest number of passengers per hour and passengers per mile. Route 6 serves the high need area with the greatest density in the system. Route 1 serves Fort Campbell, leading to its high ridership. The Ridership on each route in the CTS is displayed in Table 6.17.

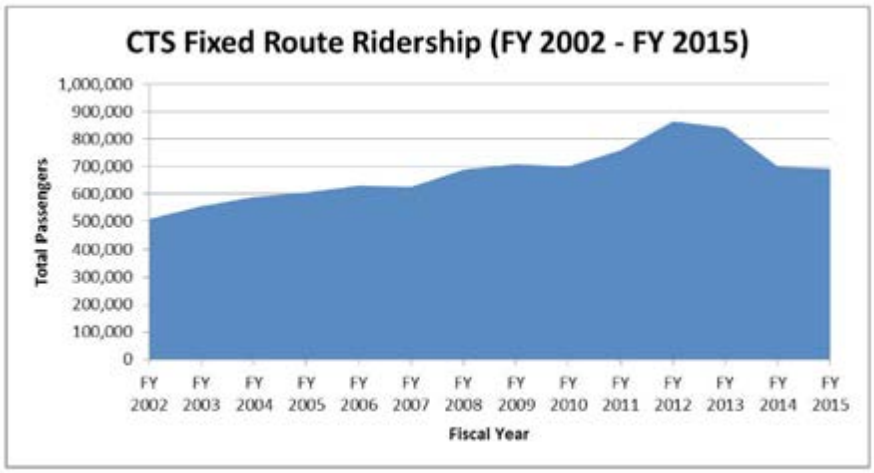
Table 6.17 CTS Route Ridership

Route	Daily Ridership	Annual Ridership	Passengers per Hour	Passengers per Mile
Total	2,679	683,060	10.7	0.6
Route 1-Fort Campbell	412	104,992	11.4	0.7
Route 2- Tiny Town Rd	328	83,612	10.6	0.5
Route 3- Cunningham Loop	378	96,418	12.7	0.7
Route 4- Peachers Mill	154	39,294	8.6	0.5
Route 5- Hilldale	335	85,424	9.2	0.6
Route 6- Madison St.	466	118,765	15.6	1
Route 7- Governors Square Mall	384	98,036	11.5	0.7
Route 8- 101 Express/ Gateway Medical Center	222	56,519	6.3	0.3
Route 900 -Peay Pickup	52	7,114	5.8	0.6

Source: CTS

From 2002 to 2012, ridership increased from approximately 500,000 to 850,000. Since 2012, CTS ridership has decreased. Although some local factors may play a role, such as the fare increase in 2013, this follows a nationwide trend of decreased ridership based on data from the FTA. There is no consensus on the causes of this trend. Ridesharing services such as Uber and Lyft have affected public transportation ridership, but this effect has not been quantified. Figure 6.17 shows the fixed route ridership on the CTS from 2002 through 2015.

FIGURE 6.17 CTS ANNUAL FIXED ROUTE RIDERSHIP



Source: CTS

Clarksville Transit System Lift Service

The Lift is a demand response service for the disabled and elderly. The ADA requires complementary paratransit service for passengers who are:

- unable to navigate the public bus system,
- unable to get to a point where they could access the public bus system, or
- have a temporary need for these services because of injury or some type of limited duration cause of disability (49 CFR 37.123).

The FTA requires that the paratransit service area comprises a three-quarter mile buffer around existing fixed routes. This means that paratransit service must be offered if the origin or destination of a trip is within three-quarters of a mile of the existing fixed route alignment. The service is by appointment only.

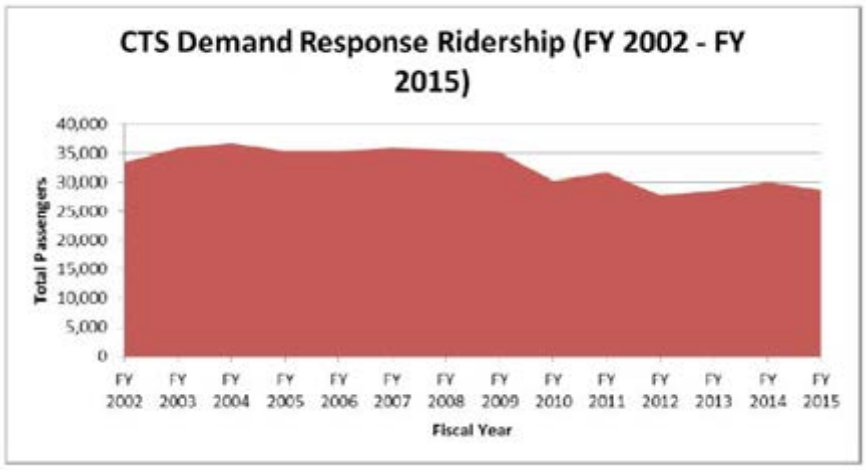
Recent ridership numbers indicate a decrease since 2009; however, the COA noted that ridership is expected to increase as the elderly population eligible for the service increases over the next 50 years. Figure 6.18 shows the Lift ridership on the CTS from 2002 through 2015.

THE LIFT PROVIDES

2,400

TRIPS PER MONTH

FIGURE 6.18 CTS ANNUAL LIFT RIDERSHIP



Source: CTS

Some of the decreases in ridership may be attributed to the CTS travel training program. The program is for passengers with disabilities who wish to learn to navigate the fixed route bus system. Qualified passengers can schedule the training with CTS, and a travel trainer will meet them at the downtown transit center. At that time, the travel trainer will go over the bus schedule, fares, passes, and routes.

The trainer will also instruct the passenger on obtaining the proper ID for receiving a reduced fare. The trainer will then ride the bus with the passenger and teach them about:

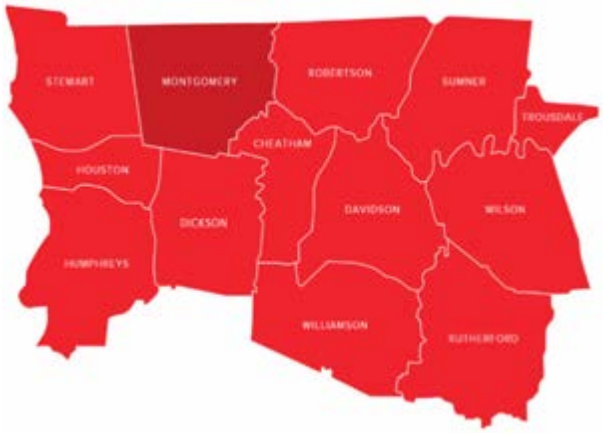
- using the fare box,
- listening for ADA announcements,
- how to signal for a stop,
- using the Lift if needed.

The trainer will make at least one transfer with the passenger, and complete at least one full round trip. The passenger will also be taught what a bus stop looks like, and safe procedures for waiting for the bus[5].

MCHRA Public Transit

The Mid-Cumberland Human Resource Agency (MCHRA) serves a 13-county area in Tennessee. It provides rural transit services to:

- Montgomery
- Cheatham
- Dickson
- Davidson
- Houston
- Humphreys
- Robertson
- Rutherford
- Stewart
- Sumner
- Trousdale
- Williamson
- Wilson Counties



Graphic Courtesy of MCHRA

The MCHRA's service area covers 5,145 square miles over 1.1 million persons. The service operates 126 vehicles and provides nearly 248,000 vehicle trips annually. In 2016, MCHRA vehicles drove approximately 3.8 million miles[6]. Within Montgomery County, the MCHRA operates 10 vehicles and employs 12 drivers. The service operates Monday through Friday from 6 a.m. to 6 p.m. A one-way ticket within the county is $3.00, and the service is by appointment only.

Pennyrile Allied Community Services (PACS)

The Pennyrile Allied Community Services (PACS) provides rural public transportation for a nine-county area in Kentucky. This area is comprised of the following counties:

- Christian
- Caldwell
- Crittenden
- Hopkins
- Livingston
- Lyon
- Muhlenberg
- Todd
- Trigg

5 Clarksville Comprehensive Operations Analysis Report. 2016
6 NTD database 2016

The PACS operates 90 demand response vehicles and 3 buses. In 2016, the service provided nearly 195,000 trips and traveled almost 2.3 million miles. The demand response service is available Monday through Friday. In-county trips are $0.70 per mile per person. Out of county trips are $1.10 per mile per person. Veterans have a reduced fare of $0.35 per mile. Medicaid eligible persons and seniors ride for free. Special fares are available for groups. Service is by appointment only.

The PACS now offers inter-city transit services to Nashville. The service must be scheduled 24 hours in advance and costs $12.50 for round trip. The service stops at:

- Vanderbilt University Medical Center
- Nashville International Airport
- Nashville MTA
- the Department of Veterans Affairs

Transit Capital Assets

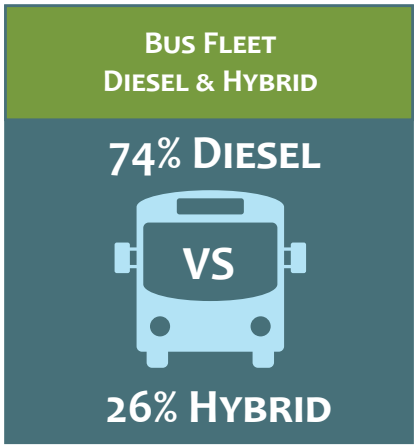
An inventory of capital assets for the CTS was provided in the COA. Inventory of the MCHRA and PCS systems are not included, since capital funding for these providers comes from sources outside of metropolitan planning sources.

CTS OPERATES:

- twenty-one buses
- two trolleys
- twelve demand response vehicles
- support vehicles for its operations

The trolleys are used to serve the APSU route. Each bus has between 26 and 30 seats, two wheelchair positions, and a bike rack. The fixed route vehicles average 8.1 years of service and nearly 414,000 miles per vehicle.

Almost half of the fleet (10 buses) are more than 10 years old and considered in poor condition. The trolleys are 11 years old and in fair condition. These vehicles are nearing the end of their useful life. The vehicles are generally replaced in a 10-year cycle. The vehicles are reaching the point where repairs and maintenance will exceed the costs of purchasing new vehicles.



The fleet is 74 percent diesel and 26 percent hybrid. The hybrid buses are between two (2) to eight (8) years old. Hybrid buses are considered a more economical option for the long-term since they can offer up to 40% reduction in fuel costs. However, hybrid buses can be almost double the cost of a traditional diesel bus. In order to maintain current levels of service while replacing the older vehicles in the fleet, it may be necessary to consider diesel vehicles.

The demand response fleet, operated under Lift, drives 172,000 miles annually. The fleet's average vehicle age is 5.2 years old. The useful life of a demand response vehicle is 4 years.

A complete list of the CTS transit inventory and capital assets can be found in the COA.

Transit Dependent Populations

It is important that the CTS serves all members of the community. This section analyzes the location of existing routes relative to transit dependent populations. These populations include:

- persons in poverty
- minorities
- zero-vehicle households
- persons over the age of 65

While not a transit dependent population, this section also analyzes the location of public transit in relation to those persons aged 18-34, due to their increased propensity to use public transit. Table 6.18 displays a breakdown of the demographic information, available in the COA, for the MPA.

TABLE 6.18 CTS DEMOGRAPHICS BREAKDOWN

POPULATION	KY	TN	CHRISTIAN COUNTY	MONTGOMERY COUNTY	MPA	CITY OF OAK GROVE	CITY OF CLARKSVILLE
Minority	14%	25%	33%	35%	39%	38%	40%
Households in Poverty in Last 12 Months	19%	18%	20%	16%	21%	17%	17%
Zero-Vehicle Households	8%	6%	8%	5%	8%	5%	5%
Over 65	14%	15%	11%	8%	7%	1%	8%
18-34	23%	23%	32%	31%	35%	42%	33%

Source: CTS

Methodology

DATA FROM THE 2015 AMERICAN COMMUNITY SURVEY 5-YEAR ESTIMATES WAS ANALYZED AT THE BLOCK GROUP LEVEL TO DETERMINE HOW WELL THE CTS SERVES THE POPULATION. THE FOLLOWING METHODOLOGY WAS USED TO ANALYZE IF CTS MEETS THE NEEDS OF THE POPULATION:

- The percentage of each transit dependent population by block group was calculated.
- The percentage was then compared to the MPA average.
- Each block group was placed in a category of:
  - "below average"
  - "at or below average"
  - "slightly above average"
  - "moderately above average"
- These categories were defined based on standard deviations above the mean.
  - Guidance from the EPA concerning formal environmental analyses suggests using a metric of 2 standard deviations above the mean to identify an outlier group.

This analysis considered it more meaningful to consider groups that fell more than one standard deviation outside the mean. Nearly 68 percent of the population falls within one standard deviation of the mean.

THIS ANALYSIS IDENTIFIED CONCENTRATIONS OF PERSONS WHO MAY NEED TRANSIT SERVICES, THUS IDENTIFYING TRANSIT DEPENDENT POPULATIONS IDENTIFIED AS THOSE "MODERATELY ABOVE" THE MPA AVERAGE.

Minority Populations

For the purposes of this plan, a minority group is defined as any group other than "non-Hispanic white alone," based on the U.S. Census. The MPA average was approximately 27 percent.

BLOCK GROUPS THAT HAVE A MINORITY POPULATION OF 56 PERCENT OR GREATER ARE CONSIDERED MODERATELY ABOVE AVERAGE.

The CTS routes are along every Census block group that is moderately above average. The CTS routes and percentage of minority populations within the MPA are shown in Figure 6.19.

ON BOARD SURVEYS, CONDUCTED AS PART OF THE COA, FOR THOSE RIDERS WHO SELECTED JUST ONE RACE OR ETHNICITY SHOW THAT:

41%	BLACK/AFRICAN AMERICAN
37%	WHITE
3%	HISPANIC/LATINO
1%	ASIAN AND NATIVE AMERICAN

THIS INDICATES THAT A MAJORITY OF CURRENT CTS RIDERS ARE MINORITY PERSONS.

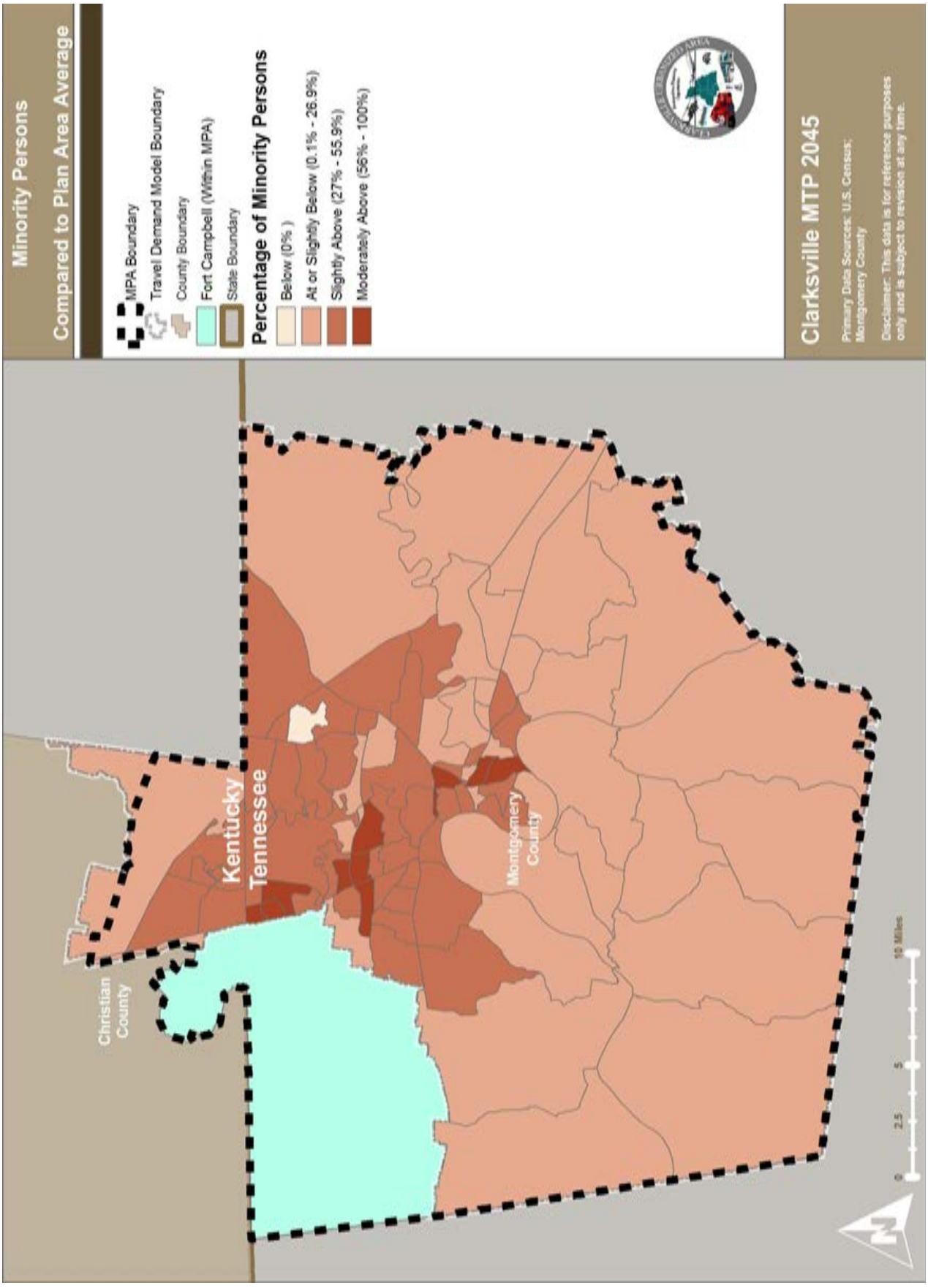


FIGURE 6.19 MINORITY PERSONS COMPARED TO PLAN AREA AVERAGE

Poverty

For this plan, poverty was identified by the U.S. Census "households in poverty in the last 12 months". The plan area average was approximately 18 percent.

BLOCK GROUPS WITH AN AVERAGE OF 30 PERCENT OR MORE HOUSEHOLDS IN POVERTY WERE IDENTIFIED AS MODERATELY ABOVE AVERAGE.

The CTS lines reach the majority of the block groups identified using this method. The CTS routes and percentage of poverty populations within the MPA are shown in Figure 6.20.

On board surveys conducted as part of the COA show that **49 percent of those surveyed indicated that their household income falls within the poverty level.**

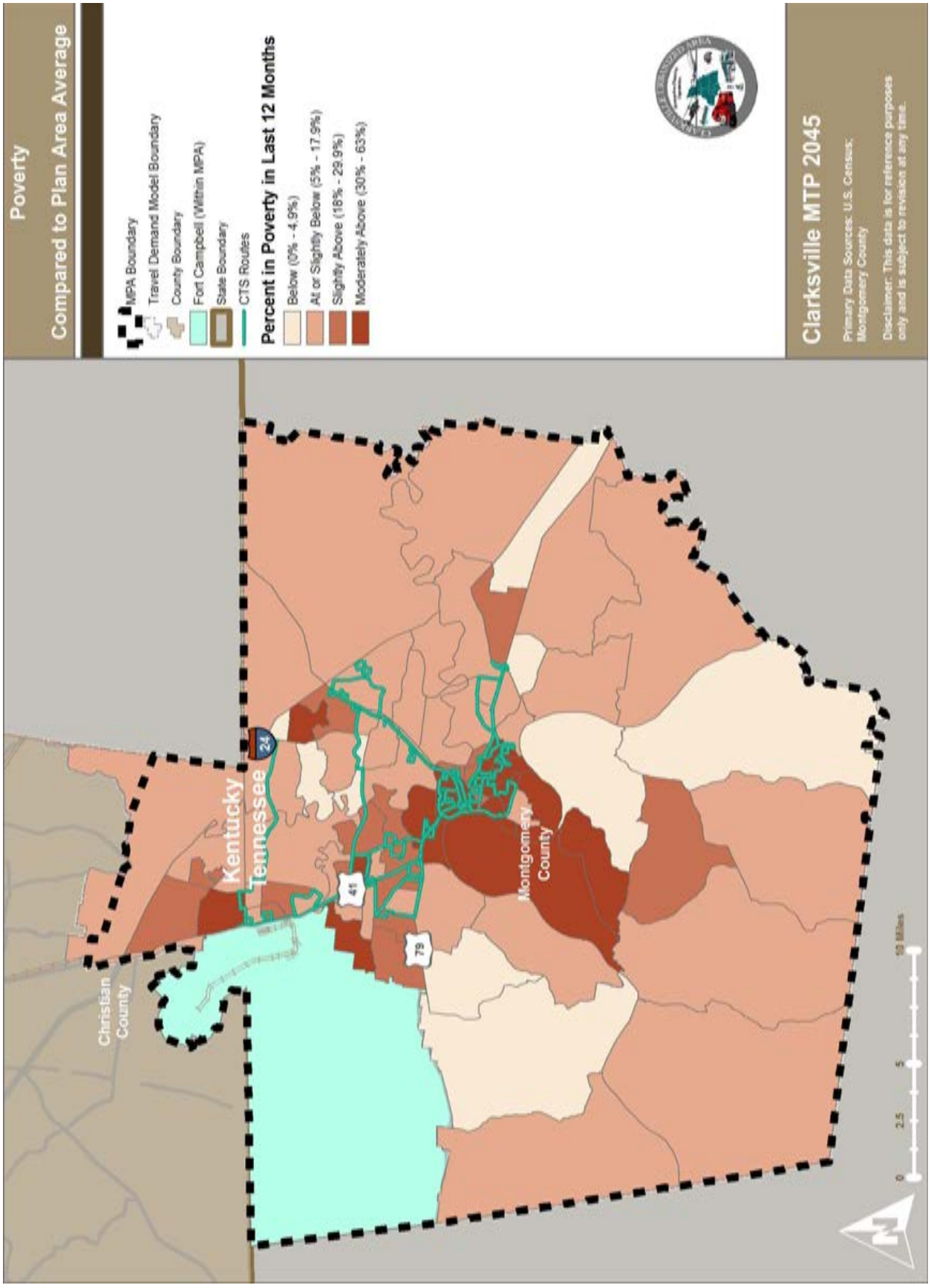


Figure 6.20 Poverty Compared to Plan Area Average

Zero-Vehicle households

Households with no vehicles available to them were identified using the U.S. Census "zero-vehicle households". The average percent of households within the MPA that have no access to a vehicle was approximately 6 percent.

THE BLOCK GROUPS WITH 13 PERCENT OR MORE HOUSEHOLDS THAT HAVE NO VEHICLES WERE IDENTIFIED AS MODERATELY ABOVE THE AVERAGE.

The CTS lines reach the majority of the block groups identified using this method. There are two pockets of households with no access to vehicles outside the CTS operating area. One is to the north in Oak Grove. The other is to the south of the existing routes shown. The CTS routes and percentage of zero-vehicle households within the MPA are shown in Figure 6.21.

Surveys conducted as part of the COA show 61 percent of CTS riders did not have a working vehicle in the household. When this question was further expanded to assess whether a vehicle was available for the trip, 87 percent said that a vehicle was not available. This indicates that the service is currently serving a majority of "captive riders," since they do not have access to a vehicle.

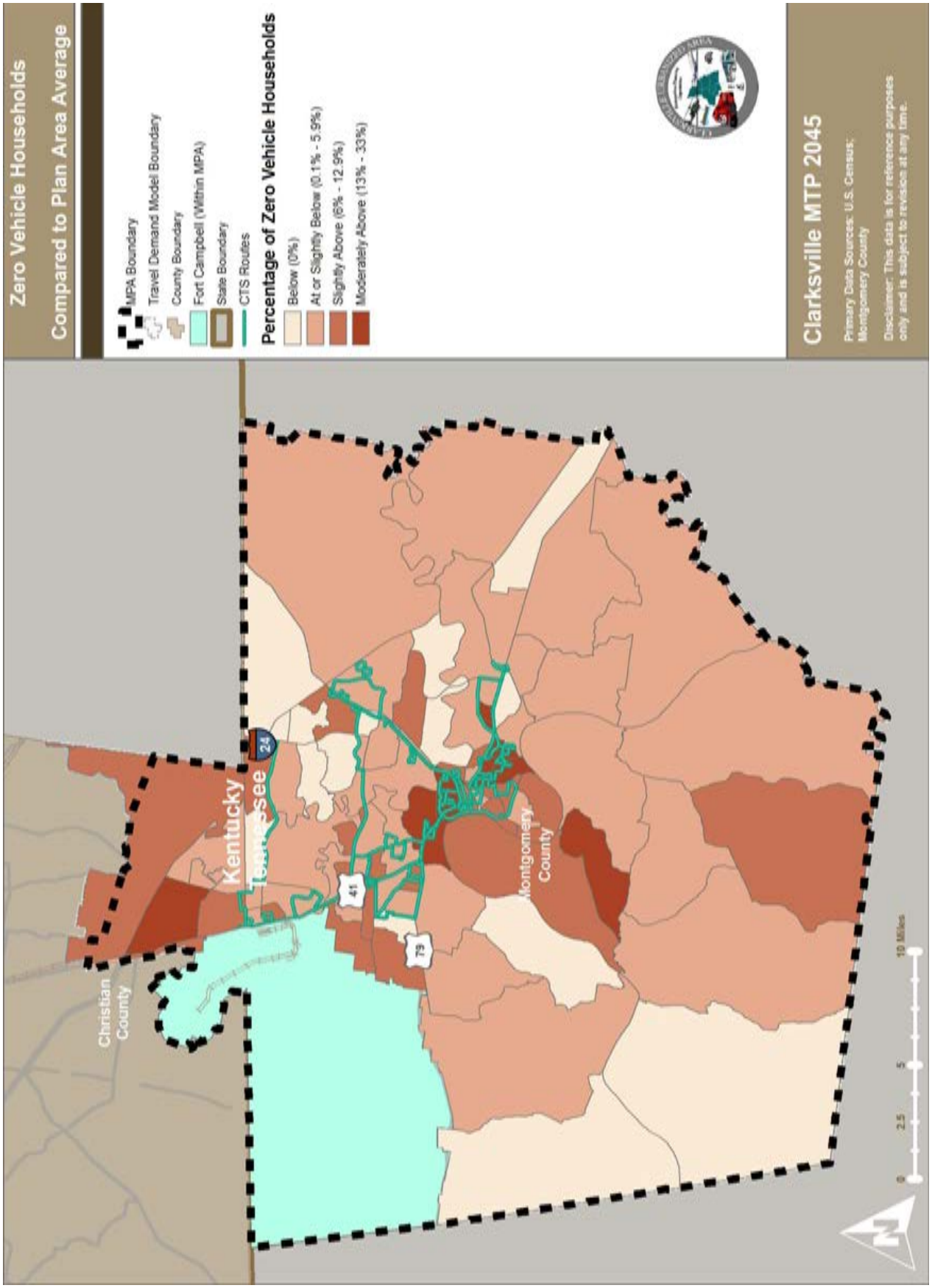


FIGURE 6.21 ZERO-VEHICLE HOUSEHOLDS COMPARED TO PLAN AREA AVERAGE

Over 65 Years of Age

Persons over 65 years of age were identified using the U.S. Census. Within the MPA, the average percentage of persons 65-years old or greater in a block group was approximately 10 percent.

BLOCK GROUPS WITH A PERCENTAGE OF 17 OR GREATER WERE IDENTIFIED AS MODERATELY ABOVE THE AVERAGE.

The block groups with the highest percentage of persons over the age of 65 are in the southern portion of the Plan area.

THE CTS SERVICE COVERS THE BLOCK GROUPS WITH HIGH PERCENTAGES OF PERSONS OVER THE AGE OF 65 WITHIN THE URBAN CORE OF THE MPA. THE OTHER PORTIONS OF MONTGOMERY COUNTY, WHICH ARE NOT COVERED BY THE CTS, ARE SERVED BY THE MCHRA ON-DEMAND TRANSIT SERVICES.

The CTS routes and percentage of elderly population within the MPA are shown in Figure 6.22.

Surveys conducted during the COA show that CTS serves a broad range of riders by age; however, persons over 65 account for only six (6) percent of bus ridership. This reflects the relatively young population within the MPA.

The percentage of persons over the age of 65 is 14 percent in the State of Kentucky, and 15 percent in the State of Tennessee. These percentages are expected to increase as the number of elderly Americans is expected to double by 2060 [7]. **The number of persons over age 65 in Montgomery County is anticipated to increase from approximately 18,000 in 2016 to 66,000 in 2070 [8] .**

Persons over 65 years of age may live in group housing, such as nursing homes and assisted living communities, which provide transportation services. This increase in the elderly population will place a greater demand on MCHRA and CTS services in the future.

7 "Fact Sheet: Aging in the United States". 2016. U.S. Census Population Reference Bureau (PRB)
8 Boyd Center for Business and Economic Research, University of Tennessee, Knoxville - September 2017

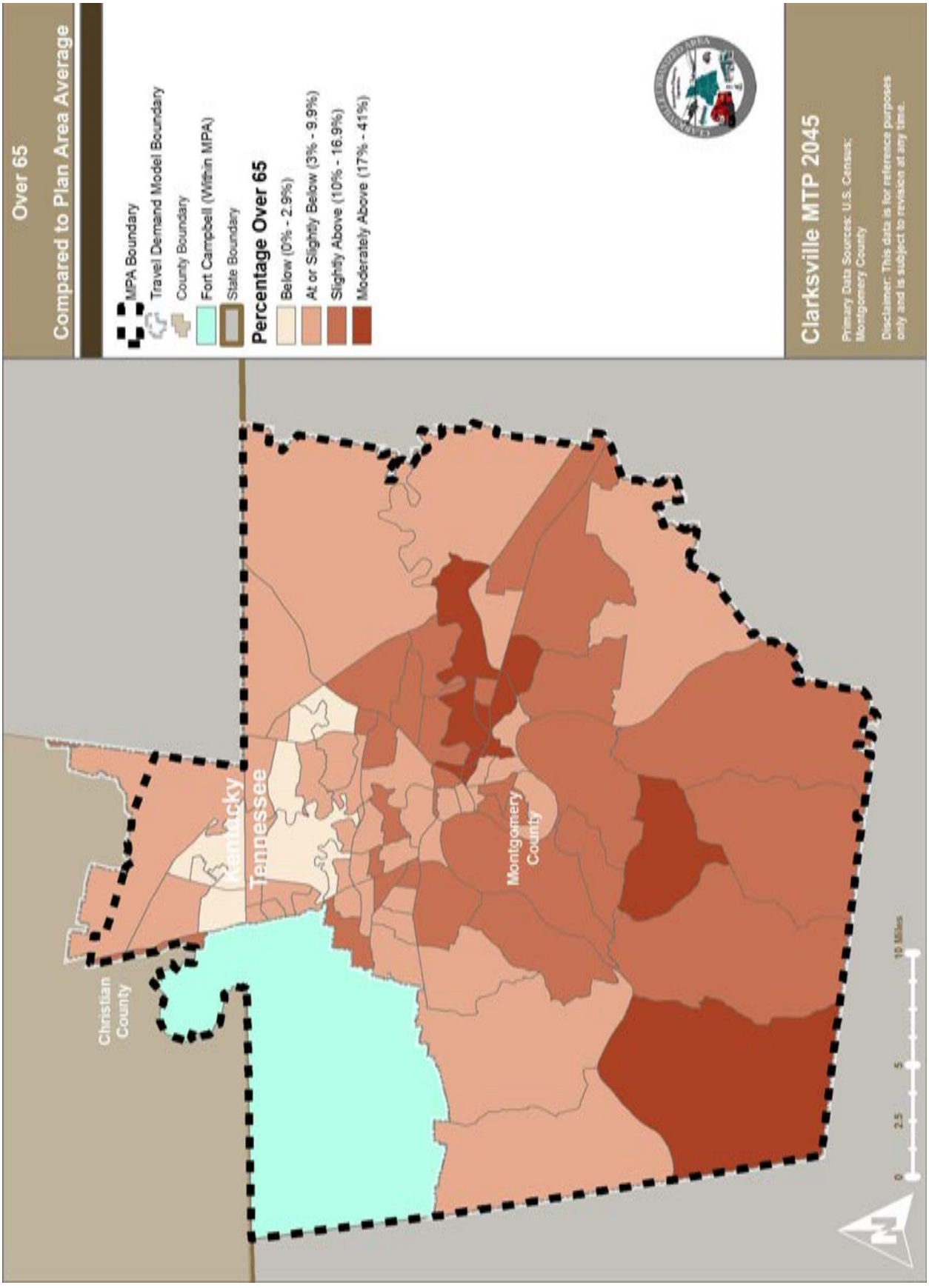


FIGURE 6.22 OVER 65 COMPARED TO PLAN AREA AVERAGE

Persons Aged 18-34

As previously mentioned, the presence of Fort Campbell means that there are a higher than average number of people aged 18-34 within the MPA. This age group is more willing to walk, use a bicycle, or use public transit. While not a transit dependent population, they have a large impact on the transit system. The plan area average for this age group was approximately 30 percent.

BLOCK GROUPS WITH AN AVERAGE OF 43 PERCENT OR MORE WERE IDENTIFIED AS MODERATELY ABOVE THE AVERAGE. THE CONCENTRATION OF THIS AGE GROUP IS IN THE NORTHERN PART OF THE MPA, NEAR FORT CAMPBELL, NEW DEVELOPMENT, AND JOBS.

DATA FROM COA SHOWS:

41%
OF RIDERS ARE AGES
18-34

The CTS currently serves the majority of areas. The CTS routes and percentage of population aged 18-34 within the MPA are shown in Figure 6.23.

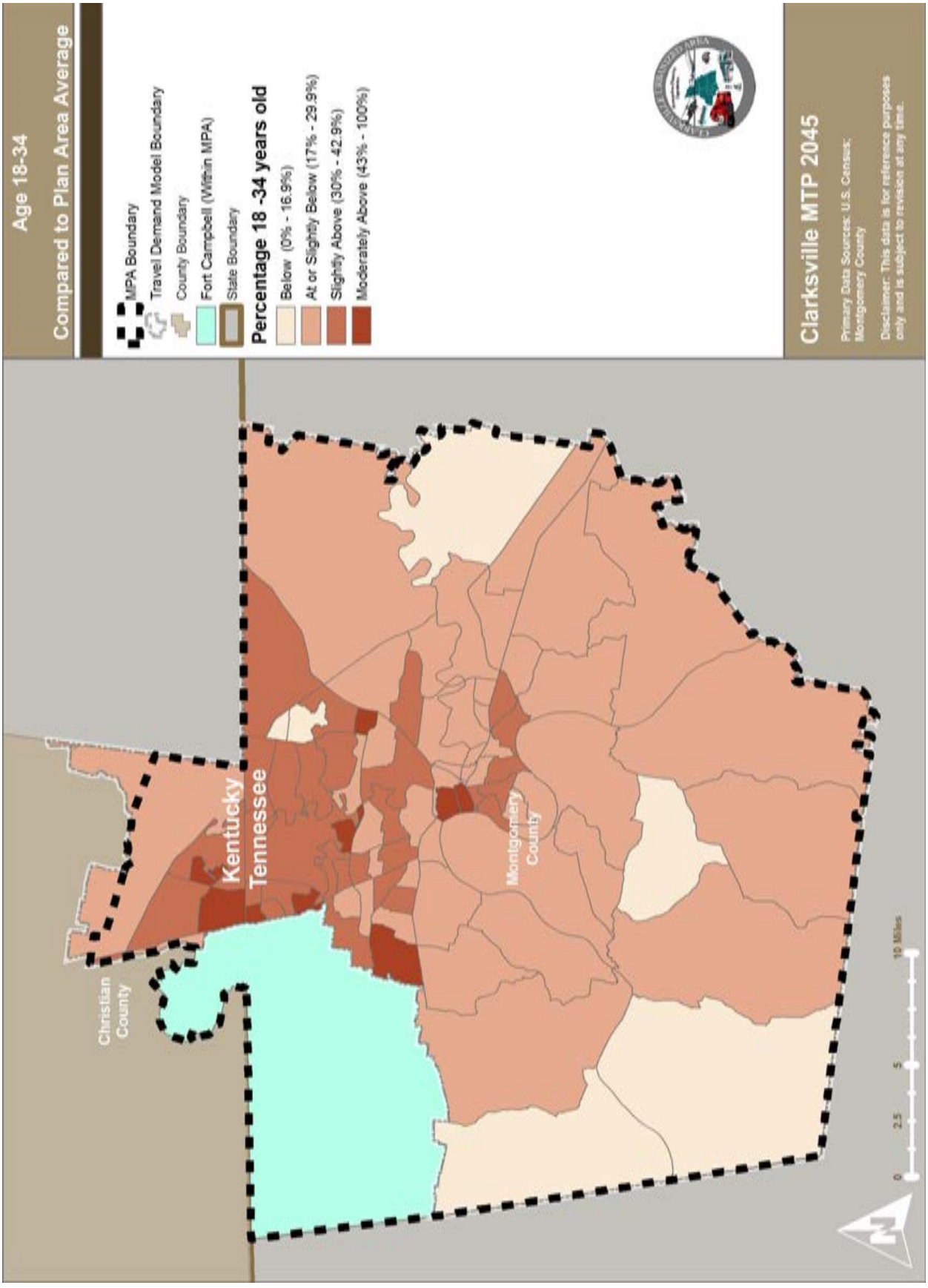


FIGURE 6.23 AGE 18-34 COMPARED TO PLAN AREA AVERAGE

System Performance Targets

In order to provide a well-maintained transportation system, the FTA requires all transit facilities and vehicles be in a State of Good Repair (SGR). New requirements call for the completion of a Transit Asset Management Plan (TAM) to inventory and assess the SGR of assets by October, 2018. The CTS Strategic Plan (2016) outlines a path to obtaining a "state of good repair"and serves as CTS's TAM plan.

The CTS COA inventoried some assets and set a timeframe for replacement of rolling stock meeting useful life.

http://www.cuampo.com/files/FINAL122115StrategicPlan.pdf

http://www.cuampo.com/files/Final%20CTS%20COA%20Report%20(1).pdf

As part of the process of establishing metrics to determine what a State of Good Repair means for the Clarksville MPO, performance measures and targets were established. TDOT and KYTC established and submitted their targets to the FTA in August 2017. In February, the MPO stated their intention to use the targets established by the state departments of transportation. This intention is formalized in a Memorandum of Agreement between the MPO agencies.

THE PLANNING PERFORMANCE MEASURES ESTABLISHED BY THE FTA ARE:

- Percent of revenue vehicles exceeding ULB (Useful Life Benchmark).
- Percent of non-revenue service vehicles exceeding ULB.
- Percent of facilities rated under 3.0 on the TERM (Transit Economic Requirements Model) Scale for the "Administrative and Maintenance" and "Passenger and Parking" classes.
- Percent of track segments under performance restriction, by mode, excluding BRT and Ferry.

The MPA's baseline performance and performance targets are shown in Table 6.19. Data for the State of Tennessee baseline was not available for this report.

TABLE 6.19 - TRANSIT ASSET MANAGEMENT PERFORMANCE MEASURE TARGETS

CLARKSVILLE TRANSIT SYSTEM						
	NTD REPORTING YEAR FY- 2018			PERFORMANCE TARGET YEAR FY- 2019		
ASSET CLASS/ULB	CURRENT YEAR NUMBER OF ASSETS IN SGR	CURRENT YEAR NUMBER OF ASSETS IN SGR BACKLOG	CURRENT YEAR PERCENT OF ASSETS IN SGR BACKLOG	TARGET YEAR NUMBER OF ASSETS IN SGR	TARGET YEAR NUMBER OF ASSETS IN SGR BACKLOG	PERFORMANCE TARGET
Rolling Stock State of Good Repair (SGR)						
BU Bus/ 14 years	12	0	0.00%	12	0	0.00%
CU Cutaway/ 10 years	4	0	0.00%	7	0	0.00%
MV Minivan / 8 years	2	0	0.00%	2	0	0.00%
RT Rubber-tired vintage trolley/8 years	0	0	0.00%	0	0	0.00%
VN Van/ 8 years	7	0	0.00%	7	0	0.00%
Facilities:						
Admin-Maintenance/40 years	4	0	0.00%	4	0	0.00%
Transit Station/40 years	1	0	0.00%	1	0	0.00%
Equipment State of Good Repair (Support Vehicles Only)						
AO Automobile/8 years	11	6	35.29%	13	4	23.53%
MID-CUMBERLAND HUMAN RESOURCE AGENCY						
Rolling Stock State of Good Repair (SGR)						
BU Bus/ 14 years	0	0	0.00%	0	0	25.00%
CU Cutaway/ 10 years	0	0	0.00%	0	0	25.00%
MV Minivan / 8 years	10	19	65.52%	22	7	25.00%
RT Rubber-tired vintage trolley/14 years	0	0	0.00%	0	0	25.00%
VN Van/ 8 years	64	32	33.33%	72	24	25.00%
Facilities:						
Admin-Maintenance/40 years	0	0	0.00%	0	0	25.00%
Transit Station/40 years	0	0	0.00%	0	0	
Equipment State of Good Repair (Support Vehicles Only)						
AO Automobile/8 years	0	0	0.00%	0	0	25.00%

6.4 | Freight

Freight Movement/Regional Commodity Flows

Movement by Weight and Value for Trucks and Rail

Using data obtained from Transearch by TDOT, general trends in freight movement within Montgomery County, Tennessee can be observed. Freight data was unavailable for Christian County, Kentucky.

In 2012, Montgomery County was the 11th highest truck freight-generating county in Tennessee.

Montgomery County trailed counties from other metropolitan areas, as well as several non-metropolitan counties. In terms of value transported, Montgomery County ranks 10th.

Table 6.20 shows that in 2012, truck freight originating or destined for Montgomery County accounted for less than three percent of truck freight volume by weight. The county also accounts for less than two (2) percent of truck freight value in Tennessee. For rail, Montgomery County accounted for less than one (1) percent of all rail freight volume and value in Tennessee.

Table 6.20 Freight Movement by Weight and Value in Montgomery County, 2012

	Truck		Rail	
	Tons	Value	Tons	Value
Montgomery County, TN	6,911,929	$6,524,558,958	68,640	$140,218,135
Kentucky	241,326,300	$424,551,650,000	76,940,170	$18,632,670,000
Tennessee	262,478,590	$441,721,710,000	35,984,660	$22,216,630,000

Note: Excludes through-traffic
Source: Transearch, Freight Analysis Framework

Table 6.20 displays the freight truck movement within Montgomery County. It should be noted that the information above does not include through traffic, which accounts for 60 percent of freight transported in Tennessee, as indicated in Table 6.21. Nearly 48 percent of all truck freight volume by weight is through traffic in Tennessee, while nearly 67 percent of all rail freight volume by weight is through traffic.

Table 6.21 Freight Movement in Tennessee by Direction by Weight, 2012

	Inbound	Outbound	Intrastate	Through	Total
Truck	133,551,873	125,024,562	60,261,031	290,440,845	609,278,311
Rail	98,102,632	76,352,009	7,813,027	372,983,680	555,251,348
Total	**231,654,505**	**201,376,571**	**68,074,058**	**663,424,525**	**1,164,529,659**

Source: Transearch

Table 6.22 Freight Truck Movement in Montgomery County by Direction by Weight, 2012

	From Outside Tennessee	To Outside Tennessee	From Other Tennessee County	To Other Tennessee County	Within County	Total
Montgomery County	2,746,997	1,816,627	1,177,231	1,133,545	37,529	6,911,929

Source: Transearch

Movement for Other Modes

Due to the MPA's size and relatively low freight volumes, the FHWA's Freight Analysis Framework (FAF) commodity flow data is not available at any geography relevant to the MPA. State-level data can provide some insight to how freight is handled in the MPA.

Table 6.23 and Table 6.24 show the ton-miles of freight generated in Kentucky and Tennessee, respectively. The truck and rail modes account for about 50 percent of all ton-miles of freight in the State of Kentucky, and over 70 percent in the State of Tennessee. Since there are no multi-purpose commercial or industrial water ports in the MPA, it can be assumed that the truck and rail modes account for the overwhelming majority of ton-miles in the MPA as well. A key difference between the two modes of freight movement is that rail tends to travel much greater distances; nearly 750 miles compared to about 275 miles for trucks.

Table 6.23 Means of Transporting Freight Originating in Kentucky, 2015

	Ton-miles (millions)	
	Number	Percent of Ton-miles
Truck	32,434.53	28.73%
Rail	29,252.57	25.91%
Water	26,082.05	23.10%
Air (include truck-air)	53.29	0.05%
Multiple modes & mail	6,283.60	5.57%
Pipeline	18,779.73	16.64%
Total	**112,885.77**	**100.00%**

Source: Freight Analysis Framework

Table 6.24 Means of Transporting Freight Originating in Tennessee, 2015

	Ton-miles (millions)	
	Number	Percent of Ton-miles
Truck	41,966.88	62.11%
Rail	6,494.68	9.61%
Water	1,481.11	2.19%
Air (include truck-air)	24.32	0.04%
Multiple modes & mail	3,945.35	5.84%
Pipeline	13,651.80	20.21%
Total	**67,564.14**	**100.00%**

Source: Freight Analysis Framework

Trucking Network and Facilities

Network

The MPA has no active intermodal terminal facilities or roadways designated as intermodal connectors. I-24 is part of the National Primary Freight Network (NPFN), which makes it part of the National Highway Freight Network. The other two roadways within the MPA that are part of the National Highway Freight Network are SR-76 from Memorial Drive to I-24, and SR-13 from I-24 to Jim Johnson Road. TDOT has identified all interstates and state-owned arterials as key components of their freight network. The major roadways that have been identified are I-24, US 41A, and US 79. The State of Kentucky freight plan identifies all NHS routes and principal arterials as part of their freight network. This network also contains routes on the National Truck Network and 900 additional roadway miles that enhance the statewide geographic coverage of the network. These freight networks can be found in each state's freight plan[9] [10] .

All elements of the truck freight network in the MPA are illustrated in Figure 6.24.

Facilities

There are no active intermodal terminal facilities listed by the Bureau of Transportation Statistics within the MPA. Beyond intermodal terminal facilities, there are many trucking establishments within the MPA. These establishments provide both local and long- distance trucking services.

Traffic

In an effort to better understand freight needs, the travel demand model is able to calculate the estimated daily freight truck volumes on the MPA roadways. These estimated volumes are illustrated in Figure 6.25.

The estimated freight truck volumes suggest the following trends:

- Freight truck traffic is greatest on I-24, US 79, and US 41A. These correspond to the roadways included in the KY and TN state freight networks.
- Freight truck traffic is also relatively high on portions of SR-374 and a few other roadways segments.

9 https://transportation.ky.gov/Planning/Documents/Freight%20Planning/Freight%20Plan/2016%20KYTC%20Freight%20Plan/2016%20Kentucky%20Freight%20Plan.pdf

10 https://www.tn.gov/content/dam/tn/tdot/long-range-planning/TN%20Statewide%20Multimodal%20Freight%20Plan-web.pdf

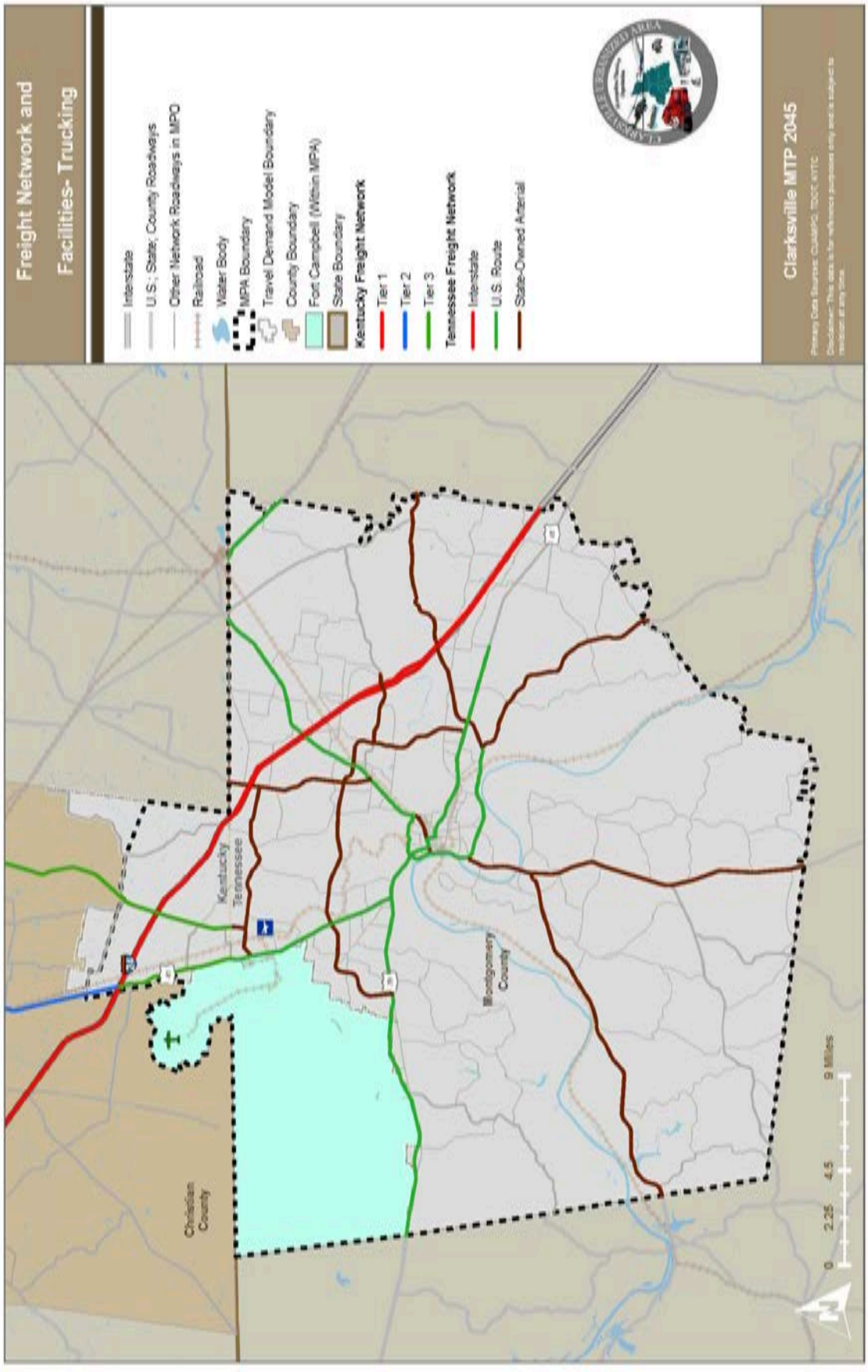


FIGURE 6.24 FREIGHT NETWORK AND FACILITIES- TRUCKING

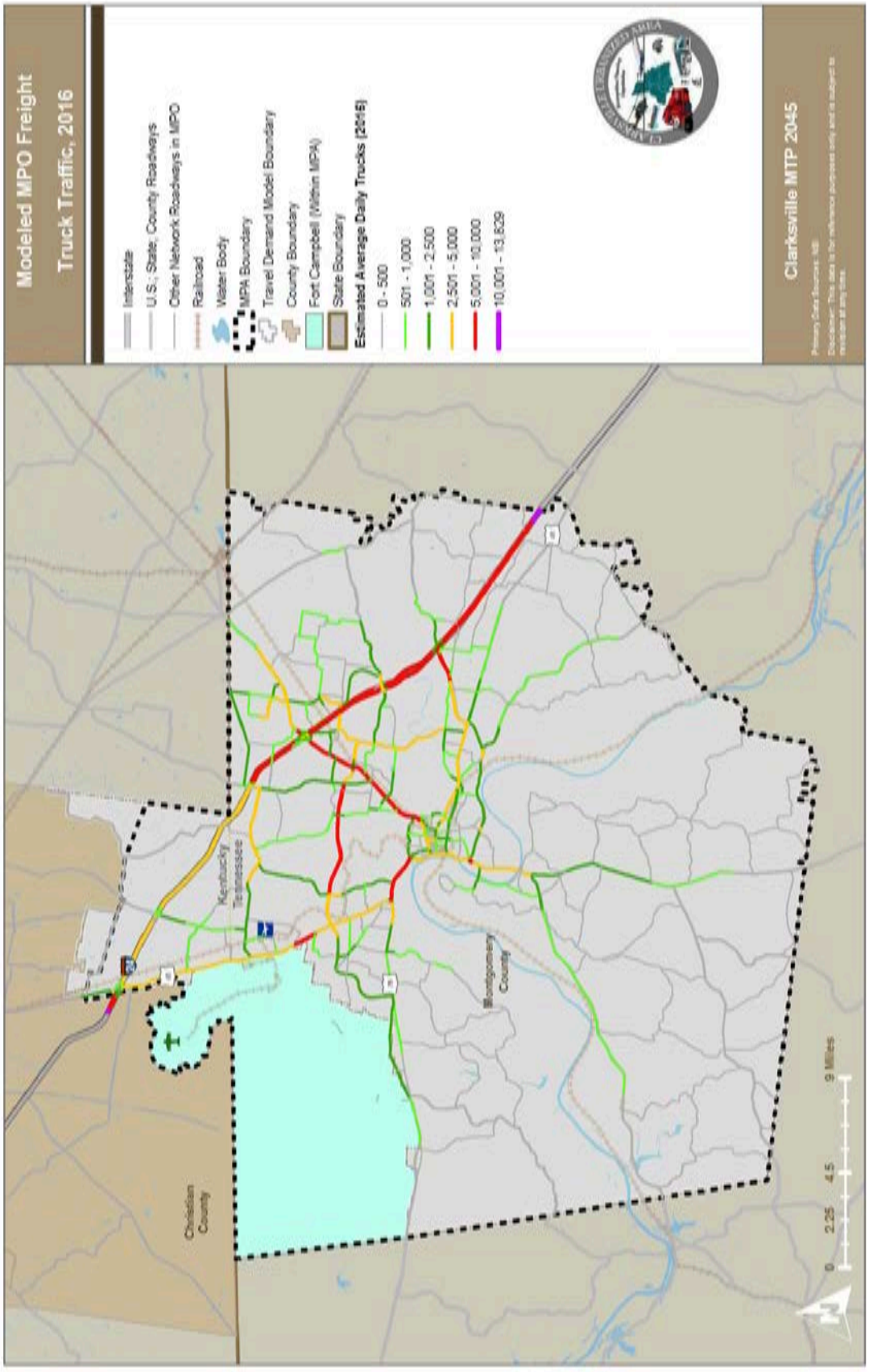


Figure 6.25 Modeled MPO Freight Truck Traffic, 2016

Freight Performance Measures

The FHWA established one performance measure for freight: the Truck Travel Time Reliability (TTTR) Index on the Interstate system. The FHWA states that the TTTR Index is calculated by:

"Freight movement will be assessed by the TTTR Index. Reporting is divided into five periods: morning peak (6-10 a.m.), midday (10 a.m.-4 p.m.) and afternoon peak (4-8 p.m.) Mondays through Fridays; weekends (6 a.m.-8 p.m.); and overnights for all days (8 p.m.-6 a.m.). The TTTR ratio will be generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. The TTTR Index will be generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate."

Data from the NPMRDS states that I-24, the MPA's only Interstate, has an overall TTTR of 1.14. By comparison, the State of Tennessee has a TTTR of 1.35 in their baseline performance report, and the State of Kentucky has a TTTR of 1.23 in their Baseline Performance Report.

The TTTR of each I-24 segment is shown in Figure 6.26. Currently, there are no freight bottlenecks within the MPA reported by TDOT or KYTC.

Freight Targets

Performance measures for freight were finalized by the FHWA with an effective date of May 20, 2017. This requires the states to set their targets by May 20, 2018, and report them to the FHWA in the Baseline Performance Period Report by October 1, 2018. These targets must be reported every 4 years afterwards. Each state is required to establish 2-year and 4-year targets for the freight performance measure. The MPO may either support the targets established by KYTC and TDOT or establish their own 4-year target. For the 2045 MTP, the CUAMPO has chosen to support the state targets established by KYTC and TDOT.

The KYTC state performance measure targets for TTTR are 1.250 for both 2-year and 4-year targets. The TDOT state performance measure targets for TTTR are 1.350 for the 2-year target and 1.330 for the 4-year target.

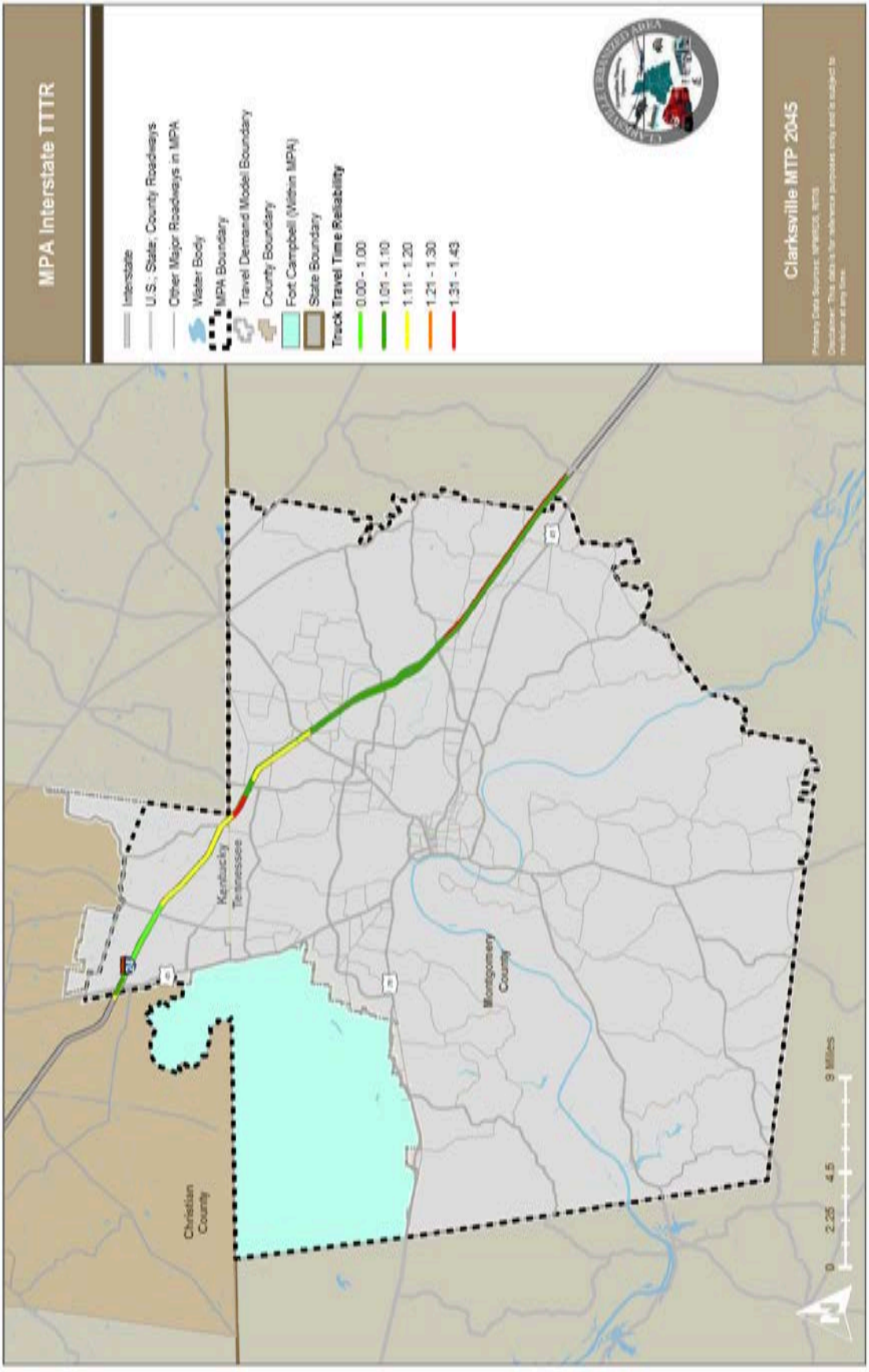


FIGURE 6.26 MPA INTERSTATE TTTR

Rail Network and Facilities

Network

The MPA is served by two railroads: Tier I CSX Transportation (CSXT), and the Tier II shortline from the R.J. Corman Railroad Company (RJCM). A third rail line in the MPA is used for Fort Campbell and the airport.

Facilities

CSXT is headquartered in Jacksonville, FL and maintains a rail line that passes through the northeast corner of the MPA. It operates about 21,000 miles of track, all of which is located in the eastern U.S. The portion of the rail line within the MPA is about 14 miles northeast of the City of Clarksville. It connects to both the RJCM and Fort Campbell rail lines. The CSXT line provides access to:

- Chicago, IL
- Jacksonville, FL
- Louisville, KY
- Nashville, TN
- Atlanta, GA

The RJCM is the MPA's main railroad. It passes through the MPA from southwest to northeast. The line connects with CSXT's lines in the northeastern corner of Clarksville and in Nashville. Services include a spur to the Google Data Center. and the Clarksville-Montgomery County Industrial Park. Commodities shipped by the RJCM include:

- aluminum
- steel
- wallboard
- lumber
- zinc
- grain
- paper
- chemicals

Traffic

The amount of freight carried by the rail lines in the Clarksville MPA is not readily available. Further information from CSX and RJCorman can be obtained through the rail lines. As TDOT has frozen funding for shortline railroads, the operators of those lines are not required to submit annual reports regarding the goods they transport.

Figure 6.27 shows the location of the rail facilities within the MPA.

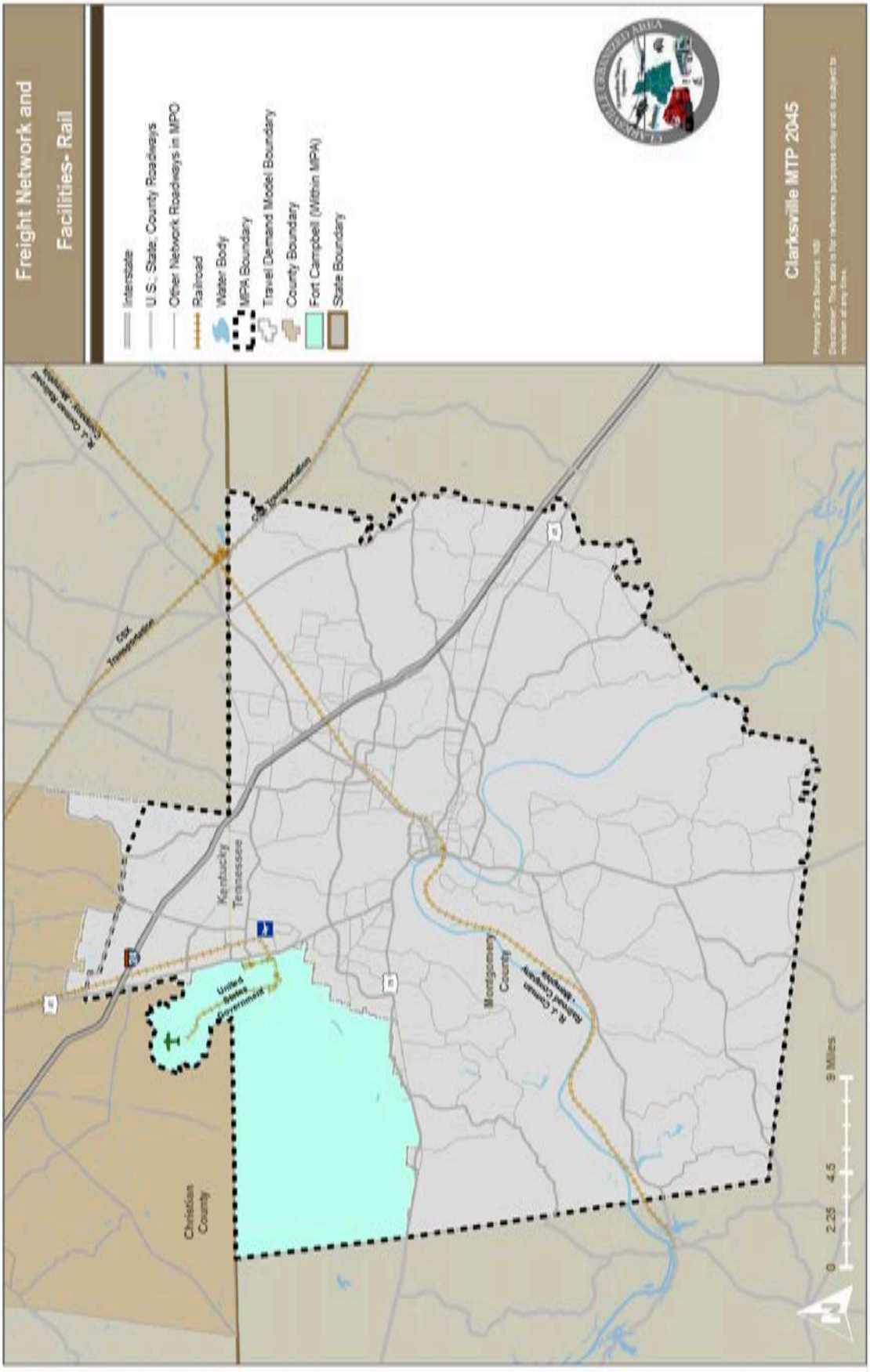


FIGURE 6.27 FREIGHT NETWORK AND FACILITIES- RAIL

Airports

Facilities

While only a small amount of freight is typically shipped by air, these commodities tend to be high in value. The area around airports also tends to serve as distribution and manufacturing hubs.

There is only one public-use airport in the MPA, the Clarksville Regional Airport, which is also known as Outlaw Field. The Clarksville Regional Airport is a general aviation airport that transports very little freight. The Nashville International Airport is the nearest airport that provides commercial service. Public transit is able to reach the airport by Route 1 (Fort Campbell) and Route 2 (Tiny Town).

The Clarksville Regional Airport is governed by the Clarksville-Montgomery County Regional Airport Authority, which has responsibility of operational oversight and maintaining safe and efficient air operations. From the air, the Clarksville Regional Airport is approximately 4.0 nautical miles southeast of Fort Campbell Army Airfield and 4.0 nautical miles northeast of Sabre Army Heliport. Due to the proximity of the airport to these locations, the arrival and departure of flights to the airport are controlled by Fort Campbell Air Traffic Control. Clarksville Regional Airport's airspace extends approximately 1.5 nautical miles west of the center of the airfield where it intersects the eastern edge of the R-3702A-B Restricted Airspace areas, and is within the A-371 Alert Area.

Clarksville Regional Airport

Total Aircraft:

59
(51 Single Engine)

Daily Aircraft Operations 2017

89

The total number aircraft based at the airport has increased over the past several years. The current hangars available at the airport are now at capacity. There are 59 total aircraft based at the Clarksville Regional Airport, with 51 of those aircraft being single engine planes. Daily operations at the airport average 89 aircraft in 2017 according to FAA traffic records. None of these aircraft operations included commercial flights. The airport is shown in Figure 6.28.

A new $5 million airport terminal was completed in 2012, as well as a new aircraft parking apron that was completed in 2015. This new apron includes weight bearing capabilities that match those of the runway and taxiway. There are now two dedicated helicopter landing pads at the airport. Recently, new T Hangars were built in 2016 which included sitework for future hangars. During the beginning of 2018, the airport

secured nearly 13 million in federal and state grant dollars to rebuild the main runway and associated taxiway. This project will add a new high visibility LED runway and taxiway lighting system.

Cargo Volume

No cargo data was available for the Clarksville Regional Airport.

Water Ports

Facilities

There are no major port facilities located within the MPA. However, there are four single-purpose port facilities (shown in Figure 6.28) located along the Cumberland River. These ports are for:

- Ingram Materials, Inc. – Located at river mile 126.7 near South Riverside Drive. The facility operates at a water depth of nine feet and a berthing space of 200 feet.
- Nystar Taylor Chemicals – Located at river mile 122.2 near Zinc Plant Road. The facility operates at a water depth of 11 feet and a berthing space of 1,000 feet. A surface railroad track connects the port to the R.J. Corman Railroad.
- Winn Materials, Inc. – Located at river mile 123.7 off Barge Point Road. The facility operates at a water depth of 22 feet and a berthing space of 390 feet. The facility's primary purpose is the loading of crushed limestone onto barges and the unloading of sand.
- Hopkinsville Elevator Company Inc. – Located at river mile 123.9 off Barge Point Road. The facility operates at a water depth of 22 feet and a berthing space of 800 feet. The facilities primary purpose is to ship grain products.

Cargo Volume

Cargo volumes for the four single-purpose ports listed above are not readily available.

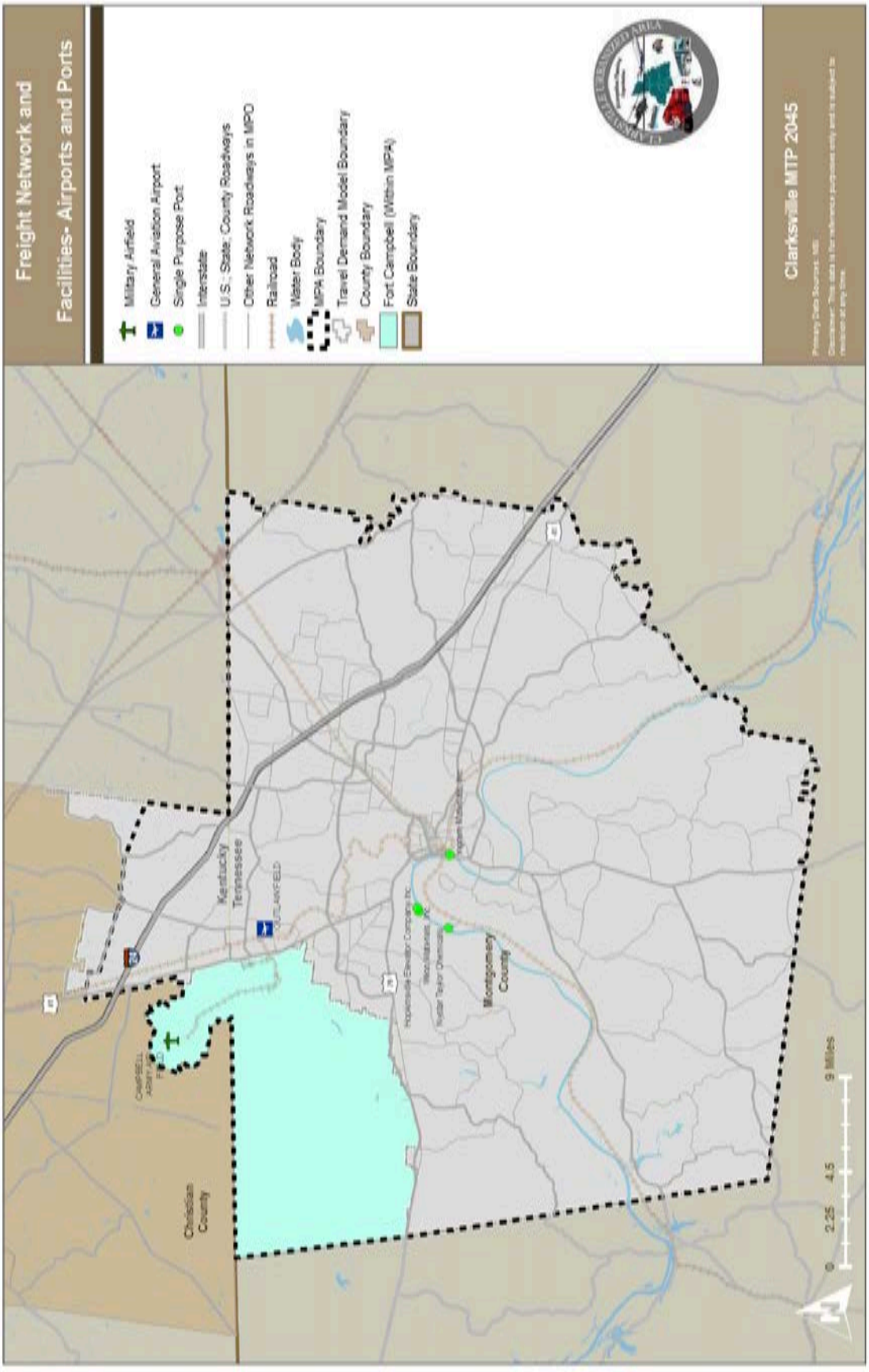


Figure 6.28 Freight Network Facilities- Airports and Ports

Statewide Freight Plan

Both KYTC and TDOT have statewide comprehensive freight plans. KYTC also maintains a separate statewide rail plan. These plans are a comprehensive evaluation of each state's freight transportation system. They allow for the efficient planning and investment in the preservation, improvement, and strategic expansion of each state's freight system.

Of particular importance, the freight plans do the following:

1. Identifies highway and rail freight corridors of statewide significance.
2. Identifies improvement strategies through a needs assessment, with a focus on ensuring continued efficient and safe movement of freight within the key freight corridors.
3. Identifies potential improvements and funding for the freight system.

6.5 | Safety

The safety element of the 2045 MTP focused on gathering and analyzing the available safety data and then identifying general hazardous areas.

Due to the limited scope of this study, it does not identify location specific recommendations for the identified hazardous locations. However, potential countermeasures which could be used to mitigate various crash types have been included in Chapter 8: Future Transportation Needs. The FAST Act requires each state to maintain a Highway Safety Improvement Program (HSIP). The HSIP must include the FHWA performance measures for roadway safety and the development a Strategic Highway Safety Plan (SHSP).

"Disclaimer: This document and the information contained herein is prepared solely for the purpose of identifying, evaluating and planning safety improvements on public roads which may be implemented utilizing federal aid highway funds; and is therefore exempt from discovery or admission into evidence pursuant to 23 U.S.C. 409."

Roadways Crash Data Analysis

According to the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS), between 2011 and 2015, approximately 33,400 fatalities occurred annually on United States roadways.

Every crash, regardless of the severity, costs money and time in damages, emergency services, and delays. These costs affect both governments and taxpayers. Despite the trend of reduced crashes over previous years, crashes and roadway safety still need to be addressed. One of the goals of this plan is to improve travel safety by reducing the risk of crashes on the roadways.

- severity
- location
- alcohol involvement
- vehicle type

Crash records for the MPA were obtained from KYTC and Tennessee's Integrated Traffic Analysis Network (TITAN). These crash records are from 2012 through 2016. The crash records included the:

From 2012 through 2016, the years for which all necessary data for analysis was available, a total of 29,728 crashes occurred within the MPA. Table 6.25 shows the breakdown of the crashes by county and year.

Table 6.25 MPA Crashes by Year, 2012-2016

Crash Year	Montgomery County Total	Montgomery County Fatal Crashes	Montgomery County Severe Crashes	Christian County Total	Christian County Fatal Crashes	Christian County Severe Crashes	MPA Total
2012	5,559	22	193	327	0	0	5,886
2013	5,412	21	196	327	2	0	5,739
2014	5,526	24	228	295	0	1	5,821
2015	5,842	27	234	321	0	0	6,163
2016	5,768	24	167	351	2	0	6,119
2017	6,300	26	172	--	--	--	6,300
Total	**34,407**	**144**	**1,190**	**1,621**	**4**	**1**	**36,028**

Note: Kentucky 2017 crash data was unavailable at the time of this report.

Source: KYTC, TITAN (2012-2016)

Crash Severity and Alcohol Involvement

Crash severity reveals the extent to which crashes in the MPA pose a safety risk to roadway users. The severity of the crashes within the MPA from 2012 through 2016 is shown in Table 6.26. Within the MPA, there were 121 fatal crashes and 7,331 crashes causing injuries. Less than four (4) percent of the total crashes resulted in a fatality or severe injury. Nearly 75 percent of the crashes had no injuries reported.

Table 6.26 MPA Crashes by Severity, 2012-2016

Severity	Montgomery County	Christian County	MPA Total	Percentage
Fatal	117	4	121	0.4%
Incapacitating Injury	983	35	1,018	3.4%
Non-incapacitating injury	6,190	123	6,313	21.2%
Property damage only (PDO)	20,817	1,447	22,264	74.9%
Unlisted	0	12	12	0.0%
Total	**28,107**	**1,621**	**29,728**	**100.0%**

Source: KYTC, TITAN (2012-2016)

An analysis was also conducted on alcohol involvement in the MPA's crashes. The Clarksville area has made strides in recent years to reduce impaired driving. As part of these efforts, law enforcement has been actively conducting sobriety checkpoints and introducing additional enforcement programs. Table 6.27 displays a breakdown of alcohol involvement for crashes that occurred in the MPA between 2012 and 2016. Less than two (2) percent of overall crashes in the MPA involved alcohol. Of the 121 total fatal crashes within the MPA, seven (7) were fatal crashes related to alcohol involvement, resulting in a nearly six (6) percent share of total fatality crashes being alcohol related.

Table 6.27 Alcohol Involvement in Crashes, 2012-2016

Alcohol Involvement	Montgomery County	Christian County	MPA Total	Percentage
Alcohol involved	335	62	397	1.3%
Alcohol not involved	27,772	1,559	29,331	98.7%
Total	**28,107**	**1,621**	**29,728**	**100.0%**

Source: KYTC, TITAN (2012-2016)

11 https://tntrafficsafety.org/
12 https://transportation.ky.gov/HighwaySafety/Pages/default.aspx

Additional efforts have been made by the Tennessee Highway Safety Office (THSO)[11] and the Kentucky Office of Highway Safety[12] (KOHS) to educate roadway users on the dangers of:

- drunk driving
- distracted driving
- lack of seatbelt use
- speeding

THE PROGRAMS INITIATED BY THESE TWO AGENCIES INCLUDE:

- Click It or Ticket
- Booze It & Lose It (THSO)
- Drive Sober or Get Pulled Over (KOHS)
- Buckle Up in Your Truck
- 100 Days of Summer Heat (THSO)
- One Text or Call Could Wreck It (KOHS)
- Speed Week (KOHS)

Crash Locations

THERE WERE NEARLY 12,400 INTERSECTION CRASHES IN THE MPA FROM 2012 TO 2016. THIS REPRESENTS NEARLY 42 PERCENT OF ALL MPA CRASHES.

Table 6.28 shows the top 20 intersections with the highest crash frequency in the MPA and their severity. Table 6.29 shows the collision types that occurred at these intersections. **These intersections account for nearly 28 percent of all intersection crashes within the MPA.** Figure 6.29 displays the top 20 intersections with high crash frequency.

The nature of this study is only to identify trends; thus it did not attempt to analyze each location and corresponding crash records.

11 https://tntrafficsafety.org/
12 https://transportation.ky.gov/HighwaySafety/Pages/default.aspx

Table 6.28 Top 20 Intersections with High Crash Frequency by Severity, 2012-2016

Rank	Location	Crashes	Fatal	Incapacitating Injury	Non-Incapacitating Injury	PDO
1	US 41A/Madison St @ SR-76	342	0	4	66	272
2	US 41A/Providence Blvd @ US 79/Kraft St	287	0	7	67	213
3	US 79/Wilma Rudolph Blvd @ SR-48/Trenton Rd	270	0	4	46	220
4	SR-48/College St @ Second St	253	0	4	67	182
5	SR-48/Trenton Rd @ SR-236/Tiny Town Rd	253	0	9	59	185
6	US 79/Wilma Rudolph Blvd @ Dunbar Cave Rd	211	0	5	50	156
7	SR-374/101st Airborne Division Pkwy @ Peacher's Mill Rd	189	0	9	34	146
8	SR-76 @ Sango Rd	178	1	9	46	122
9	US 41A/Providence Blvd @ Peacher's Mill Rd	147	0	3	35	109
10	US 41A/Fort Campbell Blvd @ SR-236/Tiny Town Rd	134	0	0	23	111
11	US 79/Wilma Rudolph Blvd @ Ted Crozier Blvd	134	0	1	22	111
12	SR-374/101st Airborne Division Pkwy @ Old Trenton Rd	133	0	3	39	91
13	US 79/Wilma Rudolph Blvd @ Needmore Ln	123	0	1	25	97
14	SR-374/101st Airborne Division Pkwy @ SR-48/Trenton Rd	122	3	7	39	73
15	US 79/Wilma Rudolph Blvd @ Dunlop Ln	120	0	3	25	92
16	SR-374/Richview Rd @ Memorial Dr	111	0	1	19	91
17	US 79/Wilma Rudolph Blvd @ I-24 EB Ramps	111	0	2	27	82
18	US 41A/Fort Campbell Blvd @ Britton Springs Rd	108	0	2	30	76
19	SR-48/Trenton Rd @ Needmore Rd	106	0	4	25	77
20	US 41A/Madison St @ Memorial Dr	105	1	4	18	82
	Total	**3,437**	**5**	**82**	**762**	**2,588**

Source: KYTC, TITAN (2012-2016)

TABLE 6.29 TOP 20 INTERSECTIONS WITH HIGH CRASH FREQUENCY BY COLLISION TYPE, 2012-2016

RANK	LOCATION	CRASHES	NO COLLISION WITH VEHICLE	REAR END	HEAD ON	ANGLE	SIDE-SWIPE SAME DIR.	SIDE-SWIPE OPP. DIR	REAR TO SIDE	REAR TO REAR	OTHER	UN-KNOWN
1	US 41A/Madison St @ SR-76	342	7	241	3	71	14	1	0	0	2	3
2	US 41A/Providence Blvd @ US 79/Kraft St	287	14	137	13	89	27	4	0	0	3	0
3	US 79/Wilma Rudolph Blvd @ SR-48/Trenton Rd	270	5	228	1	26	7	0	0	1	2	0
4	SR-48/College St @ Second St	253	8	105	13	107	10	3	0	0	6	1
5	SR-48/Trenton Rd @ SR-236/Tiny Town Rd	253	6	152	8	73	8	3	1	0	2	0
6	US 79/Wilma Rudolph Blvd @ Dunbar Cave Rd	211	4	136	2	54	15	0	0	0	0	0
7	SR-374/101st Airborne Division Pkwy @ Peacher's Mill Rd	189	2	115	4	43	16	2	1	4	2	0
8	SR-76 @ Sango Rd	178	3	67	0	96	8	1	1	0	2	0
9	US 41A/Providence Blvd @ Peacher's Mill Rd	147	8	76	6	47	8	1	0	0	1	0
10	US 41A/Fort Campbell Blvd @ SR-236/Tiny Town Rd	134	3	81	0	40	7	1	0	0	2	0
11	US 79/Wilma Rudolph Blvd @ Ted Crozier Blvd	134	2	61	1	58	7	2	2	0	0	1
12	SR-374/101st Airborne Division Pkwy @ Old Trenton Rd	133	1	103	2	21	1	1	1	1	2	0
13	US 79/Wilma Rudolph Blvd @ Needmore Ln	123	0	57	2	54	8	1	0	0	1	0

Source: KYTC, TITAN (2012-2016)

continued

TABLE 6.29 TOP 20 INTERSECTIONS WITH HIGH CRASH FREQUENCY BY COLLISION TYPE, 2012-2016

RANK	LOCATION	CRASHES	NO COLLISION WITH VEHICLE	REAR END	HEAD ON	ANGLE	SIDE-SWIPE SAME DIR.	SIDE-SWIPE OPP. DIR	REAR TO SIDE	REAR TO REAR	OTHER	UN-KNOWN
14	SR-374/101st Airborne Division Pkwy @ SR-48/ Trenton Rd	122	2	72	8	33	6	0	0	0	1	0
15	US 79/Wilma Rudolph Blvd @ Dunlop Ln	120	2	66	0	42	6	1	0	0	2	1
16	SR-374/Richview Rd @ Memorial Dr	111	4	86	1	16	3	0	0	0	1	0
17	US 79/Wilma Rudolph Blvd @ I-24 EB Ramps	111	2	74	1	27	6	0	0	0	1	0
18	US 41A/Fort Campbell Blvd @ Britton Springs Rd	108	6	42	4	44	10	0	0	0	2	0
19	SR-48/Trenton Rd @ Needmore Rd	106	1	69	1	26	6	2	0	0	1	0
20	US 41A/Madison St @ Memorial Dr	105	8	51	3	32	6	2	0	0	3	0
	Total	**3,437**	**88**	**2,019**	**73**	**999**	**179**	**25**	**6**	**6**	**36**	**6**

Source: KYTC, TITAN (2012-2016)

Crash Rates

Crash rates for the study area were based on the model network layer and base year (2016) volumes obtained from the Clarksville MPO travel demand model. The length of each segment and the corresponding daily traffic volumes from the model are used in the crash rate equation. The segment crash rate equation is:

$$\text{Segment Crash Rate} = \frac{N*10^6}{365*ADT*L}$$

Where:

Segment Crash Rate = crashes per million vehicle miles traveled

N = average annual crash frequency of the segment

ADT = average daily traffic of the segment

L = length of the segment in miles

Table 6.30 shows the ten (10) segments with the highest crash frequencies in the MPA and their corresponding crash rates. Table 6.31 shows the ten (10) segments with the highest crash rates in the MPA (with a length that is greater than one-tenth of a mile). Figure 6.29 illustrates the locations with the highest crash frequencies and crash rates. Tables 6.30 and 6.31 show the relative ranking of the segments by their crash frequencies and rates and are not used to infer an order of priority.

The equation that was used to calculate intersection crash rates is:

$$\text{Intersection Crash Rate} = \frac{N*10^6}{365*ADT}$$

Where:

Intersection Crash Rate = crashes per million vehicles entering

N = average annual crash frequency of the intersection

ADT = average daily traffic entering the intersection

Table 6.32 shows the ten (10) intersections with the highest crash frequencies in the MPA and their corresponding crash rates.

Table 6.30 Top 10 High Crash Frequency Segments and Crash Rates, 2012-2016

Segment	From	To	Total Crashes	Annual Crash Frequency	ADT	Length (mi)	Crash Rate*
US 41A/US 79/ Providence Blvd	Peacher's Mill Rd	0.94 miles east	265	53.00	42,626	0.94	5.43
I-24 EB	SR-237/Rossview Rd	SR-76	210	42.00	31,218	2.11	1.75
I-24 EB	SR-48/Trenton Rd	US 79/Wilma Rudolph Blvd	176	35.20	27,035	2.33	1.53
US 41A/ Fort Campbell Blvd	Britton Springs Rd	0.54 miles south	131	26.20	31,687	0.54	4.22
US 79/SR-13/ Wilma Rudolph Blvd	I-24 West Ramps	I-24 East Ramps	111	22.20	33,937	0.27	6.66
US 41A/ Fort Campbell Blvd	0.20 miles south of SR-374	0.44 miles south of SR-374	109	21.80	33,494	0.24	7.32
US 41A/Fort Campbell Blvd	0.26 miles north of KY-400/State Line Rd	KY-400/State Line Rd	102	20.40	29,795	0.26	7.11
US 79/SR-13/ Wilma Rudolph Blvd	Old Trenton Rd	SR-48/Trenton Rd	99	19.80	33,537	0.13	12.74
Needmore Ln	0.24 miles west of US 79/ Wilma Rudolph Blvd	US 79/Wilma Rudolph Blvd	95	19.00	9,767	0.24	22.30
Tiny Town Rd	0.46 miles west of SR-48/ Trenton Rd	SR-48/Trenton Rd	94	18.80	28,179	0.46	3.99

Note: *Crash Rate is expressed in crashes per million vehicle miles traveled

Source: KYTC, TITAN (2012-2016)

TABLE 6.31 TOP 10 HIGH CRASH RATE SEGMENTS, 2012-2016

SEGMENT	FROM	TO	TOTAL CRASHES	ANNUAL CRASH FREQUENCY	ADT	LENGTH (MI)	CRASH RATE*
Red River St	SR-48/College St	0.19 miles north	13	2.60	168	0.19	227.86
Hickory Grove Blvd	US 41A Bypass/Riverside Dr	0.35 miles east	6	1.20	49	0.35	189.47
Old Hwy 48	Martha's Chapel Rd	1.96 miles east	10	2.00	22	1.96	127.80
Main St	US 41A Bypass/Riverside Dr	Public Square	20	4.00	1,092	0.12	82.48
Woodlawn Church Rd	0.21 miles south of US 79/Dover Rd	US 79/Dover Rd	2	0.40	78	0.21	66.06
Stephanie Dr	US 79/Dover Rd	0.28 miles north	4	0.80	123	0.28	64.06
Antioch Church Rd	0.69 miles north of Antioch Rd	0.85 miles north of Antioch Rd	2	0.40	117	0.16	60.31
Commerce St	6th St	0.10 miles east	11	2.20	1,049	0.10	57.31
Lake Rd	Lylewood Rd	1.56 miles east	4	0.80	25	1.56	56.38
Franklin St	Public Square	Second St	19	3.80	1,624	0.15	43.88

Note: *Crash Rate is expressed in crashes per million vehicle miles traveled

Source: KYTC, TITAN (2012-2016)

6.32 Top 10 High Crash Rate Intersections, 2012-2016

Location	Total Crashes	Annual Crash Frequency	ADT	Crash Rate*
SR-48/College St @ Second St	253	50.6	22,509	6.16
US 41A/Madison St @ SR-76	342	68.4	39,922	4.69
US 79/Wilma Rudolph Blvd @ SR-48/Trenton Rd	270	54.0	37,267	3.97
SR-48/Trenton Rd @ SR-236/Tiny Town Rd	253	50.6	37,857	3.66
US 41A/Providence Blvd @ US 79/Kraft St	287	57.4	46,422	3.39
SR-76 @ Sango Rd	178	35.6	34,329	2.84
US 79/Wilma Rudolph Blvd @ Dunbar Cave Rd	211	42.2	41,866	2.76
SR-374/101st Airborne Division Pkwy @ Peacher's Mill Rd	189	37.8	53,751	1.93
US 41A/Fort Campbell Blvd @ SR-236/Tiny Town Rd	134	26.8	40,778	1.80
US 41A/Providence Blvd @ Peacher's Mill Rd	147	29.4	46,393	1.74

Note: *Crash Rate is expressed in crashes per million vehicles entering

Source: KYTC, TITAN (2012-2016)

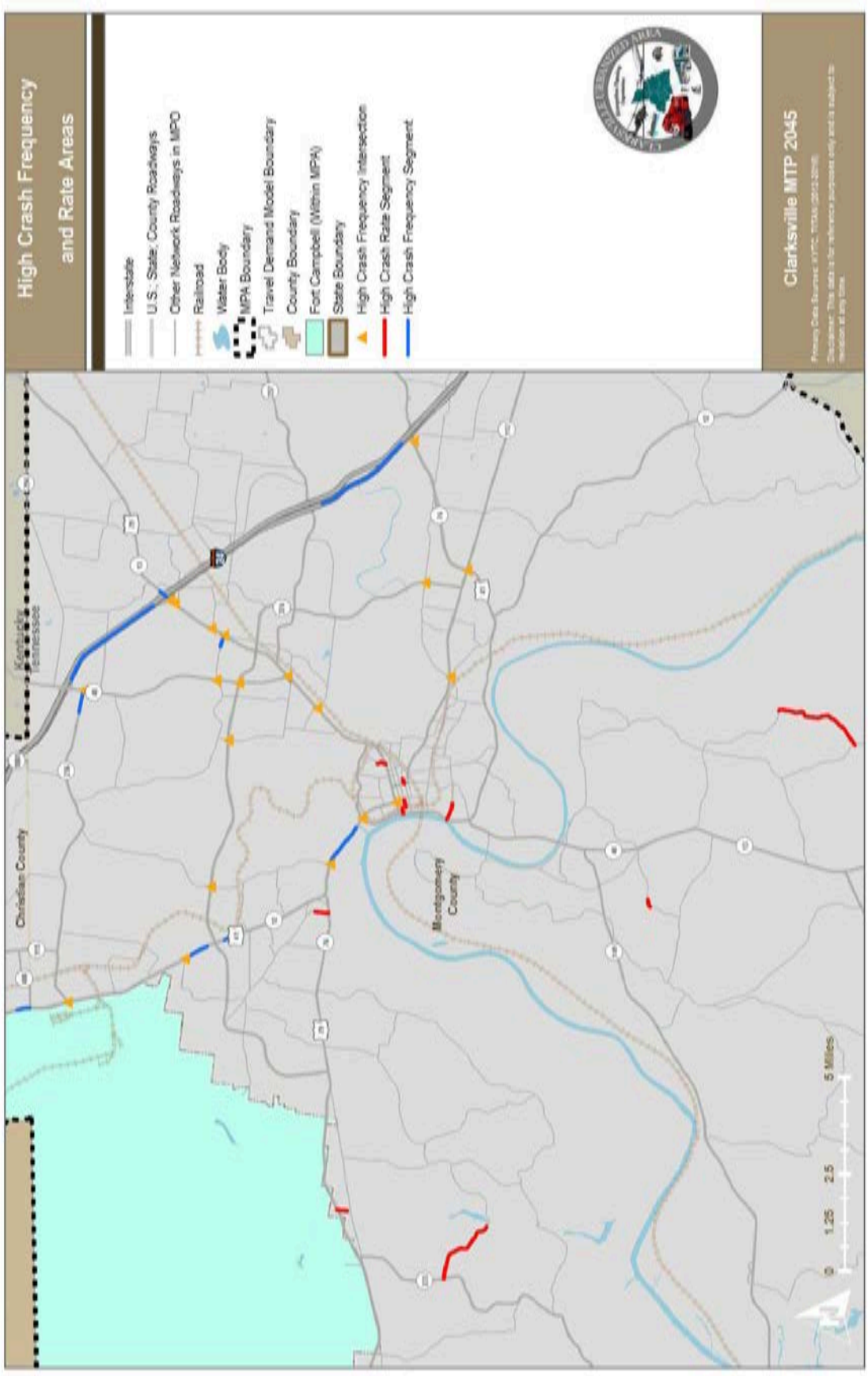


FIGURE 6.29 HIGH CRASH FREQUENCY AND RATE AREAS

Bicycle and Pedestrian Crash Data Analysis

When involved in a crash, pedestrians and bicyclists are more likely to experience severe or fatal crashes.

These roadway users are considered vulnerable due to the lack of protection that they have in a crash. Crashes involving pedestrians and bicyclists were analyzed based on the crash records from 2012 to 2016. A total of 144 pedestrian crashes and 79 bicycle crashes occurred in the MPA during the five-year study period and are illustrated in Figure 6.30. Table 6.33 breaks down the number of pedestrian and bicycle crashes by county and year.

Table 6.33 Pedestrian and Bicycle Crashes (2012 - 2016)

Mode	Year	Montgomery County	Christian County	Total
Pedestrian	2012	33	0	33
	2013	21	1	22
	2014	25	3	28
	2015	29	0	29
	2016	29	3	32
Total Pedestrian		**137**	**7**	**144**
Bicycle	2012	21	0	21
	2013	18	0	18
	2014	13	0	13
	2015	15	0	15
	2016	10	2	12
Total Bicycle		**77**	**2**	**79**

Source: KYTC, TITAN (2012-2016)

Between 2012 and 2016, thirteen (13) fatal pedestrian crashes and one (1) fatal bicycle crash occurred in the MPA, as shown in Tables 6.34 and 6.35. Less than five (5) percent of pedestrian crashes and less than fourteen (14) percent of bicycle crashes were property damage only (PDO).

Table 6.34 Pedestrian Crashes by Severity (2012-2016)

Severity	Montgomery County	Christian County	Number of Crashes	Percentage
Fatal	13	0	13	9.0%
Incapaciting Injury	31	1	32	22.2%
Non-Incapacitating Injury	90	3	93	64.6%
PDO	3	4	7	4.9%
Unlisted	0	0	0	0.0%
Total	**137**	**7**	**144**	**100.0%**

Source: KYTC, TITAN (2012-2016)

Table 6.35 Bicycle Crashes by Severity (2012-2016)

Severity	Montgomery County	Christian County	Number of Crashes	Percentage
Fatal	1	0	1	1.3%
Incapaciting Injury	11	0	11	13.9%
Non-Incapacitating Injury	55	1	56	70.9%
PDO	10	1	11	13.9%
Unlisted	0	0	0	0.0%
Total	**77**	**2**	**79**	**100.0%**

Source: KYTC, TITAN (2012-2016)

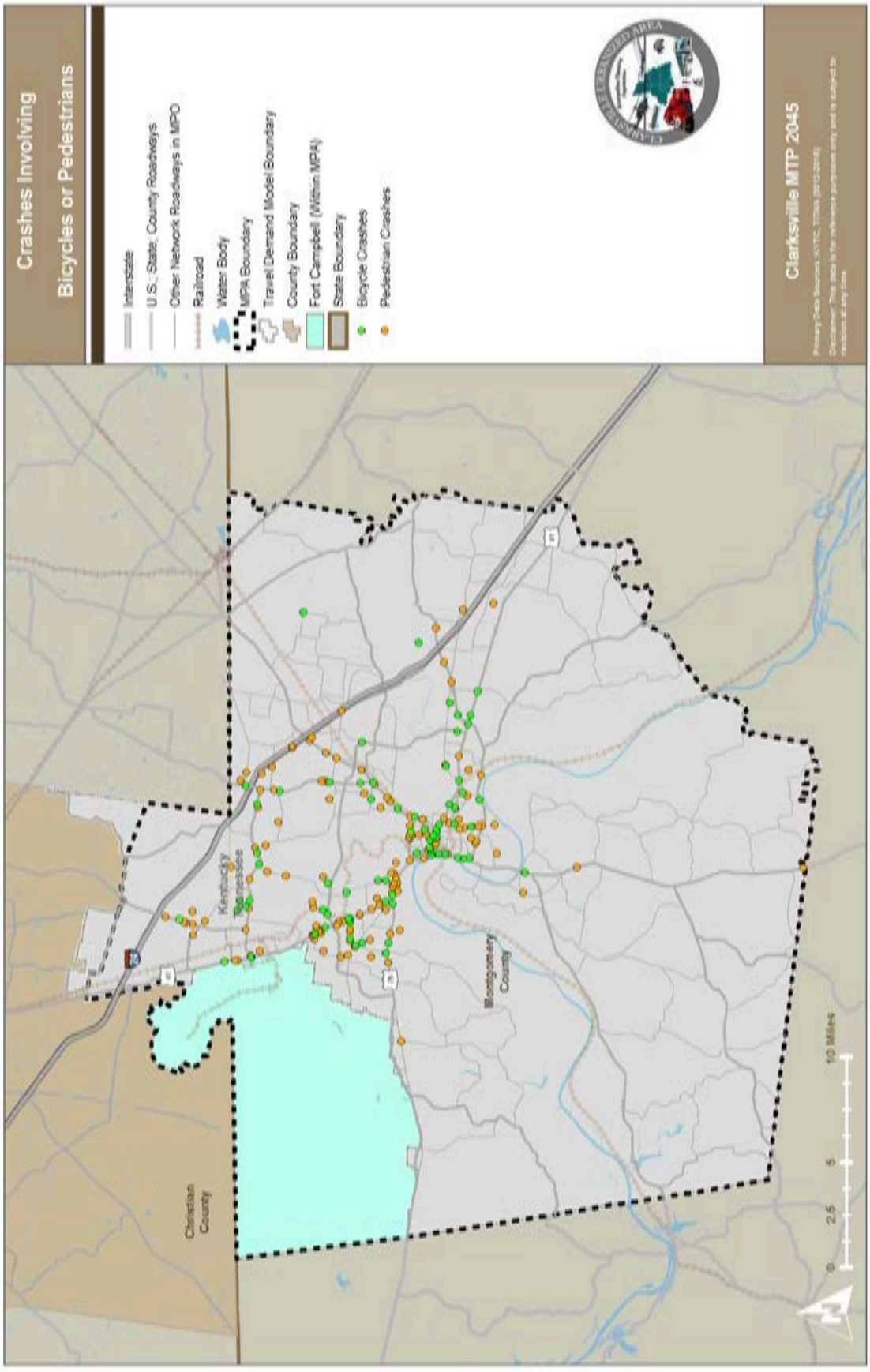


Figure 6.30 Crashes Involving Bicycles or Pedestrians

Motorcycle Crash Data Analysis

Motorcyclists are also considered vulnerable roadway users.

The State of Tennessee requires all motorcycle riders to wear a helmet, while the State of Kentucky requires all motorcycle riders and passengers in sidecars below the age of 21 to wear a helmet.

The State of Tennessee also offers a Motorcycle Rider Education Program. The program offers classes for both beginning and experienced motorcyclists in order to educate motorcyclists on basics, licensing, and more.

Crashes involving motorcyclists were also analyzed based on the crash records from 2012 to 2016. A total of 827 motorcycle crashes occurred in the MPA during the five-year study period and are illustrated in Figure 6.31. Table 6.36 breaks down the number of motorcycle crashes by county and by year.

Table 6.36 Motorcycle Crashes (2012 - 2016)

Year	Montgomery County	Christian County	Total
2012	193	14	207
2013	148	5	153
2014	140	11	151
2015	161	4	165
2016	144	7	151
Total	**786**	**41**	**827**

Source: KYTC, TITAN (2012-2016)

Between 2012 and 2016, 19 fatal motorcycle crashes occurred in the MPA. The severity of the motorcycle crashes within the MPA is shown in Table 6.37.

TABLE 6.37 MOTORCYCLE CRASHES BY SEVERITY (2012-2016)

SEVERITY	MONTGOMERY COUNTY	CHRISTIAN COUNTY	NUMBER OF CRASHES	PERCENTAGE
Fatal	19	0	19	2.3%
Incapaciting Injury	94	10	104	12.6%
Non-Incapacitating Injury	280	7	287	34.7%
PDO	393	24	417	50.4%
Unlisted	0	0	0	0.0%
Total	**786**	**41**	**827**	**100.0%**

Source: KYTC, TITAN (2012-2016)

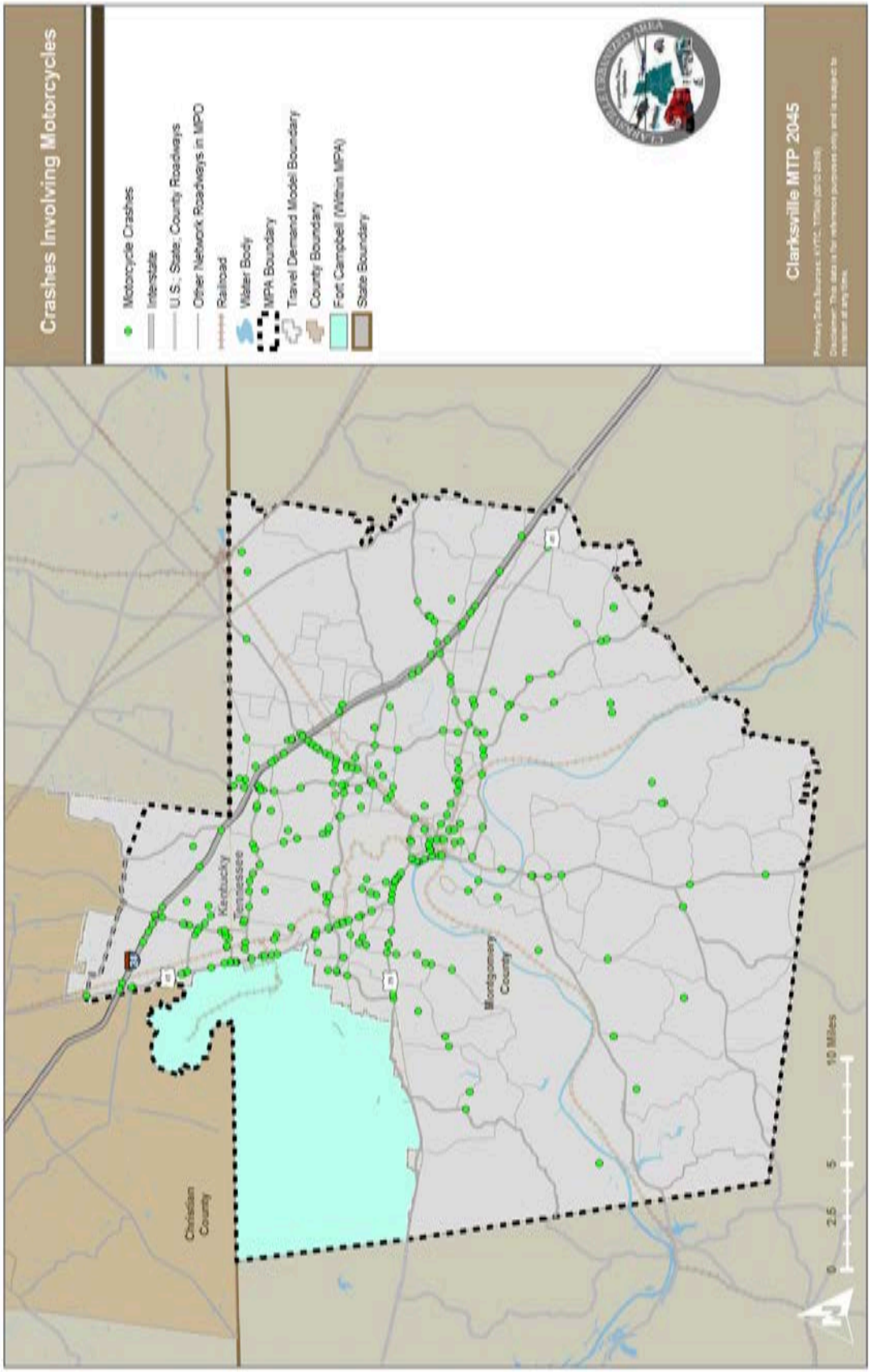


Figure 6.31 Crashes Involving Motorcycles

Transit Safety Events Analysis

From 2012-2016, there were 25 crashes involving a Transit Bus, as defined in the TITAN database. However, the database does not contain information on which provider is involved in the crash. Further information can be obtained from the service providers discussed in Section 6.3.

Freight Truck Safety Analysis

Crashes involving heavy vehicles were analyzed using crash records from 2012 to 2016 obtained from KYTC and TITAN. A total of 897 crashes involving heavy vehicles occurred within the Clarksville MPA counties during the study period. Table 6.38 shows the number of heavy vehicle crashes by county during the study period. Figure 6.32 shows the crashes in the MPA involving freight trucks.

Table 6.38 Heavy Vehicle Crashes by Year by County (2012-2016)

Crash Year	Montgomery County	Christian County	Total
2012	121	15	136
2013	105	25	130
2014	139	21	160
2015	196	23	219
2016	225	27	252
Total	**786**	**111**	**897**

Source: KYTC, TITAN (2012-2016)

During the same time-period, nine (9) fatal crashes involving heavy vehicles occurred within the MPA. While this represented one (1) percent of heavy vehicle crashes, about seven (7) percent of all fatal crashes in the MPA involved a heavy vehicle.

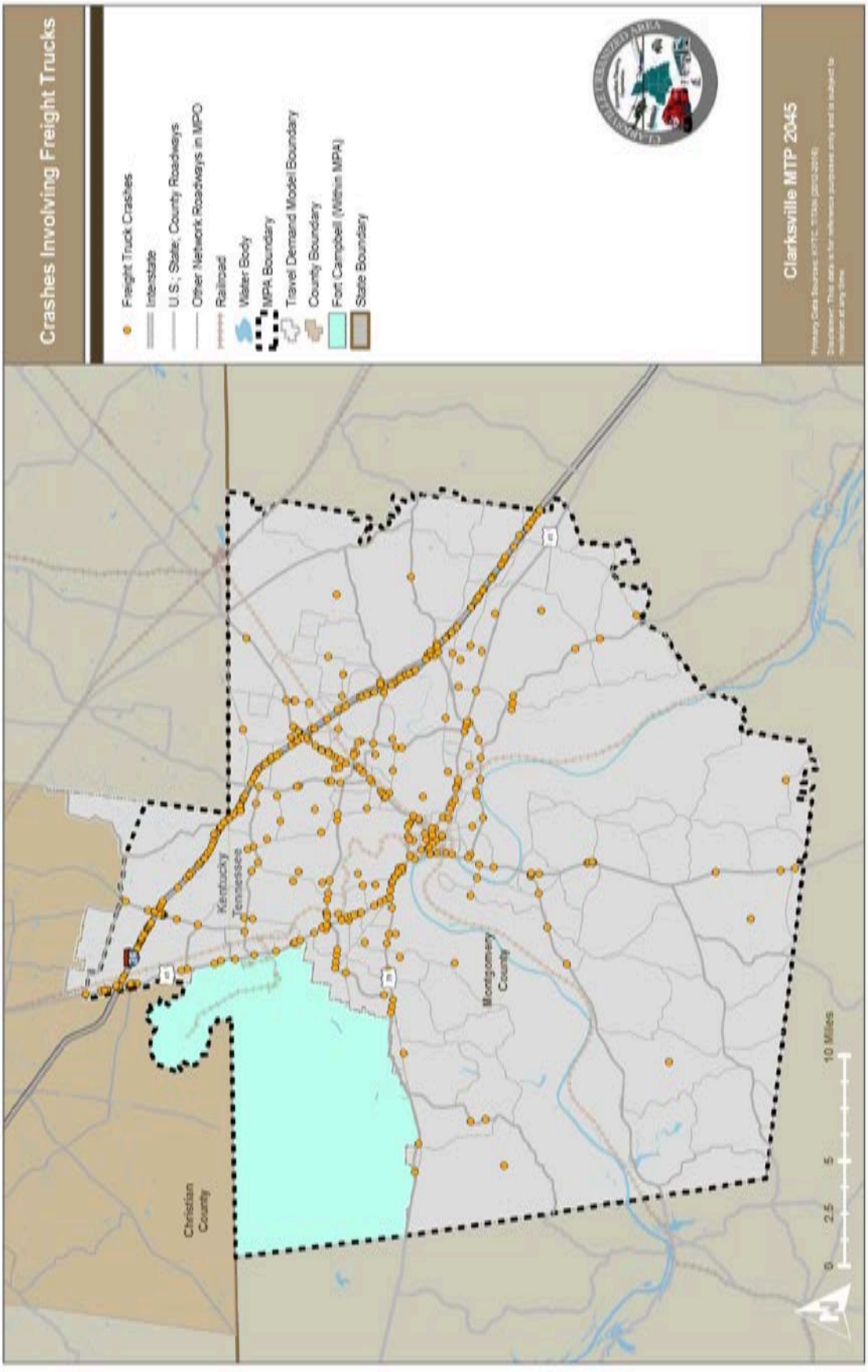


Figure 6.32 Crashes Involving Freight Trucks

Rail Safety Analysis

Rail-Automobile Collisions

From 2012 through 2016, there were no crashes involving an automobile and a train within the MPA.

Derailments

According to the Federal Railroad Administration (FRA), from 2012 to 2016, no train derailments occurred in the MPA.

Strategic Highway Safety Plans

A SHSP is a statewide-coordinated safety plan that is developed to reduce fatalities along state highways and all public roads. Each state maintains a SHSP that was put in place as part of the SAFETEA-LU requirements, which formed the core of the MAP-21 and FAST Act legislation. The State of Tennessee updated its SHSP in 2014 and the State of Kentucky updated its SHSP in 2015. Almost all SHSP's use the 4Es of traffic safety: Engineering, Enforcement, Emergency Response, and Education.

In order to improve on a state's roadway safety, the SHSP often identifies emphasis areas that are the most common causes for crashes in a state.

The State of Tennessee's emphasis areas in the 2014 SHSP are:

- Data Collection and Analysis
- Driver Behavior
- Infrastructure Improvements
- Vulnerable Road Users
- Operational Improvements
- Motor Carrier Safety

THE STATE OF KENTUCKY'S EMPHASIS AREAS IN THEIR 2015 SHSP ARE:

Behavior Modifications

- Aggressive Driving
- Distracted Driving
- Impaired Driving
- Occupant Protection

Design and Operation

- Intersections
- Roadway Departure

System Management

- Commercial Vehicle Safety
- Incident Management

Vulnerable Roadway Users

- High Risk Drivers
- Motorcycles
- Non-Motorized Users

Each of the states have developed strategies that will reduce the number of injury and property damage crashes based on the focus areas identified in their SHSP. These expected crash reductions will help the MPO and states to meet their designated targets under the transportation planning measures required by the FHWA.

Safety Performance Measures

The safety performance measures were the first established by the FHWA, with an effective date of April 14, 2016. The rules for the effective performance measures required all states to develop an HSIP which coordinates with the state's SHSP. As part of the HSIP, the states were required to establish their initial targets for the performance measures in their August 31, 2017, HSIP Annual Report. These targets are updated with each HSIP Annual Report.

THE PERFORMANCE MEASURES ESTABLISHED BY THE FHWA FOR SAFETY ARE:

- The number of fatalities
- The rate of fatalities per 100 million VMT
- The number of serious injuries
- The rate of serious injuries per 100 million VMT
- The number of non-motorized fatalities and non-motorized serious injuries

A database of fatal crashes, provided by the Fatal Accident Reporting System (FARS)[13], was used to analyze the yearly fatalities within the MPA from 2012 through 2016. This database reports the characteristics and locations of all reported fatal crashes within the country. Using GIS, only those fatal crashes that occurred within the MPA were selected for analysis. The MPO's Travel Demand Model (TDM) was used to determine the annual VMTs for typical weekdays on the study area's network. The number of serious injuries in automobile crashes, and non-motorized fatalities and serious injuries, were obtained by the 2012-2016 crash databases provided by KYTC and TITAN.

TABLE 6.39 MPA BASELINE SAFETY PERFORMANCE

Measure	2012	2013	2014	2015	2016	MPA BASELINE (2012-2016)	TN BASELINE (2013-2017)	KY BASELINE (2013-2017)
Number of Fatalities	22.0	23.0	24.0	27.0	26.0	24.4	1,000.6	737.4
VMT (100 million)	11.6	11.4	11.8	12.2	12.3	11.9	752.9	484.8
Rate of Fatalities (per 100 million VMT)	1.902	2.015	2.039	2.209	2.107	2.054	1.329	1.521
Number of Serious Injuries	193.00	196.00	229.00	234.00	167.00	203.80	7,227.6	3,124.8
Rate of Serious Injuries (per 100 million VMT)	16.685	17.168	19.452	19.141	13.532	17.195	9.594	6.451
Number of Non-Motorized Fatalities and Serious Injuries	8.0	12.0	16.0	8.0	14.0	11.6	467.7	277.8

Source: FARS, TDM, KYTC, TITAN (2012-2016)

13 ftp://ftp.nhtsa.dot.gov/fars/

Safety Targets

The initial safety targets for each state are located in the annual HSIP report[14] [15] . The CUAMPO may either support the targets established by KYTC and TDOT or establish their own. For the 2045 MTP, the CUAMPO has chosen to support the state targets established by KYTC and TDOT in their HSIP. These targets are shown in Table 6.40.

TABLE 6.40 KYTC AND TDOT STATE SAFETY TARGETS

PERFORMANCE MEASURE	KY BASELINE (2013-2017)	KY TARGET 2019	TN BASELINE (2013-2017)	TN TARGET 2019
Number of Fatalities	737.4	737.0	1000.6	1,022.0
Rate of Fatalities (per 100 million VMT)	1.521	1.500	1.329	1.291
Number of Serious Injuries	3,124.8	2,991.8	7,227.6	7,374.6
Rate of Serious Injuries (per 100 million VMT)	6.451	6.070	9.594	9.324
Number of Non-motorized Fatalities and Serious Injuries.	277.8	276.0	467.7	546.8

Note: The Baseline and Target values are 5-year rolling averages, as specified by the FHWA guidance.

Source: KYTC, TDOT

IN ORDER TO SUPPORT THE SAFETY TARGETS ESTABLISHED BY EACH STATE, THE CUAMPO WILL NEED TO WORK WITH STATE AND SAFETY STAKEHOLDERS TO ADDRESS AREAS OF CONCERN WITHIN THE MPA. THIS IS PARTICULARLY IMPORTANT FOR THE CRASH FATALITY AND SERIOUS INJURY RATES WITHIN THE CLARKSVILLE AREA. THIS WILL NECESSITATE COORDINATION BETWEEN THE CUAMPO AND THEIR STATE DOT PARTNERS AS THEY UPDATE THEIR SHSPS AND HSIPS. WHILE THE FHWA MONITORS IF STATE DOTS MEET THEIR PERFORMANCE TARGETS OR NOT, THERE IS NO DIRECT ASSESSMENT OF THE MPO'S PERFORMANCE MEASURE PROGRESS TOWARDS THE HSIP. THE MPO WILL REVIEW THE TARGETS WITH EACH SUCCESSIVE MTP AND ADJUST THEM AS NECESSARY.

14 https://safety.fhwa.dot.gov/hsip/reports/pdf/2017/ky.pdf

15 https://safety.fhwa.dot.gov/hsip/reports/pdf/2017/tn.pdf

During the public survey period, traffic safety was identified as one of the most important issues facing the residents of Clarksville. This lead to an increased impact of safety on the scoring methodology used to rank the test projects developed during the MTP. By doing so, these scores assist the MPO's efforts to support the established state targets by selecting projects that have a higher safety benefit to the study area's roadway users.

Special Safety Issues

Some drivers present unique safety challenges for the MPA. This is due to the presence of Fort Campbell and the soldiers returning from deployment. A 2012 USAA report found that the average enlisted soldier returning from recent deployment was nearly a quarter more likely to be at-fault in a crash. This is a result of the training and instincts developed while on deployment. These factors influence driver behavior and are very different from everyday driving. Figure 6.33 displays these learned behaviors and how they translate to driving on the roadways when they return.

Figure 6.33 Driving Behaviors Learned During Military Deployment

In Combat		At Home
Drives as far as possible from road edge to avoid IEDs.	▶	Drives in middle of road, straddling lanes.
Changes direction and lanes unexpectedly, especially at tunnels or underpasses where insurgents might be waiting.	▶	Weaves through traffic. Does not signal turns, merges or lane changes. Avoids or changes lanes at underpasses and tunnels.
Always moving. Does not stop for traffic or people. Always has right of way.	▶	Anxious when stopped. Rolls through traffic lights and stop signs. Does not yield right of way to other vehicles.
Speeds as fast as the lead vehicle in a convoy.	▶	Drives over posted speed limit.
Hypervigilant of roadside elements.	▶	Overly attentive to roadside elements.

Source: Office of The Surgeon General (Army)

Source: Returning Warriors: 2012 Driving Safety Report (USAA)

The 2040 MTP identified several countermeasures for these driving behaviors. These countermeasures, which still apply, are based on the ITE Traffic Handbook and consultation with Dr. Erica Stern at the University of Minnesota. The countermeasures are shown in Table 6.41. Upon MPO review of the accident reports within the MPA, if the behaviors shown in Table 6.41 are contributing to the cause of the crash, the MPO will work with TDOT/KYTC local maintenance, and the City/County highway departments, to develop and deploy potential improvements. As this process evolves, the MPO will establish new procedures for the evaluation of the crashes and establish, or work with, a local safety coalition for this purpose.

Table 6.41 Potential Countermeasures for Deployment Learned Behaviors

Behavior	Potential Countermeasure
Drives in middle of road	Upgrade pavement markings / delineation Increase lane width Install rumble stripes
Traffic congestion increases anxiety	Use dynamic signage to inform drivers of congestion and advise on alternate routes Utilize smart phone app for traffic congestion / road work
Rolls through traffic signals and stop signs	Increase yellow or all red signal phase for additional intersection clearance time
Drives over posted speed limit	Reduce speed limit with enforcement Have law enforcement keep track of warnings issued
Overly attentive to roadside elements	Remove sight obstructions Limit advertising Maintain clear zone Reduce trash / roadkill Increase space between sidewalk and curb
Anxiety driving alongside parked cars	Reduce / remove on-street parking
Anxiety driving at night	Additional street / highway lighting
Anxiety at tunnels / overpasses	Keep clear of debris / signage distraction; additional lighting
Weaves around potholes, etc.	Better pavement maintenance

Source: MTP 2040, ITE Traffic Handbook, 6th Edition; AASHTO Highway Safety Manual; discussion with Dr. Erica Stern, University of Minnesota

Another method that has been used to deal with this unique challenge includes the Veterans' Safe Driving Initiative. This initiative is a cooperation of the U.S. Department of Veterans Affairs, Department of Defense, and USDOT. It encourages returning service members to drive safely and provides them, family members, and medical staff with information about these driving behaviors. More information can be found on the VA website at:

https://www.va.gov/health/safedriving/

6.6 | Security

While safety and security are closely related, they are differentiated by the cause of the harm from which the transportation system and its users are being protected. Safety encompasses the prevention of unintentional harm to system users or their property. This includes vehicular crashes, train derailments, slope failures, sudden destruction of roadways, or non-motorized user injuries.

SECURITY INVOLVES THE PREVENTION, MANAGEMENT, AND RESPONSE TO INTENTIONAL HARM TO THE TRANSPORTATION SYSTEM OR ITS USERS.

This includes:

- theft or dismemberment of elements of the transportation infrastructure,
- assault on users of the system, or
- large-scale attacks intended to completely disrupt the movement of people and goods.

Security concerns can include natural disasters, acts of violence, and terrorism.

The MPA greatly benefits from Fort Campbell, which can provide security expertise and guidance. Of note is that Fort Campbell Boulevard (US-41A) in Christian County is a route designated for the movement of the installation's equipment and personnel. This makes the corridor a key security consideration.

MPO ROLE

THE MAIN ROLE OF MPOS IN PLANNING FOR SECURITY IS TO COORDINATE WITH RELEVANT AGENCIES, SUCH AS:

- emergency management officials
- police and sheriff's departments
- fire departments
- rescue squads

This means that the MPO is often in a supporting role to the agencies involved. The MPO may also be involved in the development of plans to identify critical infrastructure, system vulnerabilities, and the development of risk reduction plans.

As part of its security management, the CUAMPO participates in regular incident management meetings that are held throughout the Middle Tennessee region. These meetings involve local and state law enforcement, fire/rescue, TDOT, and more. Discussion of the resources needed for safety management and the opportunities for the various agencies to coordinate their efforts occurs at that time. The meetings also conduct "after action" reviews of a recent incident in order to analyze the response efforts and improve management of future incident scenes.

The CUAMPO can take certain measures to improve security within the MPA.

Prevention

As related to security, prevention refers to efforts to limit access to resources that may be compromised or efforts to increase surveillance. Examples of prevention measures include:

- access control systems
- closed circuit television (CCTV) systems
- security alarms
- fencing
- locks
- architectural barriers

The design of facilities and public spaces can also incorporate features that deter security breaches.

Protection

For facilities that are high vulnerability risks, additional design measures should be considered. These measures would mitigate potential security risks, should they occur. Protection efforts could also include law enforcement where necessary.

Response

Redundancy of transportation facilities should be encouraged in capital project planning. This assists in emergency evacuations or detours should a particular segment of the transportation network become unavailable. The use of Intelligent Transportation Systems (ITS) to control traffic signals and other controls also assists in responding to security risks.

Recovery

Short-term and long-term recovery plans should be familiar to transportation decision-makers. This includes everything from evacuations to restoring local businesses and neighborhoods. Both KYTC and TDOT maintain an emergency operations plan for their entire state.

In the Clarksville MPO area, Christian and Montgomery Counties each have their own emergency management bodies. More information can be found on each county's operations at:

Christian County, KY
http://www.christiancountyky.gov/emergency-management

Montgomery County, TN
https://mcgtn.org/ema

Key Security Participants

As stated previously, the MPO coordinates with relevant agencies and is in a support role when security issues arise. The CUAMPO can serve as a medium of communication between the various agencies involved. Several key participants have been identified to the security management process.

State and Local Governments

TDOT's Office of Emergency Operations maintains a preparedness program that includes planning, training, and exercises regarding emergency response activities. The department also provides traffic control, manpower, and equipment to the Tennessee Emergency Management Agency (TEMA) upon request. There is an additional emergency services coordinator who provides assistance to TEMA for emergencies involving railroads that are Class 1, Class 2, or Class 3.

Freeway Incident Management Programs have also been established and maintained by KYTC and TDOT. These programs coordinate with state and local emergency officials on freeway traffic control when incidents arise and respond to motorist emergencies. They are called "Safe Patrol" in Kentucky, and "HELP" in Tennessee.

Austin Peay State University

The university maintains an Emergency Action Plan that allows it to coordinate with state and local agencies. The plan contains transportation elements that allow for the evacuation, emergency transportation services, and clearance/restoration of roads on campus.

More information can be found at:

http://www.apsu.edu/police/emergency-procedures-plan

Additional MPO Measures

Ultimately it is the responsibility of each MPO to craft a security policy consistent with its goals, state guidance, and the FAST Act. Security will be a consideration in the establishment of MPO goals and the support for MPO funding priorities. Additional measures that the CUAMPO may take are shown below.

Use of MPO Transportation Model to Assess Evacuation Plans

The TransCAD regional model can be modified to simulate evacuation events. This can be used to test the effectiveness of existing plans or to improve plans for routing traffic through the MPO region.

Use of Area Transit Systems to Support Evacuation Events

The MPO will work with local transit providers to investigate opportunities for the use of transit vehicles to provide for the evacuation of transit dependent populations.

Integration of Intelligent Transportation Systems (ITS) in Evacuation Planning

The MPO supports investment in ITS technologies. The MPO understands the need to study and assess how this technology can be used to assist evacuees in their decision-making and expedite their progress

during evacuation events. This can include the use of the electronic message signs to guide motorists during emergency evacuations or adjusting signal timings to aide with these efforts.

Strategic Highway Network (STRAHNET)

The STRAHNET is a portion of the NHS which is considered vital to the nation's strategic defense. The current STRAHNET is about 61,000 miles long and links military installations with roadways that provide for the mobility of strategic military assets. All interstate highways are included as part of the STRAHNET.

The following routes in the MPA are part of STRAHNET:

- I-24
- US-41A, from Screaming Eagle Blvd (Fort Campbell, Gate 4) north to I-24, Exit 86.

The STRAHNET routes need additional considerations, which include maintenance of bridge capability, pavement conditions, and congestion management. Recently KYTC developed video surveillance and installed dynamic message signs and other technologies along the I-24 corridor. This allows for better management of the traffic related to military convoys.

Intelligent Transportation Systems and Security

The MPO and its partner agencies can use the Clarksville Regional Intelligent Transportation System to increase security within the MPA. ITS technologies, such as the use of cameras, can provide the agencies with the ability to monitor suspicious activity, reduce theft, or aid in emergency response.

6.7 | Overview of MPO Planning Performance Measures

The MTP 2045 follows the regulations laid out in MAP-21 and the FAST Act, which require that MPOs meet national goals and track the established TPMs. The plan follows the principles of Performance-Based Planning and Programming. The sections above provided the MPO's baseline performance and the supported state targets. Tables 6.42 through 6.45 summarize the performance data in the previous sections and identify areas of concern that may be addressed.

Table 6.42 MPA Interstate and Non-Interstate Performance

Pavement Condition Index	Interstate NHS Routes							Non-Interstate NHS Routes						
	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target
Good	98.80%	75.60%	66.20%	N/A	60.00%	N/A	50.00%	53.40%	44.80%	78.90%	42.00%	40.00%	35.00%	35.00%
Fair	1.20%	24.26%	33.80%	N/A	N/A	N/A	N/A	46.20%	51.96%	16.80%	N/A	N/A	N/A	N/A
Poor	0.00%	0.14%	0.00%	N/A	1.00%	N/A	3.00%	0.40%	3.24%	4.30%	4.00%	4.00%	6.00%	6.00%

Level of Travel Time Reliability	Interstate NHS Routes							Non-Interstate NHS Routes						
	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target
Reliable	100.00%	87.70%	95.69%-	85.30%	83.00%	93.00%	93.00%	92.40%	N/A	N/A	N/A	87.50%	N/A	82.50%
Not Reliable	0.00%	12.30%	4.31%	N/A	N/A	N/A	N/A	7.60%	N/A	N/A	N/A	N/A	N/A	N/A

Truck Travel Time Reliability	Interstate NHS Routes							Non-Interstate NHS Routes						
	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target	MPA Base-line	TN Base-line	KY Base-line	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target
TTTR	1.14	1.35	1.23	1.35	1.33	1.25	1.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: KYTC, TDOT, NPMRDS

Table 6.43 Bridge Performance

Bridge Condition	NHS Bridges						
	MPA Baseline	TN Baseline	KY Baseline	TN 2-year Target	TN 4-year Target	KY 2-year Target	KY 4-year Target
Good	57.90%	39.50%	34.80%	36.00%	36.00%	35.00%	35.00%
Fair	42.10%	55.60%	61.40%	N/A	N/A	N/A	N/A
Poor	0.00%	4.90%	3.80%	6.00%	6.00%	3.70%	3.20%

Source: KYTC, TDOT, NBI

Table 6.44 MPA Safety Performance

Performance Measure	MPA Baseline (2012-2016)	TN Baseline (2013-2017)	KY Baseline (2013-2017)	TN Target 2019	KY Target 2019
Number of Fatalities	24.4	1,000.6	737.4	1,022.0	737.0
Rate of Fatalities (per 100 million VMT)	2.054	1.329	1.521	1.291	1.500
Number of Serious Injuries	203.80	7,227.6	3,124.8	7,374.6	2,991.8
Rate of Serious Injuries (per 100 million VMT)	17.195	9.594	6.451	9.324	6.070
Number of Non-Motorized Fatalities and Serious Injuries	11.6	467.7	277.8	546.8	276.0

Source: FARS, TDM, KYTC, TITAN (2012-2016)

Table 6.45 FTA Transit Performance Measures

Asset Class/ULB	NTD Reporting Year FY- 2018			Performance Target Year FY- 2019		
	Current Year Number of Assets in SGR	Current Year Number of Assets in SGR Backlog	Current Year Percent of Assets in SGR Backlog	Target Year Number of Assets in SGR	Target Year Number of Assets in SGR Backlog	Performance Target
CLARKSVILLE TRANSIT SYSTEM						
Rolling Stock State of Good Repair (SGR)						
BU Bus/ 14 years	12	0	0.00%	12	0	0.00%
CU Cutaway/ 10 years	4	0	0.00%	7	0	0.00%
MV Minivan / 8 years	2	0	0.00%	2	0	0.00%
RT Rubber-tired vintage trolley/8 years	0	0	0.00%	0	0	0.00%
VN Van/ 8 years	7	0	0.00%	7	0	0.00%
Facilities:						
Admin-Maintenance/40 years	4	0	0.00%	4	0	0.00%
Transit Station/40 years	1	0	0.00%	1	0	0.00%
Equipment State of Good Repair (Support Vehicles Only)						
AO Automobile/8 years	11	6	35.29%	13	4	23.53%
MID-CUMBERLAND HUMAN RESOURCE AGENCY						
Rolling Stock State of Good Repair (SGR)						
BU Bus/ 14 years	0	0	0.00%	0	0	25.00%
CU Cutaway/ 10 years	0	0	0.00%	0	0	25.00%
MV Minivan / 8 years	10	19	65.52%	22	7	25.00%
RT Rubber-tired vintage trolley/14 years	0	0	0.00%	0	0	25.00%
VN Van/ 8 years	64	32	33.33%	72	24	25.00%
Facilities:						
Admin-Maintenance/40 years	0	0	0.00%	0	0	25.00%
Transit Station/40 years	0	0	0.00%	0	0	
Equipment State of Good Repair (Support Vehicles Only)						
AO Automobile/8 years	0	0	0.00%	0	0	25.00%

Source: FTA

The CUAMPO has chosen to support all of the state targets listed above. The state safety targets are established in a state's HSIP, which is submitted to the FHWA annually. The remaining performance measure targets are submitted in a state's Baseline Performance Report; the first of which must be received by the FHWA on October 1, 2018.

The CTS maintains a TAM Plan through its Strategic Plan, which contains information on the service's inventory and performance. Information about the MPO's baseline performance can be obtained from TDOT, KYTC, and CTS. However, the CTS and MPO have chosen to support the recommended "state of good repair" performance measures established by the FTA.

The MPO meets all of the established state performance targets, with the exception of safety targets for Rate of Fatalities and Rate of Serious Injuries. For the MPO to support the state targets, it must keep the MPA's roadways and bridges maintained and as congestion-free as possible. To address safety, the MPO will need to work with state and local officials, as well as other safety stakeholders, to reduce the fatalities and serious injuries on the MPA's roadways. This will be possible with coordination between the MPO and their state DOT partners as they update their SHSPs and HSIPs, as well as identifying safety programs that may be implemented within the MPA.

The MTP also supports the state targets through the use of the project scoring criteria (discussed in Chapter 10) to determine project rankings for the purposes of developing the Staged Improvement Program (discussed in Chapter 11). These criteria consider the MPA's needs for safety, reduced congestion, and well-maintained roadways. The criteria are based upon the goals and objectives that were developed from the public outreach survey, which was meant to address the required FHWA performance measures.

Further support for the state targets for pavement/bridge conditions and system performance can be achieved by:

- Prioritizing maintenance, overlay, and bridge line item funds (Chapter 11) for roadways and bridges that are in "poor" condition.
- Working with State and local stakeholders to identify and repair pavement cracking, rutting, potholes, etc.
- Using the regional ITS structure to monitor roadway conditions and redirect drivers to less congested routes.
- Employing Travel Demand Management Strategies, discussed in Chapter 8.

In addition to the project scoring criteria, in an addendum to the 2040 MTP, the MPO addressed support of the state HSIP targets by stating that it would:

- Work with each State and safety stakeholders to address areas of concern for fatalities or serious injuries within the metropolitan planning area.
- Coordinate with each State and include the safety performance measures and the State's HSIP targets for those measures in the metropolitan transportation plan (MTP).
- Integrate into the metropolitan transportation planning process the safety goals, objectives, performance measures, and targets described in other State safety transportation plans and processes such as applicable portions of the HSIP, including the SHSP.
- Include a description in the TIP of the anticipated effect of the TIP toward achieving HSIP targets in the MTP, linking investment priorities in the TIP to those safety targets.

7.0 | Forecasting Future Travel Demand

The following chapter describes how transportation demand in the MPA was forecasted through 2045 for the MTP.

7.1 | Generalized Travel Demand Forecast Process

The 2045 MTP uses a regional travel demand model to forecast future travel demand. This generalized four-step process is described below. More detailed information can be found in the Appendix.

Step 1: Trip Generation

This is the first step of the travel demand modeling process. This step determines the number and type of trips that will be produced from, and attracted to, a TAZ. Trip generation relies on socioeconomic and land use data. While this data already exists for the base year, it must be forecasted for future years.

Step 2: Trip Distribution

This step links trip productions to trip attractions for each TAZ pair. It uses land use patterns and a gravity model. The gravity model assumes that travelers will gravitate toward the closest establishment that meets the purpose of their trip, while seeking to reduce their travel time.

Step 3: Mode Choice

This step converts person trips to vehicle trips. The step also estimates the number of trips using a particular mode of travel for each TAZ pair.

Step 4: Trip Assignment

FINAL

This is the final step in which vehicular trips are distributed across the roadway network based on a number of factors; most notably travel time.

7.2 | Forecasting Population and Employment Changes

Aside from changes to the transportation system itself, land use changes are the primary drivers of changes in travel demand over time. For modeling purposes, land use changes are measured by changes in the magnitude and distribution of population, employment, and school enrollment. Changes are forecast at the TAZ level, which is typically comprised of multiple census blocks, but is not larger than a census block group.

Data Sources and County Control Totals

Population, employment, and school enrollment information for the base year was compiled for all TAZs by the CUAMPO.

- **The population and housing information used in the MTP 2040 was adjusted by the MPO to reflect known conditions within the study area for the Montgomery County TAZs.**
- **The population and housing information for the Christian County TAZs were updated from the MTP 2040's data using aerial imagery analysis.**
- **Employment data obtained by the CUAMPO and KYTC provided detailed information on existing establishments in the MPA, including the location and number of employees.**
- **School enrollment data was obtained from the Clarksville-Montgomery County School System (CMCSS).**

The initial control totals for the forecast population and employment were developed at the county level. The population and housing forecasts were developed using data obtained from the Tennessee and Kentucky State Data Centers. The employment forecasts were obtained from Woods & Poole projections.

TAZ-Level Forecasts

After developing the county forecasts, population and employment had to be forecast for all TAZs in the MPO for the interim years and horizon year. This effort was conducted by the CUAMPO, who:

- Determined the amount of the forecast population and employment within each county that would be within the MPA.
- Determined the amount of group quarters' population and the average household sizes in the forecast years.
- Developed household control totals for the MPA.
- Allocated household and population growth from the control totals based on time periods and anticipated developments.
- Allocated employment growth from the control totals based on where commercially or industrially zoned land is vacant.
    - This assumes that employment can be allocated based on 30 jobs/acre in commercial areas, and 15 jobs/acre in industrial areas.

School enrollment forecast data was developed by Neel-Schaffer, Inc. and CMCSS. This involved increasing the school enrollment in each TAZ to match population growth until each school achieved the capacity threshold set by CMCSS. Where the MPA experiences high population growth for the forecast years, additional schools were forecasted to be built based on the CMCSS's growth plan .

Further information about the forecast methodology and control totals can be obtained from the MPO office.

Summary of Forecasted Change

The resulting changes in population and employment through 2045 are shown in Table 7.1 and illustrated in Figures 7.1 through 7.6.

Table 7.1 Change in Population and Employment Variables in MPA, 2016 to 2045

Variable	Description	2016	2026	2036	2045	Change	Percent Change
HH	Households (Occupied Dwelling Units)	75,073	96,393	113,806	130,489	55,416	73.8%
POP	Population in TAZ	196,758	250,249	295,483	339,954	143,196	72.8%
TOT_EMP	Total Employment	68,326	92,611	111,007	129,119	60,793	89.0%
RET_EMP	Retail Employment	10,692	13,987	16,378	18,721	8,029	75.1%
SE_EMP	Service Employment	38,923	53,597	64,397	74,778	35,855	92.1%
OTH_EMP	Other Employment	18,711	25,027	30,234	35,622	16,911	90.4%
SCHATT	School Enrollment	33,388	42,362	49,749	55,108	21,720	65.1%

[1] https://cmcss.net/documents/operations/10yearplan.pdf

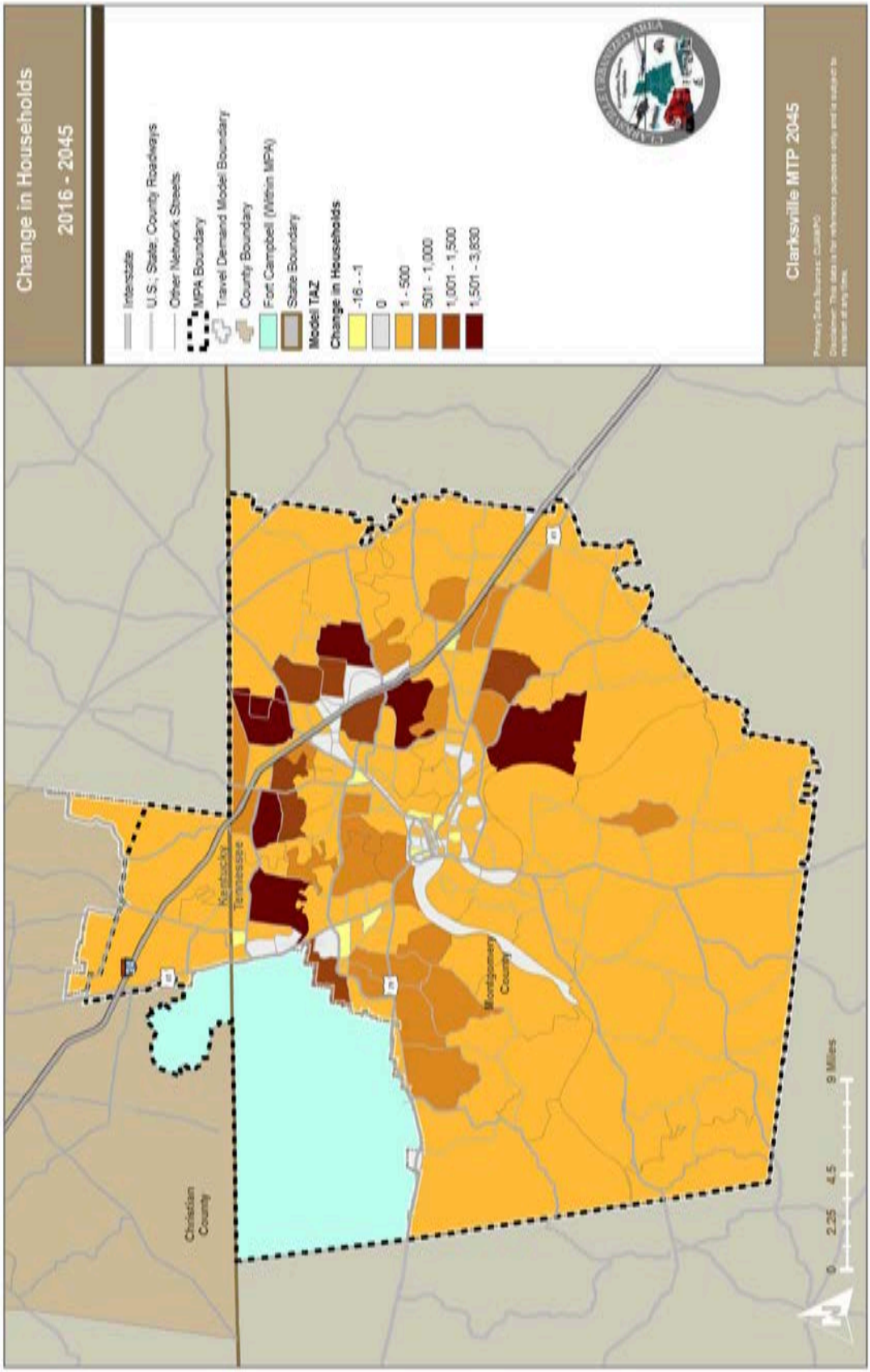


FIGURE 7.1 CHANGE IN HOUSEHOLDS, 2016-2045

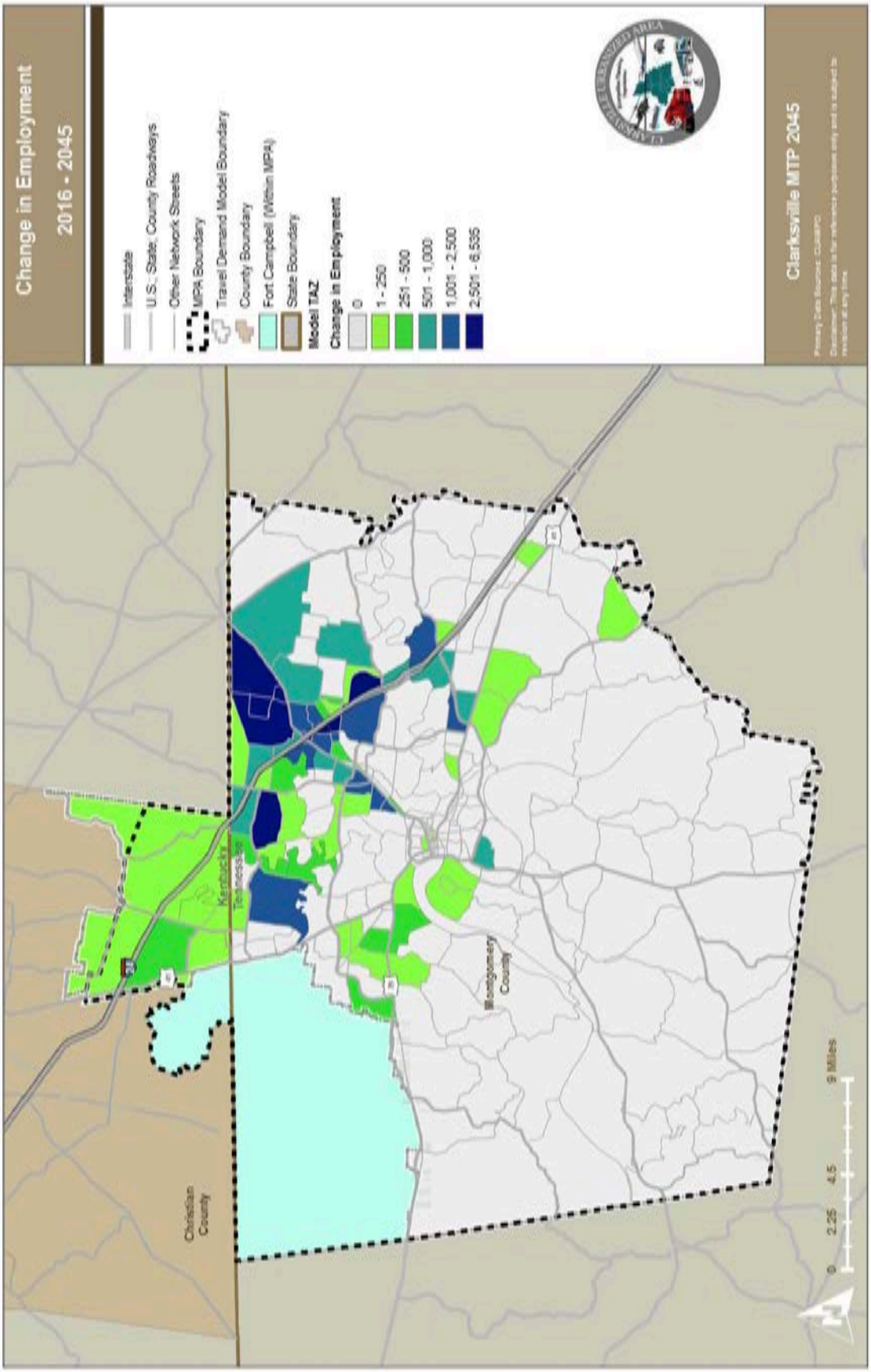


Figure 7.2 Change in Employment 2016-2045

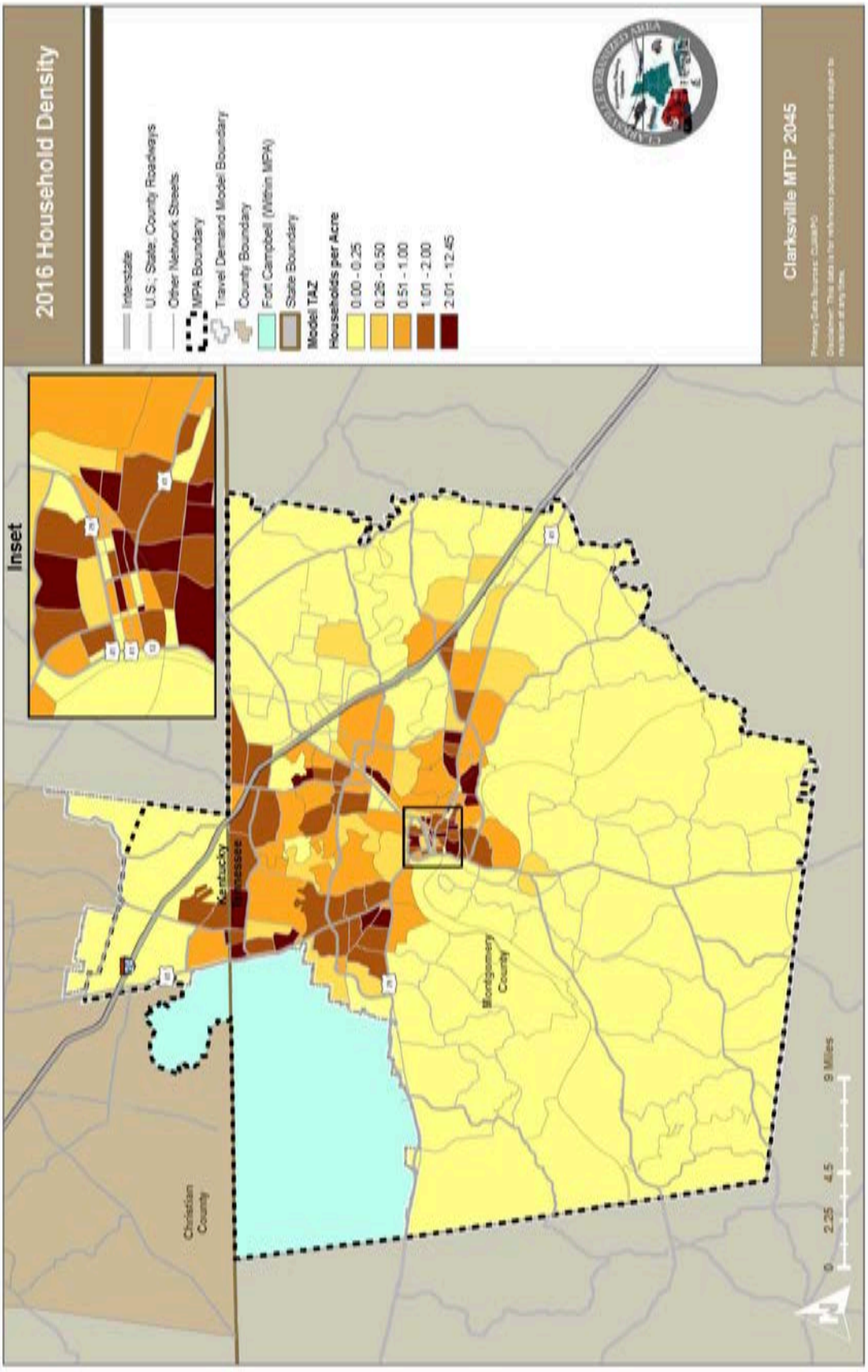


FIGURE 7.3 2016 HOUSEHOLD DENSITY

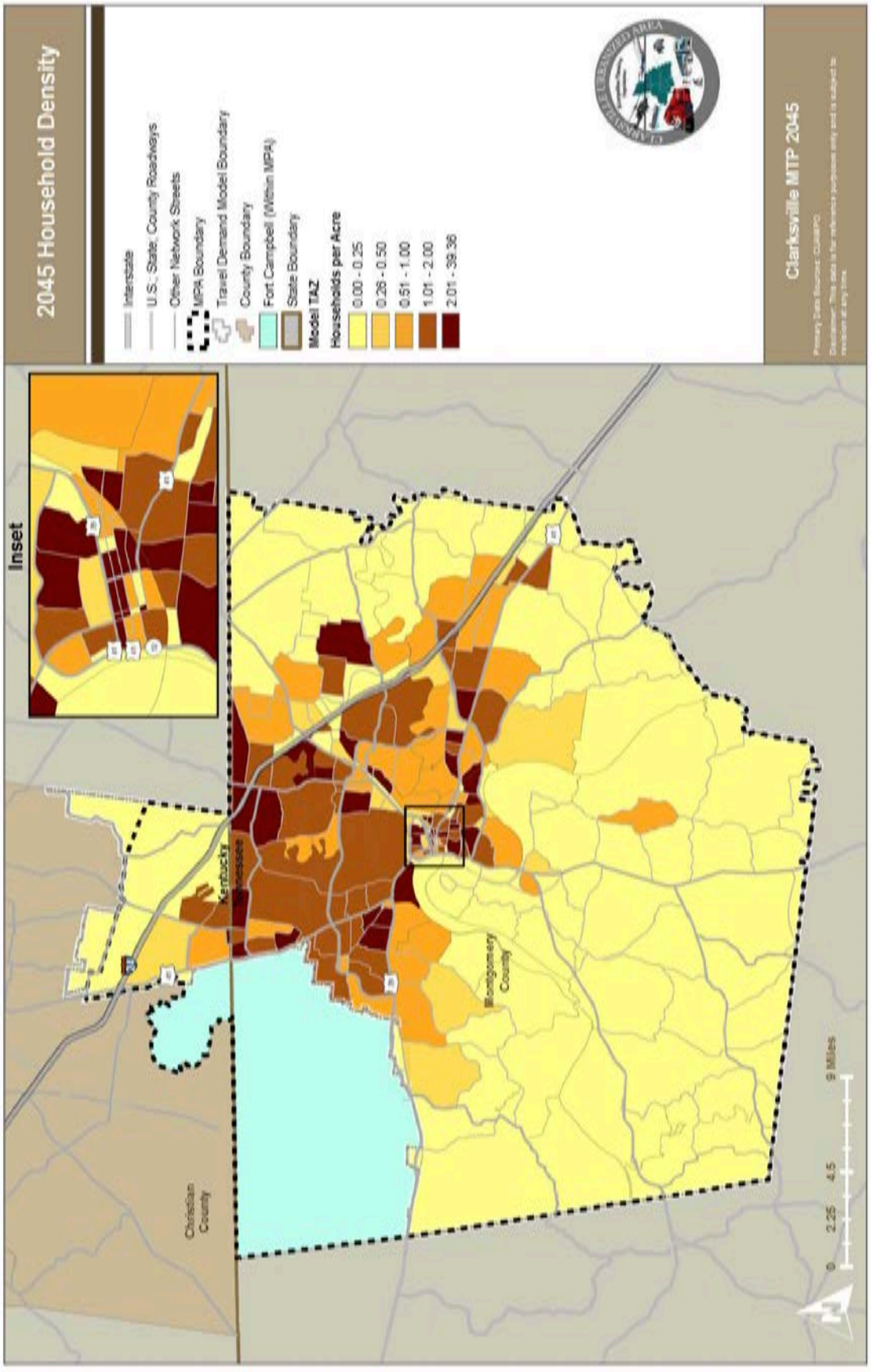


FIGURE 7.4 2045 HOUSEHOLD DENSITY

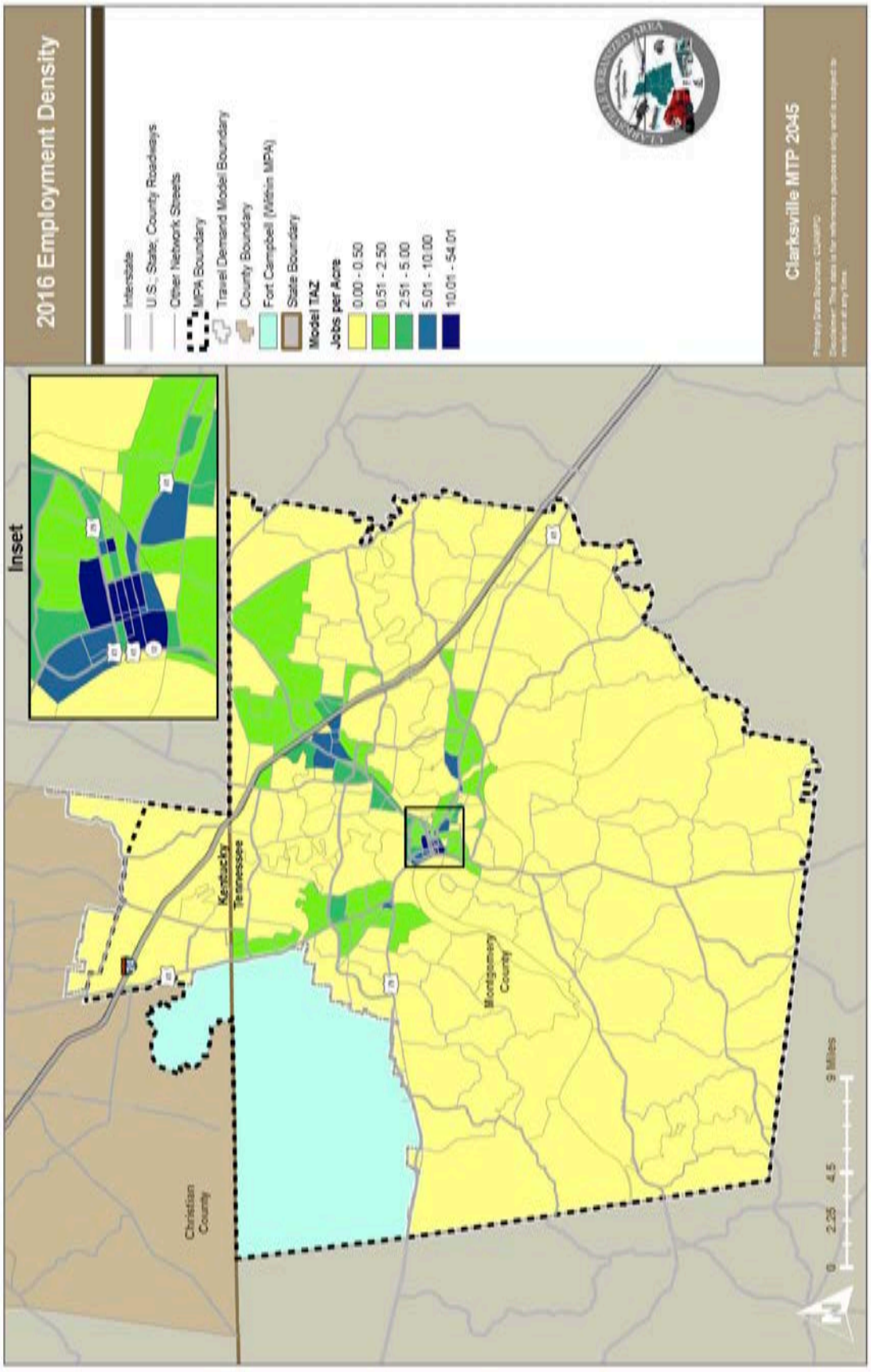


FIGURE 7.5 2016 EMPLOYMENT DENSITY

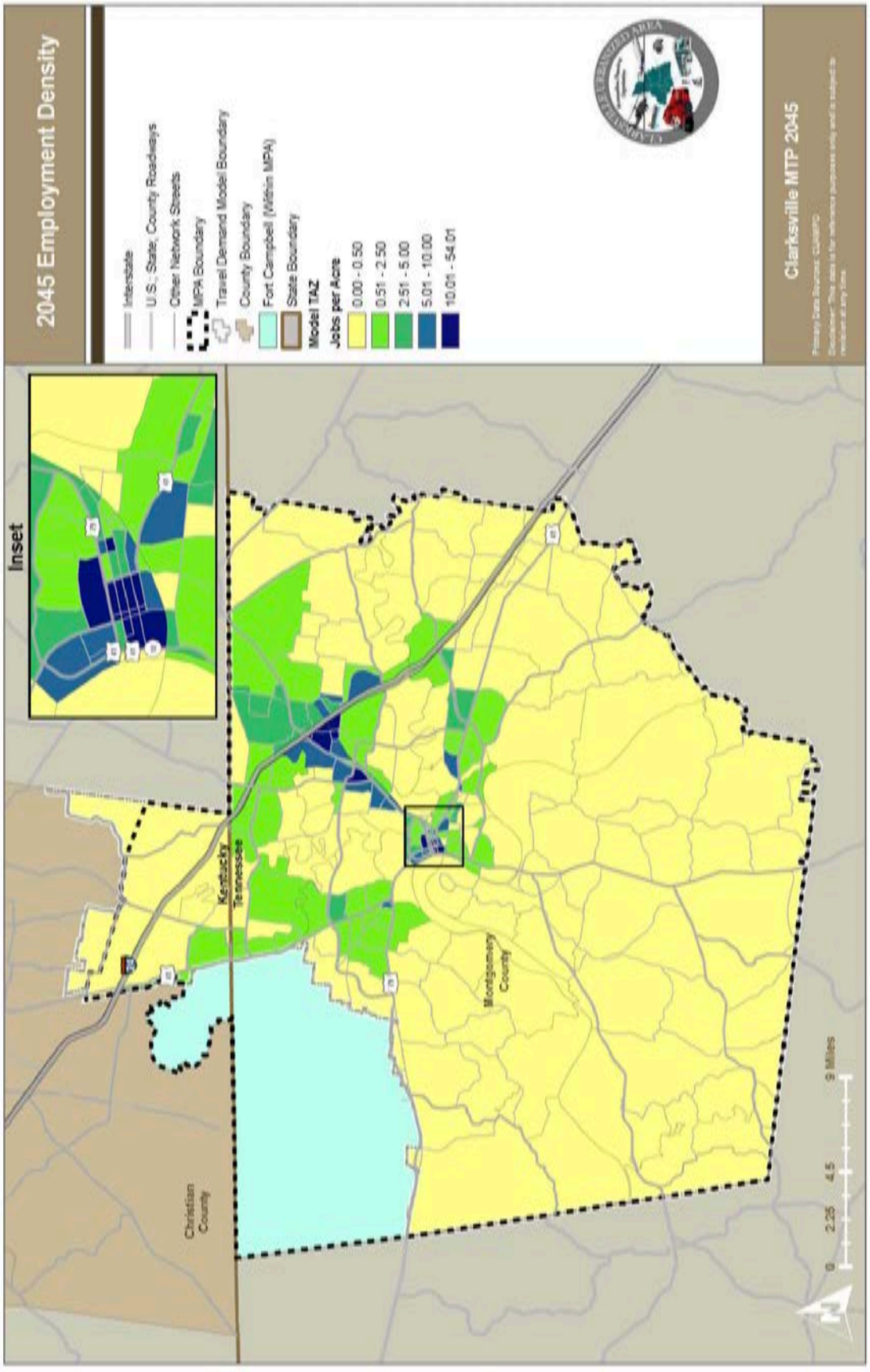


FIGURE 7.6 2045 EMPLOYMENT DENSITY

7.3 | Updating the Future Transportation Network

The MTP is a document for the purpose of planning for the MPA's future travel needs. In order to understand these needs, the expected travel in 2045 must be known.

Existing + Committed Projects

As stated previously, improvements to the transportation network also affect travel demand. In addition to the socioeconomic forecasts, transportation projects that have committed funding or have been constructed since 2016 were noted. Committed projects are those improvements for which:

- construction was either completed or begun since 2016,
- a contract for construction has been awarded,
- have completed the National Environmental Policy Act (NEPA) phase, or
- have funding for right-of-way and/or construction programmed in the MPO's Transportation Improvement Program.

These projects were then added to the model network to create a 2045 Existing plus Committed (E+C) network. This network is depicted in Figure 7.7. The E+C projects are displayed in Table 7.2.

Future Roadway Conditions without Additional Improvements

The E+C network is used to display a "No-Build" condition for the MPA. It serves to identify areas of deficiency in future years if no further transportation projects are built within the study area. These areas of deficiency can lead to increased congestion, delay, and potential environmental hazards. An analysis of the E+C network in 2045 and the identification of deficient areas are discussed in Chapter 8: Future Transportation Need.

External Station and Special Generator Growth

In addition to socio-economic growth and changes to the model network, the travel demand model forecasts growth for the external stations and special generators. The growth rate at each external station was determined through the analysis of historical traffic counts at each station. The growth rates were applied to the base year external station traffic counts to obtain the projected external station volumes. The same procedures used to develop the External-Internal (EI) and External-External (EE) trips were then applied to the forecast volumes to determine trip purposes in future years.

The amount of trips for the special generators were also projected based on their anticipated growth through the horizon year. Adjustments to the special generators for the forecast years include growth for Austin Peay State University (increasing to 17,000 students in 2045) and Draughons Junior College (increasing to 1,100 students in 2045). It was assumed that the Gateway Medical Center would not undergo a significant expansion or experience large employment growth during the MTP timeframe.

A detailed explanation of the methodology used to forecast the external station volumes and special generator trips can be found in the Appendix.

TABLE 7.2 EXISTING + COMMITTED PROJECTS

Project ID	TIP ID	Roadway	Location	Improvement
1	6	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway
2	5	SR-374 Ext/SR-149	Dotsonville Rd to River Rd	New 4 Lane Roadway, Widen to 5 Lane
3	66	SR-237 (Rossview Rd)	I-24 to 400 feet west of Keysburg Rd	Widen from 2 to 5 Lanes
4	13	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes
5	1	SR-112/US 41A (Madison St)	SR-76 to McAdoo Rd/Sango Rd	Widen from 2 to 5 Lanes
6	65	Oakland Rd	US 79 to Oakland Rd	2 Lane Realignment
7	12	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes

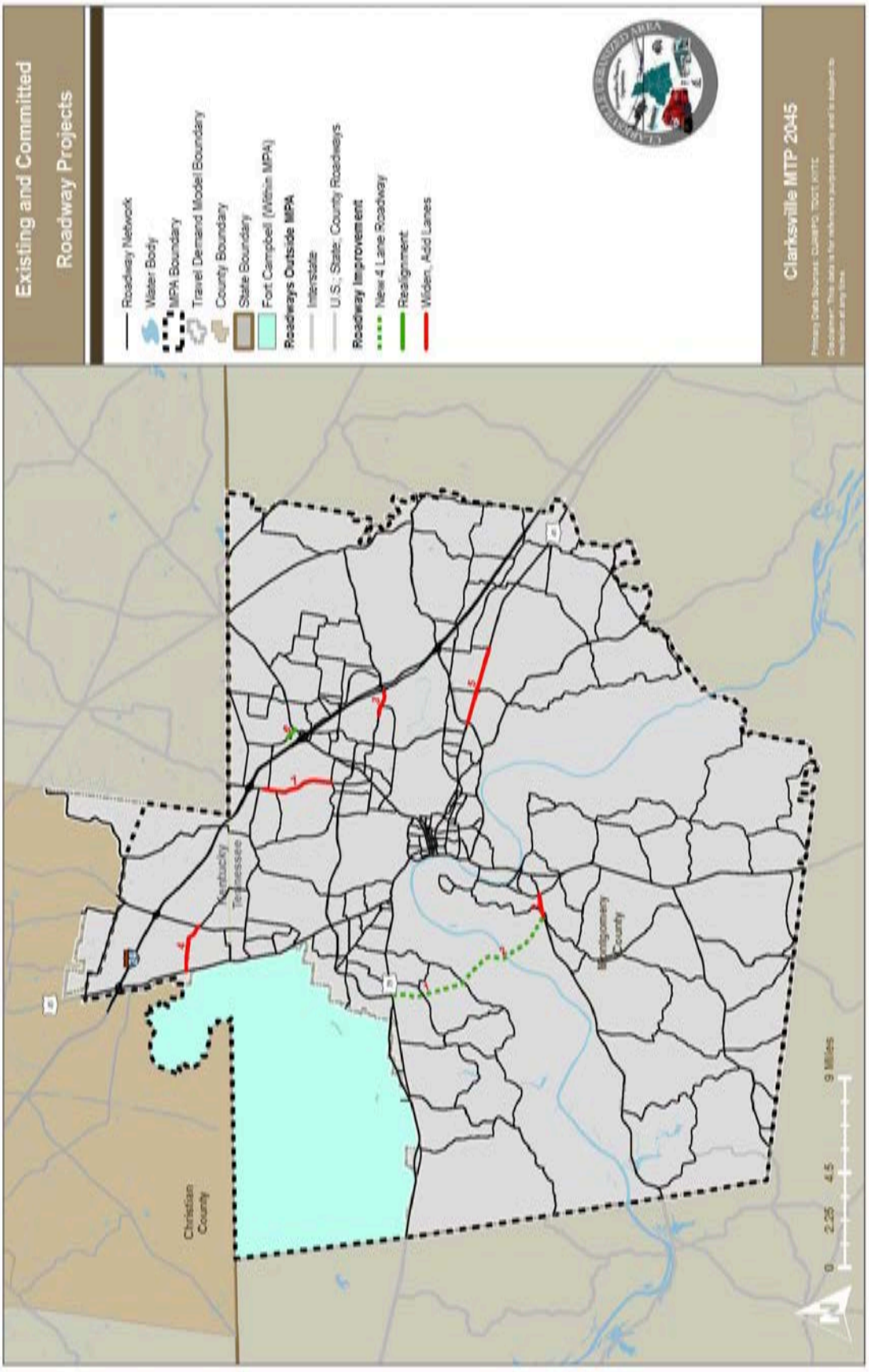


FIGURE 7.7 EXISTING AND COMMITTED ROADWAY PROJECTS

7.4 | Travel Demand Model Outputs

The primary outputs of the Travel Demand Model are:

- daily roadway volumes,
- vehicle miles traveled,
- vehicle hours traveled,
- vehicle hours of delay,
- volume/capacity ratio,
- congested speeds,
- and congested travel times.

This information, when combined with roadway capacities and other network information, informs the needs analysis in Chapter 8: Future Transportation Need.

8.0 | Future Transportation Needs

This chapter discusses transportation issues that will need to be addressed in the future. It was developed by an analysis of existing conditions and travel demand model forecasts. Additionally, existing plans, public involvement, and stakeholder input were also incorporated.

8.1 | Roadways and Bridges

Congestion Relief

Given the population and employment growth forecasted to occur by 2045, the Clarksville Travel Demand Model indicates that the number of vehicle trips in the MPA will increase by more than 71 percent. This results in about 376,000 more trips from 2016 to 2045. Most of the trip types grow by the same rate. However, trips passing through the MPA are forecasted to grow at a lower rate. These changes are summarized in Table 8.1.

Table 8.1 Vehicle Trips by Purpose, 2016 to 2045

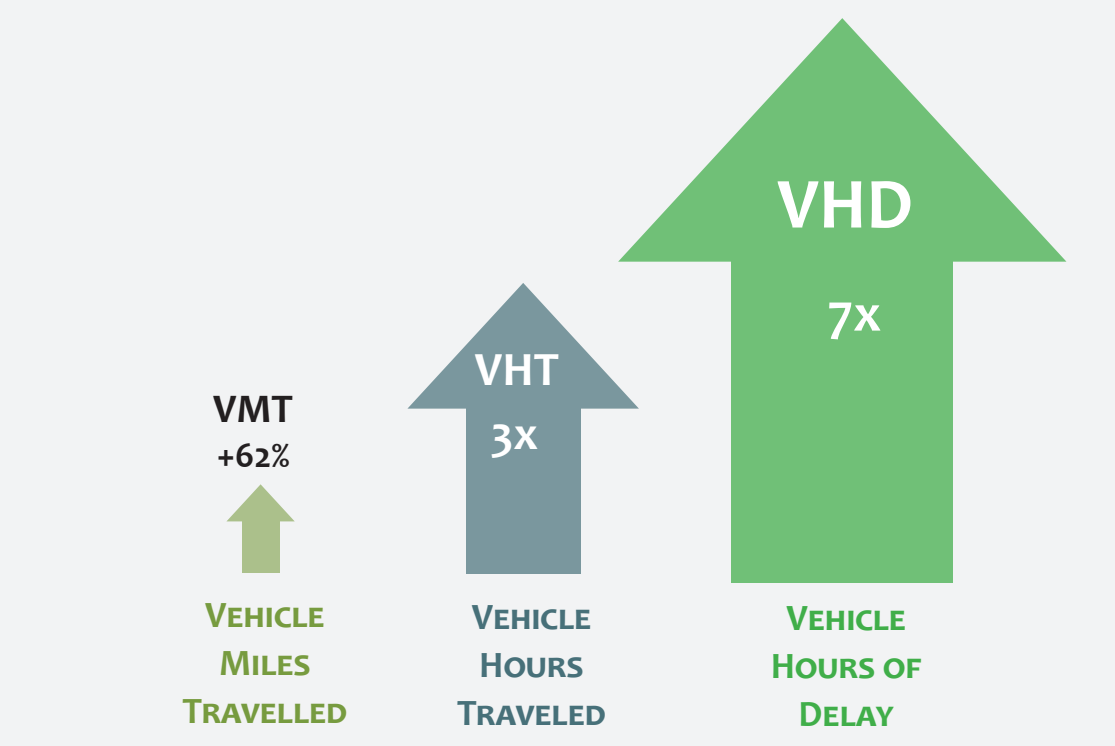
Trip Process	2016	2045 (E+C)	Change	Percent Change
Home-Based Work	111,652	189,684	78,032	69.9%
Home-Based Other	190,402	321,104	130,702	68.6%
Non-Home Based	113,353	201,776	88,423	78.0%
Commercial Vehicle	63,214	113,844	50,630	80.1%
Freight	12,366	21,654	9,288	75.1%
External-External	36,673	55,519	18,846	51.4%
Total	**527,659**	**903,581**	**375,921**	**71.2%**

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: Clarksville Travel Demand Model, NSI

Table 8.2 shows that if the transportation projects that currently have committed funding are constructed, the centerline miles of the roadway network will increase by 1.6 percent. The table also shows the forecast change in Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Vehicle Hours of Delay (VHD) if only those projects are constructed.

This data indicates that, by 2045, the VMT will increase by about 62 percent. However, during this same time period, the VHT will nearly triple, and the VHD will be more than seven (7) times current delay. During the public survey, congestion reduction on the roadway network was identified as the top priority for residents and workers. This results in a high emphasis placed on congestion reduction during the project scoring process discussed in Chapter 10. Projects that will help reduce the large increase in the VHD from 2016 to 2045 therefore receive a higher score.



These changes are the result of a large growth in vehicle trips and comparatively slow growth of the roadway network.

Table 8.2 Travel Demand Impact of Growth and Existing and Committed Projects, 2016 to 2045

Centerline Miles of Roadways				
Classification	**2016 (Base)**	**2045 (E+C Projects)**	**Change**	**Percent Difference**
Interstate	25.6	25.6	0	0.00%
Principal Arterial	54.5	61.6	7.1	13.00%
Minor Arterial	115.7	115.7	0	0.00%
Collector	223	222.7	-0.3	-0.10%
Total	**418.8**	**425.6**	**6.8**	**1.60%**
Daily Vehicle Miles Traveled (VMT)				
Classification	**2016 (Base)**	**2045 (E+C Projects)**	**Change**	**Percent Difference**
Interstate	1,210,751	1,726,719	515,968	42.62%
Principal Arterial	1,258,285	1,950,292	692,007	55.00%
Minor Arterial	1,272,585	2,230,573	957,988	75.28%
Collector	528,892	1,015,652	486,760	92.03%
Total	**4,270,513**	**6,923,236**	**2,652,723**	**62.12%**
Daily Vehicle Hours Traveled (VHT)				
Classification	**2016 (Base)**	**2045 (E+C Projects)**	**Change**	**Percent Difference**
Interstate	33,294	228,960	195,666	587.69%
Principal Arterial	40,998	107,577	66,579	162.40%
Minor Arterial	43,326	128,386	85,060	196.33%
Collector	18,375	58,040	39,665	215.86%
Total	**135,993**	**522,963**	**386,970**	**284.55%**

Note: E+C is future scenario with only Existing and Committed transportation projects.
Source: Clarksville Travel Demand Model, NSI

continued

Daily Vehicle Hours of Delay (VHD)				
Classification	2016 (Base)	2045 (E+C Projects)	Change	Percent Difference
Interstate	13,832	201,806	187,974	1358.98%
Principal Arterial	14,181	66,053	51,872	365.79%
Minor Arterial	14,131	77,057	62,926	445.30%
Collector	4,564	30,806	26,242	574.98%
Total	**46,708**	**375,722**	**329,014**	**704.41%**

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: Clarksville Travel Demand Model, NSI

CURRENTLY, CONGESTION IS CONCENTRATED MOSTLY NEAR INTERSECTIONS IN THE CLARKSVILLE MPA. BY 2045, CONGESTION IS FORECAST TO BECOME MORE WIDESPREAD IF ONLY THE E+C PROJECTS ARE IMPLEMENTED.

The number of roadway segments with a LOS of F would increase significantly, as shown in Table 8.3 and illustrated in Figure 8.1.

It is important to note that not all congested street and highway segments should be widened with additional through lanes or turning lanes. In urban settings, it may be more appropriate to consider ITS improvements or Travel Demand Management (TDM) strategies. Congestion may also be reduced by improving pedestrian, bicycle, and/or transit conditions that will encourage alternative means of transportation.

Table 8.3 Roadway Corridors with Volumes Exceeding Capacity (E+C)

Route	Limits	Length (miles)
I-24	Southern Study Area Boundary to Dunlop Lane	11.05
I-24	US 79/SR-13 to SR-48	2.88
I-24 NB	SR-237 to US 79	3.58
I-24 SB Off Ramp	@ SR-76	0.25
I-24 NB On Ramp	@ SR-76	0.33
I-24 SB On Ramp	@ SR-76	0.42
I-24 NB Off Ramp	@ SR-76	0.34
I-24 SB On Ramp	@ SR-237	0.27
I-24 NB Off Ramp	@ SR-237	0.23
I-24 SB On Ramp	@ SR-48	0.21
I-24 SB Off Ramp	@ US 41A	0.47
US 41A/Fort Campbell Boulevard	0.83 miles north of Britton Springs Road to Britton Springs Road	0.83
US 41A/US 79	0.30 miles west of Peachers Mill Road to US 79/Kraft Street	1.50
US 41A/Madison Street	6th Street to 0.11 miles east	0.11
US 41A/Madison Street	10th Street to Pageant Lane	0.54
US 41A/Madison Street	Porters Bluff Road to Golf Club Lane	0.05
US 41A/Madison Street	Crossland Ave to 0.36 miles east of SR-76	2.98
US 41A/Madison Street	Sango Rd to 0.95 miles east of Shady Grove Road	3.69
US 41A Bypass	Crossland Avenue to SR-48	0.63
US 79/SR-13	N 8th Street to Solar Way	7.56
US 79/SR-13	Jim Johnson Rd to 1.63 miles east	1.63

continued **TABLE 8.3 ROADWAY CORRIDORS WITH VOLUMES EXCEEDING CAPACITY (E+C)**

ROUTE	LIMITS	LENGTH (MILES)
US 41A Bypass	0.29 miles west of Hawkins Road to US 41A/Madison Street	4.77
SR-13/SR-48	Old Hwy 48 to US 41A Bypass	4.93
SR-374/101st Airborne Division Parkway/ Richview Road	Britton Springs Road to US 41A	12.90
SR-374/101st Airborne Division Parkway EB Off Ramp	@ US 79	0.07
SR-374/101st Airborne Division Parkway WB On Ramp	@ US 79	0.12
SR-48/College Road	9th Street to Red River Street	0.15
SR-48/College Road	Hornerger Lane to US 79	0.30
SR-48/Trenton Road	US 79 to 0.21 miles north of SR-249	5.28
SR-236/Tiny Town Road	0.82 miles west Peachers Mill Road to SR-48	3.88
SR-149	SR-374 Extension to River Road	0.85
SR-76	Old Farmers Road to N Woodson Road	2.80
SR-249/Tylertown Road	SR-48 to Jim Johnson Road	3.78
SR-237/Rossview Road	US 79 to 0.55 miles east of Rollow Lane	5.04
SR-237/Rossview Road	Kirkwood Road to Port Royal Road	2.92
SR-374/101st Airborne Division Parkway Extension	SR-149 to Dotsonville Road	4.25
SR-12/Ashland City Road	US 41A Bypass to 1.10 miles east	1.10
KY-115/Pembroke Oak Grove Road	0.86 miles south of I-24 to I-24	0.86
KY-911	KY-115 to 0.52 mile east	0.52
Hornerger Lane	Franklin Street to SR-48	0.10
Zinc Plant Road	Briarwood Road to SR-13	0.97

continued **TABLE 8.3 ROADWAY CORRIDORS WITH VOLUMES EXCEEDING CAPACITY (E+C)**

ROUTE	LIMITS	LENGTH (MILES)
7 Mile Ferry Road	Mayhew Road to 0.10 miles east	0.10
Peacher's Mill Road	0.12 miles south of Hillsboro Drive to 0.42 miles south of Hillsboro Drive	0.30
10th Street	US 41A to Franklin Street	0.29
Jim Johnson Road	0.05 miles east of Solar Way to SR-249	1.65
Oakland Road	US 79 to Merriweather Road	1.17
Merriweather Road	SR-48 to Oakland Road	1.73
Solar Way	US 79 to 1.71 miles north	1.71
Alfred Thun Road	Corporate Parkway Boulevard to US 79	0.56
Ted Crozier Boulevard	SR-374 to Dunlop Lane	1.01
International Boulevard	SR-237 to 0.58 miles north	0.58
Rollow Lane	SR-237 to 0.74 miles north	0.74
Dotsonville Road	0.57 miles south of US 79 to US 79	0.58
Sango Road	0.42 miles south of Trough Springs Road to SR-76	1.12
Memorial Drive	Golf Club Lane to US 41A	0.06
Memorial Drive	0.35 miles east of SR-374 to SR-76	2.21
Crossland Avenue	Cumberland Drive to Golf Club Lane	1.51
Porters Bluff Road	US 41A to Reynolds Street	0.66
Reynolds Street	Porters Bluff Road to Franklin Street	0.43
N 8th Street	Main Street to SR-48	0.09
N 9th Street	Main Street to SR-48	0.09
Franklin Street	N 9th Street to 10th Street	0.05

continued **TABLE 8.3 ROADWAY CORRIDORS WITH VOLUMES EXCEEDING CAPACITY (E+C)**

ROUTE	LIMITS	LENGTH (MILES)
Main Street	Cedar Street to Reynolds Street	0.35
Red River Street/Frosty Morn Drive	0.39 miles south of US 79 to US 79	0.39
Greenwood Avenue	Woodmont Boulevard to Daniel Street	0.02
Old Ashland City Road	US 41A Bypass to Memorial Drive	1.28
Old Farmers Road	0.63 miles south of US 41A to US 41A	0.63
Port Royal Road	SR-76 to SR-237	3.04
Cunningham Lane	Lafayette Road to Fort Campbell Boulevard/US-41A	1.25
Corporate Parkway Boulevard	0.56 miles west of International Boulevard to International Boulevard	0.56

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: Clarksville Travel Demand Model, NSI

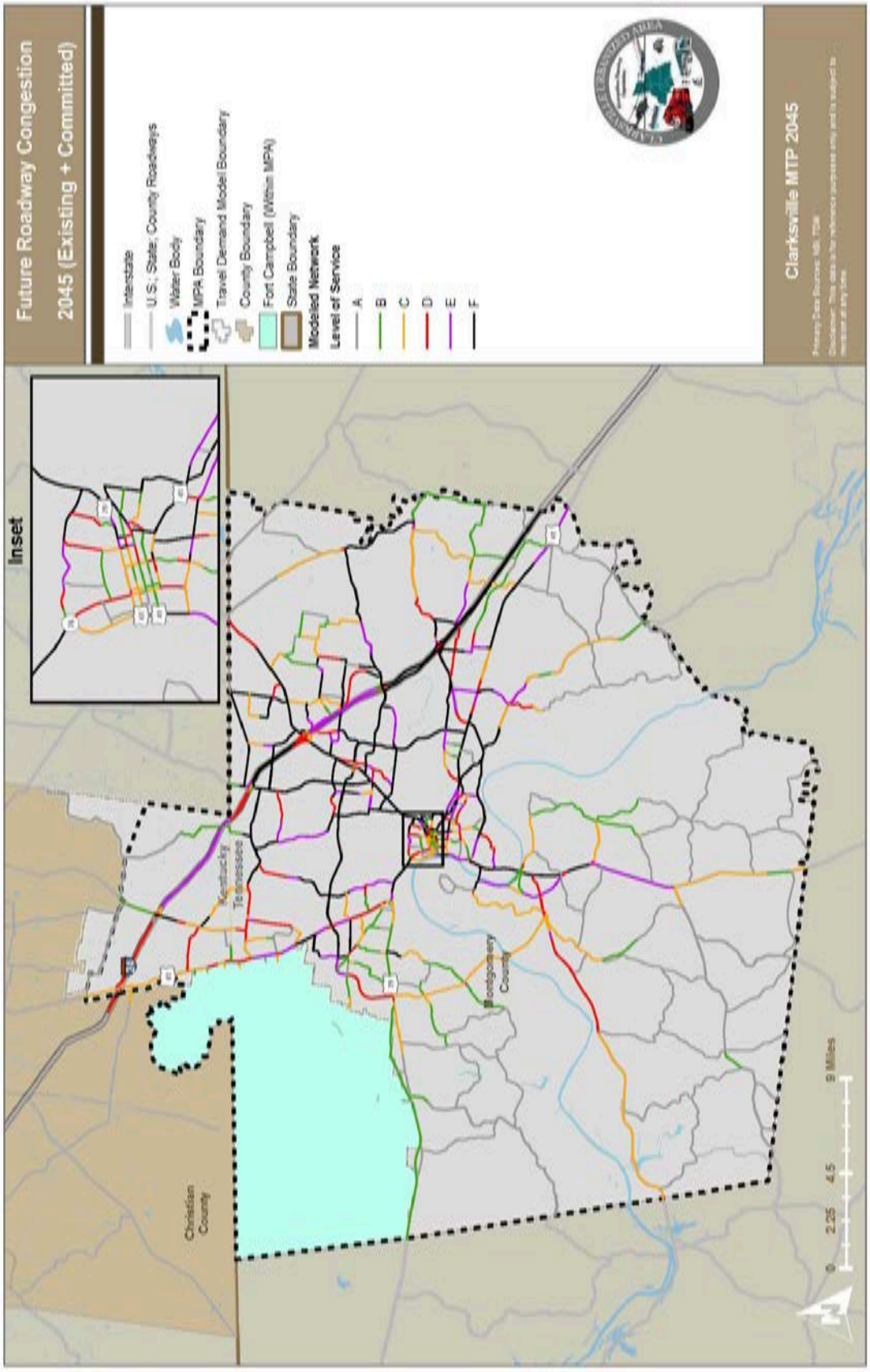


Figure 8.1 Future Roadway Congestion, 2045 (Existing + Committed)

Roadway Safety Needs

Within the MPA, a total of 29,728 crashes occurred between 2012 and 2016. During that timeframe, there were 121 fatal crashes and 7,331 injury-causing crashes. Less than two (2) percent of the crashes that occurred in the MPA involved alcohol. This resulted in nearly six (6) percent of total fatal crashes being alcohol related. Hence, this study recommends continuing to promote and enforce programs that aim to eliminate drunk driving. The public survey places a great emphasis on roadway safety in the MPA. Project scoring discussed in Chapter 10 reflects that need, and projects that promote safety or will reduce crashes receive more points. As traffic increase from 2016 to 2045, so too will the number of crashes. Projects that will reduce the number of crashes will become another need for safety and receive more points during the project scoring process.

Any safety projects designed to improve the high frequency, or crash rate, segments or intersections outlined in Chapter 6: Existing Conditions must consider the types of collisions occurring. Recommendations for reducing the most common types of crashes are outlined below:

Rear-End Collisions

Rear-end crashes can be attributed to a number of factors, such as:

- driver inattentiveness
- large turning volumes
- slippery pavement
- inadequate roadway lighting
- crossing pedestrians
- poor visibility of a traffic signal
- congestion
- inadequate signal timing
- an unwarranted signal

In general, the recommendations for reducing rear-end crashes include:

- Analyze turning volumes to determine if a right-turn lane or left-turn lane is warranted. Providing a turning lane separates the turning vehicles from the through vehicles, preventing through vehicles from rear ending turning vehicles. If a large right turn volume exists, increasing the corner radius for right turns is an option.
- Checking the pavement conditions. Rear-end collisions caused by slippery pavement can be reduced by lowering the speed limit with enforcement, providing overlay pavement, adequate drainage, groove pavement, or with the addition of a "Slippery When Wet" sign.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surroundings.
- Determine if there is a large amount of pedestrian traffic. Pedestrians crossing the roads may impede traffic and force drivers to stop suddenly. If crossing pedestrians are an issue, options include installing or improving crosswalk devices and providing pedestrian signal indications.
- Check the visibility of the traffic signals at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal heads, installing 12" signal lenses, visors, back plates, or relocating/adding signal heads.
- Verify that the signal timing is adequate to serve the traffic volumes at the trouble intersections. Options include adjusting phase-change interval, providing or increasing a red-clearance interval, providing progression, and utilizing signal actuation with dilemma zone protection.
- Verify that a signal is warranted at the given intersection.

Angle Crashes

Angle crashes can be caused by a number of factors, such as:

- restricted sight distance
- excessive speed
- inadequate roadway lighting
- poor visibility of a traffic signal
- inadequate signal timing

- inadequate advance warning signs
- running a red light
- large traffic volumes.

In general, the recommendations for reducing right angle collisions include:

- Verify that the sight distance at all intersection approaches is not restricted. Options to alleviate restricted sight distance include removing the sight obstruction and/or installing or improving warning signs.
- Conduct speed studies to determine whether or not speed was a contributing factor. In order to reduce crashes caused by excessive speeding, the speed limit can be lowered with enforcement, the phase change interval can be adjusted, or rumble strips can be installed.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surrounding area.
- Check the visibility of the traffic signal at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal heads, installing 12" signal lenses, visors, back plates, and/or relocating or adding signal heads.
- Verify that the signal timing is adequate to serve the traffic volumes. Options include adjusting phase change interval, providing or increasing a red-clearance interval, providing progression, and/or utilizing signal actuation with dilemma zone protection.
- Verify that the intersection is designed to handle the traffic volume. If the traffic volumes are too large for the intersection's capacity, options include adding a lane(s) and retiming the signal.

Sideswipes

Sideswipes may be caused by factors such as:

- excessive speed,
- inadequate roadway lighting,
- poor pavement markings,
- large traffic volumes, and
- driver inattentiveness.

The recommendations for reducing sideswipes include:

- Check for proper signage around the intersection, especially if the roadway geometry may be confusing for the driver. Verify that all one-way streets are marked "One-Way" and "No Turn" signs are placed at appropriate locations.
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be easily maneuvered by drivers.
- Evaluate left and right turning volumes to determine if a right turn and/or left turn lane is warranted.
- Ensure roadway lighting is sufficient for drivers to see roadway and surroundings.
- Verify that lanes are marked properly and provide turning and through movement directions on lanes as well as signage that indicates lane configurations. This will prevent cars from dangerously switching lanes at the last minute.

Other Collision Types

Recommendations for increasing the safety and reducing the number of crashes for other crash types include:

- Determine if the speed limit is too high or if vehicles in the area are traveling over the speed limit. Reducing the speed can reduce the severity of crashes and make drivers more attentive to their surroundings.
- Verify the clearance intervals for all signalized intersection approaches and ensure that there is an all red clearance. For larger intersections, it is particularly important to have a long enough clearance interval for vehicles to safely make it through the intersection before the light turns red.
- Check for proper intersection signage, especially if the roadway geometry may be confusing for the driver. Verify that all one-way streets are marked "One-Way" and "No Turn" signs are placed at appropriate locations.
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be easily maneuvered by drivers.
- Evaluate left and right turning volumes to determine if a right turn and/or left turn lane is warranted.

- Ensure roadway lighting is sufficient for drivers to see roadway and surroundings.
- Check the visibility of the traffic signals from all approaches.
- Verify that lanes are marked properly and provide turning and through movement directions, as well as signage that indicates lane configurations. This will prevent cars from dangerously switching lanes at the last minute and reduces crash potential.

Develop a Safety Management System (SMS)

Traffic safety programs are relatively uniform from state to state in their approach to making the highway system safer for their users. The typical traffic safety program combines several different features from a SMS, which all states were mandated to have under the federal transportation bill known as ISTEA in 1991. Under ISTEA, the SMS was required to address:

- Coordinating and integrating safety features for the various modes of travel.
- Identifying hazardous locations, investigating them, and establishing countermeasures to increase safety.
- Early consideration for safety in all highway projects and programs.
- Identifying safety needs of special user groups (handicapped, elderly, etc.).
- Routinely maintaining and upgrading the safety features on the roadways.
- Marketing safety programs to encourage community involvement.

The SMS mandate was later withdrawn due to the 1995 National Highway System Designation Act. However, MAP-21 Section 1203 requires that each state and MPO have a planning process that addresses the safety performance measure to "achieve a significant reduction in traffic fatalities and serious injuries on all public roads. MAP-21 also retained the SAFETEA-LU requirement that the planning process address the need to "increase the safety of the transportation system for motorized and non-motorized users." The FAST Act builds upon MAP-21 and these requirements are still in place. The FAST Act also requires states to create and maintain an HSIP, which a SMS would work in conjunction with. A traffic safety program involves several steps.

The typical traffic safety program includes:

- A crash record system
- Identification of hazardous locations
- Engineering studies
- Selection of countermeasures
- Prioritization of improvement projects
- Planning and implementation of improvement projects
- Evaluation of the implemented projects

The crash record system should contain data on individual crashes that occur in the area. The crash data should include information on:

- time
- date
- weather condition
- pavement condition
- driver
- roadway

The primary source for crash data is usually police reports from local jurisdictions. In order for this record system to be useful, the data has to be processed and available on a timely basis so that it can be analyzed.

The identification of hazardous locations is based on the actual crashes that have occurred, and/or the potential of an area to have a high number of crashes. The severity of these crashes must also be considered in order to prioritize the locations and develop solutions for them. Once the hazardous locations have been identified, engineering studies can be conducted using the crash record system data. An analysis can use crash frequency, crash rate, Equivalent Property Damage Only (EPDO) rates, and other methods. Supplemental data from police comments and citizen complaints can also be used in the analysis process in order to find the causes of the crashes.

Once the causes of the crashes have been determined, countermeasures can be proposed and evaluated. Improvement projects are then selected based on the benefits they provide compared to the cost to implement them. Sometimes, enforcement and education may be all that is necessary to reduce the number of crashes. Other times, multiple projects may be needed to mitigate a particular problem area.

Once projects have been selected, they need to be prioritized based on their cost and benefits. Not all improvement projects will be able to be implemented due to funding limitations. After the projects have been selected and prioritized, an implementation plan should be developed to help ensure that resources and finances are available to complete the improvement projects in a timely manner. Implementation of projects should occur as soon as possible to avoid cost increases and prevent potential crashes that may occur without the project in place.

Safety projects must be evaluated to determine if they are effective or can be used to address similar problems in the future. This is typically done in a before-and-after analysis. This is accomplished by observing the frequency and severity of the crashes several years before the implementation of the project, and then for several years after the project has been completed.

Two issues can arise in this method of analysis. First, if enforcement and/or education change from before to after conditions, it can affect the number of crashes at that location. Second, "regression to the mean", a statistical phenomenon that can make natural variation in repeated data look like real change, must be taken into account to ensure that change in crash patterns and/or frequency can be attributable to the safety projects. In order to correct these two issues, control sites should be established that are similar to the study locations, but have not had any changes made to them.

Roadway Maintenance Needs

According to the data from the FHWA's Highway Performance Monitoring System, most of the pavements on major roadways in the MPA are in good or fair condition, as measured by the International Roughness Index (IRI).

Table 8.4 shows the major roadway segments in the MPA that were in poor condition in 2016 and have not been repaved.

Table 8.4 Roadway Segments in MPA with Poor Pavement Conditions

Route	FROM	To	Miles	Functional Class	Average Daily Traffic
US 79/SR-13	Rockwood Heights	Gill Street	0.18	Arterial	10,300
US 79/SR-13	0.12 mi west of Dunbar Cave Road	Dunbar Cave Road	0.12	Arterial	35,300

Source: KYTC, TDOT

Bridge Deficiencies

The existing conditions analysis revealed that there are currently 15 bridges in poor condition within the Clarksville MPA. Table 8.5 displays the MPA's bridges in poor condition, sorted by their sufficiency ratings, which contribute to the National Bridge Inspection Standards (NBIS) ratings. Addressing the needs of these bridges will improve safety, reduce maintenance costs, and avoid future bridge shutdowns. Bridges are rated by the NBIS based on the conditions of their decks, superstructure, substructure, and stream channel and channel protection. A bridge is considered to be in poor condition if any of the above categories are rated "Poor".

Some of these deficient bridges may be improved via the MTP through other transportation projects, such as a roadway widening. Other bridges could instead be improved through line item funding for operations and maintenance. The MPO, KYTC, and TDOT should prioritize these bridges for improvements as funding becomes available.

Table 8.5 Worst Performing Bridges in Poor Condition by Sufficiency Rating

Bridge ID	Roadway	Feature Intersecting	County	Year Built	Sufficiency Rating
63SR0130007	SR-13	*Cumberland River	Montgomery	1966	28.5
63SR0480001	SR-48	Little Barton's Creek	Montgomery	1930	33.5
63SR0480003	SR-48	**Louise Creek	Montgomery	1930	37.9
63K31480003	Dunbar Cave Rd.	Branch	Montgomery	1950	45.4
630A0090001	Sulphur Springs Rd.	Sulphur Branch	Montgomery	1974	47.8
63S62690001	Dotsonville Rd.	Cummings Creek	Montgomery	1942	49.0
63018880001	Shady Grove Rd.	Mcadoo Creek	Montgomery	1945	51.8
630A3940001	Akin Rd.	Louise Creek	Montgomery	1982	64.7
630A6060003	St. Paul Rd.	Branch	Montgomery	1970	68.1
63SR0120001	State Hwy. 12	Brush Creek	Montgomery	1958	71.3
63018610001	Budds Creek Rd.	Budd's Creek	Montgomery	1978	78.4
630A4470001	Watkins Ford Rd.	Bartons Creek	Montgomery	1976	80.5
630A6280001	Moody Rd.	Antioch Creek	Montgomery	1974	86.0
630A6160003	Poplar Springs Rd.	Eldridge Creek	Montgomery	1982	93.9
630A6150001	Rawlings Rd.	Blooming Grove Creek	Montgomery	1976	94.9

* As of 2016, bridge replacement under construction.
**As of 2016, bridge is scheduled for replacement.
Source: KYTC, TDOT

Alternative Fuel Vehicle Infrastructure Needs

For the last several years, the U.S. Energy Information Administration's Annual Energy Outlook has anticipated that the AFV market share will grow to about 16 percent by 2040. The EIA has forecasted a roughly threefold increase in light-duty vehicles, from approximately 15.8 million vehicles now to 45.4 million vehicles in 2040.

The two vehicle types anticipated to grow the most amongst AFVs are ethanol vehicles (+16.9 million) and electric vehicles (+12.1 million). Together, these two vehicles types account for about 98 percent of the forecasted growth in light-duty AFVs through 2040. Currently, electric vehicles are forecasted to grow at a much faster rate than ethanol vehicles. However, the MPO should be ready to accommodate the increase in both types of AFVs. This will require that the regional transportation system be able to provide additional infrastructure (i.e. fuel/charging stations).

The Clarksville MPA currently has four publicly accessible electric vehicle charging stations. This means that there are about 2.03 charging stations per 100,000 residents in the MPA. Half of the MPA's 14 AFV stations are for ethanol. There are about 3.55 ethanol fuel stations per 100,000 residents in the MPA.

The CUAMPO should further study the regional demand for AFVs in order to meet the current and future infrastructure needs for these two growing types of AFVs. The MPO should also examine the most appropriate role it should take in encouraging and accommodating the increase in AFV use.

8.2 | Bicycle and Pedestrian Needs

Bicycle Needs

The Clarksville-Montgomery County Greenway and Blueway Master Plan provides an in-depth evaluation of the existing bicycle and pedestrian facilities in Montgomery County. It also contains recommendations for future needs. The recommendations are shown in Figure 6.11. In addition to the physical improvements, the plan recommends the following priorities:

- The City of Clarksville
    - A Fort Campbell connection.
    - Bicycle signage improvement along existing roadways that are primary cyclist routes.
    - Inclusion of sidewalks and bicycle facilities in all road expansion projects.
- Montgomery County
    - Creation of a regional greenway corridor by utilizing the north/south rail corridor that connects to the Bicentennial Trail in Cheatham County.
    - Bicycle signage improvement on county roads.

The Downtown Clarksville Parking and Street Network Study suggested a street framework plan. This plan would guide future street standards in the city to promote multimodal use. The plan focuses on improvements to the dense urban street network in downtown Clarksville, and provides design guidelines based on the "Complete Streets" principles.

General recommendations from *The Downtown Clarksville Parking and Street Network Study* related to bicycle improvements include:

- Bike lanes and shared lane markings should be built per the recommended bike route map and street standards.
- A wayfinding master plan should be created to make it easier for downtown users to find public parking lots, garages, on-street parking, and bike facilities.
- Adopt bicycle parking requirements and retrofit existing streets.

Specific bicycle projects from *The Downtown Clarksville Parking and Street Network Study* are shown in Chapter 10: Project Development and Prioritization.

There are no bicycle plans available for the Kentucky portion of the MPA from KYTC. A "Rails to Trails Greenway Plan" exists for the City of Hopkinsville, but there are no proposed trails located within the MPA.

The public outreach survey revealed that less than 15 percent of the population in the MPA used a bike to travel within the study area. The vast majority, 73 percent, feel there is poor, or very poor, availability of bicycle lanes and paths. This reflects an unfulfilled need for bicycle lanes and paths. Many residents desire the ability to use a bicycle or to walk to destinations, but do not have access to facilities.

The Clarksville Cycling club provided a detailed list of recommendations, shown in the Appendix D, for bicycle lane improvements in the MPA. The recommendations reflect a need for well-maintained bicycle lanes on high traffic roadways and near schools. It is important that future route improvements include signage and are included in roadway maintenance plans.

Pedestrian Needs

The installation of sidewalks adjacent to schools and connecting to existing sidewalk infrastructure is a current priority of the CMCSS. This need was also a recurring comment during the public survey period. The County has been the recipient of Safe Routes to School grants in past years, as shown in Table 8.6. Of the 38 schools in the District, 30 are on streets without sidewalks. Seven of the schools with sidewalks have received Safe Routes to Schools grants.

"Children from surrounding areas should be able to walk to school on a paved sidewalk. There have been incidents with children being hit by cars" Clarksville MTP 2045 Transportation Survey 2018

TABLE 8.6 SAFE ROUTES TO SCHOOL RECIPIENTS MONTGOMERY COUNTY

SCHOOL	YEAR
Kenwood Middle	2016
Kenwood Elementary	2008
Northeast Elementary and Middle	2008
Ringgold Elementary	2008
Richview Middle	2008
Moore Magnet	2007
Minglewood Elementary	2007

Other priority areas for the installation of sidewalks are near public transit stops. The CTS has identified the need for sidewalks near transit stops in both their Comprehensive Operations Analysis and Strategic Plan. Over half of all persons riding the bus walk to the bus stop[1] . In Clarksville, transit stops are located along streets with high levels of vehicular traffic posing a safety risk for pedestrians.

Montgomery County and the City of Clarksville have codified a "Sidewalk Priority Indicator", shown in Table 8.7. This indicator is used to quantitatively, and objectively, prioritize the construction and repair of sidewalks. The matrix prioritizes sidewalk infrastructure in the CBD, near certain trip generators. This will serve to "fill in" gaps in the existing sidewalk network. No similar plan exists for Christian County and the City of Oak Grove.

The City of Clarksville performed spatial analysis on the sidewalk network using the "Sidewalk Priority Indicator" and produced the "Sidewalk Construction Priority Map 2016," which is shown in Figure 8.2 Many of the sidewalks with the highest priority indicators are in or near the CBD.

1 Who's on Board: What Today's Riders Teach Us about Transit that Works. 2016. Transit Center. www.transitcenter.org.

TABLE 8.7 SIDEWALK PRIORITY INDICATOR, CITY OF CLARKSVILLE AND MONTGOMERY COUNTY

FACTOR	PRIORITY RANK (1-5)
In Central Business Improvement District (a designated pedestrian district)	5
WITHIN A HALF-MILE OF THESE TRIP GENERATORS:	
Elementary, Middle & High Schools	5
Colleges & Universities	4
Parks & Greenways	4
Public Housing	4
Multi-Family Development	3
Civic Centers (post office, library, government offices, etc.)	3
Commercial or Mixed-Use Development	2
Single-Family Development	2
WITHIN A QUARTER-MILE OF THESE TRIP GENERATORS:	
Transit Routes	3
Senior Housing	2
OTHER FACTORS	
Missing Segment (within ¼ mile of existing sidewalk)	5
Damaged Segment of Existing Sidewalk	4
Missing Segment (within ½ mile of existing sidewalk)	3
Available Right-of-Way	2
Daily Traffic Volumes >20,000 vehicles per day (vpd)	3
Daily Traffic Volumes 5,000 to 20,000 vpd	2
Posted Speed Limit > 40 mph	3
Posted Speed Limit 30-40 mph	2

Source: City of Clarksville and Montgomery County Sidewalk Ordinance/Resolution, 2004

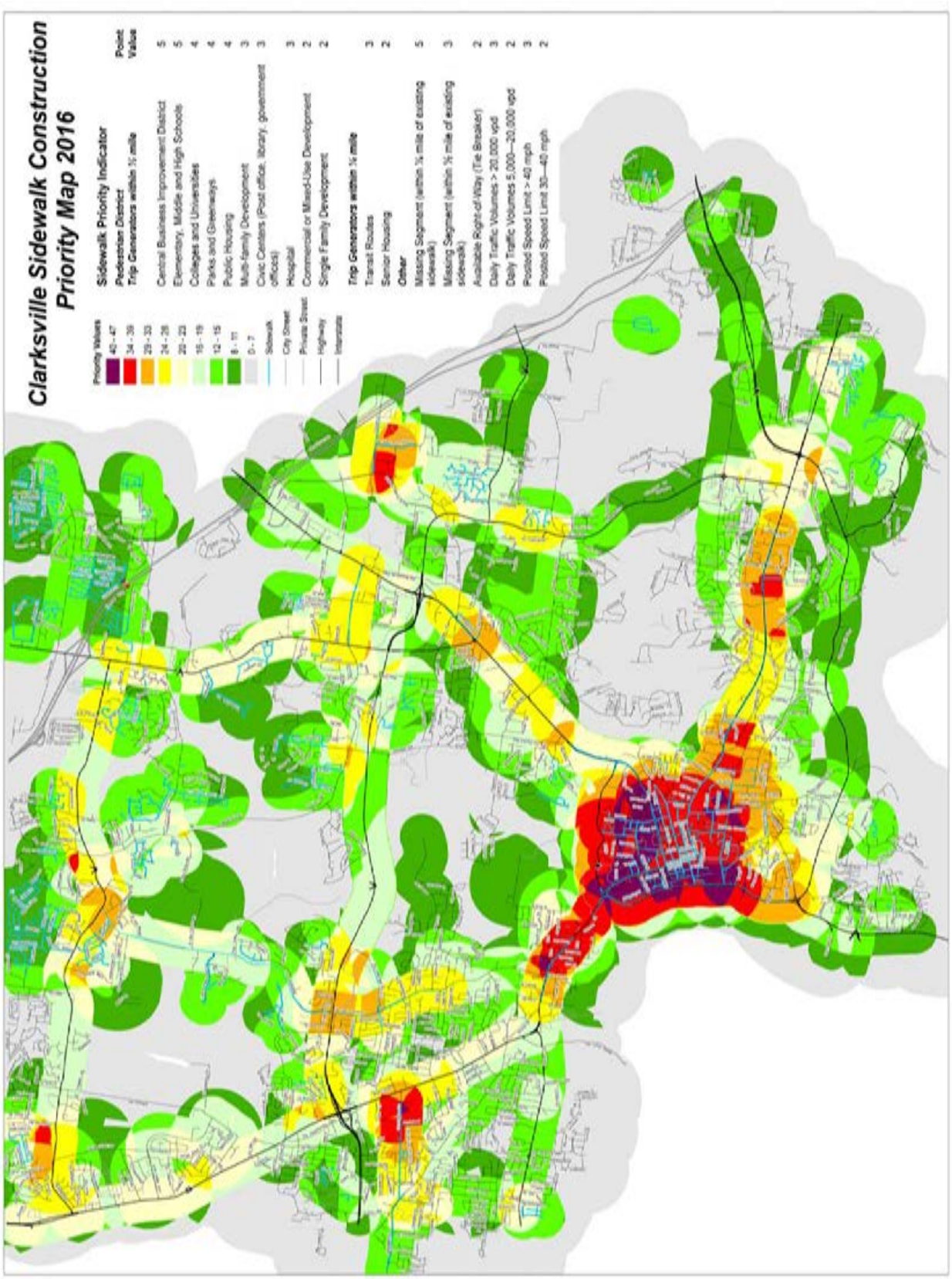


Figure 8.2 Sidewalk Construction Priority Map

The *Clarksville-Montgomery County Greenway and Blueway Master Plan* provided an analysis of pedestrian connectivity. It contains recommended improvements that are partially illustrated in "Figure 6.15 Existing and Proposed Pedestrian Improvements". These improvements are designed to improve the functionality of the greenway and blueway systems, and may not highlight or include improvements recommended in the Downtown Clarksville Parking and Street Network Study or those identified by the Sidewalk Priority Matrix. The following general recommendations for pedestrian improvements were identified in the *Clarksville Montgomery County Greenway and Blueway Master Plan*:

- A Fort Campbell connection.
- Implementation of sidewalk connections to existing greenways, especially where off-road greenways and/or dedicated on-road bicycle lanes cannot be developed.
- Inclusion of sidewalks and bicycle facilities in all road expansion projects.

The *Downtown Clarksville Parking and Street Network Study* (2010) suggested a street framework plan to guide the city on future street standards to promote multimodal use. The standard cross-sections were designed with features such as on-street parking, bike routes, street trees, pedestrian scaled lights, crosswalks, sidewalks, multi-use trails, and bioswales. General recommendations related to pedestrian usage include:

- Pedestrian signal heads and mid-block crossings should be employed where volumes are high
- Sidewalks should be added at Kraft Street and Red River Street where CTS serves this predominately industrial area and other residential areas per the street standards

Specific pedestrian improvements recommended by The Downtown Clarksville Parking and Street Network Study are located in Chapter 10: Project Development and Prioritization.

Public input demonstrated that the availability of sidewalks and safety for pedestrians are a large concern within the MPA. Of the transportation issues ranked in the public input Clarksville MTP 2045 Transportation Survey, sidewalks were ranked the worst. Most, 79 percent of respondents, felt the availability of sidewalks and pedestrian trails was poor or very poor. Forty-five percent of survey respondents saw "inadequate or no sidewalks" as a major safety concern. Survey participants also noted the lack of sidewalks near schools and bus stops as a safety concern.

Trails and Greenways Needs

In addition to the bicycle and pedestrian improvements noted in the previous sections, the following multimodal recommendations were provided by the Downtown Clarksville Parking and Street Network Study:

- Street trees should be used in future streetscapes.
- Medians should be used in certain street sections to reduce lane width or converting center turn lanes to a median with left turn lanes at intersections per the street standards.
- Road diets should be implemented per the street standards.

Along with these specific physical improvements, the Blueway and Greenway Master Plan recommends:

- Continued addition of new greenway sections that connect to existing greenways.
- A Fort Campbell connection.
- Creation of a north/south greenway corridor within the city limits.
- Implementation of sidewalk connections to existing greenways, especially where off-road greenways and/or dedicated on-road bicycle lanes cannot be developed.
- Continuation of primary city greenway and blueway corridors into the County.
- Creation of a regional greenway corridor by utilizing the north/south rail corridor that connects to the Bicentennial Trail in Cheatham County.
- Creation of a major east/west greenway corridor along Spring Creek.
- Creation of an overland greenway corridor, connecting northwest Montgomery County to the city.

Additional Needs

The region has shown great interest and care in improving bicycle and pedestrian facilities over the past 15 years. Multiple plans and studies exist to guide implementation and a strong bicycle and pedestrian culture is emerging. Improvements to facilities are fiscally constrained, but the region continues to plan for future active transportation needs which help to leverage opportunities for improvements as they arise.

The analysis provided as part of the Clarksville Montgomery County Greenway and Blueway Master Plan, the The Downtown Clarksville Parking and Street Network Study, and the Sidewalk Construction Priority Map identify specific improvements to the pedestrian networks. An overview of these plans and studies is included to provide a basic understanding of the content. Each document should be consulted for specific recommendations to identify high-need projects worthy of pursuing federal funding.

As previously stated, the FHWA, TDOT, and KYTC require the consideration of multimodal improvements as part of any federally funded roadway reconstruction or widening. Public input suggests that the City of Clarksville, Montgomery County, the City of Oak Grove, and Christian County should consider additional measures to build sidewalks in areas near public transit routes. Public input revealed that this is particularly desired near heavily traveled routes, major stops, and in areas surrounding schools. While these factors are considered in the sidewalk priority matrix, the City of Clarksville and Montgomery County should consider adjusting the sidewalk priority matrix to give these areas more precedence.

Improvements in bicycle and pedestrian facilities along the Fort Campbell Boulevard (US-41A) corridor, from Providence Boulevard to the Tennessee/Kentucky state line, are recommended in most of the current approved plans and studies in the MPA. No further widening is planned for this 7-lane highway, meaning the addition of bicycle/pedestrian facilities will likely require standalone, retrofit projects. This corridor serves transit riders for Route 1/Fort Campbell, which is among the routes with highest ridership.

Similar needs exist on other transit routes to varying degrees. Outside Clarksville's Central Business District, only Routes 5 and 6 (Hilldale and Madison Street) have sidewalks along one-third of their routes. It is recommended that the City of Clarksville and Montgomery County evaluate sidewalk needs for these two routes, along with Route 3 (Cunningham Loop) and Route 7 (Wilma Rudolph/Gateway Medical Center). The following routes rely on "critical corridors" identified in previous plans for sidewalk improvements:

- Wilma Rudolph Boulevard (US-79/SR-13),
- Madison Street (US-41A), and
- Fort Campbell Boulevard (US-41A).

Zoning policies in the region will predicate the construction of sidewalks within new commercial development in the MPA. In Clarksville and Montgomery County, new residential areas will be required to construct sidewalks. Due to future population projections for the region, the City of Oak Grove should consider a similar policy requiring sidewalk construction for any new residential subdivision.

Zoning policies do not require bicycle parking or bicycle route connections as a part of new development. These policies should be reviewed to require or incentivize bicycle parking as part of new development. For example, in some municipalities, required vehicular parking is reduced with the addition of bicycle parking.

The Clarksville-Montgomery County Greenway and Blueway Master Plan includes recommendations for improvements to bicycle connectivity, but it is also important that future route improvements include signage and are included in roadway maintenance plans. Bicycle routes must remain clean and in good repair to ensure usability and safety for cyclists.

Projects that address the needs of bicyclists, pedestrians, and other system users promote maintaining the natural environment and better air quality. They also provide an equal opportunity to low-income and minority populations. These projects receive better scores during the project prioritization process.

8.3 | Public Transit Needs

Maintaining and Improving the Existing System

The recent COA from CTS, and their Strategic Plan, have provided measures of frequency and travel time. These reports also support improvements to walkability adjacent to transit stops. The MTP reiterates the importance of those improvements.

Additionally, the CTS must begin preparing for the increase in the area's elderly population, which will require additional resources to provide adequate service. This will also apply to riders that are aged 18-34, a prominent group of transit riders within the MPA due to Fort Campbell.

Transit Policies

Transit policies can increase transit ridership in three main ways:

- Concentrate development around transit corridors and make the walk to transit safe, easy and pleasant.
- Concentrate transit improvements in walkable places with large numbers of residents and destinations.
- Pay special attention to increasing frequency and reducing transit travel time.

The MPO should work with CTS to research and develop a transit stop improvement program that identifies integral bus stops for sidewalk and amenities improvement. In addition, the MPO should assist CTS with implementing the recommendations in its Strategic Plan, including:

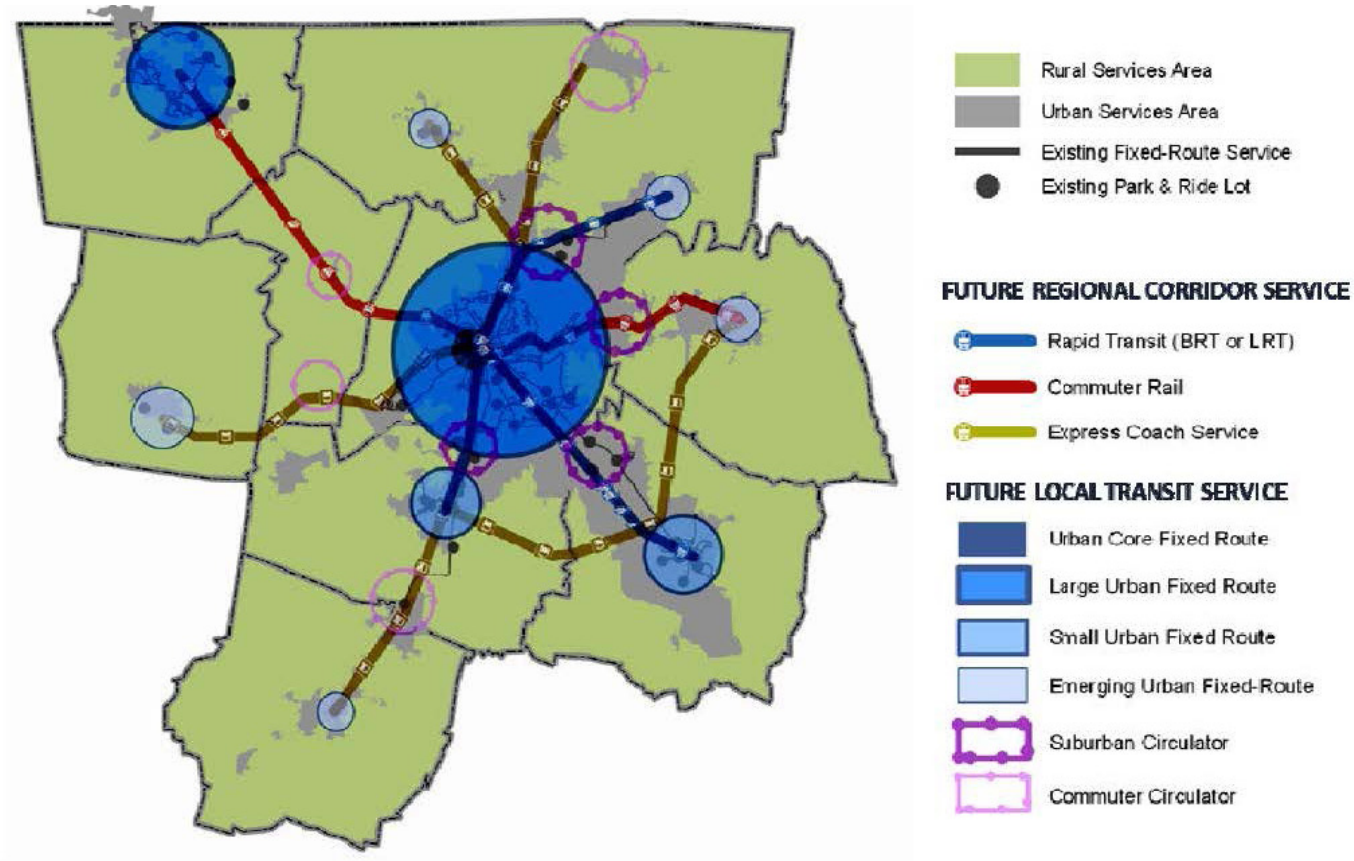
- Continue to monitor the performance of each route (number of passengers, on-time performance, etc.) and adjust the schedule to maintain on-time performance goals of 85% during peak and 90% during off-peak;
- Work with the RTA and other regional service providers to find more cost-effective options for CTS patrons;
- Explore the creation and use of a Riders' Advisory Committee or similar group who would meet periodically with CTS management and operations supervisors to give feedback and suggestion for improved operations;

- If staffing and resources permit, consider opening paratransit/dial-a-ride service to general public to increase efficiency of service and charging service at cost.
- Continue with existing travel training programs.
- Offer free fixed-route rides to passengers who are somewhat ambulatory but would otherwise qualify for ADA services.
- Continue to monitor the number of trips and costs; revisit service area, qualifications and other policies to combat cost escalation if necessary.
- Work towards a more robust "State of Good Repair" for CTS vehicles and buildings.
- Apply for additional grant funds to address critical sidewalk needs along transit routes, working in partnership with the City of Clarksville and the CUAMPO.
- Monitor the number of buses using the downtown transit center currently, or as proposed by a COA or other studies, being cognizant of the fact that the facility cannot accommodate increased vehicles due to space constraints.
- Partner with Austin Peay State University to develop a CTS next bus real-time information app for iOS and Android devices.
- Consider deployment of real time arrival information at the proposed mini hubs.
- Provide necessary data required to provide transit trip directions via Google Transit.
- Market and publicize the "free rides for seniors" program funded by AARP.
- Continue to sell bus transit advertising and bus wrapping.
- Continue to partner with employers to examine potential service expansion(s).
- Continue existing partnerships with Austin Peay State University and other educational entities.

Regional Transit

The Middle Tennessee 2040 Regional Transportation Plan recommends a fixed commuter rail service from Nashville to Clarksville in the future[2]. The cities are within the top five population centers in Tennessee. The general alignment of the route is shown in Figure 8.3. The Northwest Corridor Transit Study is currently evaluating options for implementation. The RTP recommends that the corridor include rail service using Diesel Multiple Unit vehicles. These vehicles could use the existing freight alignment or operate a new track built along dedicated right-of-way or down the center of an existing street. The service would be oriented to commuters along the corridor. A planning level cost estimate is $150M to $300M in capital costs, and $6M in annual operating costs.

Figure 8.3 Middle Tennessee Regional Transit Vision



Source: Middle Tennessee 2040 Regional Transportation Plan

2 Middle Tennessee 2040 Regional Transportation Plan

8.4 | Freight Needs

Freight needs vary by mode. However, all freight projects within the MPA can improve roadway safety and increase economic development of the region.

Trucking Needs

Forecast Growth

Table 8.8 shows the projected growth in freight tonnage for trucks in Montgomery County from 2012 to 2040. This data was developed using the Transearch data provided by TDOT, which has coverage of each county in Tennessee up to the year 2040. As such, freight data was unavailable for Christian County.

Table 8.8 Change in Truck Freight Tonnage in Montgomery County, 2012-2040

	2012	2040	Change	Percent Change
Montgomery County, TN	6,911,929	12,359,918	5,447,989	78.8%

Note: Excludes through-traffic

Source: Transearch

Table 8.9 compares freight trucking trends from 2012 through 2040 for freight being transported on trucks. The following observations emerge:

- Export tonnage to other counties in Tennessee from Montgomery County is projected to grow more than eight times as fast as import tonnage from other counties in Tennessee.
- Import tonnage to Montgomery County from other Tennessee counties is expected to grow at the slowest rate for all truck freight movements.
- Export tonnage to areas outside of Tennessee from Montgomery County is projected to grow more than twice as fast as import tonnage from other areas outside of Tennessee.

Table 8.9 Change in Freight Truck Movement in Montgomery County, 2012-2040

Year	From Outside Tennessee	To Outside Tennessee	From Other Tennessee County	To Other Tennessee County	Within County	Total
2012	2,746,997	1,816,627	1,177,231	1,133,545	37,529	6,911,929
2040	4,049,617	3,877,004	1,398,198	2,975,734	59,364	12,359,918
Change	**1,302,620**	**2,060,377**	**220,967**	**1,842,189**	**21,835**	**5,447,989**
Percent Change	**47.4%**	**113.4%**	**18.8%**	**162.5%**	**58.2%**	**78.8%**

Note: Excludes through-traffic

Source: Transearch/IHS Freight Finder

THE LARGEST AREAS OF TRUCK VOLUME GROWTH ARE LOCATED ON INTERNATIONAL BOULEVARD/SOLAR WAY FROM ROSSVIEW ROAD TO JIM JOHNSON ROAD, AND US 79 FROM KRAFT STREET TO INTERNATIONAL BOULEVARD. OTHER AREAS OF FREIGHT GROWTH INCLUDE THE I-24, US 41A, AND US 79/SR-13 FREIGHT CORRIDORS.

Figure 8.4 shows the estimated 2045 truck volumes on the MPA's roadway network.

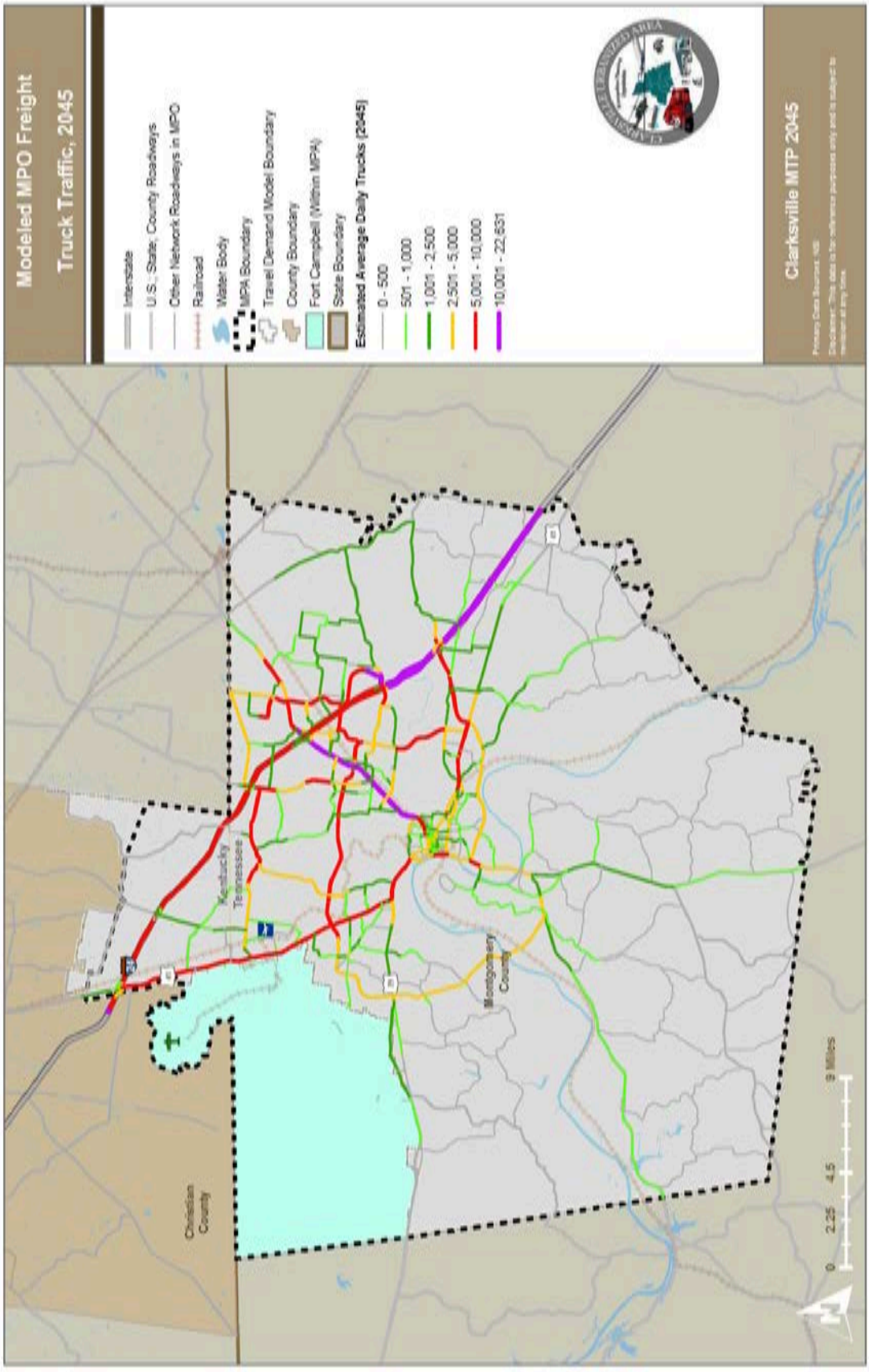


Figure 8.4 Modeled MPO Freight Truck Traffic, 2045

Roadway Capacity and Reliability

One method to address freight truck travel time reliability is through ITS improvements. Beyond ITS improvements, traditional capacity improvements can alleviate congestion-related delay.

Table 8.10 shows the roadway segments that accommodate a large number of daily truck trips (500 trucks or more) and experience congestion in the base year. These segments possess the greatest need for capacity/reliability improvements to improve future freight conditions in the short-term.

By 2045, congestion along corridors that possess a large number of daily truck trips will correspond to the same congested segments shown in Table 8.3. Figure 8.5 displays the roadway segments that are anticipated to have greater than 500 truck trips per day and experience a LOS of F in the year 2045.

TABLE 8.10 MAJOR FREIGHT ROADWAYS WITH CONGESTION ISSUES

FACILITY	FROM	FACILITY	ESTIMATED DAILY TRUCKS (2016)
US 79/Wilma Rudolph Road	Kraft Street	Old Trenton Road	7,700
US 79/Wilma Rudolph Road	I-24 West Ramps	I-24 East Ramps	8,300
US 79/SR-13	Jim Johnson Road	1.67 miles east	3,500
US 79/US 41A	0.32 miles west of Peachers Mill Road	Kraft Street	5,300-5,700
US 41A Bypass	Old Ashland City Rd	SR-12	2,600
SR-236/Tiny Town Road	Peachers Mill Road	Needmore Road	4,100
SR-48/Trenton Road	Needmore Road	0.98 miles north	1,900
SR-48/Trenton Road	I-24 West Ramps	SR-249	2,500-2,800
SR-249/Tylertown Road	SR-48	0.94 miles east	1,500
SR-13/SR-48/Cumberland Drive	Old Hwy 48	US 41A Bypass	1,600-5,000
Zinc Plant Road	Bridgwood Road	SR-13/SR-48	1,300-2,200
Peachers Mill Road	Mill Creek Road	101st Airborne Division Parkway	2,200-3,400

Source:TDM

continued

Table 8.10 Major Freight Roadways with Congestion Issues

Facility	From	Facility	Estimated Daily trucks (2016)
Madison Street	10th Street	0.21 miles east	2,500-2,900
Dunlop Lane	Ted Crozier Boulevard	International Blvd.	3,200-3,600
Hornerger Lane	Main Street	SR-48	2,000
SR-374/Richview Road	Memorial Drive	Old Russellville Pike	3,500-3,700
Needmore Road	SR-48	US 79/SR-13	1,200-1,600
Old Trenton Road	W Dunbar Cave Road	Needmore Road	1,100-1,300
Dunbar Cave Road	US 79	0.32 miles east	1,300

Source:TDM

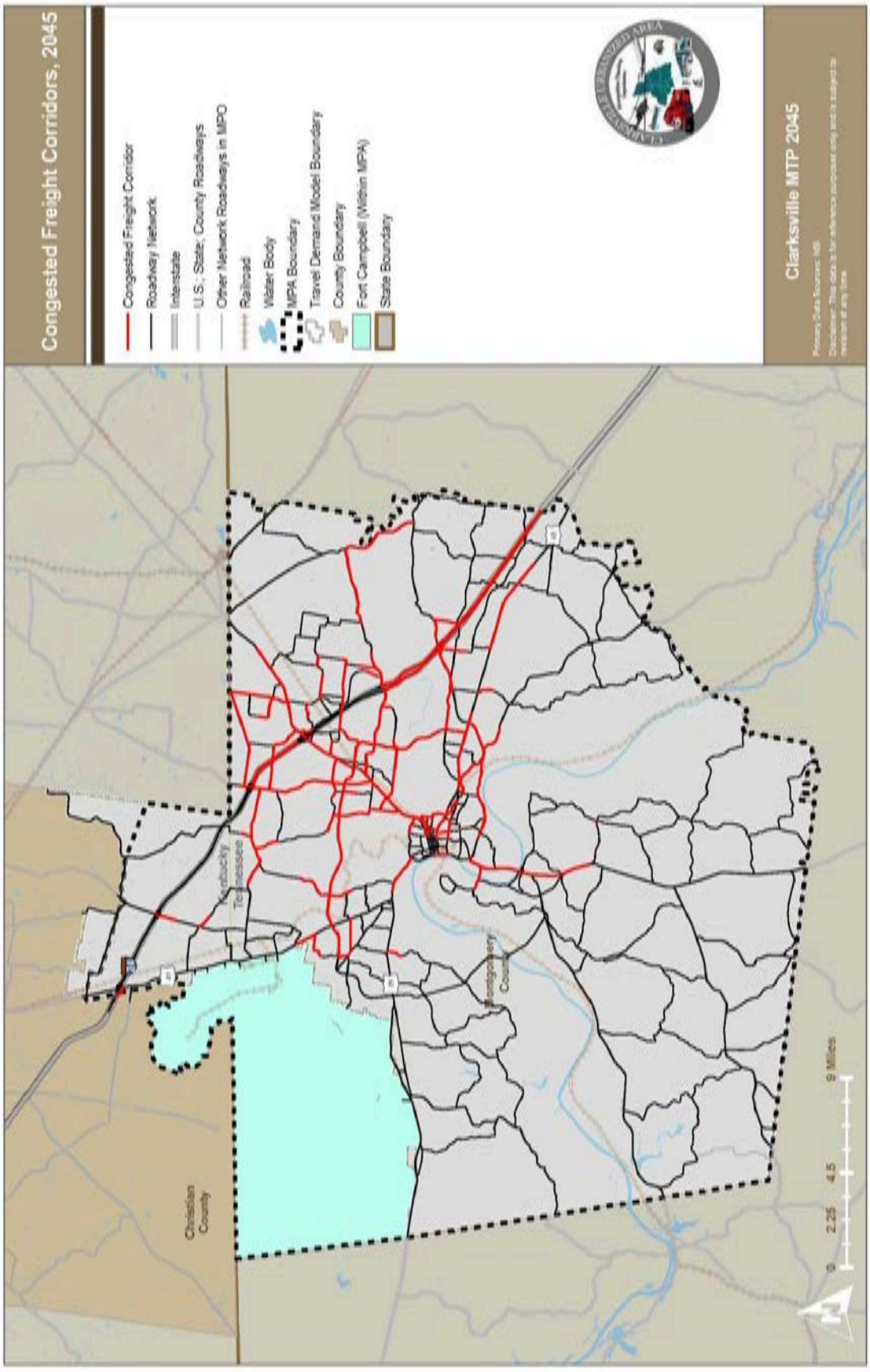


Figure 8.5 Congested Freight Corridors, 2045

Rail Needs

Forecast Growth

Table 8.11 shows the projected growth in freight tonnage for rail in Montgomery County from 2012 to 2040. This data was provided by Transearch, which has coverage of each county in Tennessee up to the year 2040.

Table 8.11 Change in Rail Freight Tonnage in Montgomery County, 2012-2040

	2012	2040	Change	Percent
Montgomery County, TN	68,640	84,102	15,462	22.5%

Note: Excludes through-traffic
Source: Transearch

Rail Capacity and Future Projects

Future rail capacity and related needs can be measured in many ways. However, actual volumes and capacities are not known for all rail segments in the Clarksville MPA; it is not possible to forecast future capacity utilization rates and needs by segment. The use of rail as a means of freight transportation is becoming a more popular alternative due to increasing roadway congestion. The 2018 Tennessee Statewide Multimodal Freight Plan and 2015 Kentucky Statewide Rail Plan outline the future efforts anticipated by each state.

The Tennessee plan has identified three goals:

- Define strategic goals for the Tennessee freight system
- Establish a strategy to achieve freight-related goals that align with TDOT's guiding principles; and
- Fulfill the requirements of the FAST Act.

Sections 1.3 and 1.4 of the 2018 Tennessee Statewide Multimodal Freight Plan define the freight goals in more detail, as well as how TDOT's plan will support reaching those goals.

The Kentucky plan has identified four goals:

- Encouraging the preservation of the existing rail system, which is largely privately owned by the corporations using them.
- Support economic development by providing connectivity to state and federal systems and intermodal facilities.
- Strengthening customer relationships and information exchanging during the KYTC planning process.
- Enhancing highway-railroad at-grade safety crossing and reliability.

Passenger Rail Needs

CURRENTLY, ALL RAIL USED IN THE MPA IS STRICTLY FOR FREIGHT.

Both KYTC and TDOT have expressed an interest in passenger rail as an alternative for moving people. However, passenger rail faces financial and logistical challenges due to limited funds and the necessary infrastructure requirements.

High Speed Passenger Rail

During the public outreach survey period, members of the public expressed interest in a passenger rail system that connects Clarksville to other areas. In 2012, a study was conducted by the Georgia Department of Transportation (GDOT) that contained the possibility of a high-speed passenger rail corridor from Atlanta, GA to Louisville, KY. If this route is constructed, Clarksville residents would be able to access it via a terminal in Nashville. However, this project has yet to be built and GDOT is continuing to study feasible passenger rail corridors.

Regional Commuter Rail Service

For the last two decades, there has been interest in the introduction of commuter rail service between Clarksville and Nashville. This service would complement the commuter bus service that was launched in 2012. The RTA of Middle Tennessee conducted the Northwest Corridor Study which assessed the viability of a regional commuter rail service, with a terminus in Clarksville.

Future Waterways Transport

There are no general-purpose water ports in the CUAMPO area. Freight needs in the MPA are currently served by four single-purpose ports that are owned by major, private companies in the area. The City of Clarksville is located on the Cumberland River, a navigable waterway which gives the MPA the opportunity to expand on water-based freight shipping and barge transfer. The addition of a port would allow the MPA to increase its intermodal profile and increase the utility of the trucking and freight networks in the area. This will also assist in reducing wear on the roadways from truck traffic.

Port Service

The MPA is dependent upon its roadways and railways for the movement of freight within the area. In recent years, discussions have been held regarding the addition of a port with a general commodities terminal. This addition has also been identified as a project in TDOT's state freight plan. This port would be expected to have almost equal amounts of inbound and outbound freight. Several companies within the MPA currently use trucks traveling on I-24 to transport their commodities to the Nashville barge terminal. The inclusion of a general-purpose port would shift the mode of travel for a number of these trips and reduce traffic.

Airport Needs

Currently, the Clarksville Regional Airport has no commercial service flights. Flight training and aircraft maintenance for these flights are conducted by independent operators under the supervision of the airport authority. There is no full-service Fixed Base Operator to provide full time maintenance and aircraft rental with flight instruction.

IN 2017 THE CLARKSVILLE-MONTGOMERY COUNTY REGIONAL AIRPORT AUTHORITY COMPLETED A THREE STEP LOOK AT THE POTENTIAL TO ATTRACT AN AIR CARRIER SERVICE PROVIDER.

Three studies were conducted as part of this effort:

- A Regional Market Study
- An Economic Impact Study
- An Air Service Master Plan

These plans detail the challenges related to community development of air carrier service. This service would require several million dollars of capital investment at the start in order to accommodate:

- air carrier ticketing and baggage functions,
- ramp operations/parking,
- TSA passenger screening,
- sufficient automobile parking, and
- concessions for passengers.

Air carriers often expect subsidies from smaller communities in order to provide service. This would extend the amount of time for the service to break even on cost. The proximity of Nashville International Airport (KBNA), which already has all of these facilities, would also be competition to this service.

Further planned updates for the Clarksville Regional Airport can be found in the Airport Strategic Plan.

8.5 | Management and Operations

The MPOs and transportation departments across the United States have increasingly been asked to perform more tasks with each successive piece of transportation legislation. This is in addition to their existing work, often with stagnant or dwindling funds available. The FAST Act, like the MAP-21 and SAFETEA-LU bills before it, require that planning efforts seek to create and maintain an efficient transportation system. These increasing needs, while dealing with stagnant funding, require the MPOs and their partners to create leaner operations. It also places greater emphasis on the maintenance of the existing infrastructure. This section introduces several strategies that can be utilized in order to achieve this need.

The strategies in this section also help the MPO to achieve its objectives to:

- provide a safe transportation system,
- provide a well-maintained system, and
- provide a reliable transportation system.

Travel Demand Management (TDM)

THE GROWING BELIEF AMONG TRANSPORTATION PLANNERS AND PROFESSIONALS IS THAT A LOCATION CANNOT "BUILD ITSELF OUT OF CONGESTION."

The use of TDM involves the creation of a system that provides travelers with options to change their:

- mode of travel,
- amount of time spent in travel, or
- the route they choose in order to avoid congested roadways.

TDM focuses on strategies that reduce travel volumes and increase reliability within the roadway network. This can be accomplished by:

- Increasing the number of high-occupancy vehicle trips by promoting carpooling, shuttle buses to major employment centers, etc.
    - About 91 percent of the commuting trips within the MPA are made in Single-Occupancy vehicles.
    - This will reduce congestion and improve air quality without adding any additional capacity to the roadway system.
    - In Middle Tennessee, VanStar operates a vanpool service that has recently added vehicles to its fleet to expand its operations.
    - TDOT promotes the use of the RTA Ridematch, which allows Tennessee residents interested in vanpooling to contact the Regional Transportation Authority (RTA) about match options with other travelers looking to reach the same destination around the same time.
- Supporting Flex-time work schedules with employers to reduce congestion at peak times.
- Encouraging major employers to cooperate with other major employers in the area to stagger their normal working hours.
    - This will disperse commuting trips over a longer period of time.
    - Local Chambers of Commerce can provide many employers a location and medium through which to discuss these efforts.
- Supporting for efforts to allow employees to telecommute when possible.
- Establishing Park and Ride facilities.

- Providing a community education program on the costs and benefits of high-occupancy trips and options available to the public.
- Providing motorists with "live" data on which routes are the least congested at the time.
    - KYTC and TDOT offer real-time travel and emergency data through the use of the 511 system, which can be accessed online or by dialing 511 from a phone.
    - Recent advancements from free and paid services also allow real-time roadway data to be provided to motorists through their smartphones.

Systems Management and Operation

THE RETIMING OF TRAFFIC SIGNALS PROVIDES AREAS WITH AN OPPORTUNITY TO REDUCE CONGESTION AND LESSEN EMISSIONS BY MAKING THE ROADWAY SYSTEM MORE EFFICIENT.

These projects are low cost and result in savings from reduced delay. Signal coordination can also decrease intersection crash rates, reduce rear-end conflicts, and reduce crashes during turning movements at signalized intersections. These events add to congestion and cost drivers and local jurisdictions time and money. This will lead to increased safety and reliability of the roadway network within the MPA.

However, traffic signals require regular maintenance and the timings must be updated periodically, especially when new signals or major access points are added to a roadway. Often, the benefit to cost ratio of these projects is 20 to 1 or greater due to the reduction in lost time, reduced crashes, and more. Signal changes can also avoid the need for costly intersection modifications by increasing their efficiency.

The MPO and its partner agencies can also use ITS technologies to monitor the status of the roadway network in real-time. Using the ITS system allows the different agencies to monitor traffic, provide travelers information through dynamic message signs, and more.

Incident Management

The FHWA states that many additional highway congestion sources come from:

- traffic crashes,
- work zones,
- bad weather,
- traffic control devices,
- bottlenecks, and
- special events.

Many times, congestion is increased as a primary incident can cause secondary incidents. Secondary incidents are events such as rear-end crashes from inattentive drivers who are observing the stopped traffic from the primary incident, or vehicles that become stranded due to overheating or running out of fuel while waiting for the primary incident to be cleared. These secondary incidents further increase the cost and delay on the system, and further increase the need for roadway incident management.

As mentioned in Chapter 6, KYTC and TDOT maintain programs that help with incident management called "Safe Patrol" and "HELP" respectively. These programs do not operate in the MPA at all times; however, they will assist with large incidents. These programs operate on the freeways and involve trained staff who help to:

- protect emergency personnel and motorists from moving traffic,
- alert other drivers to the incidents and hazards while guiding them safely through and avoiding secondary incidents, and
- coordinate clearance of the roadways in order to establish regular traffic flow as quickly as possible.

Intelligent Transportation Systems (ITS)

Cost effective ITS technologies which can be integrated within the transportation network have become an increasing trend over the last few years. The benefit/cost of applying these technologies is frequently related to the travel characteristics of the roadway network. Urban roadway networks are the most likely to benefit from ITS technology. ITS is the use of advanced technologies to effectively and efficiently manage the existing transportation system. ITS technologies include:

- closed circuit television cameras,
- the use of fiber optic cable,
- dynamic message signs, and
- automatic vehicle locator (AVL) systems on transit buses,
- vehicle video detection, and
- several other emergent technologies.

Agencies that seek federal transportation funding for ITS projects must show that the project is part of, or conforms to, the Regional ITS Architecture. The MPA's Regional ITS Architecture, which was updated in 2015, is developed and maintained by the CUAMPO. This document, the Clarksville Regional Intelligent Transportation System Architecture and Deployment Plan[3], identifies the types of ITS services that are planned for implementation in the region. This document provides all involved agencies, such as emergency responders, law enforcement, transit agencies, and pertinent transportation agencies, the ability to share resources and information necessary to ensure the operation of the transportation system. As part of the process, MPO staff and TCC members review potential TIP projects to help ensure coordination with the Architecture.

The stakeholders that participated in the update of the CUAMPO Regional ITS Architecture are:

- Christian County Road Department
- City of Hopkinsville
- City of Oak Grove
- Clarksville Street Department
- Clarksville Transit System
- CUAMPO
- FHWA- Kentucky Division
- FHWA- Tennessee Division
- Fort Campbell Directorate of Public Works
- KYTC- District 2
- Mid-Cumberland HRA
- Montgomery County Emergency Management Agency
- Montgomery County Highway Department
- TDOT Long Range Planning Division
- TDOT Region 3
- TDOT Traffic Operations Division

3 http://www.cuampo.com/files/Architecture020715.pdf

Access Management

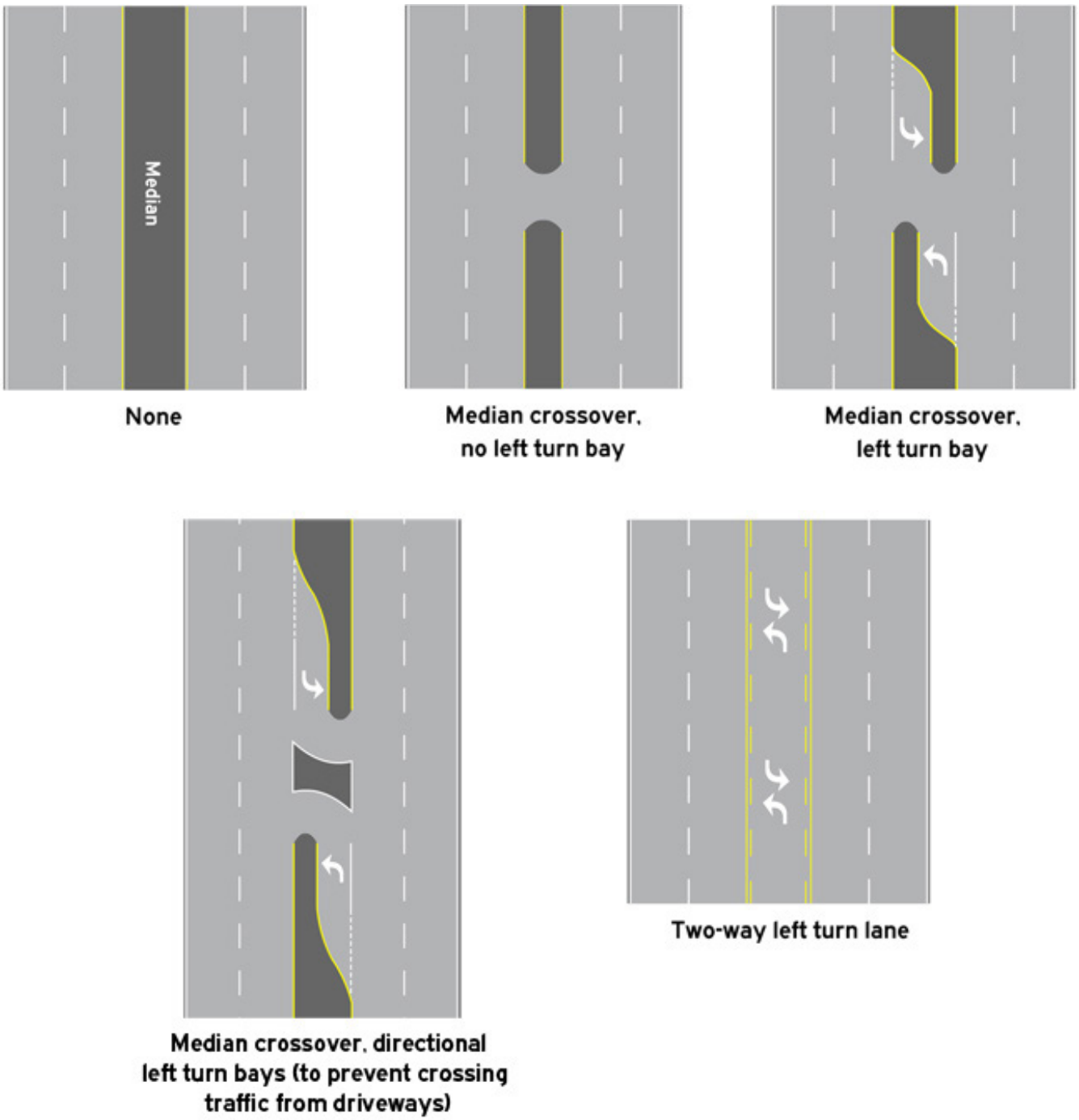
Access management is the regulation of direct accessibility to a roadway via interchanges, intersections, and medians. Poor access management on a heavily built up roadway can lead to congestion from turning vehicles blocking traffic or slowing down other vehicles. Poor access management can also increase the risk of crashes.

Several multi-lane highways in the MPA, especially those with dense commercial development along one or both sides of the road, possess a center two-way left turn lane (TWLTL). These lanes allow left-turning vehicles to be taken out of the through traffic, thus reducing the delay for through-moving vehicles and providing a safe place for left-turning vehicles. However, there is a risk posed by vehicles using TWLTLs as potential collisions with other drivers becomes possible. This can occur if an oncoming driver from the opposite direction wishes to use the lane at the same time and near the same location. Another risk of the turn lanes is that the vehicles using them must reduce their speed, which increases the possibility of a rear-end collision. The reduction of TWLTLs, driveways, and access points to roadways are key targets of access management.

Medians

Medians provide a physical separation for traffic going in opposite directions on multi-lane roadways. These roadway features improve traffic flow by limiting left turns across oncoming traffic to specific designated points where left turns can be made. Where left turn traffic is considerable, turning bays should be provided within the median. The turning bays allow left-turning traffic to be removed from the through travel lane until there is a safe opportunity to turn, thus increasing safety and traffic flow. Figure 8.6 shows various median crossover designs.

Figure 8.6 Median Crossover Designs5



Source: FHWA

Driveway Management

Roadways that serve higher traffic volumes need more access control in order to preserve their traffic function; meaning that they should have fewer direct access points or driveways. When frequent direct access is permitted to these roadways they experience slower traffic speeds, increased congestion, reduced efficiency, and increased crash risks. Frequent and direct property access is more appropriate for local and collector roadways. The FHWA[4] states that "a research synthesis found that roadway speeds were reduced an average of 2.5 miles per hour for every 10 access points per mile, up to a maximum of 10 miles per hour reduction."

As part of its "Congestion Toolbox", KYTC maintains an access management section. This program provides a report on the recommended practices needed to conduct access management. The program also contains an implementation plan. More information can be found at:

https://transportation.ky.gov/Congestion-Toolbox/Pages/Access-Management.aspx

Currently, TDOT is working on a review of their access management policy. The City of Clarksville adopted and maintains a local access management ordinance. This ordinance established an access management plan which is aimed at preserving the operational capacity and safety on its roads. Site development plan applications in the City of Clarksville must include an access plan to be reviewed by the City Street Department in order to ensure that it meets the standards of the ordinance. The standards that are applied are determined by the roadway's functional classification and the type of development that the roadway serves. Further information can be found at:

http://www.cityofclarksville.com/modules/showdocument.aspx?documentid=487

4 https://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.htm

Land Development Policies

The efficiency of a roadway can be influenced by the land around it and how it develops. Land use ordinances and subdivision regulations give local governments a degree of control over a roadway's operations. The use of lot frontage requirements can be a form of access management. It can also be used to prevent the need for approving undesirable driveway conditions on roadways in the future.

These policies may also make use of service roads or frontage roads along arterial roadways. Instead of the arterial being accessible by driveways, the service roads would carry the direct access. Vehicles on the service roads would later access the arterial at major intersections or median crossovers.

Standards for driveway width and curb radius may impact traffic on a road that serves a property. These standards are affected by local ordinances and locations that allow the use of smaller curb radii and/or narrower driveways. These factors result in vehicles having to slow down to make tight turns, which then impacts the flow of traffic on arterial and collector streets. While not an issue on residential streets, this limits the effectiveness of a major arterial road, negatively impacts traffic flow, and reduces safety by increasing the likelihood of crashes.

Guidelines should be established by local jurisdictions on the location and spacing of access points along arterials and collectors. These guidelines must additionally address the spacing of traffic signals and full-movement intersections. Doing so will ensure that traffic signal coordination is effective and that adequate turning movement and storage movement space exists between public road intersections.

8.6 | Enhancing Travel and Tourism

Not all trips on a roadway network are for the purposes of work, school, or shopping. Leisure and tourism trips often make use of an area's roadways, transit, and pedestrian facilities. Tourism promotes economic vitality and can be a driver of regional development. A developing trend in many states is the encouragement for people to "become a tourist within their own state" and to travel to other local areas. There are several potential means by which travel and tourism might be encouraged within the MPA.

State and Local Websites

The State of Kentucky places an emphasis on tourism using a portion of the state website[5], devoting several sections to the various attractions within the state. The website provides links to related agencies, upcoming events, travel guides, and roadway maps. The Tennessee Department of Tourism maintains a separate website, tnvacation.com. This site introduces travelers to the regions to visit, various categories of activities to do while in the state, and provides trip planning resources. The City of Clarksville tourism webpage can be found at:

http://www.cityofclarksville.com/index.aspx?page=4

5 http://kentucky.gov/Tourism/Pages/default.aspx

Welcome Centers

Welcome Centers are among the first sights that greet travelers when entering a new state. The MPA's location on the Kentucky-Tennessee State Line makes these establishments an opportunity to promote the region and encourage tourism and travel. There are two Welcome Centers within the MPA:

- The I-24 Welcome Center Clarksville/Montgomery County in Tennessee
- The Christian County Welcome Center in Kentucky

Both of these Welcome Centers are located on I-24, on either side of the State Line in the MPA. The I-24 Welcome Center has a website[6] on tnvacation.com and provides information about attractions in the City of Clarksville such as food, places to stay, and local attractions. The I-24 Welcome Center also provides:

- free reservations on site for hotels, motels, campgrounds, and attractions;
- a free Tennessee Vacation Guide;
- a free highway map; and
- free brochures and coupons to be used throughout the State of Tennessee.

Complete Streets

Complete streets is a design philosophy that provides transportation users with multiple, safe travel options along a roadway, including both motorized and non-motorized users. Often, complete streets designed facilities may physically share routes, while in other cases a parallel facility is used. This design process allows those who prefer to walk and bicycle to have a safer and more comfortable experience, while still having access to mobility and the ability to conduct their business. Examples of complete streets include:

- The addition of greenways and trails parallel to roadways
- The addition of pedestrian sidewalks
- The creation of a combined bike and pedestrian path
- Installation of median crossing islands

6 https://www.tnvacation.com/local/clarksville-i-24-welcome-center-clarksvillemontgomery-county

- Traffic calming measures
- The addition of bike lanes
- Road diets with the addition of bicycle/pedestrian lanes with streetscape beautification

The use of complete streets would enhance travel throughout the region by providing users with multiple options of travel, reducing roadway congestion, and increasing safety. These design philosophies will also promote tourism by encouraging potential visitors to drive to the region, park their vehicle, and use pedestrian or bike facilities to experience the area in full.

Currently, none of the jurisdictions or agencies within the MPA have a Complete Streets Policy. The City of Clarksville, KYTC, and TDOT have been studying the possibility of these policies, but nothing has yet been established.

9.0 | Forecasting Future Available Funding

Under federal regulations, fiscal constraint is required of MTPs.

In order to be fiscally constrained, the costs of programmed projects must not exceed the amount of funding that is reasonably expected to be available. This chapter provides an analysis of the funding that is expected to be available for transportation projects and programs in the MPA, following the regulations established in 23 CFR 450.324. **It should be noted that the forecast figures used in this chapter are for planning purposes only and do not commit any jurisdiction or agency to provide a specific level of funding.**

9.1 | Roadway Funding

Potential Federal Funding Sources

The FAST Act is the current transportation bill for the four year period from 2016 through 2020. **During this time, it will provide a total funding of $305 billion for the nation's transportation needs.** This legislation includes several categories of funding, under which many of the projects in the financially constrained plan will be eligible for federal funding assistance. These categories are:

National Highway Performance Program (NHPP)

This is a new program under MAP-21. The NHPP provides support for the condition and performance of the NHS and the construction of new facilities on the NHS. The NHPP also ensures that the investment of federal-aid funds in highway construction is directed to support progress toward the achievement of the performance targets established in a state's asset management plan for the NHS.

Funds used from the NHPP may only be used for the construction of a public transportation project that supports progress toward the achievement of national performance goals for improving the:

- infrastructure condition,
- safety,
- mobility, or
- freight movement on the NHS.

The funds can only be used on projects that are eligible for assistance under chapter 53 of title 49, if:

- the project is in the same corridor as, and in proximity to, a fully access-controlled NHS route;
- the construction is more cost-effective (as determined by a cost-benefit analysis) than an NHS improvement; and
- the project will reduce delays or produce travel time savings on the NHS, as well as improve regional traffic flow.

The local match requirement for NHPP funded projects varies. The standard federal/state funding ratio for arterial and interstate routes is 80/20. However, the interstate system receives funding at a 90/10 ratio when a project adds HOV or auxiliary lanes.

Two percent of the funding in this category must be set aside for State Planning and Research as defined by [23 U.S.C. 505].

According to [23 U.S.C. 126], a state has the ability to transfer up to 50 percent of its NHPP funds in a fiscal year to:

- the National Highway Freight Program,
- Surface Transportation Block Grant Program,
- Transportation Alternatives,
- Highway Safety Improvement Program, and/or
- CMAQ Program.

Surface Transportation Block Grant Program (STBGP)

The STBGP is a new funding program that was created from a conversion of the Surface Transportation Program (STP). The STBGP contains subcategories of funding for states and urban areas.

This funding category is the most flexible among all federal-aid highway programs.

Two percent of the funding in this category must be set aside for State Planning and Research as defined by [23 U.S.C. 505]. The other set-aside requirements for the STBGP are funding for bridges not on federal-aid highways and transportation alternatives. Transportation alternatives' funding is sub-allocated based on an area's population in a manner identical to the now-defunct Transportation Alternatives Program (TAP).

The STBGP continues all the provisions of the former STP. As such, these funds can be used for any road, including NHS routes, which is not functionally classified as a local road or rural minor collector. However, there are exceptions to this rule[1]. A percentage of a state's STBGP apportionment (after set-asides for Transportation Alternatives) is allocated to the areas it serves based on population size groupings. These groupings are:

- Urbanized areas with population greater than 200,000.
    - This portion is to be divided among those areas based on their relative share of population, unless the Secretary approves a joint request from the State and relevant MPO(s) to use other factors.
- Areas with population greater than 5,000 but no more than 200,000
    - The State is to identify projects in these areas for funding, in consultation with regional planning organizations, if any.
- Areas with population of 5,000 or less. [23 U.S.C. 133(d)]

The funding ratio is 80/20. However, interstate projects that add HOV or auxiliary lanes have a funding ratio of 90/10.

Under the FAST Act, STBGP funds can be used to create and operate a state office to help design, implement, and oversee public-private partnerships (P3) that are eligible to receive Federal highway or transit funding. These funds can also be used to pay a stipend to unsuccessful P3 bidders in certain circumstances [23 U.S.C. 133(b)(14)]. Through the USDOT, the funds can, upon a state's request, be used to pay the subsidy and administrative costs for TIFIA credit assistance for an eligible STBGP project or group of projects. [23 U.S.C. 133(b)(13)]. The FAST Act also provides the STBGP with mention of the eligibility of the installation of vehicle-to-infrastructure communication equipment. [FAST Act §1407, 23 U.S.C. 133(b)(1)(D)]

1 https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm

Highway Safety Improvement Program (HSIP)

The HSIP is designed to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. This includes non-State-owned public roads and those on tribal lands. Except as provided in 23 U.S.C. 120 and 130, the Federal share for projects using HSIP funding is 90 percent. The use of HSIP funds under the FAST Act are a continuation of those from MAP-21.

Funding from the HSIP can be used for safety projects that are consistent with the State's Strategic Highway Safety Plan (SHSP). The projects must correct/improve a hazardous road location, feature, or address a highway safety problem.

Under MAP-21, HSIP funds were used for many types of projects due to the non-exhaustive nature of the list of eligible projects. The FAST Act imposes a more stringent use of HSIP funds. The funds may be used only on the activities specifically listed in the HSIP statute itself. Additional inclusions to HSIP from the FAST Act are:

- Installation of vehicle-to-infrastructure communication equipment.
- Pedestrian hybrid beacons.
- Roadway improvements that provide separation between pedestrians and motor vehicles, including medians and pedestrian crossing islands.
- Other physical infrastructure projects not specifically enumerated in the list of eligible projects.

The FAST Act continues the prohibition of the use of HSIP funds for the purchase, operation, or maintenance of an automated traffic enforcement system (except in school zones). [FAST Act § 1401]. However, workforce development, training, and education activities remain an eligible use of HSIP funds. [23 U.S.C. 504(e)]

Railway-Highway Crossings Program

The Railway-Highway Crossings program provides funds for safety improvements to reduce the number of fatalities, injuries, and crashes at public railway-highway grade crossings. The Federal share for projects using funding from this category is 90 percent. The program requires that at least 50 percent of each state's railway-highway crossings funds be set aside for the installation of protective devices at railway-highway crossings.

All prior program eligibilities for this funding have continued under the FAST Act. The FAST Act also extend eligibility to two new activities [FAST Act § 1412]:

- The relocation of highways to eliminate railway-highway grade crossings.
- Projects at railway-highway grade crossings to eliminate hazards posed by blocked crossings due to idling trains.

Congestion Mitigation and Air Quality (CMAQ)

Funding under the CMAQ program continues to provide a flexible funding source to state and local governments for transportation projects and programs in order to meet the requirements established by the Clean Air Act. CMAQ funding is used to reduce congestion and improve air quality for areas that are in nonattainment for ozone, carbon monoxide, or particulate matter. Former nonattainment areas that are now in compliance, and maintenance areas, are eligible for CMAQ funds as well. The funding ratio is 80/20. However, interstate projects that add HOV or auxiliary lanes have a funding ratio of 90/10.

National Highway Freight Program (NHFP)

The National Highway Freight Program is a new funding category that was created by the FAST Act. This program is designed to improve the efficient movement of freight on the National Highway Freight Network (NHFN.) The FHWA states that the goals of this program are:

- Investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity.
- Improving the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.
- Improving the state of good repair of the NHFN.
- Using innovation and advanced technology to improve NHFN safety, efficiency, and reliability.
- Improving the efficiency and productivity of the NHFN.
- Improving state flexibility to support multi-State corridor planning and address highway freight connectivity.
- Reducing the environmental impacts of freight movement on the NHFN. [23 U.S.C. 167 (a), (b)]

The funding ratio is 80/20. However, interstate projects that add HOV or auxiliary lanes have a funding ratio of 90/10.

NHFP funds must be used in order to contribute to the efficient movement of freight on the NHFN. Projects using NHFP funds must be identified in a freight investment plan that is included in a state's freight plan.

Potential Local Funding Sources

Property Taxes

Any costs not covered by federal and/or state programs will be the responsibility of the local governmental jurisdictions. Local funding can come from a variety of sources, such as property taxes, sales taxes, user fees, special assessments, and impact fees.

Each of these potential sources is important and warrants further discussion.

Property taxation has historically been the primary source of revenue for local governments in the United States. According to the Tax Policy Center[2] from the Urban Institute & Brookings Institution, property taxes account for just over 76 percent of all local tax revenues. These taxes make up approximately 30 percent of all locally generated revenue. Property is not subject to taxation at the federal level. State governments have, in recent years, shown an increasing willingness to leave this important source of funding to local governments.

Property Taxes

Approximately 30% all Locally generated revenue

General Sales Taxes

The general sales and use tax is another important revenue source for local governments. The most commonly known form of the general sales tax is the retail sales tax. The retail sales tax is imposed on a wide range of commodities. The rate is usually a uniform percentage of the selling price. Sales taxes account for approximately seven (7) percent of all locally generated revenue. The remaining revenue sources for local government include transfers, individual income taxes, other taxes, and other charges and miscellaneous income.

User Fees

User fees are fees, taxes, or impost payments that are collected from those who utilize a service or facility. The fees are collected to pay for the cost of a facility, its operations, and/or generate revenue for other uses. User fees are commonly charged for public parks, water and sewer services, transit systems, and solid waste facilities. The intent behind user fees is that those who directly benefit from these public services pay for the costs.

2 http://www.taxpolicycenter.org/briefing-book/what-are-sources-revenue-local-governments

Special Assessments

A special assessment is a method of generating funds for public improvements, whereby the cost of the improvement is collected from those who directly benefit from it. However, special assessments are different from user fees. The owners of property located adjacent to the new facility are assessed a portion of the cost, based on the amount of frontage they own along the new facility. In many instances, new streets are financed by special assessment.

Special assessments have also been used to generate funds for general improvements within special districts, such as central business districts. In some cases, these assessments are paid over a period of time, rather than as a lump sum payment.

Impact Fees

Development impact fees have been generally well received in other states and municipalities in the United States. New developments create increased traffic volumes on the streets around them. Development impact fees seek to place a portion of the cost of funding improvements on the developers that are creating, or adding to, the need for improvements. None of the municipalities within the MSA currently make use of these fees.

Bond Issues

Bonds can be issued by local governments upon the approval of the voting public. When approved, the bonds allow the local government additional spending to build projects. Property tax and sales tax funds can be used on a pay-as-you-go basis. As a result, the revenues from those taxes can be used to pay off general obligation or revenue bonds.

2045 MTP Funding Forecast

Excluding Fort Campbell (which conducts its own planning), an average of $37 million per year in 2017 dollars is forecasted to be available for all jurisdictions in the MPA, assuming that future funding for transportation improvements will be consistent with the level of expenditure indicated by recent historical data. These state and federal funds for transportation improvements in the MPA will use MPO designated funding, KYTC, and TDOT funds. By factoring in an inflation rate of three percent for Tennessee, and four percent for Kentucky, ***the total amount forecasted to be available through 2045 is $1.9 billion.*** The annual amounts available each year are aggregated to the three time periods of the MTP. The historic and forecast funding for roadway projects in the MPA are shown in Appendix F. Note that the funding for the years 2018, 2019, and 2020 is determined by the MPO's TIP since those values are already known.

This results in the following levels of state and federal funding to be available for each stage:

1. **Stage 1 (2018-2026) - $433,784,550**
   $349,097,818 from Tennessee, and $84,686,732 from Kentucky
2. **Stage 2 (2027-2036) - $655,646,925**
   $518,900,103 from Tennessee, and $136,746,822 from Kentucky
3. **Stage 3 (2037-2045) - $796,409,962**
   $617,987,792 from Tennessee, and $178,422,171 from Kentucky

9.2 | Public Transit Funding

Potential Federal Funding Sources

There are many federal funding sources for public transit. Most of these sources are programs funded by the Federal Transit Administration (FTA) or the Federal Highway Administration (FHWA). While funded by federal agencies, these programs are administered by the states. The following federal funding programs are formula-based or discretionary grants that are funded by the federal government and available for transit providers in the Clarksville MPA to utilize.

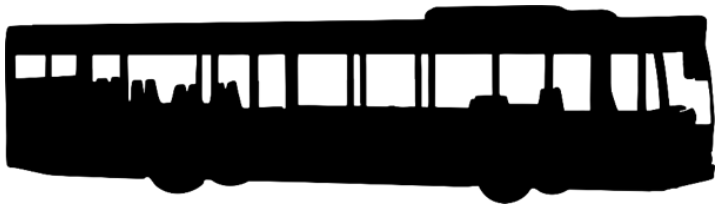
Metropolitan Transportation Planning (Section 5303)

This formula-based funding program provides funding and procedural requirements for multimodal transportation planning in metropolitan areas. The planning efforts must follow the 3C process and result in long-range plans and short-range programs of transportation investment priorities. The maximum federal share for this funding category is 80 percent, with a required local match minimum of 20 percent. This funding category is only available to Metropolitan Planning Organizations. The funds are first apportioned to the state DOTs, which are then allocated to the MPOs.

Urbanized Area Formula Grants (Section 5307)

This formula-based funding program provides funds for capital and operating assistance for transit operations in urbanized areas and for transportation-related planning. The funds can be used for:

- planning, engineering, design and evaluation of transit projects, and other technical transportation-related studies;
- capital investments in bus and bus-related activities such as:
    - replacement of buses,
    - overhaul of buses,
    - rebuilding of buses,
    - crime prevention and security equipment,
    - construction of maintenance and passenger facilities;



- computer hardware/software; and
- operating assistance in urbanized areas under 200,000 in population, or with 100 or fewer fixed-route buses operating in peak hours.

Activities eligible under the former Job Access and Reverse Commute (JARC) program, which provided services to low-income individuals to access jobs, are now eligible under the Urbanized Area Formula program. The maximum federal share is 80 percent for capital projects, 50 percent for operating assistance, and 80 percent for ADA non-fixed route paratransit service.

Capital Investment Grants (CIG) (Section 5309)

Capital Investment Grants are the FTA's primary grant program for funding major transit capital investments. These investments include:

- heavy rail,
- commuter rail,
- light rail,
- streetcars, and
- bus rapid transit.

There is an annual call for applications and selection of awardees by the FTA. The law requires that projects seeking CIG funding complete a series of steps over several years to be eligible for funding. New Starts and Core Capacity projects require the completion of the Project Development and Engineering phases in advance of the receipt of a construction grant agreement. Small Starts projects require only the completion of the Project Development phase. The projects are required to be rated by the FTA at various points in the process according to statutory criteria used for evaluating project justification and local financial commitment.

Enhanced Mobility of Seniors and Individuals with Disabilities (Section 5310)

Grants for this funding category are made by the states to private non-profit organizations (and certain public bodies) to increase the mobility of seniors and persons with disabilities. The former New Freedom program (Section 5317) has been folded into this program. The New Freedom program provided grants for

services for individuals with disabilities that went above and beyond the requirements of the Americans with Disabilities Act (ADA). Activities that were eligible under New Freedom are now eligible under the Enhanced Mobility of Seniors and Individuals with Disabilities program. Eligible capital costs include buses, vans, radios, computers, engines, and transmissions.

Section 5310 funds are apportioned among the states by a formula. The formula is based on the number of seniors and people with disabilities in each state according to the latest available U.S. Census data. The maximum federal share is 80 percent for eligible capital costs, and 50 percent for operating assistance. The 10 percent that is eligible to fund program administrative costs including administration, planning, and technical assistance may be funded at a 100 percent federal share.

Rural Area Formula Grants (Section 5311)

This formula-based funding program provides funding that can be used for:

- administration,
- planning,
- capital,
- operating,
- job access and reverse commute projects, and
- the acquisition of public transportation services.

Eligible recipients for the grants include states and federally recognized Indian Tribes. Subrecipients may include state or local government authorities, nonprofit organizations, and operators of public transportation or intercity bus service. The federal share is 80 percent for capital projects, 50 percent for operating assistance, and 80 percent for ADA non-fixed route paratransit service.

Bus and Bus Facilities Formula Grants (Section 5339a)

This program provides funds to replace, rehabilitate, and purchase buses and related equipment. The funds may also be used to construct bus-related facilities. Eligible recipients include:

- designated recipients that operate fixed route bus service or that allocate funding to fixed route bus operators,
- state or local governmental entities, and
- federally recognized Indian tribes that operate fixed route bus service that are eligible to receive direct grants under 5307 and 5311.

A designated recipient that receives a grant under this section may allocate amounts of the grant to sub-recipients that are public agencies or private non-profit organizations engaged in public transportation. This is a capital grant program which requires a minimum 20 percent local match. However, the federal share may exceed 80 percent for certain projects related to the ADA, the Clean Air Act, and certain bicycle projects.

Other FTA Grant Programs

The FTA has several other funding sources for special programs, including:

- Public Transportation Emergency Relief Program (Section 5324)
- Public Transportation Innovation (Section 5312)
- Human Resources & Training (Section 5314b)
- Low and No-Emission Component Assessment Program
- Low or No-Emission Vehicle Program (Section 5339c)
- Mobility on Demand (MOD) Sandbox Program (Section 5312)
- Rural Transportation Assistance Program {Section 5311(b)(3)}
- Safety and Research Demonstration Program
- State of Good Repairs Grants (Section 5337)
- Technical Assistance & Standards Development - 5314(a)
- Tribal Transit Formula Grants - 5311(c)(2)(B)
- Zero Emission Research Opportunity (ZERO)
- CMAQ (FAST Act § 1114; 23 U.S.C. 149)

Surface Transportation Block Group Program (STBGP)

The STBGP provides funding that may be used by states and localities for a wide range of projects, including transit and intercity bus. The local match requirements vary based on the project and facility type. Funds that were previously available through the TAP have been created as a set-aside in the STBGP.

National Highway Performance Program (NHPP)

The NHPP funds for transit apply in the same manner as described in Section 9.1: Roadway Funding. However, with transit projects, the local match requirement varies.

Potential Local Funding Sources

Local funding sources include the same potential sources as local roadways revenue, outlined previously. Fare revenue, a user fee, is an important but relatively small local funding source.

IMPROVE Act

The State of Tennessee approved the IMPROVE Act[3] in 2017. This legislation changed Tennessee tax laws for fuel, vehicle registration, and other revenue sources. A major provision in the IMPROVE Act is the ability for local governments to increase revenue for public transit by levying surcharges on a variety of local taxes. This includes sales, business tax, and rental car taxes. These surcharges may only be applied after a local referendum approves the changes.

3 http://www.comptroller.tn.gov/Repository/RE/OREA%20IMPROVE%20Act_July%202017.pdf

2045 MTP Funding Forecast

The Clarksville Transit System currently receives funds from:

- federal programs and grants,
- the States of Tennessee and Kentucky,
- the City of Clarksville,
- fare box charges,
- advertising,
- investment income, and
- other non-transportation funds.

Additional Information about the federal programs and grants used by CTS can be obtained from their office. Historic funding from 2010 through 2016 CTS COA was provided to the MPO. It contained the funding received from federal, state, and local sources; as well as fare box charges. Based on the historic funding, an average of $5.9 million per year in 2017 dollars is forecasted to be available for transit. **By using the same inflation rate of three percent used for Tennessee portion of the MPO roadway funding, the total amount forecast to be available through 2045 is $261.1 million. The historic and forecast funding for transit operations in the MPA are shown in Appendix F.**

Based on these assumptions, the following levels of state and federal funding for public transit in the MPO can be expected to be available through 2045:

1. Stage 1 (2018-2026) - **$61,784,942**
2. Stage 2 (2027-2036) - **$90,969,074**
3. Stage 3 (2037-2045) - **$108,340,270**

9.3 | Bicycle and Pedestrian Funding

Future federally funded transportation projects will present many opportunities for bicycling and pedestrian facilities to be incorporated, unless exceptional circumstances exist. In order to assess the project-specific bicycle and pedestrian needs, the surrounding context will be considered, including:

- land use patterns;
- existing, informal bicycle or pedestrian activities;
- any reference to bicycle or pedestrian needs in the planning process; and
- public, agency, or other comments requesting bicycle or pedestrian facilities.

This approach is consistent with federal guidance.

Potential Federal Funding Sources

Many of the major federal roadway and public transit funding sources described in previous sections of this chapter are flexible enough to fund construction of bicycle and pedestrian facilities. However, the MTP forecasted the available independent bicycle and pedestrian funding based on the set-aside STBGP funding available. This funding represents the now-defunct TAP program under MAP-21 that previously funded such projects.

Potential Local Funding Sources

Local funding sources include the same potential sources as local roadways revenue, outlined in Section 9.1.

2045 MTP Funding Forecast

Bicycle and pedestrian improvements are funded through the set asides in the STBGP for the Transportation Alternatives. Additional bicycle and pedestrian improvements can be funded through a transfer of NHPP funds. For MPAs with a population of 5,000 to 200,000 persons, such as the Clarksville MPA, the transfer of funds for Transportation Alternatives is discretionary by the state and is determined on an annual basis. Forecast funding for Transportation Alternatives is included in the overall federal funding forecast shown earlier.

10.0 | Project Development and Prioritization

This chapter summarizes how transportation projects were developed and evaluated in the 2045 MTP.

10.1 | Project Development

Project Identification

Roadway capacity and intersection improvement projects were identified from the:

- Public Outreach Survey,
- MPO staff,
- KYTC,
- TDOT, and
- previous plans.

Public Transit projects and programs were identified from the CTS Comprehensive Operation Analysis and the MPO's TIP under the assumption that public transit will continue to operate at similar levels in the future. There was no anticipated change in the level of service for the MTP. Bicycle and pedestrian projects were identified from the Public Outreach Survey and the Clarksville-Montgomery County Greenway and Blueway Master Plan.

Project Cost Estimates

Roadway Project Cost Estimates

Cost estimates for some projects (those that are in the current TIP) were available from KYTC, TDOT, or local public agencies. For project types without provided cost estimates, it was necessary to develop them. Where such construction estimates were not available, the study team prepared order-of-magnitude cost estimates, in 2017 dollars, based on projects in the historic funding database. The typical construction cost estimates for various types of improvements are shown in Table 10.1.

No cost estimates were made for maintenance projects such as bridge and pavement projects, other than overlays.

Table 10.1 Clarksville Urbanized Area MTP 2045 Typical Project Cost by Improvement Type (2017 Dollars)

Improvement Type	Avg. Cost	Unit
New 2 Lane Roadway	$4,500,000	Mile
New 4 Lane Arterial	$10,000,000	Mile
Interstate Widening	$10,000,000	Mile
Arterial Widening	$5,200,000	Mile
Center Turn Lane	$2,800,000	Mile
Reconstruction	$1,950,000	Mile
Overlay	$500,000	Mile
Intersection Improvement	$900,000	Each
Interchange Improvement	$5,650,000	Each
New Interchange	$25,000,000	Each

Source: KYTC and TDOT Historic Project Lettings 2014-2017, NSI 2018

Public Transit Project Cost Estimates

The annual cost of operating public transit in the MPO was taken from the current levels of expenditures shown in the CTS Comprehensive Operational Analysis (COA). It was assumed that any local costs above and beyond those required to match federal funds in the TIP will grow in proportion to the increase in revenues. This increase will continue to be paid by local sources. CTS uses the funds it receives to satisfy operating needs first. Any remaining funds are then used to repair and replace assets as needed to maintain a State of Good Repair; with safety concerns being placed first.

The City of Oak Grove has proposed a transit system for the city that would operate a single 15 passenger bus. The cost estimates for this project include $61,000 in initial capital costs and $75,000 in yearly operating costs.

THE COA ALSO IDENTIFIES FIVE POTENTIAL CAPACITY PROJECTS. THESE ARE:

- The creation of a downtown circulator for $294,000.
- Creating a circulator route on Fort Campbell for $324,000.
- Splitting Route 5 for $267,000.
- Splitting Route 8, which is expected to have a negligible cost.
- Discontinuing Route 812, which will result in a savings of $30,600.

The CTS COA identifies cost estimates for projects from FY2017 through FY 2022. Project cost estimates for CTS after FY2022 are unavailable. Figures 10.1 through 10.3 display the project costs identified in the CTS COA.

FIGURE 10.1 CTS ACTION PLAN COSTS

Task ID	Tasks to be Implemented	Costs	Funding Sources
Administration			
A1	New Bus Operator Training should include working with motorized wheelchairs	$1,500	Section 5307 - Operating
A2	Purchase and install Paratransit Scheduling software	$250,000	Section 5339
A3	Consider scheduling Paratransit Rider interviews twice a month (exceptions can be made if warranted by special circumstances)	$850	Section 5307 - Operating
A4	Provide an automated way to collect Section 15 data	$1,200	Section 5339
A5	Initiate paper transfers	$150	Section 5307 - Operating
A6	Provide an annual survey and community outreach at the Rivers and Spires Festival	$600	Section 5307 - Operating
A7	Continue to assess the feasibility of a new location for a transfer center	CUAMPO is funding this study	Section 5303
A8	Initiate a bus stop signage review	$40,000	Section 5339
A9	Develop a Quarterly CTS Newsletter	$700	Section 5307 - Operating
A10	Collaboration with Austin Peay State University	$2,500	Section 5307 - Operating
A11	Consider a 10-Ride Ticket book to be sold for $13.50 (one free ride)	$900	Section 5307 - Operating
A12	Offer a 30-Ride Ticket book to be sold for $47.00 (two free rides) in place of the 31-day Liberty Pass	$3,200	Section 5307 - Operating
A13	Become a partner in the National Safe Place Network	$700	Section 5307 - Operating
A14	Consider implementing a Student Transit Ambassador program	$1,800	Section 5307 - Operating
A15	Consider implementing a "Commuter Benefit" program.	$2,400	Section 5307 - Operating
A16	System Map and Schedule Updates	$11,000	Section 5307 - Operating
A17	Software Annual Fees	$60,000	Section 5307 - Capital
Operating			
O1	Create downtown circulator: - Veterans Plaza/Health Dept. - AJAX Senior Center - Madison Street - CTS Transfer Facility	$294,000	Section 5307 - Operating
O2	Initiate a circulator route on the Fort Campbell military installation	$324,000	Section 5307 - Operating
O3	Route #5 Split	$267,000	Section 5307 - Operating
O4	Route #8 Split	Costs expected to be negligible	Section 5307 - Operating
O5	Discontinue Route #812	$(30,600)	CMAQ - Commuter
Capital			
C1	Replace vehicles meeting FTA useful life	Refer to Section 5.2 Capital Improvement Plan	CMAQ
C2	Provide additional shelters, including the Wal-Mart on Fort Campbell Blvd. location	$30,000	Section 5307 - Capital
C3	Consider procuring Automatic Passenger Counters (APC)	$250,000	Section 5339
C4	Procure additional buses	$2,700,000	CMAQ
C5	Transition from diesel fixed route bus fleet to hybrid fleet	Costs are reflected in Task C1	CMAQ

CTS No.	Vehicle Description	FY 2016 Mileage	Years in Service	Avg. Annual Mileage	Replacement Year	FY 17 Mileage	FY 18 Mileage	FY 19 Mileage	FY 20 Mileage	FY 21 Mileage	FY 22 Mileage
716	Gillig (2001)	836,221	15	55,748	FY 2017	891,969	-	-	-	-	-
709	Gillig (2003)	737,851	13	56,758	FY 2017	794,609	-	-	-	-	-
711	Gillig (2003)	756,615	13	58,201	FY 2017	814,816	-	-	-	-	-
717	Gillig (2003)	754,635	13	58,049	FY 2017	812,684	-	-	-	-	-
718	Gillig (2005)	611,203	11	55,564	FY 2017	666,767	-	-	-	-	-
719	Gillig (2005)	639,980	11	58,180	FY 2018	698,160	756,340	-	-	-	-
720	Gillig (2005)	625,520	11	56,865	FY 2018	682,385	739,251	-	-	-	-
721	Gillig (2005)	638,385	11	58,035	FY 2018	696,420	754,455	-	-	-	-
T-2	Supreme Trolley (2005)	85,331	11	7,757	FY 2017	93,088	-	-	-	-	-
T-3	Supreme Trolley (2005)	84,663	11	7,697	FY 2017	92,360	-	-	-	-	-
722	Gillig (2006)	557,807	10	55,781	FY 2018	613,588	669,368	-	-	-	-
723	Gillig (2006)	556,615	10	55,662	FY 2018	612,277	667,938	-	-	-	-
724	Gillig (2006)	549,312	10	54,931	FY 2018	604,243	659,174	-	-	-	-
725	Gillig (2010)	342,665	6	57,111	FY 2019	399,776	456,887	513,998	-	-	-
726	Gillig (2010)	341,203	6	56,867	FY 2019	398,070	454,937	511,805	-	-	-
727	Gillig (2010)	294,795	5	58,959	FY 2021	353,754	412,713	471,672	530,631	589,590	-
728	Gillig (2010)	286,991	5	57,398	FY 2021	344,389	401,787	459,186	516,584	573,982	-
729	Gillig (2010)	286,479	5	57,296	FY 2022	343,775	401,071	458,366	515,662	572,958	630,254
730	Gillig (2010)	311,042	5	62,208	FY 2020	373,250	435,459	497,667	559,876	-	-
731	Gillig (2015)	55,641	1	55,641	FY 2022	111,282	166,923	222,564	278,205	333,846	389,487
732	Gillig (2015)	56,477	1	56,477	FY 2022	112,954	169,431	225,908	282,385	338,862	395,339
733	Gillig (2015)	56,415	1	56,415	FY 2022	112,830	169,245	225,660	282,075	338,490	394,905
734	Gillig (2015)	55,781	1	55,781	FY 2022	111,562	167,343	223,124	278,905	334,686	390,467
Vehicles Replaced:						7	6	2	1	2	5
Total Cost ($M):						$4,982,922	$4,221,529	$1,434,898	$731,583	$1,491,990	$3,803,455
Local Match (10%):						$498,292	$422,153	$143,490	$73,158	$149,199	$380,345

FIGURE 10.2 CTS FIXED ROUTE FLEET CAPITAL PLAN

CTS No.	Vehicle Description	FY 2016 Mileage	Years in Service	Avg. Annual Mileage	Replacement Year	FY 17 Mileage	FY 18 Mileage	FY 19 Mileage	FY 20 Mileage	FY 21 Mileage	FY 22 Mileage
523	Ford E150 Conv Van (2009)	243,484	7	34,783	FY 2019	278,267	313,051	347,834	-	-	-
524	Ford E150 Conv Van (2009)	221,065	7	31,581	FY 2019	252,646	284,226	315,807	-	-	-
525	Ford E150 Conv Van (2009)	238,362	7	34,052	FY 2019	272,414	306,465	340,517	-	-	-
526	Ford E150 Conv Van (2009)	248,300	7	35,471	FY 2020	283,771	319,243	354,714	390,186	-	-
527	Ford E150 Conv Van (2009)	228,036	7	32,577	FY 2020	260,613	293,189	325,766	358,342	-	-
528	Ford / Goshen Coach (2009)	231,440	7	33,063	FY 2020	264,503	297,566	330,629	363,691	-	-
529	Ford / Goshen Coach (2009)	230,538	7	32,934	FY 2021	263,472	296,406	329,340	362,274	395,208	-
530	Ford / Goshen Coach (2010)	234,419	6	39,070	FY 2021	273,489	312,559	351,629	390,698	429,768	-
531	Dodge Grand Caravan Van (2013)	53,941	3	17,980	FY 2021	71,921	89,902	107,882	125,862	143,843	-
532	Dodge Grand Caravan Van (2014)	25,895	2	12,948	FY 2022	38,843	51,790	64,738	77,685	90,633	103,580
533	Ford E150 Conv Van	54,868	1	54,868	FY 2022	109,736	164,604	219,472	274,340	329,208	384,076

FIGURE 10.3 CTS DEMAND RESPONSE FLEET CAPITAL PLAN

Bicycle and Pedestrian Project Cost Estimates

Many of the projects identified in the Greenway and Blueway Master Plan are anticipated to be built as part of another roadway project. These project costs are assumed to be part of the larger roadway project cost.

For those bike and pedestrian projects that are not part of another roadway project, the average cost for a 5-foot wide sidewalk is $205,000 per mile. The average cost of an 10-foot multi-use path is $410,000.

10.2 | Roadway Project Prioritization

To maximize the amount of limited funding available within the MPA, roadway capacity projects were prioritized. ITS projects that are part of, or conform, to the ITS Architecture justified by local/state departments do not require prioritization. The same applies to high priority Maintenance and Operations (MO) projects. They can be implemented by the MPO and its partner agencies, and are funded through the various programs highlighted in Chapter 9: Forecasting Future Available Funding.

Table 10.2 shows the criteria and weights that were utilized to prioritize the identified roadway capacity projects. Table 10.3 shows how these criteria were measured. The results of this prioritization exercise are shown in Table 10.4 and illustrated in Figure 10.4.

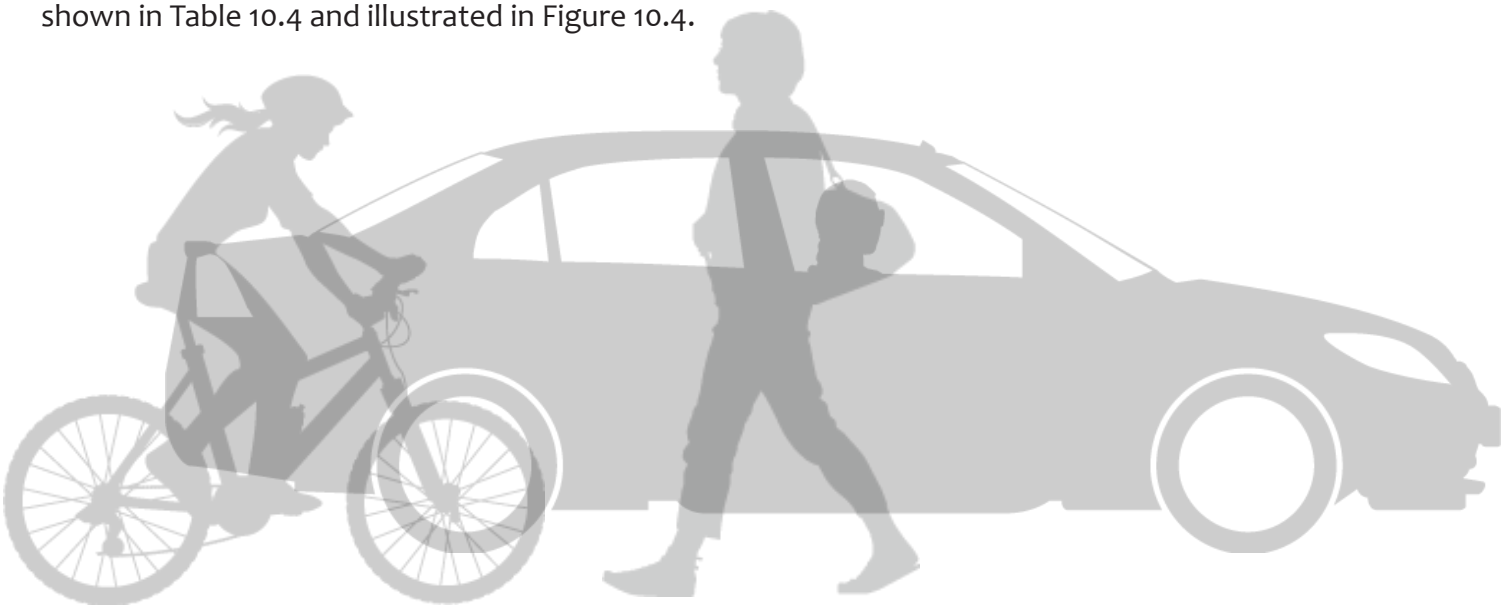


Table 10.2 Roadway Capacity Project Prioritization Criteria

Criteria	Rationale	Maximum Points	Addresses MTP Goal
Reduce Congestion	Prioritize projects with congestion reduction.	20	Goal 4
Improve Safety	Unsafe areas should receive priority over other areas.	20	Goal 1 and Goal 2
Minimize Impacts on Natural Environment, Preserve Air Quality	Avoid negative and costly environmental impacts.	15	Goal 3 and Goal 5
Balance Benefit vs Cost	Projects with benefits exceeding construction costs should be considered first, and maximize limited federal funds.	10	Goal 5
Potential Impact to Minority and Low-Income Population*	Avoid disproportionately high and adverse impacts to Environmental Justice (EJ) groups.	10	Goal 5
Provide Pedestrian and Bicycle Facilities	Encourage projects that have the potential to improve bicycle and pedestrian conditions.	10	Goal 3
Improve Freight Movement, Support Economic Development	Encourage projects that benefit the movement of people and goods. Encourage projects that may result in the growth of economic corridors.	10	Goal 3, Goal 4, and Goal 5
Plan Consistency	Encourage projects that have been vetted in locally-adopted plans or existing studies or plans.	5	Goal 3

*If a roadway project going through an Environmental Justice area receives support from its minority and low-income community, a project will receive maximum points for this criterion.

Project Scoring Breakdown

The project scoring criteria developed from the public participation process are used only for the roadway capacity projects analyzed in the MTP. Maintenance projects cannot be modeled, and therefore cannot be scored. However, the MPO's maintenance needs are covered in line-item funding. Prioritization of the maintenance projects is on a case-by-case basis, determined by the MPO.

Table 10.3 Roadway Capacity Project Prioritization Criteria Measures

Criterion	Measure	Scoring Scale (Points Possible)				
		0	5	10	15	20
Reduce Congestion	Reduction in VHD from Existing + Committed Network	Points awarded in increments of 5 based upon the effectiveness of a project in reducing overall roadway network delay.				
Improve Safety	Qualitative assessment based on crash data, bridge conditions, and engineering analysis.	No safety benefits	Minimal safety benefits	Mild safety benefits	Moderate safety benefits	Considerable safety benefits
Minimize Impacts on Natural Environment and Preserve Air Quality	Proximity to community or natural resources like historic sites, recreational areas, churches, cemeteries, preserves, etc.	Scaled 0-15, with score reduced based on project's proximity to, or impacts upon, natural or community resources.				
Balance Benefit vs Cost	Benefit/Cost Ratio. Annual dollars saved from reduced delay divided by project cost.	Points awarded in increments of 5 based upon the effectiveness of a project in providing benefits greater than the project coast.				
Potential Impact to Minority and Low-Income Population*	Percentage of population in Environmental Justice group along project route.	Project disproportionately impacts both EJ groups	Project disproportionately impacts one EJ group	Project impacts neither EJ group		
Provide Pedestrian and Bicycle Facilities	Bike and pedestrian facilities located along the project limits. Identification in local bike/pedestrian plans.	No bike or ped access	Partial bike or ped access	MPO or community Bike/Ped Plan facility. Full bike or ped access		
Improve Freight Movement, Support Economic Development	Type of roadway and estimated truck delay reduction. Projects that ease congestion on the established freight system.	Fewer than 100 daily hours of truck delay reduction. Will not spur economic development.	100-1,000 daily hours of truck delay reduction. Moderate economic development potential.	More than 1,000 daily hours of truck delay reduction. Part of state freight network. High economic development potential.		
Plan Consistency	In previous locally-adopted plan or in preliminary study.	Not in previous plan	In previous MTP, local comprehensive plan, or preliminary study			

*If a roadway project going through an Environmental Justice area receives support from its minority and low-income community, a project will receive maximum points for this criterion.

Source: NSI, CUAMPO

Table 10.4 Roadway Capacity Project Prioritization Results

Project ID	MTP 2040 ID	Route	Description	Location	Total Cost in 2017 Dollars	Congestion Score	Safety Score	Air Quality & Environment Score	Balanced Benefit/ Cost Score	EJ Score	Walking and Biking Score	Freight and Econ. Development Score	Plan Consistency Score	Total Score	Rank
104	T-16	North-East Connector Ph 1	New 4/5 Lane Roadway	Ted Crozier Blvd to Wilma Rudolf Blvd to Trenton Rd	$39,522,000	20	10	8	10	10	10	10	5	83	1
203	T-35	North-East Connector Ph 2	New 4 Lane Roadway	SR-48 (Trenton Rd) to Peachers Mill Rd	$73,200,000	20	10	8	5	10	10	10	5	78	2
103	T-41	SR-374 (North Pkwy)	Widen from 2 to 5 Lanes	Dunbar Cave Rd to Stokes Rd	$30,902,000	15	5	13	10	10	10	10	5	78	3
201	T-40	SR-374 (Warfield Blvd)	Widen from 2 to 4 Lanes	Memorial Dr to Dunbar Cave Rd	$49,900,000	20	0	9	10	10	10	10	5	74	4
406	I-7	Kennedy Ln Ext	New 2 Lane Roadway	Extension to Meriwether Rd	$9,900,000	15	0	12	10	10	10	10	5	72	5
507	N/A	I-24	New interchange	@ Dixie Bee Road	$25,000,000	20	0	15	10	10	0	10	5	70	6
101	T-33	US 79/SR-13 (Guthrie Hwy)	Widen from 2/3 to 5 Lanes	Cracker Barrel Dr to International Blvd	$27,480,000	15	5	14	5	10	5	10	5	69	7
403	I-4	International Blvd Ext	New 2 Lane Roadway	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	$40,700,000	20	5	9	10	5	5	10	5	69	8
405	I-6	SR-374 (Richview Rd) Ext	New 4 Lane Roadway	SR-112 (Madison St) to US 41A Bypass	$13,000,000	10	10	14	10	5	5	10	5	69	9
302	T-37	I-24	Widen from 4 to 6 Lanes	SR-76 to SR-256 in Robertson County	$148,000,000	20	0	13	10	10	0	10	5	68	10
515	N/A	Wilma Rudolph Boulevard	Widen to 6 Lanes	Kraft St to SR 374	$54,000,000	20	0	8	10	10	5	10	5	68	11
409	I-11	8th St connector	New 2 Lane Roadway	Needmore Rd to Patterson Ln	$20,900,000	15	5	7	5	10	10	10	5	67	12

Source: NSI, CUAMPO

continued

TABLE 10.4 ROADWAY CAPACITY PROJECT PRIORITIZATION RESULTS

PROJECT ID	MTP 2040 ID	ROUTE	DESCRIPTION	LOCATION	TOTAL COST IN 2017 DOLLARS	CONGESTION SCORE	SAFETY SCORE	AIR QUALITY & ENVIRONMENT SCORE	BALANCED BENEFIT/ COST SCORE	EJ SCORE	WALKING AND BIKING SCORE	FREIGHT AND ECON. DEVELOPMENT SCORE	PLAN CONSISTENCY SCORE	TOTAL SCORE	RANK
108	K-06	KY-400 (State Line Rd)	Reconstruct with CTL	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	$16,200,000	5	20	15	0	10	10	0	5	65	13
102	T-43	SR-149/SR-13	Widen from 2/3 to 5 Lanes	River Rd to Zinc Plant Rd	$82,526,000	15	5	9	5	10	5	10	5	64	14
506	N/A	Providence Blvd (US 79)	Widen to 6 Lanes	US 41 to Red River	$27,000,000	15	0	13	10	10	5	10	0	63	15
301	T-06	I-24	Widen from 4 to 6 Lanes	KY/TN State Line to SR-76	$193,900,000	20	0	7	10	10	0	10	5	62	16
401	I-1	New Roadway	New 3 Lane Roadway	Fair Brook Place to Needmore Rd	$7,920,000	10	10	11	10	10	0	5	5	61	17
504	N/A	SR 13/48	Center Turn Lane	River Road to Old Highway 48	$10,725,000	5	5	15	0	10	10	10	5	60	18
508	N/A	I-24	Widen to 2 Lanes	@ Exit 8 WB Off Ramp	$5,400,000	10	5	15	10	10	0	10	0	60	19
111	K-12	Oatts-Riggins Rd	New 3 Lane Roadway	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	$9,900,000	5	5	9	5	10	10	10	5	59	20
204	T-36	Peachers Mill Rd	Widen from 3 to 4 Lanes	Pine Mountain Rd to Stonecrossing Dr	$6,300,000	15	0	13	10	5	5	5	5	58	21
207	K-10	KY-117	New 5 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	$19,600,000	0	10	8	5	10	10	10	5	58	22
402	I-2	Professional Park Dr Ext	New 2 Lane Roadway	Extension to Cardinal Ln	$11,000,000	10	5	8	10	10	5	5	5	58	23
105	T-22	Jack Miller Blvd Ext	New 4 Lane Roadway	Tobacco Rd to Peachers Mill Rd	$29,500,000	10	5	10	5	5	5	10	5	55	24

Source: NSI, CUAMPO

continued

TABLE 10.4 ROADWAY CAPACITY PROJECT PRIORITIZATION RESULTS

PROJECT ID	MTP 2040 ID	ROUTE	DESCRIPTION	LOCATION	TOTAL COST IN 2017 DOLLARS	CONGESTION SCORE	SAFETY SCORE	AIR QUALITY & ENVIRONMENT SCORE	BALANCED BENEFIT/ COST SCORE	EJ SCORE	WALKING AND BIKING SCORE	FREIGHT AND ECON. DEVELOPMENT SCORE	PLAN CONSISTENCY SCORE	TOTAL SCORE	RANK
109	K-07	KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	KY-400 (State Line Rd) to I-24	$28,200,000	5	10	15	0	10	5	5	5	55	25
110	K-08	KY-115 (Pembroke)	Reconstruct with CTL	I-24 to KY-1453 (Barker's Mill Rd)	$13,700,000	5	5	15	0	10	10	5	5	55	26
306	K-04	I-24	Widen from 4 to 6 Lanes	US 41A (Ft Campbell Blvd) to TN State Line	$112,000,000	20	0	5	5	10	0	10	5	55	27
304	T-05C	SR-48 (Trenton Rd)	Widen from 2 to 5 Lanes	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	$25,000,000	10	0	13	5	10	5	5	5	53	28
411	I-14	SR-374 (Richview Rd)	Widen from 3 to 5 Lanes	Memorial Dr to US 41A (Madison St)	$14,400,000	10	0	13	5	10	5	5	5	53	29
503	N/A	Dunbar Cave Road	Widen to 4 Lanes	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	$72,000,000	15	0	6	5	10	5	10	0	51	30
509	N/A	Madison Street	Widen to 4 Lanes	10th Street to Pageant Lane	$9,000,000	15	0	1	10	10	10	5	0	51	31
514	N/A	Tylertown Road	Widen to 4 Lanes	Trenton Rd to Oakland Rd	$30,600,000	10	0	11	5	10	10	5	0	51	32
112	K-13	KY-1453 (Elmo Rd)	Reconstruct with CTL	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	$21,700,000	5	5	15	0	10	10	0	5	50	33
202	T-23	US 41A Bypass (Ashland City Rd)	Widen from 2/3 to 5 Lanes	US 41A/SR-112 to SR-13	$134,300,000	20	0	0	5	5	5	10	5	50	34

Source: NSI, CUAMPO

continued

TABLE 10.4 ROADWAY CAPACITY PROJECT PRIORITIZATION RESULTS

PROJECT ID	MTP 2040 ID	ROUTE	DESCRIPTION	LOCATION	TOTAL COST IN 2017 DOLLARS	CONGESTION SCORE	SAFETY SCORE	AIR QUALITY & ENVIRONMENT SCORE	BALANCED BENEFIT/COST SCORE	EJ SCORE	WALKING AND BIKING SCORE	FREIGHT AND ECON. DEVELOPMENT SCORE	PLAN CONSISTENCY SCORE	TOTAL SCORE	RANK
205	K-02	Hugh Hunter/ Gritton Church Rd	Reconstruction	KY-911 (Thompsonville Ln) to Allen Rd	$14,200,000	5	5	15	0	10	10	0	5	50	35
209	K-14	KY-109 (Bradshaw Rd)	Reconstruct with CTL	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	$6,800,000	5	5	15	0	10	10	0	5	50	36
303	T-01	Needmore Rd	Reconstruct with CTL	Hazelwood Rd to SR-236 (Tiny Town Rd)	$13,600,000	5	10	15	0	10	5	0	5	50	37
404	I-5	Dixie Bee Rd Ext	New 2 Lane Roadway	Sango Rd to US 41A	$7,700,000	0	5	15	0	10	10	5	5	50	38
510	N/A	Needmore Road	Widen to 4 Lanes	Wilma Rudolph Road to Trenton Road	$16,200,000	0	0	15	10	10	5	5	5	50	39
511	N/A	Riverside Drive	Reduce to 3 Lanes, Add Bike/Ped	Providence Blvd to Cumberland Dr	$3,000,000	0	15	10	0	10	10	5	0	50	40
412	I-15	Hazelwood Rd	Widen from 2 ro 5 Lanes	Trenton Rd to Needmore	$36,000,000	10	5	13	0	5	5	5	5	48	41
512	N/A	Rossview Road	Widen to 5 Lanes	Wilma Rudolph Blvd (US 79) to Dunbar Cave Rd	$50,400,000	10	0	13	5	10	5	5	0	48	42
106	T-29	Lafayette Rd	Widen from 2 to 5 Lanes	Walnut Grove Rd to Ft Campbell Gate	$2,438,000	5	5	11	0	10	10	0	5	46	43
208	K-11	Ft Campbell Gate 5 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	$26,900,000	0	5	6	0	10	10	10	5	46	44

Source: NSI, CUAMPO

continued

TABLE 10.4 ROADWAY CAPACITY PROJECT PRIORITIZATION RESULTS

PROJECT ID	MTP 2040 ID	ROUTE	DESCRIPTION	LOCATION	TOTAL COST IN 2017 DOLLARS	CONGESTION SCORE	SAFETY SCORE	AIR QUALITY & ENVIRONMENT SCORE	BALANCED BENEFIT/COST SCORE	EJ SCORE	WALKING AND BIKING SCORE	FREIGHT AND ECON. DEVELOPMENT SCORE	PLAN CONSISTENCY SCORE	TOTAL SCORE	RANK
305	T-18	Whitfield Rd/ Old Trenton Rd	Reconstruct with CTL	Needmore Rd to SR-374	$5,200,000	0	5	15	0	10	5	5	5	45	45
513	N/A	Tiny Town Road	Widen to 6 Lanes	US 41A to Trenton Rd	$122,400,000	15	0	5	5	5	5	10	0	45	46
407	I-8	SR-236 (Tiny Town Rd) Ext	New 2 Lane Roadway	Extension to Meriwether Rd	$7,700,000	0	5	15	5	5	0	5	5	40	47
408	I-10	New Roadway	New 2 Lane Roadway	9th St to 10th St	$1,100,000	5	0	15	10	0	0	5	5	40	48
501	N/A	College St (SR 48)	Widen to 6 Lanes	N 2nd St (US 41A) to Kraft St	$25,200,000	15	0	0	5	10	0	10	0	40	49
206	K-05	Ft Campbell Gate 4 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	$19,400,000	0	5	11	0	5	5	5	5	36	50
505	N/A	College St (SR 48)	Widen to 4 Lanes	Riverside Dr to N 2nd St (US 41A)	$5,400,000	10	0	0	0	10	0	10	5	35	51
410	I-12	I-24	New Interstate Interchange	Dunlop Ln	$25,000,000	0	0	10	0	5	0	10	5	30	52
502	N/A	Cumberland Dr	Widen to 4 Lanes	Ashland City Rd (SR 12) to Madison St (SR 76)	$32,400,000	0	0	1	0	10	0	0	0	11	53

Source: NSI, CUAMPO

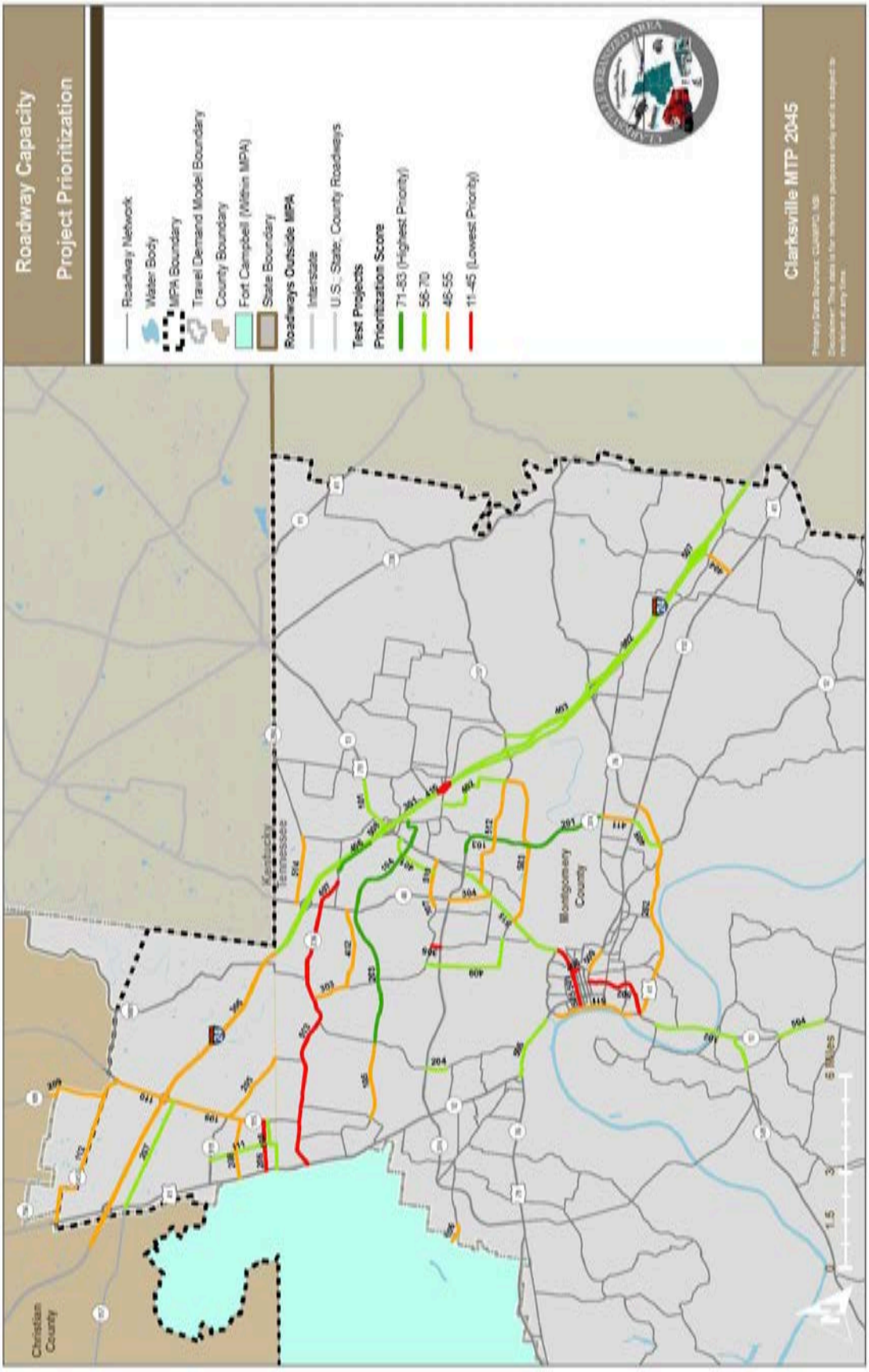


Figure 10.4 Roadway Capacity Project Prioritization

10.3 | Transit, Bicycle, and Pedestrian Projects

The potential transit projects for the MPA were discussed in Section 10.1. Potential bicycle and pedestrian projects are displayed in Table 10.5.

Additional projects may be developed from the priorities listed in the Greenway and Blueway Master Plan, and the Sidewalk Construction Priority Map.

Table 10.5 Bicycle and Pedestrian Transportation Projects

Location	From	To	Improvement
8th Street	College Street	Kraft Street	Stripe shared lanes for autos and bikes and allow on-street parking on west side
Farris Drive	Drane Street	8th Street	Stripe shared lanes for autos and bikes and allow on-street parking on west side
2nd Street	College Street	Commerce Street	Replace western travel lane with angled back-in on-street parking and mark eastern travel lanes as shared lane for autos and bikes
2nd Street	Commerce Street	Madison Street	Replace western travel lane with parallel on-street parking and mark eastern travel lanes as shared lane for autos and bikes
3rd Street	Madison Street	Commerce Street	Replace western travel lane with angled back-in on-street parking and mark eastern travel lanes as shared lane for autos and bikes
3rd Street	Commerce Street	College Street	Replace to include parallel on-street parking on east side, one northbound travel lane, and a 5' bike lane
College Street	2nd Street	Riverside Drive	Stripe 7-foot bike lane on both sides
Marion Street	1st Street	8th Street	Stripe 4-foot bike lane on both sides
Kraft Streetscape	College Street	Riverside Drive	Reconstruct roadway including median and urban curb and gutter drainage with bike lanes and sidewalk
College Streetscape	Ford	2nd Street	Implement cross section with wide outside shoulders
Residential Sidewalks	All	All	Construct sidewalk on residential streets where none exist
Main Streetscape	Riverside	2nd Street	Construct sidewalk (Riverside to 1st), add bulbouts with trees and/or bioswales (Public Square to 2nd)

Source: Downtown Clarksville Parking and Street Network Study

continued

Table 10.5 Bicycle and Pedestrian Transportation Projects

Location	From	To	Improvement
Commerce Streetscape	3rd Street	University	Implement cross section with on-street parking and sidewalks
Spring Streetscape	Adams	Union	Implement cross section with on-street parking and sidewalks
Spring Streetscape	Commerce Street	Riverside Drive	Implement cross section with on-street parking and sidewalks
Jefferson/West/ Home	Riverside	College Street	Implement cross section with on-street parking and sidewalks
1st Streetscape	Commerce Street	Franklin	Implement cross section with on-street parking and sidewalks
Union Streetscape	2nd Street	Madison Street	Implement cross section with on-street parking and sidewalks
Kraft Streetscape	College Street	Riverside Drive	Reconstruct roadway including median and urban curb and gutter drainage with bike lanes and sidewalk
College Streetscape	Ford	2nd Street	Implement cross section with wide outside shoulders

Source: Downtown Clarksville Parking and Street Network Study

10.4 | Intersection Projects

Currently, most of the congested roadway segments within the MPA are near intersections or Interstate interchanges with high traffic volumes. Intersection improvements such as signal retiming, additional turn lanes, ITS improvements, and more could reduce congestion and delay on the MPA's street and highway network. Many of these projects can also increase intersection safety. These improvements are low-cost and can be implemented in a timely manner. Some intersection improvements, such as the addition of traffic signals, will require additional studies to see if they are warranted.

The intersection projects displayed in Table 10.6 were developed from the comments received in the Public Outreach Survey. According to the respondents, these locations experience high congestion or safety concerns. Table 10.7 displays the intersection projects that the CUAMPO analyzed for potential inclusion in the MTP.

Table 10.6 Intersection Projects Identified in Public Outreach Survey

Location	Improvement
101st Airborne Parkway/Warfield Boulevard @ Wilma Rudolph Boulevard	Add signage
Ashland City Road @ Glendale Drive	Add turn lanes
Beechaven winery @ Dunlop road	Add traffic signal or roundabout
College Street @ Hornberger Road	Add turn lanes
Crossland Avenue @ Pageant Lane	Intersection improvements
Dover Road @ High Point Road	Intersection improvements
Dunbar Cave Road @ Rossview Road	Intersection improvements
Garretsburg Road @ Purple Heart Parkway	Add traffic signal
Greenland Farms @ Highway 48	Intersection improvements
Guthrie Highway @ Oakland Road	Add traffic signal
Hazelwood Road @ Needmore Road	Add lighting
Highway 12 @ US 41A Bypass/SR-12/SR-13/SR-48/S Riverside Drive	Add signage
Highway 48 @ Highway 13	Intersection improvements

Source: NSI, CUAMPO

continued

TABLE 10.6 INTERSECTION PROJECTS IDENTIFIED IN PUBLIC OUTREACH SURVEY

LOCATION	IMPROVEMENT
Highway 76 @ Clarksville Christian School	Add turn lanes
Highway 76 @ Vaughn Road	Intersection improvements
I-24 @ Exit 1	Add traffic signal
I-24 @ Exit 4	Add traffic signal
MLK Parkway @ Vaughn Road	Add traffic signal or improve signage
Needmore Road @ Wilma Rudolph Road	Add turn lanes
Pageant Ln @ Madison Terrace	Traffic light not aligned properly
Powell Road @ Rossview Road	Add turn lanes
Ringgold Road @ 101st Airborne Road	Add traffic signal
Ringgold Road @ Fort Campbell Boulevard	Retime traffic signal
Rossview Road @ Rollow Lane	Add turn lanes
Rossview Road @ Basham	Improve sight distance
Seven Mile Ferry Road @ SR-13	Add traffic signal
Talley Drive/Clark Street @ Senior Center	Reconstruction
Ted Crozier Boulevard @ Weatherly Drive	Add traffic signal
Tiny Town Road @ Needmore Road	Add school zone sign
Tiny Town Road @ Barkers Mill Road	Add traffic signal
Trenton Road @ Hazelwood	Add traffic signal
Trenton Road @ Meriweather Road	Add traffic signal
Trenton Road @ Northeast High	Add traffic signal
US 79 @ Dotsonville Road	Add traffic signal

Source: NSI, CUAMPO

continued

Table 10.6 Intersection Projects Identified in Public Outreach Survey

Location	Improvement
W Dunbar Cave Road @ Industrial Drive	Add traffic signal
Warfield Boulevard @ Stokes Road	Add traffic signal
Whitfield Road @ 101st Airborne Parkway	Add turn lanes
Wilma Rudolph Boulevard @ Athletic Drive	Intersection improvements
Wilma Rudolph Boulevard @ Dunbar Cave Road	Intersection improvements
Wilma Rudolph Boulevard @ Walmart	Traffic signal improvements
101st Airborne Parkway/Warfield Boulevard @ Wilma Rudolph Boulevard	Add signage
Ashland City Road @ Glendale Drive	Add turn lanes

Source: NSI, CUAMPO

Table 10.7 Intersection Projects for Potential Programming

Location	Improvement
Crossland Avenue @ Pageant Lane	Intersection improvements
Ringgold Road @ 101st Airborne Road	Add traffic signal
Ringgold Road @ Fort Campbell Boulevard	Retime traffic signal
Rossview Road @ Rollow Lane	Add turn lanes
SR-112 @ SR-76 Improvement	Intersection Improvements
Ted Crozier Boulevard @ Weatherly Drive	Add traffic signal
Tiny Town Road @ Needmore Road	Add school zone sign
Trenton Road @ Hazelwood	Add traffic signal
Trenton Road @ Meriweather Road	Add traffic signal
Trenton Road @ Northeast High	Add traffic signal
US 79 @ Dotsonville Road	Add traffic signal
Whitfield Road @ 101st Airborne Road	Add turn lanes
Wilma Rudolph Boulevard @ Athletic Drive	Intersection improvements

Source: NSI, CUAMPO

11.0 | Implementation Plan

11.1 | Fiscally-Constrained Staged Improvement Program

THE 2045 MTP'S STAGED IMPROVEMENT PROGRAM IS A FISCALLY-CONSTRAINED LIST OF TRANSPORTATION PROJECTS THAT REPRESENT THE CLARKSVILLE MPA'S PLANNED FUTURE TRANSPORTATION IMPROVEMENTS.

Projects included in the staged improvement plan become eligible for federal and/or state funding assistance through the funding sources listed in Chapter 9.

During plan development, the approach was to identify the region's transportation needs and consider multiple alternatives for meeting them. In many cases, additional studies may be required in order to determine the most effective and feasible improvement alternative.

The projects identified in the staged improvement program are meant to convey the type of improvement that would make the most sense based on currently available information.

This approach acknowledges the inability to avoid all future traffic congestion by simply building as much roadway capacity as the anticipated demand for travel would seem to require. It also recognizes the reality of induced demand, a condition where more of a good is consumed in response to an increase in supply. For roadways, this results in increased traffic being generated as a response to increased roadway capacity.

One principle that guided the plan development was the idea that alternative travel options should be made available wherever possible.

Possibilities include new or improved parallel routes or modal choices that serve the same origins and destinations. Where a need for additional roadway capacity is projected, the preferred response may not be a wider facility, but enhanced operational efficiency. Improvements can be achieved using access management, Transportation System Management (TSM), TDM, or ITS strategies that serve to optimize the performance of a facility.

Project Staging Phases and Applying Fiscal Constraint

The staged improvement program is a long-range plan for transportation improvements in the Clarksville MPA. The plan covers the 27-year period from 2016 to 2045. Note that the tables and references for the Staged Improvement Program show Stage I beginning in 2018 as the years 2016 and 2017 have already passed.

Recommended improvements are distributed among three stages:

- Stage I covers the short-term period from 2018 through 2026;
- Stage II corresponds to the intermediate period from 2027 through 2036; and
- Stage III is the long-range period from 2037 through 2045.

The assignment of a given project to a particular stage was largely determined by:

- The prioritization of projects discussed in Chapter 10
- Estimated funding available for each stage of the plan
- Project cost
- Other mobility-related considerations (such as safety, emergency evacuation, access to developable areas, etc.)

Table 11.1 summarizes the total costs of the projects selected to be funded in the 2045 MTP, including Line Item funding. Line item funding includes operations, maintenance, and funding for non-capacity improvements. Data from the MPO's partners and public outreach survey were used to develop a 2017 average annual cost for line item funding and is shown in Appendix F. The forecast development for these funding categories is also shown in Appendix F. The total cost of transit, pedestrian, intersection, and bikeway projects selected from those in Chapter 10 for funding through the MTP cannot exceed the funding from the Line Item categories in the Staged Improvement Program. The table also displays all forecast state and federal revenues, (with local match funding) anticipated to be available for implementing transportation projects through 2045. The anticipated state and federal roadway funding, with local match funding, for the plan period (2018–2045), was calculated to be $2.15 billion. **The estimated total cost of improvements, as identified in the staged improvement program, is $2.15 billion.**

This falls within acceptable programming limits of available funding. Therefore, the 2045 MTP is fiscally-constrained.

Table 11.1 Fiscal Constraint for Roadway Projects

	Stage I 2018-2026	Stage II 2027 - 2036	Stage III 2037 - 2045	Total 2016 - 2045
Estimated Funding Availability**	$495,569,550	$746,615,925	$904,749,962	$2,146,935,437
Estimated Fiscally-Constrained MTP Project Costs	$536,773,000	$730,595,000	$879,589,000	$2,146,957,000
			Vision Needs*	$551,193,000
			Total Needs Plan	$ 2,698,150,000

*Vision Needs describe additional projects that cannot be funded in the fiscally-constrained staged improvement program. These projects and their costs can be found on Page 11-10 and Table 11.8

** Estimated Funding Availability also includes transit funding.

Note: Annual Inflation Factors – 3.0% in the State of Tennessee, 4.0% in the State of Kentucky

Table 11.2 Fiscal Constraint for Public Transit Operations

	Stage I 2018-2026	Stage II 2027 - 2036	Stage III 2037 - 2045	Total 2016 - 2045
Estimated Funding Available	$61,784,942	$90,969,074	$108,340,270	$261,094,286

Staged Improvement Plan and Conformity

Since the CUAMPO must conduct conformity analysis for its MPA, projects identified in the MTP must be identified as being Exempt, Non-Exempt, or Regionally Significant. Projects that are exempt are not subject to the transportation conformity rule. Projects that are non-exempt must be shown in the region's conformity analysis. Projects that are regionally significant are non-exempt projects that are on roadways that serve regional needs, such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals.

The tables for each stage of the Staged Improvement Program display the conformity status of each project. The transit projects identified in Chapter 10 were determined to be exempt from conformity analysis.

Project Costs and Line Items

The initial project costs developed in Chapter 10 were in 2017 dollars. Due to inflation, these projects costs will increase over time and it was necessary to adjust the costs based on the stage in which a project is programmed to be built. This was accomplished by multiplying the 2017 cost by a factor that is based upon the state inflation rates and mid-point of the stage time period. These calculations are shown in Appendix F.

Line item funding covers a variety of transportation projects that provide non-capacity improvements or maintenance needs. These line items include enhancements, safety, bridges, overlays, and maintenance.

- Enhancement projects include bicycle/pedestrian facilities, multi-use trails, lighting, and landscaping.
- Safety projects include turn lanes, roundabouts, traffic signals, guard rails, and signage.
- Bridge projects include bridge replacements and new bridges.
- Overlay projects are those that resurface a roadway with asphalt.
- Maintenance projects include pothole repairs, surface sealant, guard rail repair, sign replacements, debris removal, and roadway sweeping.

The development of the line items funding breakdowns is discussed in Appendix F.

Stage I (2018-2026) Projects

Stage I is planned for improvements in the years 2018 to 2026. A list of these projects is shown in Table11.3. These planned improvements are projected to cost $536.7 million and will be funded with local, state, and federal funds. Project improvements consist of roadway widening, new roadway construction, and reconstruction.

Table 11.3 2045 MTP Staged Improvement Program - Stage I (2018-2026)

ID	Mode	Route	Location	Project Description	Project Cost ($000)	Conformity Status
1	Roadway	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway	$45,400	Non-Exempt
2	Roadway	SR-374 Ext/SR-149	Dotsonville Rd to SR-149; SR-374 to River Rd	New 4 Lane Roadway & Bridge, Widen to 5 Lanes	$120,375	Non-Exempt
3	Roadway	SR-237 (Rossview Rd) & Dunbar Cave Rd	I-24 to 400 ft west of Keysburg Rd	Widen from 2 to 3/5 Lanes & Realignment	$13,300	Non-Exempt
4	Roadway	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes	$14,810	Non-Exempt
7	Roadway	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes	$40,000	Non-Exempt
101*	Roadway	US 79/SR-13 (Guthrie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes	Under Const	Non-Exempt
102*	Roadway	SR-149/SR-13	River Rd to SR-13; SR-149 to Zinc Plant Rd	Widen from 2/3 to 5 Lanes	Under Const	Non-Exempt
103*	Roadway	SR-374 (Warfield Blvd)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes	Under Const	Non-Exempt
104	Roadway	North-East Connector Phase 1	Ted Crozier Blvd to Wilma Rudolf Blvd to Trenton Rd	New 4/5 Lane Roadway	$39,522	Non-Exempt
106	Roadway	Lafayette Rd	Walnut Grove Rd through Ft Campbell Gate	Widen from 2 to 5 Lanes	$2,438	Non-Exempt
107*	Roadway	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement	Completed	Exempt

continued **TABLE 11.3 2045 MTP STAGED IMPROVEMENT PROGRAM - STAGE I (2018-2026)**

ID	MODE	ROUTE	LOCATION	PROJECT DESCRIPTION	PROJECT COST ($000)	CONFORMITY STATUS
108	Roadway	KY-400 (State Line Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	$5,486	Non-Exempt
109	Roadway	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL	$11,364	Non-Exempt
110	Roadway	KY-115 (Pembroke)	I-24 to KY-1453 (Barker's Mill Rd)	Reconstruct with CTL	$7,446	Non-Exempt
Line Item	Roadway	Various	Various	Enhancement	$3,497	Exempt
Line Item	Roadway	Various	Various	Safety	$17,485	Exempt
Line Item	Roadway	Various	Various	Bridge	$48,083	Exempt
Line Item	Roadway	Various	Various	Overlay	$34,969	Exempt
Line Item	Roadway	Various	Various	Maintenance	$5,245	Exempt
Line Item	Roadway	Various	Various	Reconstruction	$65,568	Exempt
Line Item	Transit	--	--	CTS Funding	$61,785	Exempt
Total Stage I					**$536,773**	

*** Project received funding, or was completed, after the identification of the E+C projects and before the development of the Staged Improvement Program. These projects are not subject to fiscal constraint.**

Stage II (2027-2036) Projects

Stage II is planned for improvements in the years 2027 to 2036. A list of these projects is shown in Table 11.4. These planned improvements are projected to cost $730.6 million and represent improvements consisting of roadway widening, new roadway construction, reconstruction, and center turn lane addition.

Table 11.4 2045 MTP Staged Improvement Program - Stage II (2027-2036)

ID	Mode	Route	Location	Project Description	Project Cost ($000)	Conformity Status
105	Roadway	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway	$41,445	Non-Exempt
201	Roadway	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes	$22,629	Non-Exempt
203	Roadway	North-East Connector Phase 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway	$76,673	Non-Exempt
204	Roadway	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes	$4,310	Non-Exempt
207	Roadway	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	$71,523	Non-Exempt
209	Roadway	KY-109 (Bradshaw Rd)	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	Reconstruct with CTL	$5,687	Non-Exempt
304	Roadway	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes	$10,776	Non-Exempt
401	Roadway	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway	$11,190	Non-Exempt
402	Roadway	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway	$9,325	Non-Exempt
403	Roadway	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway	$34,503	Non-Exempt
405	Roadway	SR-374 (Richview Rd) Ext	SR-12 (Madison St) to US 41A Bypass	New 4 Lane Roadway	$20,723	Non-Exempt
406	Roadway	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway	$8,393	Non-Exempt

continued **TABLE 11.4 2045 MTP STAGED IMPROVEMENT PROGRAM - STAGE II (2027-2036)**

ID	MODE	ROUTE	LOCATION	PROJECT DESCRIPTION	PROJECT COST ($000)	CONFORMITY STATUS
409	Roadway	8th St connector	Needmore Rd to Peterson Ln	New 2 Lane Roadway	$17,718	Non-Exempt
411	Roadway	SR-374 (Richview Rd)	Memorial Dr to US 41A (Madison St)	Widen from 3 to 5 Lanes	$8,621	Non-Exempt
504	Roadway	SR 13/48	River Road to Old Highway 48	Center Turn Lane	$6,426	Non-Exempt
508	Roadway	I-24	@ Exit 8 EB Off Ramp	Widen to 2 Lanes	$9,106	Non-Exempt
514	Roadway	Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes	$18,319	Non-Exempt
Line Item	Roadway	Various	Various	Enhancement	$5,245	Exempt
Line Item	Roadway	Various	Various	Safety	$26,226	Exempt
Line Item	Roadway	Various	Various	Bridge	$72,121	Exempt
Line Item	Roadway	Various	Various	Overlay	$52,452	Exempt
Line Item	Roadway	Various	Various	Maintenance	$7,868	Exempt
Line Item	Roadway	Various	Various	Reconstruction	$98,347	Exempt
Line Item	Transit	--	--	CTS Funding	$90,969	Exempt
Total Stage II					**$730,595**	

Stage III (2037-2045) Projects

Stage III is planned for improvements in the years 2037 to 2045. A list of the projects is shown in Table 11.5. These planned improvements are projected to cost $879.6 million and represent improvements consisting of roadway widening, new roadway construction, and reconstruction.

Table 11.5 2045 MTP Staged Improvement Program - Stage III (2037-2045)

ID	Mode	Route	Location	Project Description	Project Cost ($)	Conformity Status
111	Roadway	Oatts-Riggins Rd	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	New 3 Lane Roadway	$23,355	Non-Exempt
112	Roadway	KY-1453 (Elmo Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	$33,837	Non-Exempt
202	Roadway	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes	$78,494	Non-Exempt
205	Roadway	Hugh Hunter/ Gritton Church Rd	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction	$10,920	Exempt
208	Roadway	Ft Campbell Gate 5 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	$23,355	Non-Exempt
303	Roadway	Needmore Rd	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL	$5,892	Non-Exempt
305	Roadway	Whitfield Rd/ Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL	$1,309	Non-Exempt
404	Roadway	Dixie Bee Rd Ext	Sango Rd to US 41A	New 2 Lane Roadway	$8,645	Non-Exempt
407	Roadway	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway	$8,645	Non-Exempt
408	Roadway	New Roadway	9th St to 10th St	New 2 Lane Roadway	$1,235	Non-Exempt
412	Roadway	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 ro 5 Lanes	$28,543	Non-Exempt
502	Roadway	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes	$25,689	Non-Exempt
503	Roadway	Dunbar Cave Road	Wilma Rudolph Blvd (US 79/SR 13) to Rossview Rd (SR 237)	Widen to 4 Lanes	$57,087	Non-Exempt

continued **TABLE 11.5 2045 MTP STAGED IMPROVEMENT PROGRAM - STAGE III (2037-2045)**

ID	MODE	ROUTE	LOCATION	PROJECT DESCRIPTION	PROJECT COST ($)	CONFORMITY STATUS
507	Roadway	I-24	@ Dixie Bee Road	New interchange	$68,614	Non-Exempt
510	Roadway	Needmore Road	Wilma Rudolph Blvd to Trenton Road	Widen to 4 Lanes	$12,844	Non-Exempt
512	Roadway	Rossview Road	SR 374 to Dunbar Cave Rd	Widen to 5 Lanes	$21,407	Non-Exempt
515	Roadway	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes	$42,815	Non-Exempt
Line Item	Roadway	Various	Various	Enhancement	$6,371	Exempt
Line Item	Roadway	Various	Various	Safety	$31,856	Exempt
Line Item	Roadway	Various	Various	Bridge	$87,605	Exempt
Line Item	Roadway	Various	Various	Overlay	$63,713	Exempt
Line Item	Roadway	Various	Various	Maintenance	$9,557	Exempt
Line Item	Roadway	Various	Various	Reconstruction	$119,461	Exempt
Line Item	Transit	--	--	CTS Funding	$108,340	Exempt
Total Stage III					**$879,589**	

Effectiveness of Fiscally-Constrained Projects

Tables 11.6 and 11.7 show the travel impacts of implementing the capacity projects in the fiscally-constrained project list. The tables compare network statistics against the "No Build" E+C network. Figure 11.1 displays these projects.

While daily vehicle miles traveled decrease by less than one (1) percent, the daily vehicle hours travelled and daily hours of delay decrease by thirty-four (34) and forty-seven (47) percent respectively by implementing the projects recommended in the 2045 MTP.

Table 11.6 Travel Impacts of Fiscally-Constrained 2045 MTP Roadway Capacity Projects

Measure	2045 Existing and Committed	2045 Fiscally Constrained MTP	Difference	Percent Difference
Daily Vehicle Miles Traveled	6,923,236	6,954,406	31,170	0.5%
Daily Vehicle Hours Traveled	522,963	345,200	-177,763	-34.0%
Daily Hours of Delay	375,722	198,147	-177,575	-47.3%

Source: Clarksville Travel Demand Model, NSI

Note: Values in this table include all facilities modeled and do not match the values in other tables regarding VMT, VHT, and VHD.

Table 11.7 Travel Impacts of Fiscally Constrained 2045 MTP Projects by Roadway Functional Class

Centerline Miles of Roadways				
Classification	**2045 (E+C Projects)**	**2045 MTP**	**Difference**	**Percent Difference**
Interstate	25.6	25.6	0.0	0.00%
Principal Arterial	61.6	61.6	0.0	0.00%
Minor Arterial	115.7	128.9	13.2	11.41%
Collector	222.7	225.0	2.3	1.03%
Total	**425.6**	**441.1**	**15.5**	**3.64%**
Daily Vehicle Miles Traveled (VMT)				
Classification	**2045 (E+C Projects)**	**2045 MTP**	**Difference**	**Percent Difference**
Interstate	1,726,719	1,564,899	-161,820	-9.37%
Principal Arterial	1,950,292	1,959,421	9,129	0.47%
Minor Arterial	2,230,573	2,501,550	270,977	12.15%
Collector	1,015,652	928,536	-87,116	-8.58%
Total	**6,923,236**	**6,954,406**	**31,170**	**0.45%**
Daily Vehicle Hours Traveled (VHT)				
Classification	**2045 (E+C Projects)**	**2045 MTP**	**Difference**	**Percent Difference**
Interstate	228,960	105,376	-123,584	-53.98%
Principal Arterial	107,577	77,890	-29,687	-27.60%
Minor Arterial	128,386	116,921	-11,465	-8.93%
Collector	58,040	45,013	-13,027	-22.44%
Total	**522,963**	**345,200**	**-177,763**	**-33.99%**

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: Clarksville Travel Demand Model, NSI

continued

TABLE 11.7 TRAVEL IMPACTS OF FISCALLY CONSTRAINED 2045 MTP PROJECTS BY ROADWAY FUNCTIONAL CLASS

DAILY VEHICLE HOURS OF DELAY (VHD)				
CLASSIFICATION	2045 (E+C PROJECTS)	2045 MTP	DIFFERENCE	PERCENT DIFFERENCE
Interstate	201,806	80,719	-121,087	-60.00%
Principal Arterial	66,053	36,755	-29,298	-44.36%
Minor Arterial	77,057	60,134	-16,923	-21.96%
Collector	30,806	20,539	-10,267	-33.33%
Total	**375,722**	**198,147**	**-177,575**	**-47.26%**

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: Clarksville Travel Demand Model, NSI

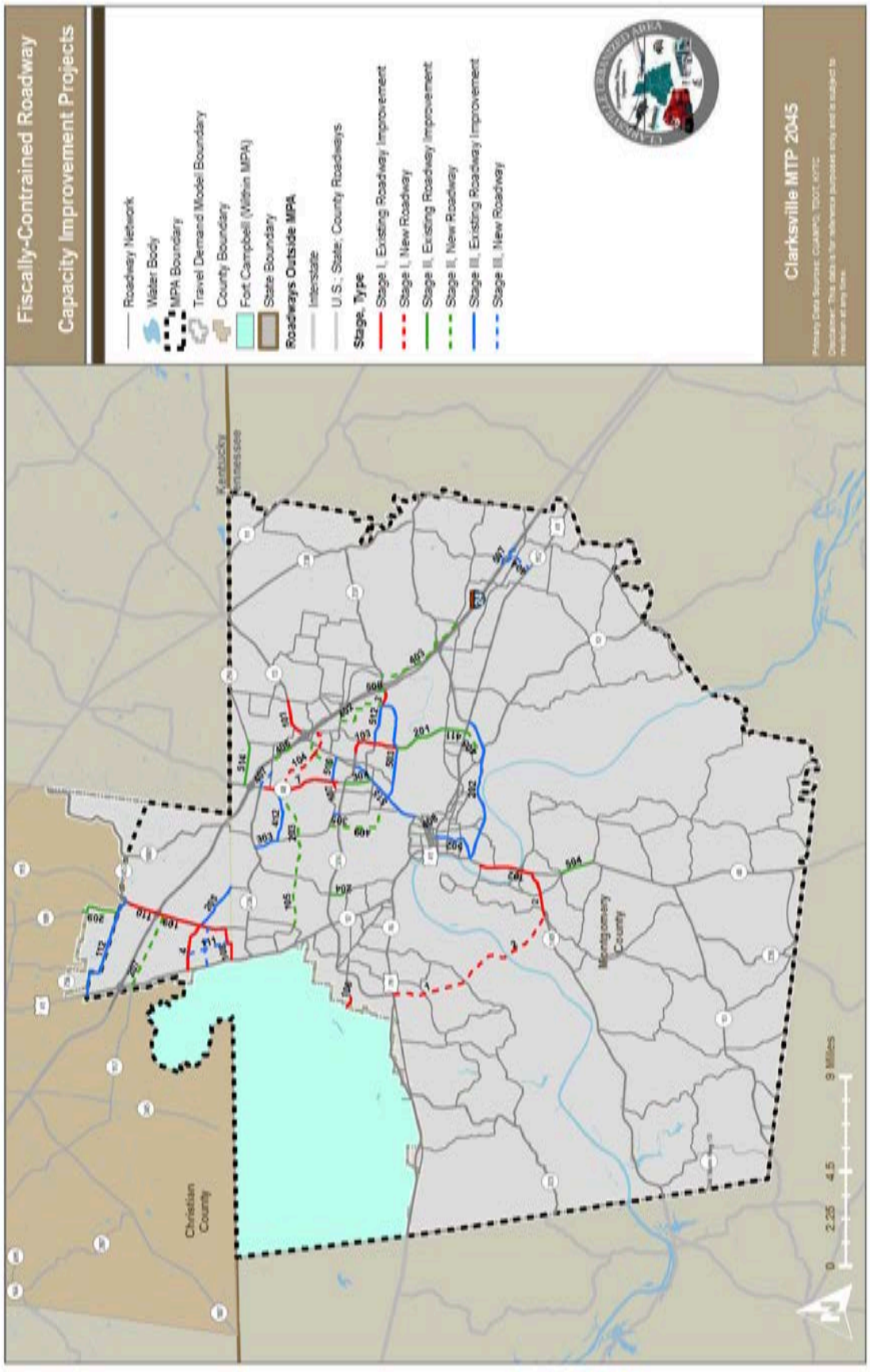


Figure 11.1 Fiscally-Constrained Roadway Capacity Improvement Projects

11.2 | Visionary (Unfunded) Roadway Projects

The previous section addressed transportation improvements with identified funding sources. However, many unfunded transportation improvements may further improve travel conditions. These projects have been included in a Visionary Needs list to keep a record of future needs.

Unfunded transportation improvements are not necessarily less important or effective; they just cannot be accommodated within the financially constrained budget. Delayed funding for an improvement project may be the result of its:

- size
- cost
- design complexity
- acquisition difficulties
- jurisdictional concerns
- environmental concerns

A project may be delayed if its efficiency is minimized until other projects are completed; or it does not alleviate existing transportation deficiencies.

The estimated cost, in 2017 dollars, to implement the unfunded projects is $530.8 million. The Visionary Needs list is shown in Table 11.8 and the projects are shown in Figure 11.2.

TABLE 11.8 2045 MTP VISIONARY NEEDS LIST

ID	ROUTE	LOCATION	IMPROVEMENT	MILES	PROJECT COST (2017 $,000)
206	Ft Campbell Gate 4 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	1.20	$7,290
301	I-24	KY/TN State Line to SR-76	Widen from 4 to 6 Lanes	10.70	$123,050
302	I-24	SR-76 to SR-256 in Robertson County	Widen from 4 to 6 Lanes	8.60	$98,900
306	I-24	US 41A (Ft Campbell Blvd) to TN State Line	Widen from 4 to 6 Lanes	7.80	$89,700
410	I-24	Dunlop Ln	New Interstate Interchange	--	$33,750
501	SR 48 (College St)	N 2nd St (US 41A) to Kraft St	Widen to 6 Lanes	1.40	$9,828
505	SR 48 (College St)	Riverside Dr to N 2nd St (US 41A)	Widen to 4 Lanes	0.30	$2,106
506	US 79 (Providence Blvd)	US 41 to Red River Providence	Widen to 6 Lanes	1.50	$10,530
509	Madison Street	10th Street to Pageant Lane	Widen to 4 Lanes	0.50	$3,510
511	Riverside Drive	Providence Blvd to Cumberland Dr	Road Diet	2.30	$3,150
513	Tiny Town Road	US 41A to Trenton Rd	Widen to 6 Lanes	6.80	$47,736
516*	SR-374 Ext	SR-13/48 to SR-12	New 2 Lane Roadway & Bridge	5.50	$101,250
517**	SR 237 (Rossview Rd)	International Blvd to Browning Way	Reconstruct with CTL	1.60	$5,152
518**	SR 76	I-24 to Woodson Rd	Reconstruct with CTL	0.70	$2,254
519**	KY-911	US 41A to KY-115	Widen from 3 to 5 Lanes	1.85	$12,987
Total Vision					$551,193

***Project 516 was added to the MTP process after project scoring was completed.**

****Projects 517 through 519 were added to the Vision List based on comments received during the public review period.**

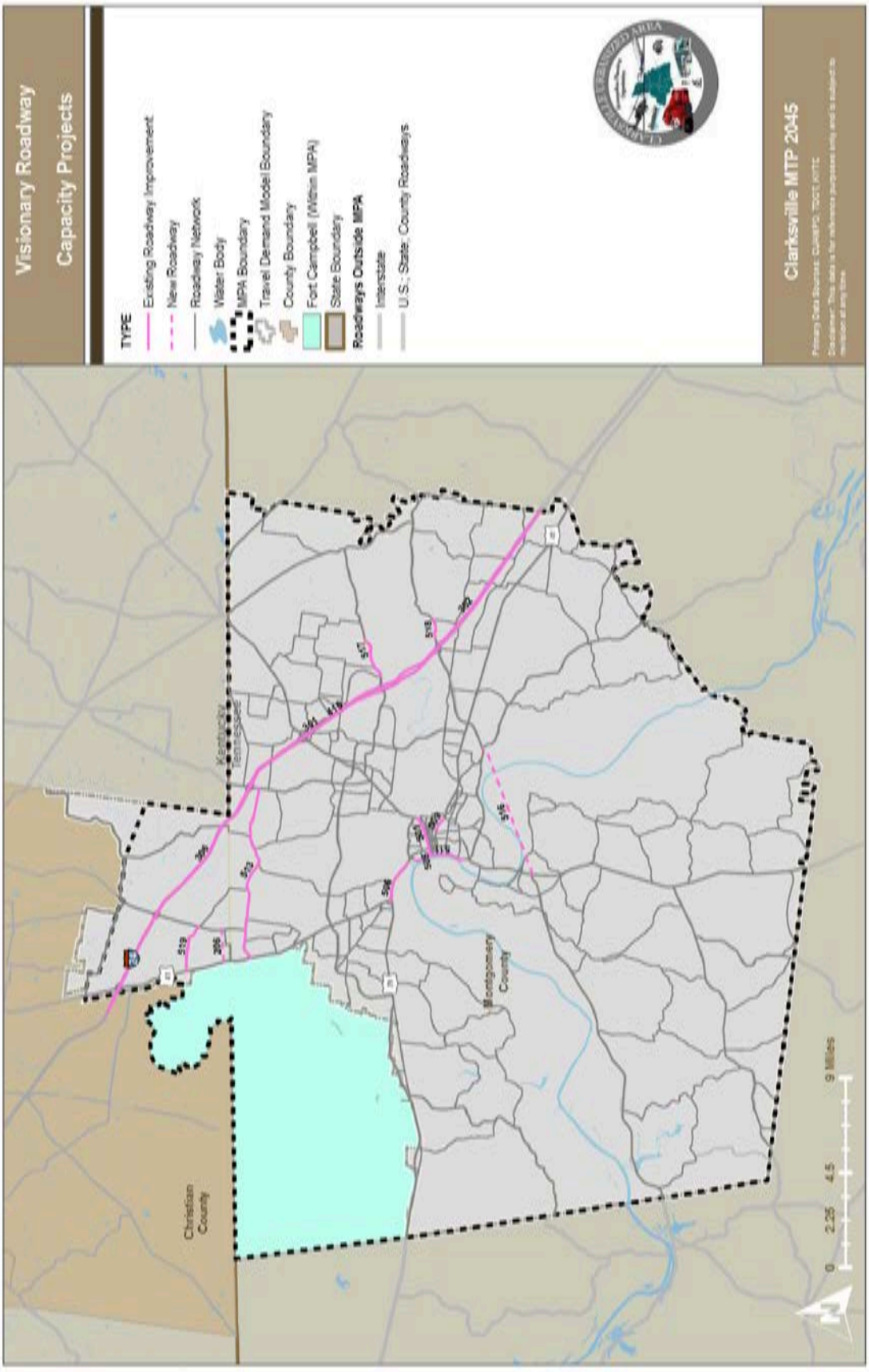


FIGURE 11.2 VISIONARY ROADWAY CAPACITY PROJECTS

11.3 | Allocation of Funds to Communities of Concern

Communities of concern are cities and communities where the percentage of low-income households or minorities is greater than that of the entire MPA. Within the MPA, 27 percent of the population are minority persons, while 18 percent of the households are below the poverty line. In order to ensure equity in the plan, an analysis was conducted to determine the level of investment that will occur near these identified populations.

Highway Projects

The staged improvement program contains $1.13 billion in capacity projects throughout the MPA. Of that amount, $982.8 million is located within (completely or partially) or bordering communities of concern. This represents approximately 88 percent of the total dollars invested in capacity projects. The staged improvement plan projects that are within or bordering communities of concern are shown in Table 11.9. The MTP projects and communities of concern are displayed in Figure 11.3.

HIGHWAY PROJECT ALLOCATION

$1.13 B
CAPACITY PROJECTS

$982.8 M
(88%)
LOCATED WITHIN OR BORDERING COMMUNITIES OF CONCERN

Each of the projects in Table 11.9 received an assessment of the likely impacts to residential properties, businesses, and community facilities in order to determine a "Level of Concern". The majority of these projects involve widenings or roadway extensions into primarily undeveloped areas, or areas with few right-of-way concerns. Overall, the level of concern for each of the projects is relatively low. However, the scope and resources of the MTP only allow for a preliminary analysis to be conducted. Further research will need to be done as a project progresses through the development process.

Table 11.9 Level of Concern for Staged Improvement Program

ID	Stage	Route	Location	Improvement	Level of Concern
1	Stage I	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 2 Lane Roadway	Low
2	Stage I	SR-374 Ext/SR-149	Dotsonville Rd to SR-149; SR-374 to River Rd	New 2 Lane Roadway & Bridge	Low
3	Stage I	SR-237 (Rossview Rd) & Dunbar Cave Rd	I-24 to 400 ft. west of Keysburg Rd	Widen from 2 to 3/5 Lanes & Realignment	Low
4	Stage I	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes	Low
7	Stage I	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes	Low
101	Stage I	US 79/SR-13 (Guthrie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes	Low
102	Stage I	SR-149/SR-13	River Rd to SR-13; SR-149 to Zinc Plant Rd	Widen from 2/3 to 5 Lanes	Low
103	Stage I	SR-374 (North Pkwy)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes	Low
104	Stage I	North-East Connector Ph 1	Ted Crozier Blvd to Wilma Rudolph Blvd to Trenton Rd	New 4/5 Lane Roadway	Low
106	Stage I	Lafayette Rd	Walnut Grove Rd through Ft Campbell Gate	Widen from 2 to 5 Lanes	Low
107	Stage I	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement	Low
108	Stage I	KY-400 (State Line Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	Low
109	Stage I	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL	Low
110	Stage I	KY-115 (Pembroke)	I-24 to KY-1453 (Barker's Mill Rd)	Reconstruct with CTL	Low

Source: NSI, CUAMPO

continued **TABLE 11.9 LEVEL OF CONCERN FOR STAGED IMPROVEMENT PROGRAM**

ID	STAGE	ROUTE	LOCATION	IMPROVEMENT	LEVEL OF CONCERN
105	Stage II	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway	Could impact minorities
201	Stage II	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes	Low
203	Stage II	North-East Connector Ph 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway	Low
204	Stage II	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes	Could impact minorities
207	Stage II	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	Low
209	Stage II	KY-109 (Bradshaw Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	Low
209	Stage II	KY-109 (Bradshaw Rd)	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	Reconstruct with CTL	Low
304	Stage II	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes	Low
401	Stage II	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway	Low
402	Stage II	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway	Low
403	Stage II	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway	Could impact minorities
405	Stage II	SR-374 (Richview Rd) Ext	SR-12 (Madison St) to US 41A Bypass	New 4 Lane Roadway	Could impact minorities
406	Stage II	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway	Low
409	Stage II	8th St connector	Needmore Rd to Patterson Ln	New 2 Lane Roadway	Low
504	Stage II	SR 13/48	River Road to Old Highway 48	Center Turn Lane	Low

Source: NSI, CUAMPO

continued **TABLE 11.9 LEVEL OF CONCERN FOR STAGED IMPROVEMENT PROGRAM**

ID	STAGE	ROUTE	LOCATION	IMPROVEMENT	LEVEL OF CONCERN
111	Stage III	Oatts-Riggins Rd	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	New 3 Lane Roadway	Low
202	Stage III	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes	Could impact minorities
205	Stage III	Hugh Hunter/ Gritton Church Rd	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction	Low
303	Stage III	Needmore Rd	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL	Low
305	Stage III	Whitfield Rd/Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL	Low
407	Stage III	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway	Could impact minorities
408	Stage III	New Roadway	9th St to 10th St	New 2 Lane Roadway	Could impact low income and minorities
412	Stage III	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 ro 5 Lanes	Could impact minorities
502	Stage III	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes	Low
503	Stage III	Dunbar Cave Road	Wilma Rudolph Blvd (US 79) to Rossview Rd (SR 37)	Widen to 4 Lanes	Low
510	Stage III	Needmore Road	Wilma Rudolph Blvd to Trenton Road	Widen to 4 Lanes	Low
512	Stage III	Rossview Road	SR 374 to Dunbar Cave Rd	Widen to 5 Lanes	Low
515	Stage III	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes	Low

Source: NSI, CUAMPO

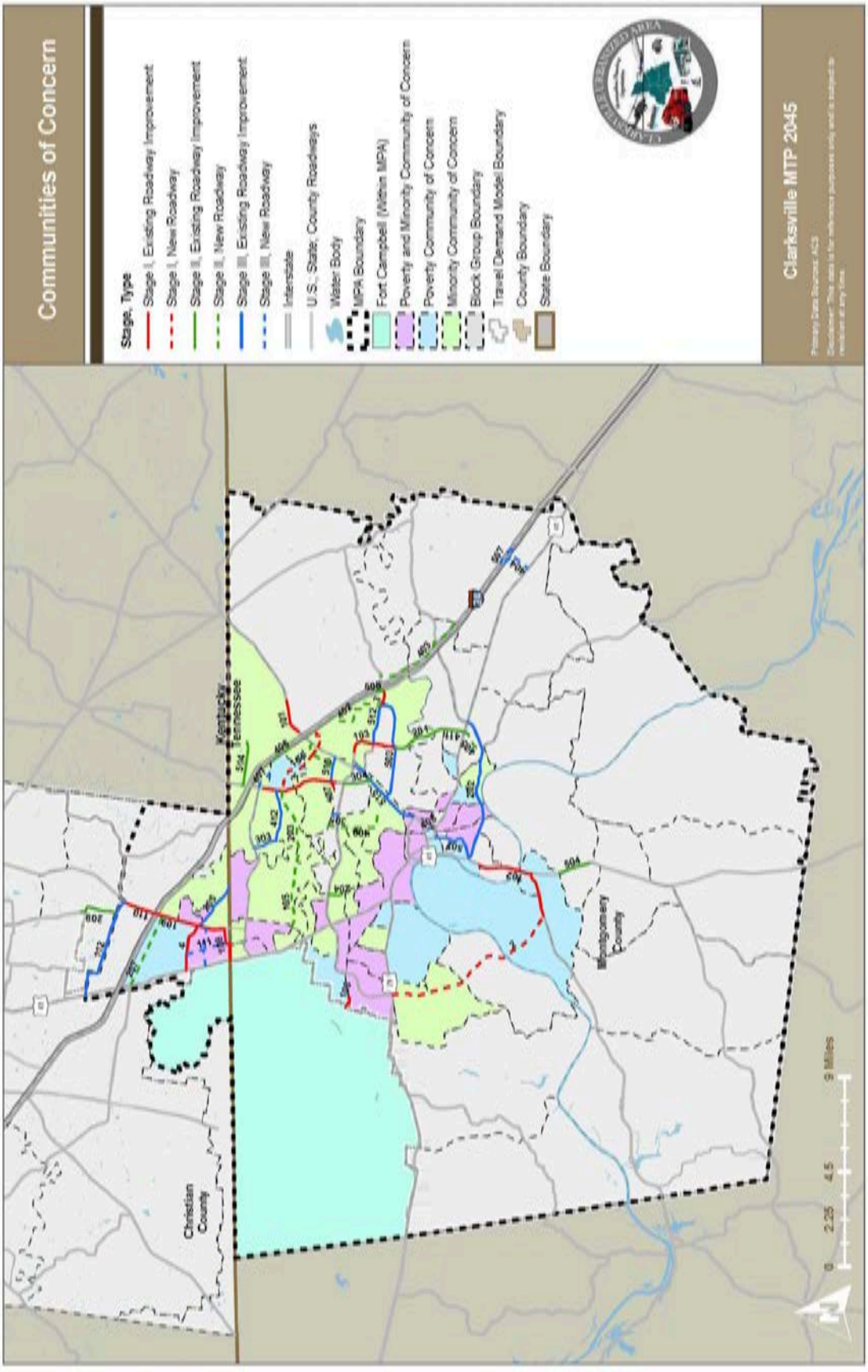


Figure 11.3 Communities of Concern

Roadway Safety and ITS Projects

These projects often require little or no right-of-way acquisition. They also provide positive impacts on the residents and businesses due to increased safety and reduced congestion issues. As such, these projects will only benefit communities of concern. Roadway safety and ITS projects can be developed at the same time as other highway improvements. The MPO has also identified the Dynamic Message Signs on I-24 within the Tennessee portion of the MPA as a visionary ITS project, based on the Regional ITS Architecture.

Transit Projects

The identified transit projects in Chapter 10 continue operating assistance for transit services and capital assistance for bus replacements, replacement and upgrade of miscellaneous capital equipment, and upgrading existing facilities. There are no proposed capital investments that involve right-of-way acquisition. Within the MPA, most of the areas that contain communities of concern are well-served by the current transit routes. These communities will benefit from the plan's transit projects through increased and more reliable service.

Bicycle and Pedestrian Projects

The 2045 MTP contains recommendations for sidewalks along major commercial corridors. These sidewalks would provide additional access to transit facilities for all people, including the communities of concern. The bicycle projects identified by the Clarksville Cycling Club would promote healthier communities and create access to facilities for all residents and workers in the MPA, benefiting communities of concern. The projects identified in Chapter 10 can be located throughout the MPA. Many of these bicycle and pedestrian projects are on roadways that TDOT and KYTC currently have no planned improvements for. However, these projects may be undertaken at the same time as other TDOT or KYTC projects that may occur in the future.

11.4 | Strategies to Improve Freight Conditions

Deploy Regional Intelligent Transportation Systems (ITS) Incident Management System

The MPO works with its partner agencies to maintain the Clarksville Regional Intelligent Transportation System. This system helps to manage traffic incidents and promote more efficient traffic operations. The continuation of this system will assist in reducing freight delay in the future.

Implement MTP Roadway Projects

Table 11.10 shows the roadway projects funded in the 2045 MTP that are along major freight corridors or roadway segments with 500 or more estimated daily trucks. The projects are shown in Figure 11.4. These projects should create reductions in delay and safety incidents for passenger and commercial traffic in the MPA.

Table 11.10 2045 MTP Roadway Projects with Freight Benefits

ID	Stage	Route	Location	Improvement
1	Stage I	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway
2	Stage I	SR-374 Ext/SR-149	Dotsonville Rd to SR-149; SR-374 to River Rd	New 4 Lane Roadway & Bridge, Widen from 2 to 5 Lanes
3	Stage I	SR-237 (Rossview Rd) & Dunbar Cave Rd	I-24 to 400 ft. west of Keysburg Rd	Widen from 2 to 3/5 Lanes & Realignment
4	Stage I	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes
7	Stage I	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes
101	Stage I	US 79/SR-13 (Guthrie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes
102	Stage I	SR-149/SR-13	River Rd to SR-13; SR-149 to Zinc Plant Rd	Widen from 2/3 to 5 Lanes
103	Stage I	SR-374 (Warfield Blvd)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes
104	Stage I	North-East Connector Ph 1	Ted Crozier Blvd to Wilma Rudolph Blvd to Trenton Rd	New 4/5 Lane Roadway
106	Stage I	Lafayette Rd	Walnut Grove Rd through Ft Campbell Gate	Widen from 2 to 5 Lanes
107	Stage I	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement
109	Stage I	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL
105	Stage II	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway
201	Stage II	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes
203	Stage II	North-East Connector Ph 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway
204	Stage II	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes
207	Stage II	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway

Source: NSI, CUAMPO

continued **TABLE 11.10 2045 MTP ROADWAY PROJECTS WITH FREIGHT BENEFITS**

ID	STAGE	ROUTE	LOCATION	IMPROVEMENT
304	Stage II	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes
401	Stage II	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway
402	Stage II	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway
403	Stage II	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway
405	Stage II	SR-374 (Richview Rd) Ext	SR-12 (Madison St) to US 41A Bypass	New 4 Lane Roadway
406	Stage II	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway
409	Stage II	8th St connector	Needmore Rd to Patterson Ln	New 2 Lane Roadway
411	Stage II	SR-374 (Richview Rd)	Memorial Dr to US 41A (Madison St)	Widen from 3 to 5 Lanes
504	Stage II	SR 13/48	River Road to Old Highway 48	Center Turn Lane
508	Stage II	I-24	@ Exit 8 EB Off Ramp	Widen to 2 Lanes
514	Stage II	Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes
202	Stage III	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes
205	Stage III	Hugh Hunter/ Gritton Church Rd	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction
303	Stage III	Needmore Rd	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL
305	Stage III	Whitfield Rd/ Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL
404	Stage III	Dixie Bee Rd Ext	Sango Rd to US 41A	New 2 Lane Roadway
407	Stage III	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway
408	Stage III	New Roadway	9th St to 10th St	New 2 Lane Roadway

Source: NSI, CUAMPO

continued **TABLE 11.10 2045 MTP ROADWAY PROJECTS WITH FREIGHT BENEFITS**

ID	STAGE	ROUTE	LOCATION	IMPROVEMENT
412	Stage III	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 ro 5 Lanes
502	Stage III	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes
507	Stage III	I-24	@ Dixie Bee Road	New interchange
510	Stage III	Needmore Road	Wilma Rudolph Blvd to Trenton Road	Widen to 4 Lanes
512	Stage III	Rossview Road	SR 374 to Dunbar Cave Rd	Widen to 5 Lanes
515	Stage III	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes

Source: NSI, CUAMPO

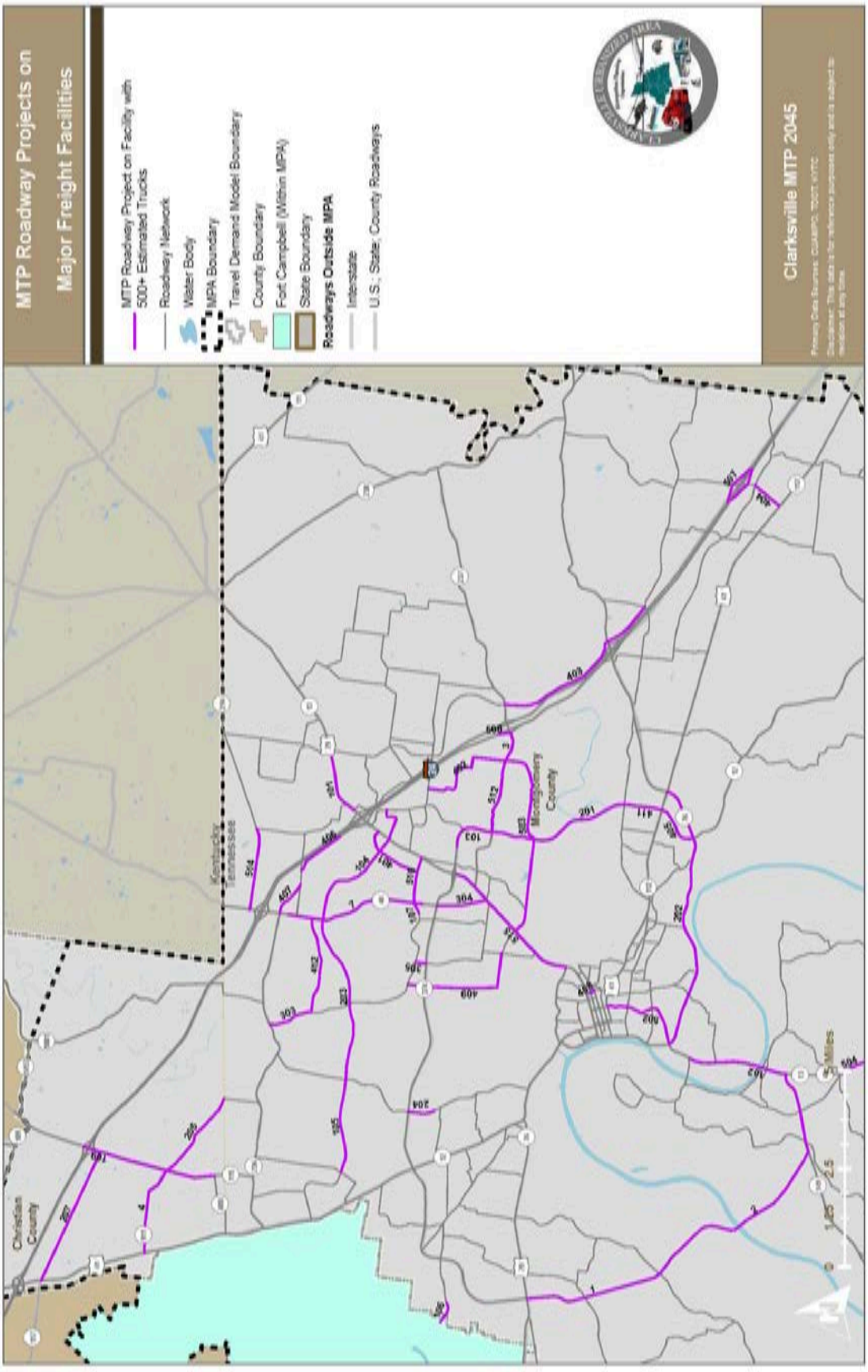


Figure 11.4 MTP Roadway Projects on Major Freight Facilities

11.5| Strategies to Improve Air Quality

The EPA offers education on air pollution caused by everyday transportation. Through their website, https://www.epa.gov/air-pollution-transportation, they provide users with:

- A history of reduction efforts for air pollution caused by transportation.
- An overview of how transportation contributes to air pollution.
- The types of air pollution caused by transportation.
- What users can do to reduce pollution from vehicles and engines.

Table 11.11 outlines actions the MPO can take to begin addressing the negative impacts of vehicle emissions on air quality and public health.

Table 11.11 Actions to Reduce Transportation-Related Air Pollution Emissions

Strategy	Description
Continue the deployment and update of the Clarksville Regional ITS Architecture as necessary.	This will improve the operational efficiency of the existing transportation system, reducing the higher level of vehicle emissions occurring at low speeds or while idling.
Encourage local governments to adopt land use regulations that encourage building urban, suburban and rural communities with housing and transportation choices near jobs, shops and schools.	Increasing the walkability of the MPO will reduce the need for trips to be made by driving an automobile. It can also be more energy efficient overall.
Implement transit and bicycle/pedestrian strategies outlined previously to reduce automobile trips.	Many of these actions will make walking, biking, and transit more attractive; thereby potentially reducing demand for travel by automobile.
Work with KYTC and TDOT to explore creating a Clean Cities coalition for Kentucky and Tennessee.	At the local level, coalitions leverage resources to create networks of local stakeholders and provide technical assistance to fleets implementing alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and emerging transportation technologies.
Perform studies to identify best programmatic, policy, and infrastructure strategies to reduce regional transportation-related air pollution emissions.	These studies should focus on improving system and operational efficiencies (e.g. idle reduction strategies and traffic management), reducing travel activity (e.g. Transportation Demand Management [TDM]), and increasing the utilization of alternative fuel vehicles (e.g. ethanol, biodiesel, natural gas, propane, synthetic fuels, hydrogen, and electricity).

11.6 | Wilma Rudolph Boulevard Corridor Study

During the public outreach survey, Wilma Rudolph Boulevard was identified most often as the corridor with the most congestion. During the survey, it was also identified most often as the corridor of greatest safety concern.

Currently, the roadway is a five-lane urban arterial facility with two through lanes and a two-way left turn lane (TWLTL).

Crash data for the five-year period of 2012 through 2016 was used to calculate the crash rate. During that period, 3,055 crashes were reported. The average AADT of the corridor was 32,607 vehicle. The crash rate for this segment, expressed in accidents per million vehicle miles, is 10.23. The statewide average crash rate for a similar facility is 2.69. This results in a crash rate that is more than three times greater than the statewide average, indicating that the roadway is high risk.

Wilma Rudolph Blvd. Crash Rate Comparison

10.23
Accidents Per Million Vehicle Miles

vs.

2.69
Statewide Average for Similar

(3x)
More than State Average

The MTP 2045 recommends a safety and access management study be conducted on the Wilma Rudolph Boulevard corridor. Potential countermeasures that could be explored in the study include:

- Install a raised median
    - Replace the existing Two-way Left Turn Lane (TWLTL) with a raised median.
    - This treatment typically reduces the crash rates by 23 percent[1] compared to a TWLTL.
    - Could improve overall speed along study corridor by reducing disruptions from driveway traffic.
    - Reduces the number of conflict points.

1 http://www.cmfclearinghouse.org/study_detail.cfm?stid=165

- Driveway consolidations
    - Reduces the density of driveways along the major corridor by closing driveways, providing alternative vehicle access, access restrictions, creating shared driveways, and relocating entrances to side streets.
    - Improves traffic flow due to reduction in disruptions
- Intersection treatments
    - Add Restricted Crossing U-Turn (RCUT) for minor street traffic and optimize signal timing.
    - RCUT is an alternative intersection design characterized by prohibiting left turns and through movements from minor streets. These prohibited movements are accommodated by requiring motorists to turn right onto the major street, then make a U-turn maneuver at a median opening located 400 to 1,000 feet from the intersection.
    - RCUT intersections are operated with two phases, thereby increasing major street throughput and reducing delay and queues for the overall intersection.
    - RCUT intersections reduce the number of conflict points from 32 to 14.
    - Research shows that RCUT design could reduce overall crashes by 15 percent and injury crashes by 22 percent.

11.7 | Freight and Nonmotorized Travel Studies

According to the 2010 Census, the Clarksville MPA is not listed as a TMA. However, the population of the MPA, excluding Fort Campbell (which has a fluctuating population), is just below the TMA threshold. The region is likely to be classified as a TMA after the 2020 Census. This will require the MPO to develop a CMP as discussed in Chapter 1. As part of these efforts, the MPO could conduct additional studies to aid in the development of the CMP, as well as address some of the needs discussed in Chapter 8. The first study would be an analysis of freight needs and an identification of freight trip generation within the MPA. The second study would be a comprehensive analysis of bicycle and pedestrian facilities and needs.

Appendices

Appendix A:
Public Outreach Strategy

Clarksville MTP 2045

Clarksville MTP 2045 Transportation Survey

Imagine the Clarksville Region in the year 2045.

How will our neighborhoods look?

How will we be connected to each other and the outside world?

What will our transportation choices be?

We need a plan to move us forward into the future, and we're asking for your help. The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) would like to hear your thoughts on important transportation issues in the Clarksville Urbanized Area. This area is comprised of Montgomery County, TN and the southernmost portion of Christian County, KY. The Clarksville Urbanized Area includes the cities of Clarksville, TN; Oak Grove, KY; and a portion of Hopkinsville, KY.

The information collected from the following short survey will be used to help guide the development of a long-range transportation plan for the Clarksville Urbanized Area.

This survey takes approximately 10-15 minutes to complete. The overall opinions that you provide in this survey will be used to develop a transportation plan to help everyone in the Clarksville Urbanized Area in the years ahead.

Since your privacy is important, your individual responses will not be shared.

OK

1. What is your primary method of transportation?

- ◯ Bus
- ◯ Drive Alone
- ◯ Bicycle
- ◯ Vanpool or Carpool
- ◯ Ridesharing Service (ex. Uber or Lyft)
- ◯ Other

2. How would you rank these issues with the current regional transportation system in Clarksville? 0 of 16 answered

	0- Very Poor	1	2	3	4 -Excellent
Air Quality	○	○	○	○	○
Frequency and Severity of Traffic Crashes	○	○	○	○	○
Available Bicycle Lanes and Paths	○	○	○	○	○
Available Sidewalks and Pedestrian Trails	○	○	○	○	○
Traffic Congestion	○	○	○	○	○
Access to Public Transit	○	○	○	○	○
Roadway Pavement Condition	○	○	○	○	○
Access to Rail Service for Freight	○	○	○	○	○

3. Regarding the safety of the transportation system within the Clarksville region, please rate the following safety concerns:

	0- Not a Concern	1	2	3	4- A Major Concern
Speed	○	○	○	○	○
Drunk or Impaired Drivers	○	○	○	○	○
Pavement Conditions	○	○	○	○	○
Distracted Drivers (cell phone or texting)	○	○	○	○	○
Congestion	○	○	○	○	○
Inadequate Signage	○	○	○	○	○
Curves on Roadway	○	○	○	○	○
Inadequate or no Sidewalks	○	○	○	○	○
Lack of Roadway Lighting	○	○	○	○	○
Difficult to Access Transit Stops	○	○	○	○	○

Please provide the specific location(s) of your major concerns

0 of 16 answered

4. When you travel to work, school, or shopping, what is the most **congested** roadway or intersection that you experience in the Clarksville region?

5. When you travel to work, school, or shopping in the Clarksville region, what roadway section or intersection has the greatest need for improvements to increase your **safety** as you travel?

6. How often do you use the bus or other public transit?

- ◯ Every day
- ◯ Two to three times a week
- ◯ Once a week
- ◯ Once a month
- ◯ Very little/ Never

If very little/ never, please explain why:

7. How often do you walk or use a bicycle to travel?

- ◯ Every day
- ◯ Two to three times a week
- ◯ Once a week
- ◯ Once a month
- ◯ Very little/ Never

If very little/ never, please explain why:

0 of 16 answered

8. Imagine that you were given $100 to invest in the following transportation improvements for the region. Using the box next to each improvement type, please enter the portion of that $100 that you would dedicate to that specific improvement. Make sure that your total amount of investment over all 11 categories does not exceed $100. Please enter a valid number 0 - 100. Do not include dollar signs and make sure your answer is a whole number (no decimals).

Widen existing roadways for additional lanes	
Build or improve sidewalks	
Widen the lanes and shoulder widths of existing roadways	
Coordinate traffic signals and driveway openings to make it easier and safer to enter and leave the roadway	
Construct new roadways	
Widen the lanes and shoulder widths of existing roadways	
Designate bicycle lanes	
Improve existing roadways with the elimination of curves or hills	
Maintain the surface of existing roadways	
Use technology to reduce congestion and delays (e.g. synchronize traffic signals, motorist message boards, ect.)	
Provide expanded transit service	

9. How strongly would you support the following options as DEDICATED funding sources for transportation improvement?

0- Would Not Support	1	2	3	4- Strongly Support
0 of 16 answered				

	0- Would Not Support	1	2	3	4- Strongly Support
Collect taxes on miles traveled by users (User Fees)	○	○	○	○	○
Ticketing from Speed enforcement cameras	○	○	○	○	○
Increased property taxes	○	○	○	○	○
Additional sales tax for transportation projects	○	○	○	○	○
Increased hotel-motel tax rate	○	○	○	○	○
Tolls and public-private partnerships	○	○	○	○	○
Use of regional or local gas tax	○	○	○	○	○
Increased car rental taxes	○	○	○	○	○
Increased business and excise taxes	○	○	○	○	○
No increased revenues (expect additional delays and congestion)	○	○	○	○	○

10. How important are these factors to be considered in the priority of transportation projects?

	0- Not important	1	2	3	4- Important
Reduces congestion	○	○	○	○	○
Reduces the number of traffic crashes	○	○	○	○	○
Balances benefits vs. costs	○	○	○	○	○
Supports economic development	○	○	○	○	○
Improves freight movement	○	○	○	○	○
Provides pedestrian and bicycle facilities	○	○	○	○	○
Minimizes impacts on existing neighborhoods	○	○	○	○	○
Supports revitalization of	○	○	○	○	○

0 of 16 answered

	0- Not important	1	2	3	4- Important
existing neighborhoods					
Minimizes impacts on the natural environment	○	○	○	○	○

11. How much time does it usually take for you to travel to work or school?

- ○ Less than 10 minutes
- ○ 11-15 minutes
- ○ 16-30 minutes
- ○ 31-45 minutes
- ○ 46-60 minutes
- ○ more than 1 hour

12. **Optional**: Please describe your race/ethnicity (check as many boxes as apply).

- ☐ American Indian or Alaskan Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian and Pacific Islander
- ☐ White
- ☐ Prefer not to say

Other

13. **Optional**: What is your approximate annual household income?

- ○ Less than $10,000
- ○ $10,000 - $14,999
- ○ $15,000 - $24,999
- ○ $25,000 - $34,999
- ○ $35,000 - $49,999
- ○ $50,000 - $74,999
- ○ $75,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 - $199,999
- ○ over $200,000

0 of 16 answered

14. **Optional**: What is your age?

- ◯ 16 - 26
- ◯ 27 - 40
- ◯ 41 - 55
- ◯ 56 - 70
- ◯ 71 - 80
- ◯ over 80

15. Do you have any additional comments?

16. **Optional**: If you would like to be added to the email mailing list for study updates and meeting notices then please provide the following:

Name

Email Address

DONE

Powered by SurveyMonkey
See how easy it is to create a survey.

0 of 16 answered

Appendix B:
Survey Letter, Flier, and Mailing List

CLARKSVILLE URBANIZED AREA
METROPOLITAN PLANNING ORGANIZATION

Stan Williams
MPO Director
stanwilliams@cityofclarksville.com

329 MAIN STREET
CLARKSVILLE, TN 37040
PHONE: (931)645-7448

Jill Hall
Transportation Planner
jhall@cityofclarksville.com

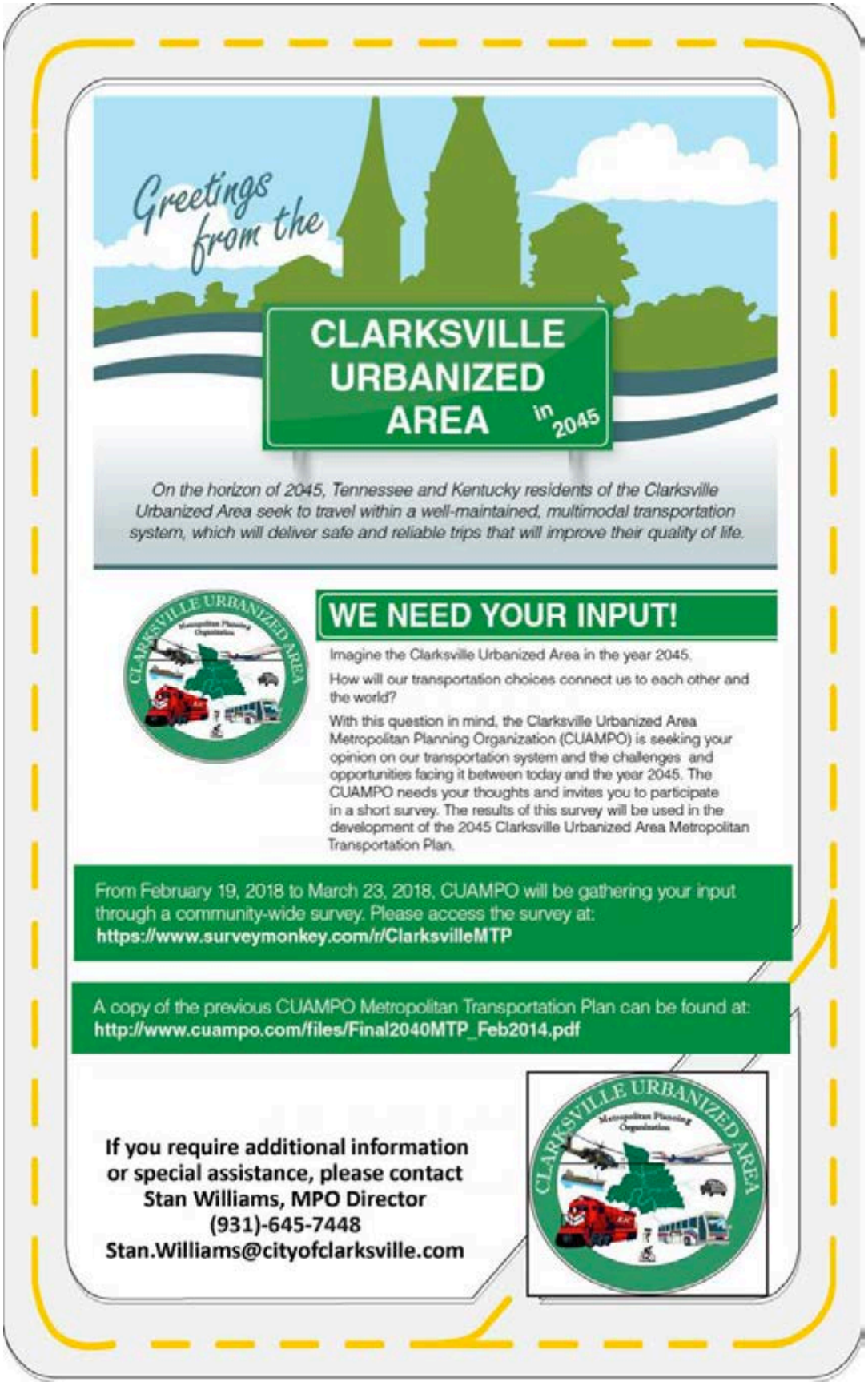
February 16, 2018

Dear Sir/Madam:

Please display the enclosed Survey Flyer on your bulletin board or where visible to the public. Public participation in the survey will aid in the development of the Long Range Transportation Plan Update for the Clarksville Urbanized Area MPO. This plan serves as a blueprint for transportation investments on streets and highways, transit, sidewalks, bike paths, airports, railroads and waterways in the Clarksville region.

Thank you for your assistance in this matter.

Sincerely,
J. Stan Williams
Clarksville MPO Director
931-645-7448


Greetings from the
CLARKSVILLE URBANIZED AREA in 2045
On the horizon of 2045, Tennessee and Kentucky residents of the Clarksville Urbanized Area seek to travel within a well-maintained, multimodal transportation system, which will deliver safe and reliable trips that will improve their quality of life.
WE NEED YOUR INPUT!
Imagine the Clarksville Urbanized Area in the year 2045.
How will our transportation choices connect us to each other and the world?
With this question in mind, the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is seeking your opinion on our transportation system and the challenges and opportunities facing it between today and the year 2045. The CUAMPO needs your thoughts and invites you to participate in a short survey. The results of this survey will be used in the development of the 2045 Clarksville Urbanized Area Metropolitan Transportation Plan.
From February 19, 2018 to March 23, 2018, CUAMPO will be gathering your input through a community-wide survey. Please access the survey at:
https://www.surveymonkey.com/r/ClarksvilleMTP
A copy of the previous CUAMPO Metropolitan Transportation Plan can be found at:
http://www.cuampo.com/files/Final2040MTP_Feb2014.pdf
If you require additional information or special assistance, please contact
Stan Williams, MPO Director
(931)-645-7448
Stan.Williams@cityofclarksville.com

Burt-Cobb Community Center
1011 Franklin Street
Clarksville, TN 37040

Crow Community Center
211 Richview Road
Clarksville, TN 37043

Save-A-Lot
1039 South Riverside Drive
Clarksville, TN 37040

Kroger
110 Dover Crossing Road
Clarksville, TN 37042

Kroger
2100 Lowes Drive
Clarksville, TN 37040

Hilltop Super Market
400 Highway 149
Clarksville, TN 37040

Clarksville-Montgomery County Public Library
350 Pageant Lane, Suite 501
Clarksville, TN 37040

Montgomery County WIC Clinic
1850 Business Park Drive, Suite #103
Clarksville, TN 37040

Kleeman Community Center
166 Cunningham Lane
Clarksville, TN 37042

Publix Super Market
1771 Madison St,
Clarksville, TN 37043

Aldi
1626 Fort Campbell Blvd,
Clarksville, TN 37042

Kroger
1489 Madison Street
Clarksville, TN 37040

Food Lion Inc 874
2306 Madison Street
Clarksville, TN 37043

Food Lion
1764 Highway 48,
Clarksville, TN 37040

Goodwill Industries of Middle Tennessee
1592 Ft. Campbell Blvd.
Clarksville, TN 37042

Walmart Neighborhood Market
216 Dover Rd,
Clarksville, TN 37042

Mid-Cumberland Human Resource Agency
350 Pageant Lane, Ste. 402
Clarksville, TN 37040

Department of Human Services
Montgomery County Office
350 Pageant Lane, Suite 301
Clarksville, TN 37040

Clarksville Career Office (VR)
350 Pageant Lane, Suite 406
Clarksville, TN 37040

Adult Literacy Council
430 Greenwood Ave.
Clarksville, TN 37040

Walmart Neighborhood Market
2551 Whitfield Rd
Clarksville, TN 37040

Walmart Neighborhood Market
408 Tiny Town Rd,
Clarksville, TN 37042

Tienda La Esperanza
108 Dover Rd,
Clarksville, TN 37042

Price Less IGA
1151 Fort Campbell Blvd,
Clarksville, TN 37042

New Seasons Market
1860 Wilma Rudolph Blvd,
Clarksville, TN 37040

World Mart International
1681 Fort Campbell Blvd Ste D,
Clarksville, TN 37042

Silver Dollar Grocery
2700 Trenton Rd,
Clarksville, TN 37040

Save-A-Lot
1140 Fort Campbell Blvd
Clarksville, TN 37042

Publix Super Market
1490 Tiny Town Rd,
Clarksville, TN 37042

APSU-Felix Woodward Library
601 College St.
Clarksville, TN 37044

Army Career Alumni Program – ACAP
5661 Screaming Eagle Blvd.
Ft. Campbell, KY 42223

Clarksville Department of Electricity
P.O. Box 31509
Clarksville, TN 37040

Clarksville Gas & Water
2215 Madison Street
Clarksville, TN 37043

Oak Grove Utilities
8505 Pembroke Oak Grove Road
Oak Grove, KY 42262

Parks and Recreation
102 Public Square
Clarksville, TN 37040

City Forester
102 Public Square
Clarksville, TN 37040

Parks and Recreation
1030-A Cumberland Heights Road
Clarksville, TN 37040

Wal-Mart Super Center
2315 Madison St,
Clarksville, TN 37043

Walmart Super Center
3050 Wilma Rudolph Blvd,
Clarksville, TN 37040

Walmart Super Center
1680 Fort Campbell Blvd,
Clarksville, TN 37042

Dollar General
155 Edmondson Ferry Rd,
Clarksville, TN 37040

Dollar General
924 Providence Blvd,
Clarksville, TN 37042

Dollar General
3855 Trenton Rd,
Clarksville, TN 37040

Dollar General
1600 Fort Campbell Blvd Ste B,
Clarksville, TN 37042

Appendix C:
Webpage and Social Media Announcements

Announcements for Public Survey

NEWS

Citizens urged to complete transportation survey

Clarksville area organization seeks input on long-range traffic planning

Posted Date: 2/20/2018

CLARKSVILLE, Tenn. — The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is asking Tennessee and Kentucky residents in the Clarksville region to provide input on how they will connect to each other and the world and what transportation system improvements are needed to make those connections safe and reliable by the year 2045.

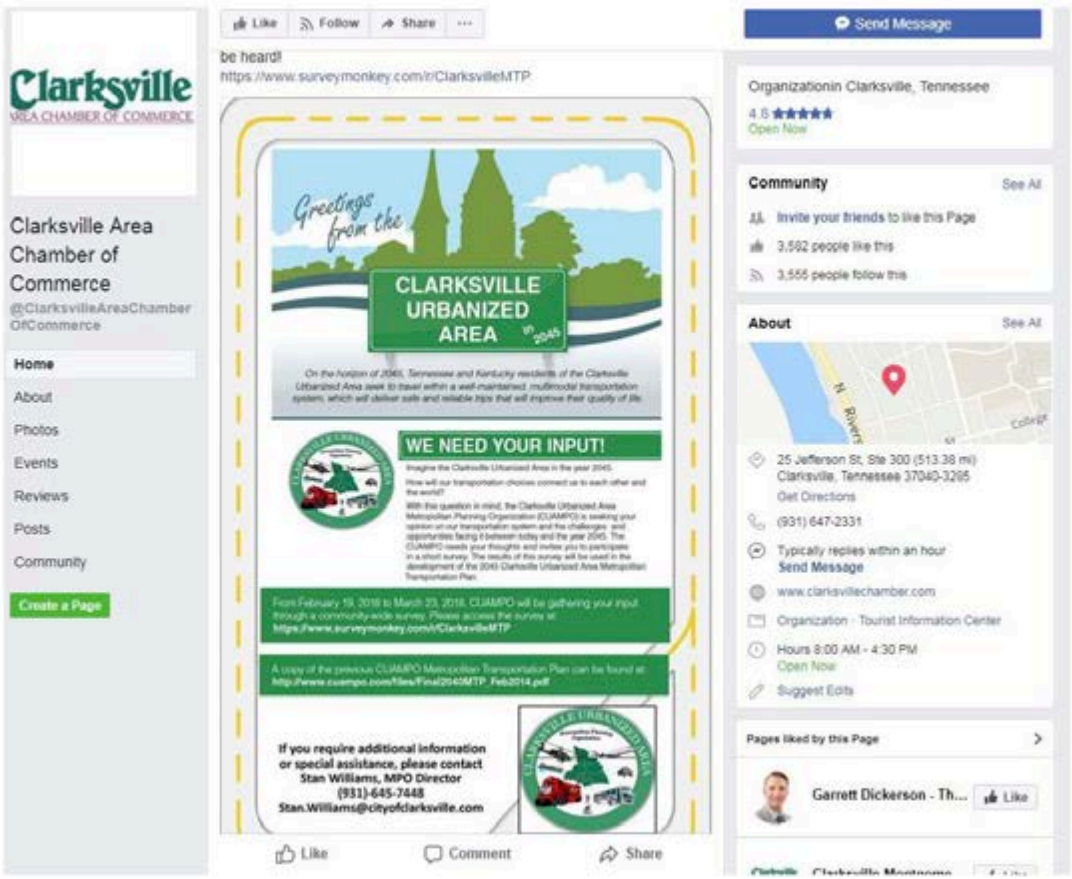
As part of the federally required planning work, the CUAMPO is developing a long-range transportation plan with a 20-plus year future view called the Metropolitan Transportation Plan (MTP).

In preparation for the 2045 MTP, the CUAMPO wants to hear the thoughts of residents concerning important transportation issues in the Clarksville Urbanized Area. From Feb. 19 to March 23, CUAMPO will conduct a community-wide survey to capture that information.

"The public's responses to this survey are vitally important in the development of a transportation plan that can help everyone travel safely and efficiently in the Clarksville region in the years ahead," said Stan Williams, CUAMPO Director. "We want to hear about transportation issues and concerns such as congestion, safety, access to transit, and funding."

The survey can be accessed at https://www.surveymonkey.com/r/ClarksvilleMTP. It takes approximately 10--15 minutes to complete. Since privacy is important, individual responses will not be shared. Requests for information about the survey and the 2045 MTP may be directed to Stan Williams, CUAMPO Director, by email at stan.williams@cityofclarksville.com or by phone at 931-645-7448.

More News »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Clarksville Area Chamber of Commerce
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Greetings from the
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WE NEED YOUR INPUT!
If you require additional information or special assistance, please contact
Stan Williams, MPO Director
(931)-645-7448
Stan.Williams@cityofclarksville.com
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Organizationin Clarksville, Tennessee
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3,555 people follow this
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Clarksville, Tennessee 37040-3295
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(931) 647-2331
Typically replies within an hour
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Garrett Dickerson - Th...
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Clarksville
Share your opinion!
The Clarksville MPO is developing a long range transportation plan (2045 MTP). They need input from the public on transportation needs and improvements.
Take the survey here.
CLARKSVILLE URBANIZED AREA
WE NEED YOUR INPUT!

Clarksvillenow.com
March 17 at 9:48am
Like Page
There's still time to complete this survey about transportation and roads in Clarksville:
Clarksville citizens urged to complete transportation survey | ClarksvilleNow.com
Area organization seeks input on long-range traffic planning.
CLARKSVILLENOW.COM
36
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City of Clarksville, TN Government
Published by Richard Stevens [?] · February 20 ·
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The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is asking Tennessee and Kentucky residents in the Clarksville region to provide input on how they will connect to each other and the world and what transportation system improvements are needed to make those connections safe and reliable by the year 2045. http://bit.ly/2EQBSMR
CLARKSVILLE URBANIZED AREA
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148 people reached
Boost Post
Like
Comment
Share
Write a comment...
Press Enter to post.

Clarksville citizens urged to complete transportation survey

By Nicole June February 19, 2018 6:00 am

- Facebook
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Clarksville Now

CLARKSVILLE, Tenn. (CLARKSVILLENOW) — The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is asking Tennessee and Kentucky residents in the Clarksville region to provide input on how they will connect to each other and the world and what transportation system improvements are needed to make those connections safe and reliable by the year 2045.

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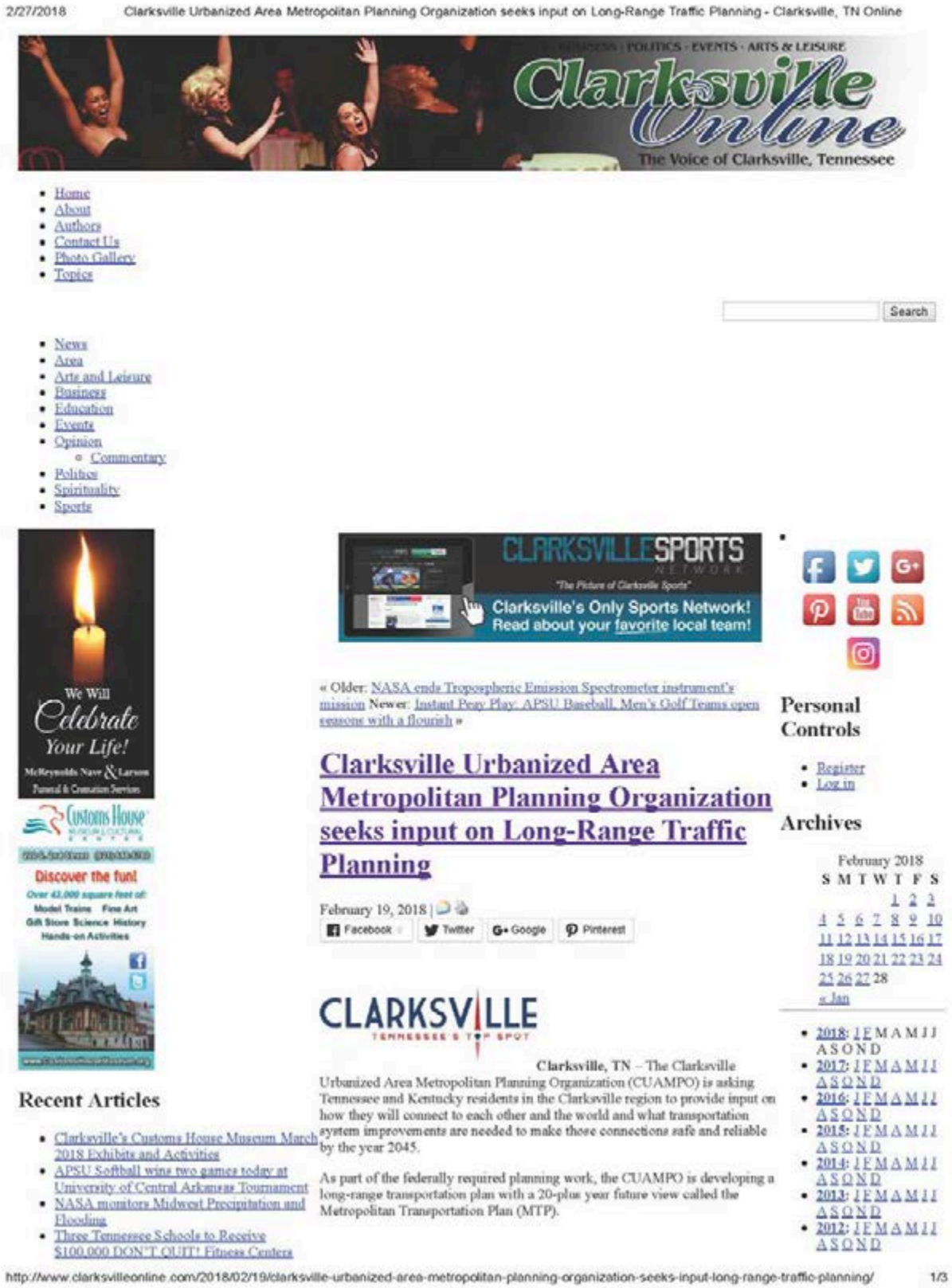

2/27/2018 Clarksville Urbanized Area Metropolitan Planning Organization seeks input on Long-Range Traffic Planning - Clarksville, TN Online

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The Voice of Clarksville, Tennessee

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Clarksville's Only Sports Network!
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« Older: NASA ends Tropospheric Emission Spectrometer instrument's mission Newer: Instant Peay Play: APSU Baseball, Men's Golf Teams open seasons with a flourish »

Clarksville Urbanized Area Metropolitan Planning Organization seeks input on Long-Range Traffic Planning

February 19, 2018 | Facebook Twitter Google Pinterest

CLARKSVILLE
TENNESSEE'S TOP SPOT

Clarksville, TN – The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is asking Tennessee and Kentucky residents in the Clarksville region to provide input on how they will connect to each other and the world and what transportation system improvements are needed to make these connections safe and reliable by the year 2045.

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Recent Articles

- Clarksville's Customs House Museum March 2018 Exhibits and Activities
- APSU Softball wins two games today at University of Central Arkansas Tournament
- NASA monitors Midwest Precipitation and Flooding
- Three Tennessee Schools to Receive $100,000 DON'T QUIT! Fitness Centers

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S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

« Jan

- 2018: J F M A M J J A S O N D
- 2017: J F M A M J J A S O N D
- 2016: J F M A M J J A S O N D
- 2015: J F M A M J J A S O N D
- 2014: J F M A M J J A S O N D
- 2013: J F M A M J J A S O N D
- 2012: J F M A M J J A S O N D

http://www.clarksvilleonline.com/2018/02/19/clarksville-urbanized-area-metropolitan-planning-organization-seeks-input-long-range-traffic-planning/ 1/3

2/27/2018 Clarksville Urbanized Area Metropolitan Planning Organization seeks input on Long-Range Traffic Planning - Clarksville, TN Online

- #16 Tennessee Vols travels to Starksville to play Mississippi State
- Traffic Safety Expert to give 'The Parent Driving Zone' presentation at Hopkinsville Community College
- APSU Baseball heads to Nashville to face nationally ranked Vanderbilt
- Clarksville Police Department Scam of the Day for February 26th, 2018
- Nashville Sounds announce Booster's Kids Club and Silver Sounds Club to return in 2018
- Austin Peay State University Arts and Letters students collaborate on new Shakespeare podcast
- Montgomery County Agencies and TEMA to conduct Tornado Damage Assessment
- AAA says Tennessee Gas Prices Drop, Higher Prices are Coming
- Instant Peay Play: March Madness begins for Governors this week
- APSU Geosciences Professors bring new geologic insights to Nevada's high desert region
- American Heart Association says Guideline Adherence, not Patient Volume, may be better Hospital Heart Failure Metric
- NASA's Hubble Space Telescope measurements show Universe expanding faster then expected
- APSU Softball drops two games at University of Central Arkansas Tournament
- Property Tax Relief and Credit Report Freeze Legislation Advances in the House
- APSU Baseball beats Toledo 8-7 to sweep series
- Tennessee Emergency Management Agency releases Severe Weather update

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Sections

News

Topics

City of Clarksville, Clarksville TN, Clarksville Urbanized Area Metropolitan Planning Organization, CUAMPO, Metropolitan Transportation Plan, Stan Williams, Survey, transportation

Related Posts

- **Clarksville's CTS Transfer Center options narrowed**
- **Downtown Clarksville Parking Survey**
- **Clarksville Parks and Recreation seeks feedback with public survey**
- **Clarksville Parks and Recreation seeks Feedback**
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Comments

You must be logged in to post a comment.

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  - Clarksville Community Concert Association
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  - Dunbar Cave State Natural Area
  - Friends of Dunbar Cave
  - Gateway Chamber Orchestra
  - Leadership Clarksville
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- **Official Sites**
  - City of Clarksville, TN
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http://www.clarksvilleonline.com/2018/02/19/clarksville-urbanized-area-metropolitan-planning-organization-seeks-input-long-range-traffic-planning/ 2/3

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STIP/TIP Reports
MTP
TitleVI

Planning for Clarksville's Growth

Survey begins February 19th!

Next Meeting Jan 18, 11:00AM
Agenda and Info
Clarksville Obligation Report 2017
RPC Lower Conference Room

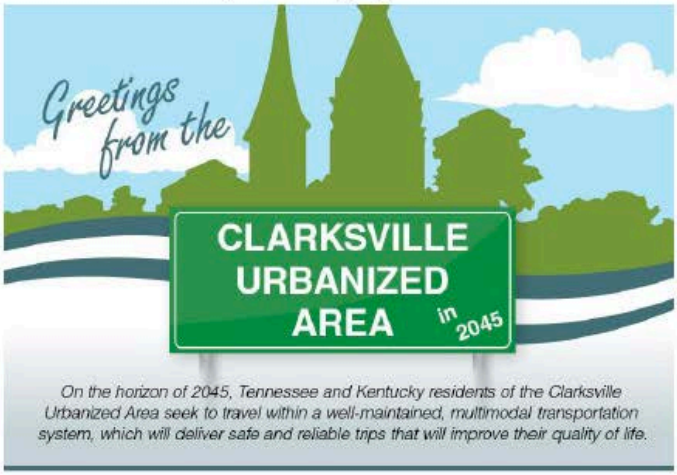
No Position Openings at this time. Please send resume and cover letter by email or mail to:

329 Main Street Clarksville, Tn 37040

Comments, complaints, suggestions, or questions?

Contact Us
931-645-7448
cuampo@cityofclarksville.com

2/27/2018 Clarksville Urbanized Area Metropolitan Planning Organization



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If you require additional information or special assistance, please contact
Stan Williams, MPO Director
(931)-645-7448
Stan.Williams@cityofclarksville.com

CUAMPO News

Planning

How can you help improve our air quality? Get suggestions at:

www.epa.gov/otaq/consumer.htm

2010 Census Data for the MPO Urbanized Area

Organization

Helpful Links

Air Quality

Alternative Fuel Station Locator

Transit Alliance

Authorized Relay Center TDD

http://www.cuampo.com/ 2/3

2/27/2018

Clarksville Urbanized Area Metropolitan Planning Organization

Call 800-848-0299 for the non-hearing impaired and for more information on TTY relay service you can also contact their customer service at 866-735-0373

Clarksville Express Bus Service from Exit 11 Park-N-Ride lot to Music City Central in downtown Nashville. For more info: Click Here

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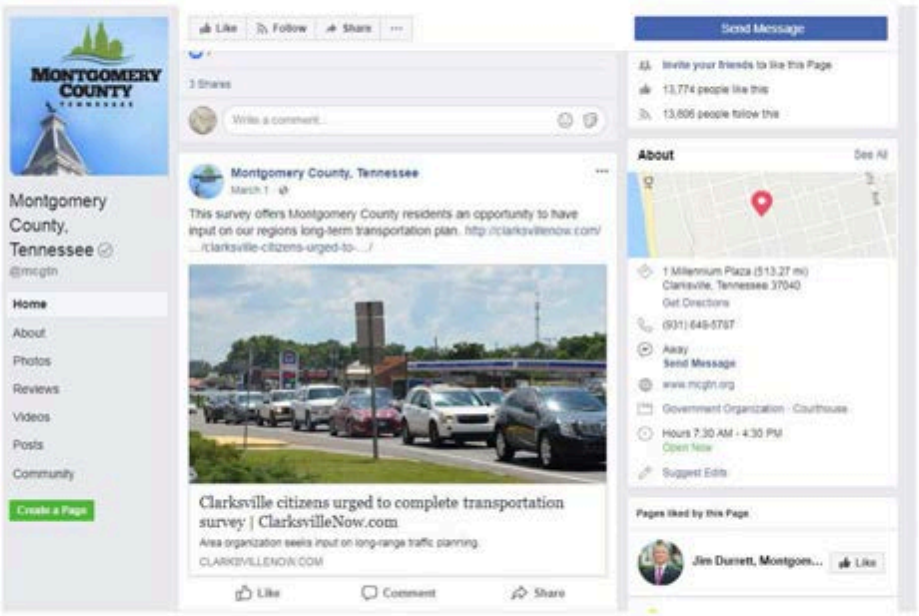
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This survey offers Montgomery County residents an opportunity to have input on our regions long-term transportation plan.
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(931) 648-8482
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Home › comm › Citizens urged to complete transportation survey

Citizens urged to complete transportation survey

Clarksville area organization seeks input on long-range traffic planning.

CLARKSVILLE, Tenn. — The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) is asking Tennessee and Kentucky residents in the Clarksville region to provide input on how they will connect to each other and the world and what transportation system improvements are needed to make those connections safe and reliable by the year 2045.

As part of the federally required planning work, the CUAMPO is developing a long-range transportation plan with a 20-plus year future view called the Metropolitan Transportation Plan (MTP).

In preparation for the 2045 MTP, the CUAMPO wants to hear the thoughts of residents concerning important transportation issues in the Clarksville Urbanized Area. From Feb. 19 to March 23, CUAMPO will conduct a community-wide survey to capture that information.

"The public's responses to this survey are vitally important in the development of a transportation plan that can help everyone travel safely and efficiently in the Clarksville region in the years ahead," said Stan Williams, CUAMPO Director. "We want to hear about transportation issues and concerns such as congestion, safety, access to transit, and funding."

The survey can be accessed at https://www.surveymonkey.com/r/ClarksvilleMTP. It takes approximately 10-15 minutes to complete. Since privacy is important, individual responses will not be shared. Requests for information about the survey and the 2045 MTP may be directed to Stan Williams, CUAMPO Director, by email at stan.williams@cityofclarksville.com or by phone at 931-645-7448.

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Announcement for Draft MTP Public Meetings

CLARKSVILLE URBANIZED AREA
METROPOLITAN PLANNING ORGANIZATION

Stan Williams
MPO Director
stanwilliams@cityofclarksville.com

329 MAIN STREET
CLARKSVILLE, TN 37040
PHONE: (931)645-7448

Jill Hall
Transportation Planner
jhall@cityofclarksville.com

November 2nd, 2018

Re: Clarksville Area Stakeholder Consultation Meeting - Invitation
December 3rd and 4th, 2018

Dear Stakeholder:

The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO); which is the regional transportation planning agency for the urbanized area of Clarksville and Montgomery County, Tennessee; the City of Oak Grove, Kentucky; and portions of Hopkinsville and Christian County, Kentucky, will be hosting a series of stakeholder meetings December 3rd and December 4th. The purpose of the meetings is to receive input from various federal, state, and local agencies that have an interest in the growth, development, transportation, safety, mobility, economic development, conservation, and/or other aspects related to the MPO's transportation planning process.

The MPO will be hosting two meetings: one on the Kentucky side of the MPO's study area on Monday December 3rd, 2018 (largely geared toward those entities involved in and/or responsible for efforts on the Kentucky side of the MPO study area), and one on the Tennessee side of the MPO's study area on Tuesday, December 4th, 2018 (largely geared towards those entities involved in and/or responsible for efforts on the Tennessee side of the MPO study area).

The intent of these meetings is to solicit input and comments from your agency on the region's Draft Metropolitan Transportation Plan (MTP) and Draft Conformity Determination Report (CDR).

The date, time, and location of each meeting are provided below. We look forward to seeing you at one of these meetings. If you are unable to attend or send a representative from your agency, please feel free to visit the MPO's website (www.cuampo.com) to access information on the MPO's current plans and the Draft 2045 MTP and Draft CDR. You are also encouraged to send any comments to the MPO via email at the email addresses above or by mail.

City of Oak Grove, KY - City Hall
8505 Pembroke/Oak Grove Rd
Oak Grove, KY
December 3rd, 2018 - 5:00PM to 7:00PM

Clarksville/Montgomery County - Public Library
350 Pageant Lane
Clarksville, TN
December 4th, 2018 - 5:00PM to 7:00PM

The draft document will be available for public review and comment from November 30th, 2018 to December 31st, 2018.

We thank you for your continued support for making the Clarksville area a more livable and sustainable community and we look forward to working with you in the future as we develop our plans for tomorrow.

Sincerely,

J. Stan Williams
MPO Planning Director

CLARKSVILLE URBANIZED AREA
METROPOLITAN PLANNING ORGANIZATION

Stan Williams
MPO Director
stanwilliams@cityofclarksville.com

329 MAIN STREET
CLARKSVILLE, TN 37040
PHONE: (931)645-7448

Jill Hall
Transportation Planner
jhall@cityofclarksville.com

November 1, 2018

Dear Sir/Ma'am:

Please display the enclosed Public Meeting Notice Flyer on your bulletin board or where everyone will see it. Public participation and comments will aid in the development of the Long Range Transportation Plan Update for the Clarksville Urbanized Area MPO. This plan serves as a blueprint for transportation investments on streets and highways, transit, sidewalks, bike paths, airports, railroads and waterways in the Clarksville region.

Thank you for your assistance in this matter.

Sincerely,

J. Stan Williams
Transportation Planning Director

Notice of Public Meeting

The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) which is responsible for transportation planning for the area that includes Clarksville/Montgomery County, Oak Grove and southern Christian County, will be hosting public meetings on December 3, 2018, from 5:00 – 7:00 pm at the Oak Grove City Hall, 8505 Pembroke Rd., Oak Grove, KY and December 4, 2018, from 5:00 – 7:00 pm at the Montgomery County Public Library, 350 Pageant Ln. Ste. 501, Clarksville, TN.

The purpose of the meetings is to present the Draft 2045 Metropolitan Transportation Plan (MTP) and solicit comments and suggestions on needed transportation improvements in the region, both short and long term. The MTP serves as a blueprint for investments on streets and highways, public transportation, sidewalks and bike path as well as for airports, railroads and waterways within the region.

Public comment period is from November 30th thru December 31st, 2018. Documents are available for public review during normal business hours at the Regional Planning Commission, 329 Main St. Clarksville; Oak Grove City Hall; Hopkinsville City Hall, 101 N. Main St; Ft. Campbell Library, 38 Screaming Eagle Blvd; Montgomery County Library and also available at www.cuampo.com home page. Individuals unable to attend the meetings are encouraged to provide written comments via email at stanwilliams@cityofclarksville.com or jillhall@cityofclarksville.com and/or mail to MPO, 329 Main St, Clarksville, TN 37040.

In accordance with the "Americans with Disabilities Act", if you have a disability, for which the MPO needs to provide accommodations, please notify us of your requirements at least 3 days before the meeting. This request does not have to be in writing. It is the policy of the MPO to ensure compliance with Title VI of the Civil Rights Act of 1964; 49 CFP part26; No person shall be excluded from participation in or be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal funds on the grounds of Race, Color, Sex or National Origin.

Aviso de reunión pública

La Organización de Planificación Metropolitana del Área Urbanizada de Clarksville (CUAMPO, por sus siglas en inglés), que es responsable de la planificación del transporte en el área que incluye los condados de Clarksville / Montgomery, Oak Grove y Southern Christian, celebrará reuniones públicas el 3 de diciembre de 2018, de 5:00 a 7 : 00 pm en el Ayuntamiento de Oak Grove, 8505 Pembroke Rd., Oak Grove, KY y 4 de diciembre de 2018, de 5:00 a 7:00 pm en la Biblioteca Pública del Condado de Montgomery, 350 Pageant Ln. Ste. 501, Clarksville, TN.

El propósito de las reuniones es presentar el Borrador del Plan de Transporte Metropolitano (MTP) 2045 y solicitar comentarios y sugerencias sobre las mejoras de transporte necesarias en la región, tanto a corto como a largo plazo. El MTP sirve como modelo para inversiones en calles y autopistas, transporte público, aceras y carriles para bicicletas, así como para aeropuertos, ferrocarriles y vías fluviales dentro de la región.

El período de comentarios públicos es del 30 de noviembre al 31 de diciembre de 2018. Los documentos están disponibles para revisión pública durante las horas normales de oficina en la Comisión de Planificación Regional, 329 Main St. Clarksville; Ayuntamiento de Oak Grove; Ayuntamiento de Hopkinsville, 101 N. Main St; Pie. Campbell Library, 38 Screaming Eagle Blvd; Biblioteca del Condado de Montgomery y también disponible en la página de inicio de www.cuampo.com. Se alienta a las personas que no pueden asistir a las reuniones a que envíen comentarios por escrito a través del correo electrónico stanwilliams@cityofclarksville.com o jillhall@cityofclarksville.com y / o envíen un correo electrónico a MPO, 329 Main St, Clarksville, TN 37040.

De acuerdo con la "Ley de Estadounidenses con Discapacidades", si tiene una discapacidad para la cual la MPO debe proporcionar adaptaciones, notifíquenos sus requisitos al menos 3 días antes de la reunión. Esta solicitud no tiene que ser por escrito. Es la política de la MPO garantizar el cumplimiento con el Título VI de la Ley de Derechos Civiles de 1964; 49 CFP part26; Ninguna persona será excluida de participar o se le negarán los beneficios, ni será objeto de discriminación en ningún programa o actividad que reciba fondos federales por motivos de raza, color, sexo u origen nacional.

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

MPO Public Meeting Dec 3rd & 4th to comment on Draft 2045 MTP

1 message

Jill Hall <jill.hall@cityofclarksville.com> Fri, Nov 2, 2018 at 10:24 AM
To: Angela Leonard <angela.l.leonard2.civ@mail.mil>, Arthur Bing <arthur.bing@cityofclarksville.com>, Bernadette Dupont <bernadette.dupont@dot.gov>, Brian Collins <bcollins@gnrc.org>, "C. Green" <cgreen@comdev-services.com>, "Caisey C Ramsey-Johnson (KYTC)" <caisey.ramseyjohnson@ky.gov>, Chris Brown <christopher.j.brown2@us.army.mil>, "Cowan, Chris" <chris.cowan@cityofclarksville.com>, Craig Morris <craig.morris@ky.gov>, Danielle Hagewood <danielle.hagewood@tn.gov>, Debbie Gentry <dlgentry@montgomerycountytn.org>, Deborah Fleming <deborah.fleming@tn.gov>, Delores Townsend <delores.townsend@tn.gov>, Deneatra Henderson <Deneatra.Henderson@ky.gov>, Denise Baker <denise.baker@tn.gov>, Dianna Myers <myers.dianna@epa.gov>, "Frazier, Jack" <jack.frazier@cityofclarksville.com>, Jason Orange <jason.orange@ky.gov>, Jeff Simpson <jsimpson@mchra.com>, Jeff Truitt <jmtruitt@mcgtn.net>, Jeffrey Tyndall <jeffrey.tyndall@cityofclarksville.com>, John Mahre <mahres@aol.com>, Jonathan Russell <jonathan.russell@tn.gov>, Justin Harrod <justin.harrod@ky.gov>, KB Aboagye <kwabena.aboagye@tn.gov>, Kimery Grant <kimery.grant@tn.gov>, Larry McGoogin <larry.mcgoogin@tn.gov>, Linda Tidwell <linda.tidwell@tn.gov>, Marc Corrigan <marc.corrigan@tn.gov>, "Maridely M Loyselle (KYTC)" <Maridely.Loyselle@ky.gov>, Mary Connelly <mconnelly@gnrc.org>, Mike Frost <rmfrost@mcgtn.net>, Misty Cutshall <cutshallm@oakgroveky.org>, Nick Hall <nick.hall@ky.gov>, Nick Powell <nbpowell@mcgtn.net>, Pamela Sharp <pamela.sharp@tn.gov>, Patty Lockard <patrica.ann.lockard@us.army.mil>, Rick Johnson <rick.johnson@rjcorman.com>, Scott Allen <scott.allen@dot.gov>, "Sean Santalla (FHWA)" <sean.santalla@dot.gov>, Shane Hester <Shane.Hester@tn.gov>, "Shepard, David" <dshepard@cityofclarksville.com>, Steve Bourne <sbourne@comdev-services.com>, Steve Ross <steve.ross@ky.gov>, Tabitha Martin <tabitha.martin@ky.gov>, Tara Walker <tara.walker@ky.gov>, "Taylor M. Lee" <Taylor.M.Lee@tn.gov>, Thomas Witt <thomas.witt@ky.gov>, Whitney Britt <whitney.britt@tn.gov>, Craig Casper <CCasper@gnrc.org>, Ian Preston <Ian.Preston@tn.gov>, Kim McMillan <kim.mcmillan@cityofclarksville.com>, Mayor Durrett <mayordurrett@mcgtn.net>
Cc: Stan Williams <stan.williams@cityofclarksville.com>

To All:
The Clarksville MPO is having a Public Meeting on Dec 3rd and Dec 4th to present and to solicit comments on the Draft 2045 Metropolitan Transportation Plan . All of the documents can be found on www.cuampo.com home page. I've attached the stakeholder letter for you and also a flyer for you to post for the public to view.

Please post the attached flyer in your office and/or on your website/facebook page.

Thank you for your assistance!

Sincerely,
Jill Hall
Clarksville MPO
931-645-7448

2 attachments

StkhlderLetterPublicMtg110218- NSI Markup.docx
74K

EJFLyerEnglishSpanish110118.docx
16K

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

Please add the attached flier to your website and facebook page for the MPO's Public Meeting

1 message

Jill Hall <jill.hall@cityofclarksville.com> Thu, Nov 1, 2018 at 2:44 PM
To: Richard Stevens <richard.stevens@cityofclarksville.com>, "Michelle A. Newell" <Manewell@mcgtn.net>
Cc: Stan Williams <stan.williams@cityofclarksville.com>

Michelle/Richard,
The Clarksville MPO is having a Public Meeting for comments on the Draft 2045 Metropolitan Transportation Plan and the Draft Conformity Determination Plan (air quality analysis). All of the documents can be found on our website www.cuampo.com .

Will you please add the attached flier to your website and facebook page and label it "Clarksville MPO Public Meeting Dec 3rd and 4th on Draft 2045 MTP and Draft CDR"?

Thank you,
Jill Hall
Clarksville MPO
931-645-7448

EJFLyerEnglishSpanish110118.docx
16K

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

Please add the attached flyer to your website/facebook page for MPO Public Meeting

1 message

Jill Hall <jill.hall@cityofclarksville.com> Thu, Nov 1, 2018 at 2:48 PM
To: Chris Brown <christopher.j.brown2@us.army.mil>, Misty Cutshall <cutshallm@oakgroveky.org>, Steve Bourne <sbourne@comdev-services.com>, John Mahre <mahres@aol.com>
Cc: Stan Williams <stan.williams@cityofclarksville.com>

All:
The Clarksville MPO is having a Public Meeting for comments on the Draft 2045 Metropolitan Transportation Plan and the Draft Conformity Determination Plan (air quality analysis). All of the documents can be found on our website www.cuampo.com .

Will you please add the attached flier to your website and facebook page and label it "Clarksville MPO Public Meeting Dec 3rd and 4th on Draft 2045 MTP and Draft CDR"?

Thank you,
Jill Hall
Clarksville MPO
931-645-7448

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11/2/2018 City of Clarksville Mail - Please post the attached flyer in your office for Public Meeting Dec 3rd and 4th

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

Please post the attached flyer in your office for Public Meeting Dec 3rd and 4th

2 messages

Jill Hall <jill.hall@cityofclarksville.com> Thu, Nov 1, 2018 at 2:30 PM
To: Keith Lampkin <keith.lampkin@cityofclarksville.com>, ln516bsa@yahoo.com, singletong@apsu.edu, aacc@apsu.edu, hcc <hcc@apsu.edu>, Contact <jimmie.garland@hotmail.com>
Cc: Stan Williams <stan.williams@cityofclarksville.com>

The Clarksville MPO is having a Public Meeting on Dec 3rd and Dec 4th for comments on the Draft 2045 Metropolitan Transportation Plan and the Draft Conformity Determination Report (air quality analysis). All of the documents can be found on www.cuampo.com home page.

Please post the attached flyer in your office and on your website/facebook page.

Thank you for your assistance!

Sincerely,
Jill Hall
Clarksville MPO
931-645-7448

EJFLyerEnglishSpanish110118.docx
16K

Keith Lampkin <keith.lampkin@cityofclarksville.com> Thu, Nov 1, 2018 at 3:53 PM
To: jill.hall@cityofclarksville.com
Cc: ln516bsa@yahoo.com, singletong@apsu.edu, aacc@apsu.edu, hcc@apsu.edu, Jimmie Garland SR <jimmie.garland@hotmail.com>, Stan Williams <stan.williams@cityofclarksville.com>

Will do, thanks!
[Quoted text hidden]
--

Keith D. Lampkin
Director
One Public Square
Suite 201
Clarksville, TN 37040-3463
931-648-6144 work
931-449-0273 cell
931-503-3092 fax

http://www.cityofclarksville.com/index.aspx?page=170

6B ▮ FRIDAY, NOVEMBER, 2, 2018. ▮ THE LEAF- CHRONICLE

THE LEAF-CHRONICLE

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0003215286
NOTICE OF RESOLUTION VIOLATION
DATE: OCTOBER 10, 2018
NAME: BRENDA BROWN
PROPERTY ADDRESS: 1312 SHADY LAWN DRIVE MONTGOMERY COUNTY
TAX MAP: 089E A PARCEL: 00800.000
Your hereby notified that the above-described property is in violation of the Montgomery County Resolution 96-7-3 and the Tennessee Code Annotated 5-1-115, which states, in part that, "every owner of real property shall keep such property free of accumulating debris, garbage, litter; refuse and rubbish. Further, every record owner of real property is hereby charged with the duty of disposing of any accumulating debris, garbage, litter, refuse or rubbish in a lawful manner." You are entitled to a hearing on this matter and may request a hearing within ten (10) days of receipt of this notice by bringing copy of this notice to the Montgomery County and Codes Department at 350 Pageant Lane, Suite 309. Failure to make a request for a hearing within ten (10) days shall without exception constitutes a waiver of the right to a hearing.
Failure to remedy the conditions of the property within ten (10) days of receiving this notice will result in the Montgomery County Building and Codes Committee. To immediately, cause the condition to remedy at a cost of $ 1207.00
Failure to reimburse the County within sixty (60) days for the cost incurred shall constitute a lien upon the property that shall be filed in the Register of Deeds office of Montgomery

(931) 648-5718
0003230185
Notice of Public Meeting
The Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) which is responsible for transportation planning for the area that includes Clarksville, Montgomery County, Oak Grove and southern Christian County, will be hosting public meetings on December 3, 2018, from 5:00 - 7:00 pm at the Oak Grove City Hall, 8505 Pembroke Rd., Oak Grove, KY and December 4, 2018, from 5:00 - 7:00 pm at the Montgomery County Public Library, 350 Pageant Ln. Ste. 501, Clarksville, TN.
The purpose of the meetings is to present the Draft 2045 Metropolitan Transportation Plan (MTP) and solicit comments and suggestions on needed transportation improvements in the region, both short and long term. The MTP serves as a blueprint for investments on streets and highways, public transportation, sidewalks and bike paths, as well as for airports, railroads and waterways within the region.
Public comment period is from November 30th thru December 31st, 2018. Documents are available for public review during normal business hours at the Regional Planning Commission, 329 Main St. Clarksville; Oak Grove City Hall; Hopkinsville City Hall, 101 N. Main St; Ft. Campbell Library, 38 Screaming Eagle Blvd; Montgomery County Library and also available at www.cuampo.com home page. Individuals unable to attend the meetings are encouraged to provide written comments via email at stanwilliams@cityofclarksville.com or lillhall@cityofclarksvill e.com and/or mail to MPO, 329 Main St. Clarksville, TN 37040.
In accordance with the "Americans with Disabilities Act", if you have a disability, for which the MPO needs to provide accommodations, please notify us of your requirements at least 3 days before the meeting. This request does not have to be in writing. It is the policy of the MPO to ensure compliance with Title VI of the Civil Rights Act of 1964; 49 CFR part26; No person shall be excluded from participation in or be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal funds on the grounds of Race, Color, Sex or National Origin.

American Storage, 1830 Ashland City Rd, Clarksville, TN, 37043. Telephone #: 931-645-0567.
Unit #117-Devin Henry, Unit #138-Joshua James, Unit #172 D. Dean Drad, Unit #187 Harry Hill, Unit #206-Matthew Edington, Unit #231-Joshua James, Unit #267-Bonnie Dailey, Unit #323-Jammie Milam, Unit #326-Glenna Minard, Unit #345-Alora Chance, Unit #555-Ted Castleberry, Unit #645-Gloria Neale Winters, Unit #675-Edgar Cornett, Unit #808-Sandy Drinnon.
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Charlotte, Multi-family Garage Sale Rain or Shine, 4140 Hwy 48N, November 3&3, 8-3. Name brand clothes infant thru adult, toys in excellent condition, furniture, jewelry, Wii games, new bedding sets, DVDs. All priced to sell

Montgomery County

ESTATE SALE
830 Stafford St, Clarksville, TN 37040
Sat 11/3 & Sun 11/4, 9am-4pm.
Corvette, NIB items, antique furniture, Christmas items, Pokémon, dolls furniture, grill, tools & more!
To see pictures visit NationalEstateCompany.com

Clarksville- 1480 Dr Meade Ln (Old Plantation Estates). Yard Sale! Sat 11/3 8am-2pm.

MULTI-PARTY INDOOR SALE! 331-E Union St., off Madison St. left o Habitat ReStore, Fri- Sat 11/2-3 ...Items priced to se

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Getting Married?
Joe L. Creek

AVISO DE REUNIÓN PÚBLICA

La **Organización de Planificación Metropolitana del Área Urbanizada de Clarksville** (CUAMPO, por sus siglas en inglés), que es responsable de la planificación del transporte para el área que incluye los condados de Clarksville / Montgomery, Oak Grove y Southern Christian, celebrará reuniones públicas el **3 de diciembre de 2018, de 5:00 a 7 : 00 pm** en el Ayuntamiento de Oak Grove, 8505 Pembroke Rd., Oak Grove, KY y 4 de diciembre de 2018, de 5:00 a 7:00 pm en la Biblioteca Pública del Condado de Montgomery, 350 Pageant Ln. Ste. 501, Clarksville, TN.

El propósito de las reuniones es presentar el **Proyecto de Plan de Transporte Metropolitano 2045 (MTP)** y solicitar comentarios y sugerencias sobre las mejoras de transporte necesarias en la región, tanto a corto como a largo plazo. El MTP sirve como modelo para las inversiones en calles y autopistas, transporte público, aceras y carriles para bicicletas, así como para aeropuertos, ferrocarriles y vías fluviales dentro de la región.

El período de comentarios públicos es del **30 de noviembre al 31 de diciembre de 2018.** Los documentos están disponibles para revisión pública durante el horario comercial normal en la Comisión de Planificación Regional, 329 Main St. Clarksville; Ayuntamiento de Oak Grove; Ayuntamiento de Hopkinsville, 101 N. Main St; Pie. Campbell Library, 38 Screaming Eagle Blvd; Biblioteca del Condado de Montgomery y también disponible en la página de Inicio de www.cuampo.com. Se alienta a las personas que no pueden asistir a las reuniones a que envíen comentarios por escrito a través del correo electrónico stanwilliams@cityofclarksville.com o jillhall@cityofclarksville.com y / o envíen un correo electrónico a MPO, 329 Main St, Clarksville, TN 37040.

De acuerdo con la "Ley de Estadounidenses con Discapacidades", si tiene una discapacidad, para la cual la MPO debe proporcionar adaptaciones, notifíquenos sus requisitos al menos 3 días antes de la reunión. Esta solicitud no tiene que ser por escrito. Es la política de la MPO garantizar el cumplimiento del Título VI de la Ley de Derechos Civiles de 1964; 49 CFP part26; Ninguna persona será excluida de participar o se le negarán los beneficios, ni será objeto de discriminación en ningún programa o actividad que reciba fondos federales por motivos de raza, color, sexo u origen nacional.

durante toda su vida. El Sr. Ronan no solo tenía un alto grado de miopía, sino también astigmatismo, que distorsionó su visión. Sin corrección, su visión era peor que la ceguera legal. El Sr. Ronan dijo que estaba realmente emocionado de ser el primer paciente en el estado en recibir el nuevo y moderno procedimiento de astigmatismo SONRISA.

El Dr. Wang, graduado de Harvard & MIT (MD, magna cum laude) y uno de los

lucro que hasta la fecha ha

Para obtener información sobre el nuevo tratamiento de astigmatismo con SMILE en Wang Vision, visite www.wangcataract-LASIK.com, llame al 615-321-8881 o envíe un correo electrónico al Dr. Wang a drwang@wangvisioninstitute.com. Wang Vision 3D Cataract & LASIK Center, 1801 West End Ave, Ste. 1150, Nashville, TN, 37203, 615-321-8881, 615-321-8874 (fax).

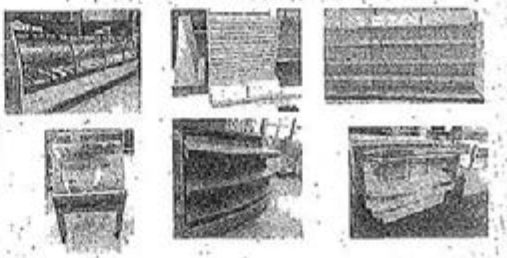
GRAN

REMATE!!!!!

DE MOBILIARIO Y EQUIPO

PARA MERCADO ,OFICINA ,

TIENDA DE ROPA, ETC.



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Hopkinsville, KY 42240

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Clarksville, TN 37040

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200 Airport Road
Clarksville, TN 37042

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Oak Grove, KY 42262

Montgomery Co Hwy Dept.
1213 Highway Drive
Clarksville, TN 37040

Hopkinsville Street Dept
101 N. Main Street
Hopkinsville, KY 42240

Christian County Road Dept.
Russellville Road
Hopkinsville, KY 42240

Special Interest Group:

Tenn Vocational Rehabilitation District Office	1575 Corporate Pkwy Blvd	Clarksville, TN 37040
Montgomery County WIC Clinic	300 Pageant Lane	Clarksville, TN 37040
Mid-Cumberland Human Resource Agency	350 Pageant Lane, Ste. 402	Clarksville, TN 37040
Goodwill Industries of Middle Tennessee	1592 Ft. Campbell Blvd.	Clarksville, TN 37042
Department of Human Services - Montgomery County Office	350 Pageant Lane, Suite 301	Clarksville, TN 37040
Army Career Alumni Program – ACAP	5661 Screaming Eagle Blvd.	Ft. Campbell, KY 42223
Adult Literacy Council	430 Greenwood Ave.	Clarksville, TN 37040
Workforce Essentials, Inc	523 Madison Street, Suite A	Clarksville, TN 37040
Senior Citizen Center	953 Clark Street	Clarksville, TN
Montgomery Health Department	330 Pageant Lane	Clarksville, TN 37040
Montgomery Veterans Service Transportation	350 Pageant Lane	Clarksville,TN 37040
Pennyrile Allied Community Services	1100 Liberty Street	Hopkinsville, KY 42240

Tenn Rehabilitation Center
1241 Highway Drive
Clarksville, TN 37040

101st Airborne Cab
3025 Ft Campbell Blvd, Ste A
Clarksville, TN 37042

Crown Cab
1119 E College St
Clarksville, TN 37040

ABC Veteran Cab
502 Providence Blvd
Clarksville, TN 37042

Old Firehouse Day Shelter
1498 Golf Club Lane
Clarksville, TN 37040

Tenn Dept of Labor and Workforce Dev
523 Madison Street, Suite B
Clarksville, TN 37040

Clarksville Housing Authority
721 Richardson Street
Clarksville, TN 37040

Wheel Me On
35 Covington Street
Clarksville TN 37040

DMC Transportation Service
725 International Blvd
Clarksville, TN 37040

Gateway Transport Inc
3250 Old Hwy 48
Clarksville, TN 37040

Greenfield Trucking Inc
1500 Wilma Rudolph Blvd
Clarksville, TN 37040

Griffy Trucking Inc
249 Needmore Road
Clarksville, TN 37040

Hall's LTL Service LLC
3756 N. Jot Dr
Clarksville, TN 37040

Hollis and Hollis Group Inc
9 Quarry Rd
Clarksville, TN 37042

Melendez Transport
3908 Tyler Brown Drive
Clarksville, TN 37040

Ohio Valley Transportation
750 Economy Drive
Clarksville, TN 37043

Queen City Inc
1309 Tylertown Rd
Clarksville, TN 37040

St. Bethlehem Trucking Co
191 Terminal Rd
Clarksville, TN 37040

Winn Trucking
486 Barge Point Rd
Clarksville, TN 37042

Ingram Materials
610 S. Riverside Drive
Clarksville, TN 37040

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Nicholasville, KY 40340

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11 Jefferson Street
Clarksville, TN 37040

Environmental Consulting Agency Stakeholders:

DNR Div. of Forestry
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Frankfort, KY 40601

Dept for Environmental Protection
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Div of Waste Management
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Dept for Environmental Protection
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Leslie.isaman@ky.gov email also

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KY Div of Forestry
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PO Box 465
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KY Div. of Historic Properties
The Vest-Lindsey House
401 Wapping Street
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KY Geological Survey
228 Mining and Mineral Resources Building
University of Kentucky
Lexington, KY 40506

KY Heritage Council/ State Historic Preservation
300 Washington Street
Frankfort, KY 40601

Corps of Engineers, Louisville District
PO Box 59
Louisville, KY 40201

Corp of Engineers, Nashville District
PO Box 1070
Nashville, TN 37202

US Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501

US EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

TN Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

National Park Service, SE Regional Office
100 Alabama Street SW
1924 Building
Atlanta, GA 30303

USDA Forest Service, Region 8
1720 Peachtree Road NW
Atlanta, GA 30309

US Coast Guard, Eighth District
Hale Boggs Federal Building
500 Poydras Street
New Orleans, LA 70130

TN Dept. of Environment and Conservation
L&C Annex, 1st floor
401 Church Street
Nashville, TN 37243

TN State Historic Preservation Office
2941 Lebanon Road
Nashville, TN 37243

TN Wildlife Resources Agency
Ellington Agricultural Center
440 Hogan Road
Nashville, TN 37204

Greater Nashville Regional Council
501 Union Street, 6th floor
Nashville, TN 37219

Pennyrile Area Develop District
300 Hammond Drive
Hopkinsville, KY 42240

City of Clarksville Street Dept.
199 Tenth Street
Clarksville, TN 37040

Regional Airport Authority
James Outlaw Field
200 Airport Road
Clarksville, TN 37042

Hopkinsville Street Dept
101 N. Main Street
Hopkinsville, KY 42240

Christian County Road Dept.
2701 Russellville Road
Hopkinsville, KY 42240

Forestry Division
1030 Cumberland Heights Road
Clarksville, TN 37040

Natural Resources Conservation
1104 N. Main St.
Ashland City, TN 37015

EJ Mailing List

Clarksville Family Bible Church
1005 South Riverside Drive
Clarksville, TN 37040

Beautiful Savior Lutheran Church
2526 Whitfield Road
Clarksville, TN 37040

Bethel Community Church
1885 Tiny Town Road
Clarksville, TN 37042

Apostolic Faith Tabernacle
1470 Golf Club Lane
Clarksville, TN 37040

Christian Fellowship Flock Church
1290 Patton Place
Oak Grove, KY 42262

Pentecostal Church of Clarksville
1166 Fort Campbell Boulevard
Clarksville, TN 37042

First Assembly of God
1186 Fort Campbell Boulevard
Clarksville, TN 37042

Ephesus Seventh Day Adventist Church
931 Cumberland Drive
Clarksville, TN 37040

Montgomery Christian Academy
1186 Fort Campbell Boulevard
Clarksville, TN 37042

Kenwood Baptist Church
992 Peachers Mill Road
Clarksville, TN 37042

Abundant Life Outreach Center
119 Chapel Street
Clarksville, TN 37042

St Matthew AME Church
1560 Rossview Road
Clarksville, TN 37043

Remnant of God Christian Outreach Fellowship Church
1208 Paradise Hill Road
Clarksville, TN 37040

Faith Mission Ministries Inc
1215B Fort Campbell Boulevard
Clarksville, TN 37042

Church of Christ
523 Madison Street
Clarksville, TN 37040

Christ Presbyterian Church
1230 Rossview Road
Clarksville, TN 37043

New Hope Presbyterian Church
1231 Tiny Town Road
Clarksville, TN 37042

Word of Life Ministries
1236 Vine Street
Clarksville, TN 37040

Willow Bend Church
1240 Northfield Drive
Clarksville, TN 37040

9th and Main Church of Christ
127 9th Street
Clarksville, TN 37040

Abundant Life Outreach Center Kingdom Care
127 E Street
Clarksville, TN 37042

Christ the Healer Church
1295 Paradise Hill Road
Clarksville, TN 37040

New Hope Baptist Church
1300 Rossview Road
Clarksville, TN 37043

Abundant Faith Church
1303 Fort Campbell Boulevard
Clarksville, TN 37042

Cumberland Presbyterian Church-New Providence
1307 Fort Campbell Boulevard
Clarksville, TN 37042

Ebenezer AME Church
131 Edmondson Ferry Road
Clarksville, TN 37040

Church of Christ
421 New Providence Blvd
Clarksville, TN 37042

New Providence United Methodist Church
1317 Fort Campbell Boulevard
Clarksville, TN 37042

Temple Baptist Church
1600 Zinc Plant Road
Clarksville, TN 37040

Walnut Grove Missionary Baptist Church
1616 Walnut Grove Road
Clarksville, TN 37042

Marantha Baptist Church
205 Stateline Road
Oak Grove, KY 42262

Ogburn Chapel Baptist Church
1660 Ogburn Chapel Road
Clarksville, TN 37042

New Galilean Baptist Church
130 S. 10th Street
Clarksville, TN 37040

Jehovah's Witnesses
1747 Ashland City Road
Clarksville, TN 37043

Hilldale United Methodist Church
1751 Madison Street
Clarksville, TN 37043

Glory Worship Center
1166 Fort Campbell Blvd
Clarksville, TN 37042

Reconciliation Christian Church
1485 Golf Club Lane
Clarksville, TN 37040

St John Missionary Baptist Church
1833 Tiny Town Road
Clarksville, TN 37042

Chapel of Holy Spirit
1856 Memorial Drive
Clarksville, TN 37043

North Tennessee Bible Institute
1856 Memorial Drive
Clarksville, TN 37043

Goodness and Mercy Outreach Church
187 Hadley Drive
Clarksville, TN 37042

Pardue Memorial Free Will Baptist Church
1895 Memorial Drive
Clarksville, TN 37043

The Community Church
199 Jack Miller Boulevard
Clarksville, TN 37042
Hickory Point United Methodist Church
2001 Lock B Road North
Clarksville, TN 37043

Hilldale Baptist Church
2001 Madison Street
Clarksville, TN 37043

Fellowship Baptist Mission
201 Britton Springs Road
Clarksville, TN 37042

Little West Fork Baptist Church
201 Britton Springs Road
Clarksville, TN 37042

Mt. Hermon Baptist Church
2204 Jarrell Ridge Road
Clarksville, TN 37043

West Gate Christian Center
1810 Memorial Drive
Clarksville, TN 37043

Grace Lutheran Church
2041 Madison Street
Clarksville, TN 37043

Park Lane Church of the Nazarene
225 Cunningham Lane
Clarksville, TN 37042

Woodlawn Church of the Nazarene
2100 Dover Road
Woodlawn, TN 37191

Community First Church of God
2125 Trenton Road
Clarksville, TN 37040

The Vineyard
2182 Old Russellville Pike
Clarksville, TN 37043

Gateway Christian Church
2200 Kim Drive
Clarksville, TN 37043

St Bethlehem United Methodist Church
2201 Old Russellville Pike
Clarksville, TN 37040

Fellowship UMC
2201 Peachers Mill Road
Clarksville, TN 37042

Baptist Collegiate Ministry
306 Drane Street
Clarksville, TN 37040

Spring Hill Missionary Baptist Church
221 Oak Street
Clarksville, TN 37042

Greenhill Missionary Baptist Church
311 Walker Street
Clarksville, TN 37042

First Baptist Church of St Bethlehem
2232 Wilma Rudolph Boulevard
Clarksville, TN 37040

Grace Church of the Nazarene
3135 Trenton Road
Clarksville, TN 37040

Little Hope Baptist Church
225 Little Hope Road
Clarksville, TN 37043

Trinity Episcopal Church
317 Franklin Street
Clarksville, TN 37040

Salem United Methodist Church
2269 Seven Mile Ferry Road
Clarksville, TN 37040

Sango United Methodist Church
3301 Sango Road
Clarksville, TN 37043

Evangelic Temple Church Of God
230 Oak Street
Clarksville, TN 37042

Oakland Church of Christ
3365 Guthrie Highway
Clarksville, TN 37040

Fountain Gate Ministries Inc
2272 Pea Ridge Road
Clarksville, TN 37040

Concord Baptist Church
2411 Peachers Mill Road
Clarksville, TN 37042

Greater New Birth Jerusalem Ministries Inc
244 Burch Road
Clarksville, TN 37042

New Jerusalem Five Fold Ministries
1331 Crossland Avenue
Clarksville, TN 37040

Memorial Baptist Church
2450 Highway 48
Clarksville, TN 37040

Pleasant View Baptist Church
1388 Cumberland Heights Road
Clarksville, TN 37040

Antioch United Methodist Church
2575 Antioch Church Road
Clarksville, TN 37040

Faith Missionary Baptist Church
2590 Madison Street
Clarksville, TN 37043

Ezra Emmanuel Ministries
2606 Union Hall Road
Clarksville, TN 37040

Fairhaven Church
2687 Tiny Town Road
Clarksville, TN 37042

Nevel Chapel Baptist Church
2720 Memorial Drive Extension
Clarksville, TN 37043

First Missionary Baptist Church
301 Fairview Lane
Clarksville, TN 37040

Spring Creek Baptist Church
2760 Trenton Road
Clarksville, TN 37040

St Bethlehem Christian Church
280 Dunbar Cave Road
Clarksville, TN 37043

Waltons Chapel United Methodist Church
2821 North Hinton Road
Clarksville, TN 37043

Warfield Boulevard Church of Christ
290 Warfield Boulevard
Clarksville, TN 37043

Hillcrest Baptist Church
380 Dover Road
Clarksville, TN 37042

Excell Baptist Church
328 Excell Road
Clarksville, TN 37043

Tabernacle Missionary Baptist Church
303 Market Street
Clarksville, TN 37042

One Heart Baptist Church
3350 Royster Lane
Clarksville, TN 37042

McAdoo Cumberland Presbyterian Church
3724 Ashland City Road
Clarksville, TN 37043

Bethel Cumberland Presbyterian Church
3375 Sango Road
Clarksville, TN 37043

Bible Baptist Church
3102 Prospect Circle
Clarksville, TN 37043

First Baptist Church
346 Union Street
Clarksville, TN 37040

First Presbyterian Church
313 Main Street
Clarksville, TN 37040

Hour of Prayer Church of God in Christ
819 Main Street
Clarksville, TN 37040

Poston St Church of God
316 Poston Street
Clarksville, TN 37040

Greater St James Baptist Church
865 Gracey Avenue
Clarksville, TN 37040

Bethel United Methodist Church
3180 Fort Campbell Boulevard
Clarksville, TN 37042

New Way Community Church of God in Christ
809 Providence Boulevard
Clarksville, TN 37042

MT Nebo Baptist Church
Kirkwood Road
Clarksville, TN 37040

Northeast Baptist Church
Po Box 30127
Clarksville, TN 37040

Forest Street United Methodist Church
416 Church Street
Clarksville, TN 37040

New Providence Church of Christ
421 Providence Boulevard
Clarksville, TN 37042

Northside Baptist Church
428 Lafayette Road
Clarksville, TN 37042

Christ United Methodist Church
430 Walter Garrett Lane
Oak Grove, KY 42262

Christ United Methodist Church - Korean
430 Walter Garrett Lane
Oak Grove, KY 42262

First Baptist Church of Clarksville
435 Madison Street
Clarksville, TN 37040

St Michael Catholic Church
448 Stateline Road
Oak Grove, KY 42262

Greater Missionary Baptist Mission
450 Ringgold Road
Clarksville, TN 37042

Boiling Springs Baptist Church
900 Tiny Town Road
Clarksville, TN 37042

Church of God of Prophecy
Po Box 30745
Clarksville, TN 37040

Mt Pisgah Baptist Church
930 Mount Pisgah Road
Clarksville, TN 37040

Trinity Baptist Church
4924 Highway 41A South
Clarksville, TN 37043

Hilldale Church of Christ
501 Highway 76
Clarksville, TN 37043

MT Carmel United Methodist Church
5050 Pickering Road
Clarksville, TN 37043

United Methodist Church Clarksville District OFC
510 College Street
Clarksville, TN 37040

Wesley Foundation Student Center
510 College Street
Clarksville, TN 37040

First Christian Church
516 Madison Street
Clarksville, TN 37040

St Peter African Methodist Episcopal Church
518 Franklin Street
Clarksville, TN 37040

St Peter African Methodist Episcopal Church Prsnge
520 Franklin Street
Clarksville, TN 37040

Madison Street Church of Christ
523 Madison Street
Clarksville, TN 37040

Liberty Church
549 Ford Street
Clarksville, TN 37040

First Church of God
590 Magnolia Drive
Clarksville, TN 37042

House of Praise
592 Peachers Mill Road
Clarksville, TN 37042

Edgefield Baptist Church
604 East Thompkins Lane
Clarksville, TN 37043

Cross & Crown Baptist Church
605 Fallbrook Lane
Clarksville, TN 37040

Greater Love AOH Church
607 Franklin Street
Clarksville, TN 37040

Mount Olive Baptist Church - Church Office
608 Main Street
Clarksville, TN 37040

Cumberland Baptist Association
850 Highway 76
Clarksville, TN 37043

Greater Faith Temple
618 9th Street
Clarksville, TN 37040

Martin Chapel AME Church
870 Palmyra Road
Clarksville, TN 37040

Full Gospel Tennessee Church
624 Lafayette Road
Clarksville, TN 37042

All Saints Church
710 Salem Road
Clarksville, TN 37040

Williams Chapel Baptist Church
730 Needmore Road
Clarksville, TN 37040

Faith Outreach Church
731 Windermere Drive
Clarksville, TN 37043

God's Sanctuary Church
739 Madison Street
Clarksville, TN 37040

Immaculate Conception Catholic Church
740 Franklin Street
Clarksville, TN 37040

The Bible Church
760 Power Street
Clarksville, TN 37042

Church of Christ-North Second St
782 North 2nd Street
Clarksville, TN 37040

Solid Rock Full Gospel Baptist Church
785 Pembroke Oak Grove Road
Oak Grove, KY 42262

Fifth Ward Baptist Church
900 Franklin Street
Clarksville, TN 37040

Kroger
2100 Lowes Drive
Clarksville, TN 37040

Wortham's Food Town - Deli
1950 Norwood Trail
Clarksville, TN 37043

Martin's Food Store
2200 Wilma Rudolph Boulevard
Clarksville, TN 37040

Food Lion Inc 874
2306 Madison Street
Clarksville, TN 37043

Fredonia One Stop Market
4574 Ashland City Road
Clarksville, TN 37043

Nicholson's Food Market
3151 Highway 41A South
Clarksville, TN 37043

Gate 4 Cleaners & Laundry
16290 Ft Campbell Blvd
Oak Grove, KY 42266

Hilltop Super Market
400 Highway 149
Clarksville, TN 37040

Clarksville Gas & Water
2215 Madison Street
Clarksville, TN 37043

Oak Grove Utilities
8505 Pembroke Oak Grove Road
Oak Grove, KY 42262

Parks and Recreation
102 Public Square
Clarksville, TN 37040

Tennessee Immigrant and Refugee Rights Coalition
1103 Chapel Avenue
Nashville, TN 37206

African American Culture Center (APSU)
PO Box 4715
Clarksville, TN 37044

Hispanic Culture Center (APSU)
PO Box 4484
Clarksville, TN 37044

Publix
Madison Street Commons
1771 Madison St
Clarksville, TN, 37043-4990

Publix
1490 Tiny Town Rd
Clarksville, TN, 37042-7201

Walmart
2315 Madison St
Clarksville, TN 37043

Walmart
1680 Ft. Campbell Blvd
Clarksville, TN 37042

Walmart
3050 Wilma Rudolph Blvd
Clarksville, TN 37040

Walmart Neighborhood Market
216 Dover Rd
Clarksville, TN 37042

Walmart Neighborhood Market
2551 Whitfield Rd
Clarksville, TN 37040

Community of Hope Center
150 Richview Rd
Clarksville, TN 37043

Burt-Cobb Community Center
1011 Franklin Street
Clarksville, TN 37040

Kleeman Community Center
166 Cunningham Lane
Clarksville, TN 37042

Crow Community Center
211 Richview Road
Clarksville, TN 37043

Clarksville-Montgomery County Public Library
350 Pageant Lane, Suite 501
Clarksville, TN 37040

Kroger
110 Dover Crossing Road
Clarksville, TN 37042

Hang Yang Oriental Market
100 Tiny Town Road
Clarksville, TN 37042

Cahpala
1191 Fort Campbell Boulevard
Clarksville, TN 37042

Goodwill Industries of Middle Tennessee
1592 Ft. Campbell Blvd.
Clarksville, TN 37042

Mimi Asian Food Market
1358 Fort Campbell Boulevard
Clarksville, TN 37042

First United Methodist Church
909 Madison Street
Clarksville, TN 37040

El Tarasco
1412 Fort Campbell Blvd
Clarksville, TN 37042

Clarksville Department of Electricity
P.O. Box 31509
Clarksville, TN 37040

Kroger
1489 Madison Street
Clarksville, TN 37040

Save-A-Lot
1039 South Riverside Drive
Clarksville, TN 37040

Appendix D:
Clarksville Cycling Club- Transportation Bike Master Plan Requests

Street	From	To	Proposed Improvements	Connectivity	Reason
1-5 years					
Greenwood Ave	Madison	Woodmont Blvd	Sweep, retrofit, restripe & signage bike lane	Crossland Ave	2 schools and low SES-road already used for transportation, connects with existing bike route. Already wide road should convert easily
Madison St	Hwy 76	Holly Circle	Sweep, retrofit, restripe & signage bike lane	Continuation of 41 A bike lane, Hwy 76	1 school, high traffic road that is unrideable in current state, extends current bike lane, connects current bike lane. 1 school
Sango Rd	Hwy 76	Mt Carmel	New construction bike lane, signage	Hwy 76	Very high number of cyclist currently, small road that has an ever increasing volume of traffic will soon become unrideable, 2 schools
Ted Crozier	Warfield	Athletic Ave	Sweep, retrofit, restripe & signage bike lane	Warfield, Dunlop Ln	High traffic road, easy to convert wide shoulders exist, connects with existing bike lanes
Warfield/101st	Madison St	Dover Rd	Sweep, retrofit, restripe & signage bike lane	Ted Crozier	High traffic road, easy to convert wide shoulders exist, connects with proposed bike lanes
Crossland Ext	Madison	Cumberland Dr	Sweep, retrofit, restripe & signage bike lane	Greenwood, improving existing bike route	1 school, easy to convert wide ride, becomes an alternate to traveling on Madison street..already a bike route that needs upgrades.
Hwy 79/ Dover Rd	Providence Blvd	Mont. County line	Sweep, retrofit, restripe & signage bike lane	101st/Warfield	High traffic road, easy to convert wide shoulders exist, connects with proposed bike lanes
Memorial Dr.	Warfield	Madison	Sweep, retrofit, restripe & signage bike lane	Warfield, Madison	High traffic road, easy to convert wide road exist, connects with proposed bike lanes
48/13	Riverside	Hwy 149	New construction bike lane, signage*	Riverside, Hwy 149	New construction will soon be happening..currently unrideable, gives cyclist access to county roads and existing bike route
5-10 years					

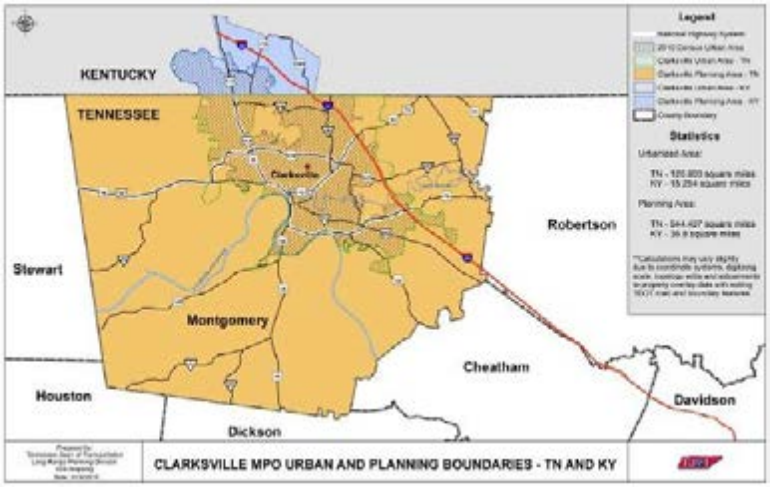
continued

Street	From	To	Proposed Improvements	Connectivity	Reason
Dunbar Cave	Wilma Rudolph	Warfield	Multipurpose path	Warfield	High traffic road that is currently unrideable. Gives opportunity for recreation and transportation, connection to Dunbar Cave state park
Trenton Rd	Tylertown	Wilma Rudolph	New construction bike lane, signage*	Tiny Town, 101st	High traffic road that is currently unrideable. Connects to current and proposed bike lanes
41A/Ft. Campbell Blvd	Riverside	I24	Multipurpose path	Riverside, Kraft St. Lafyette	High traffic road that is currently unrideable. Connects to current and proposed bike lanes.
College St	Red River Bridge	Riverside	Sweep, retrofit, restripe & signage bike lane	Riverside, Kraft St.	High traffic road that is currently unrideable. Connects to current and proposed bike lanes
Wilma Rudolph	I24	Red River Bridge	Sweep, retrofit, restripe & signage bike lane	College St	High traffic road that is currently unrideable. Connects to proposed bike lanes. 1 school
Madison St	Holly Circle	3rd st	New construction bike lane, signage	Madison, Greenwood, 3rd st, Crossland Ext.,	High traffic road that is currently unrideable. Connects to current and proposed bike lanes
Needmore	Wilma Rudolph	Peachers Mill	New construction bike lane, signage*	Wilma Rudolph, Trenton	High traffic road that is currently unrideable. Connects to proposed bike lanes
Dunlop Ln	I24	Kirkwood	New construction bike lane, signage	Dunlop Ln, International	Area is gaining population and housing. High number of cyclist use this road currently, will become unrideable if not addressed. Extends current bike lane
Rossview	Warfield	Port Royal	New construction bike lane, signage*	Warfield	Area is gaining population, housing, and industry. High number of cyclist use this road currently, will become unrideable if not addressed. 3 schools
International	Rossview	Dunlop	Sweep, retrofit, restripe & signage bike lane	Rossview, Dunlop	Area is gaining population, housing, and industry. High number of cyclist use this road currently, will become unrideable if not addressed. Connects to current bike lane.
Providence	Riverside	Dover Rd	New construction bike lane, signage*	Riverside, Dover	High traffic road that is currently unrideable. Connects to current and proposed bike lanes. Area has a low SES population that currently use bikes for transportation.
Port Royal Rd	Hwy 79	Hwy 76	New construction bike lane, signage*	Rossview	Area is gaining population, housing, and industry. High number of cyclist use this road currently, will become unrideable if not addressed.
*With future road construction					

Appendix E:
Model Development Report

MTP 2045
Metropolitan Transportation Plan
Clarksville, TN

Tech Memo 2: Travel Demand Model Update for CUAMPO



Prepared for:

Kentucky Transportation Cabinet

TN TDOT Department of Transportation

Prepared by:

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October 2018

Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

Travel Demand Model Development

Prepared For:

Prepared By:

NEEL-SCHAFFER
Solutions you can build upon

Table of Contents

1.0 Introduction and Model Overview 1
2.0 Traffic Analysis Zones and Socioeconomic Data 3
2.1 Study Area and Traffic Analysis Zones 3
2.2 Base Year (2016) Model Socioeconomic Data Update 5
3.0 Roadway Network 9
3.1 Network Line Layer 9
3.2 Functional Classification 9
3.3 Free Flow Speed and Capacity 11
3.4 Network Attributes 14
3.5 Centroid Connectors 19
3.6 Traffic Counts 19
4.0 External Travel 21
4.1 Development of EE Trips 21
4.2 Development of EI Trips 27
5.0 Trip Generation 31
5.1 Internal Travel Model 31
5.2 Special Generators 33
5.3 Balancing Productions and Attractions 33
5.4 Summary 34
6.0 Trip Distribution 36
6.1 Gravity Model 36
6.2 Impedance Matrix 37
6.3 Friction Factors 37
6.4 Terminal Times 37
6.5 Trip Length Frequency Distribution 38

6.6 Auto Occupancy Rates 42
7.0 Trip Assignment 43
7.1 BPR Volume-Delay Functions 43
8.0 Model Validation 45
8.1 VMT by Region and Facility Type 46
8.2 Percent RMSE 46
8.3 Percent Error 48
8.4 Coefficient of Determination 49
8.5 Screenlines, Cutlines, and Cordon Lines 49
9.0 Future Year Model Development 53
9.1 Future Year Socioeconomic Development 53
9.2 Existing Plus Committed (E+C) Network 54
9.3 External Station Growth 57
9.4 Special Generator Growth 61
9.5 Future Year Model Runs 61

LIST OF FIGURES

Figure 1: MTP 2045 Model TAZs 4
Figure 2: Roadway Functional Classification 10
Figure 3: Model Capacity Factors 13
Figure 4: Roadway Traffic Counts 20
Figure 5: Model External Stations 23
Figure 6: Modeled HBW Trip Length Frequency Distributions 39
Figure 7: Modeled HBO Trip Length Frequency Distributions 40
Figure 8: Modeled NHB Trip Length Frequency Distributions 41
Figure 9: Modeled Volume vs Traffic Count Plot 49
Figure 10: MTP 2045 Screenlines 50
Figure 11: Existing + Committed Projects 56

LIST OF TABLES

Table 1: Study Area Households and Population, Base Year 2016 5
Table 2: Study Area Employment Classifications, Base Year 2016 6
Table 3: TAZ Field Attributes 7
Table 4: Functional Classifications Used in CUAMPO Model 11
Table 5: CUAMPO Model Link Attributes 14
Table 6: CUAMPO Model Node Attributes 18
Table 7: Study Area External-External Trips 24
Table 8: Expanded 24-hour EE Trip Table for All Vehicles 26
Table 9: External Station EI Data 27
Table 10: EI Trips by External Station 29
Table 11: Trip Production Rates 32
Table 12: Trip Attraction Rates 32

Table 13: Commercial Vehicle and Freight Vehicle Trip Rates 32
Table 14: Special Generator Trips 33
Table 15: Balanced Productions and Attractions 34
Table 16: Modeled vs Benchmark Trip Rates 34
Table 17: Montgomery County Household Size Breakdown 35
Table 18: Gamma Function Parameter Values by Trip Purpose 37
Table 19: Average Trip Length by Trip Purpose 38
Table 20: Model Auto Occupancy Factors 42
Table 21: BPR Volume-Delay Function Parameters 44
Table 22: VMT by Region and Functional Classification 46
Table 23: RMSE by ADT Group 47
Table 24: RMSE by Roadway Functional Class 47
Table 25: Percent Deviation by ADT Group 48
Table 26: Percent Deviation by Factility Type 48
Table 27 Screenline and Cutline Anlysis 51
Table 28: Cordon Analysis 51
Table 29: Population and Household by Year 53
Table 30: Employment by Year 53
Table 31: Existing + Committed Projects 55
Table 32: External Station Forecast Growth 59
Table 33: Base and Forecast Special Generator Trips 61

Travel Demand Model Documentation

This report includes a description of the procedures used in developing the updated demographics and travel estimates used in the 2045 Metropolitan Transportation Plan for the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO.) It also describes the relationship between planning data and trip making, and the calibration and testing of the model. This report does not include how to operate the model.

1.0 Introduction and Model Overview

The CUAMPO Travel Demand Model (TDM) is being updated for use in the MPO's new Metropolitan Transportation Plan (MTP.) The TDM used for the MTP 2045 is an update of the model used in the previous MTP[1]. The updated model was calibrated and validated to meet the requirements established by the Tennessee Department of Transportation (TDOT) and the Federal Highway Administration (FHWA.)

The updated TDM has an established base year of 2016. Additional updates to the TDM include:

- new user interface;
- new master roadway network;
- updated socioeconomic data and trip rates;
- updated turn penalties, capacity factors, and external trip data;
- new alpha and beta values for the Bureau of Public Roads function; and
- new time of day periods and factors.

The CUAMPO TDM is based upon the conventional trip-based four-step modeling approach.

Broadly, the main model components fall within the following four categories:

- *Trip Generation* - The process of estimating trip productions and attractions at each TAZ.

[1] http://www.cuampo.com/files/TechMemo3rdRev73113.pdf

- *Trip Distribution* - The process of linking trip productions to trip attractions for each TAZ pair.

- *Mode Choice* - The process of estimating the number of trips by mode for each TAZ pair. This process allows the model to calculate transit trips.

- *Trip Assignment* - The process of assigning auto and truck trips onto specific highway facilities in the region.

The TDM's focus is on the region's highway network due to a limited number of transit trips. As a result, a transit element has not been included, eliminating the Mode Choice step. Following TDOT standards, the TDM was developed in TransCAD travel demand forecasting software and the model interface was developed using GISDK macros.

2.0 Traffic Analysis Zones and Socioeconomic Data

2.1 Study Area and Traffic Analysis Zones

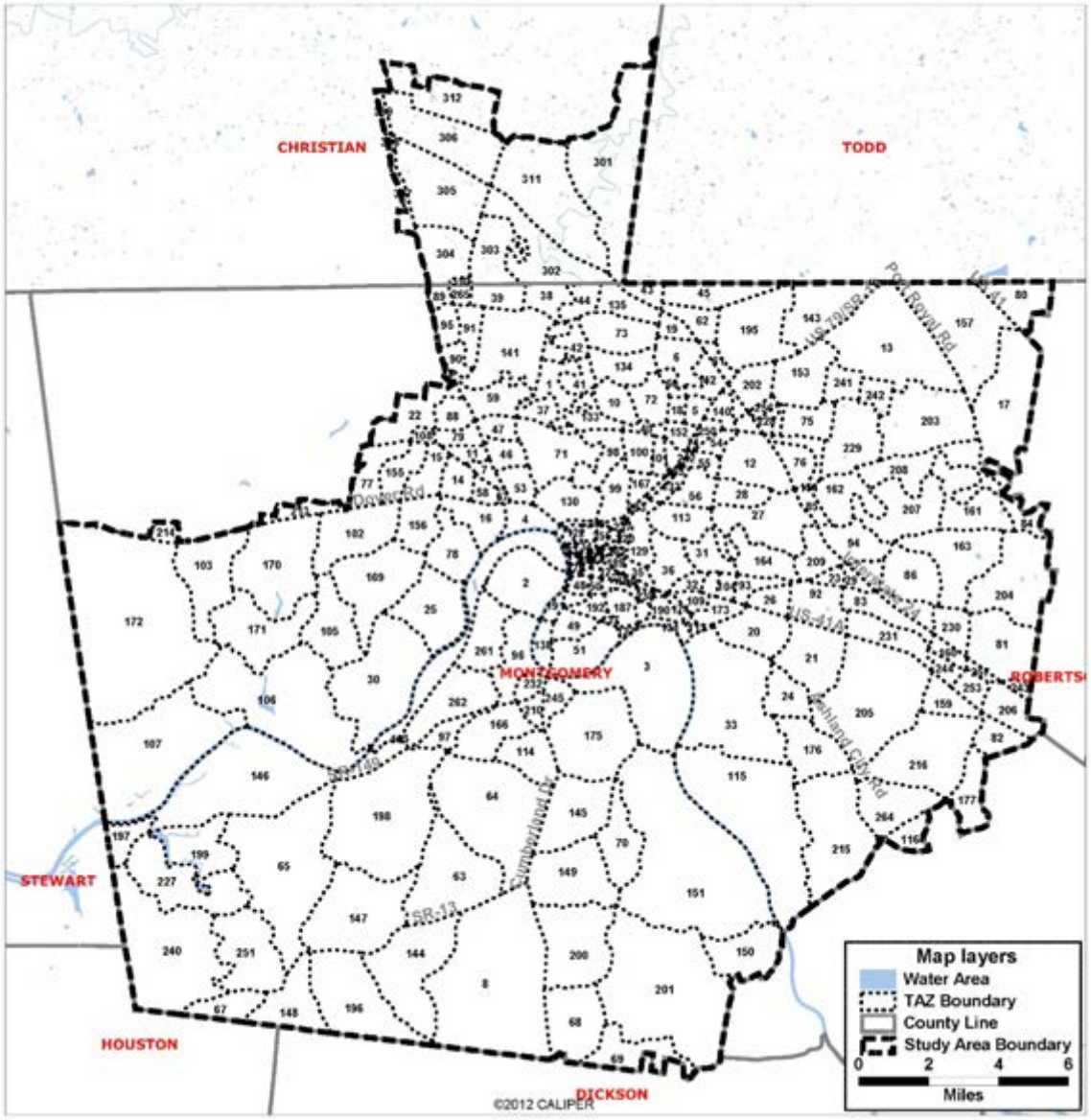
The accuracy necessary for generating trips from planning data requires it to be aggregated by small geographic areas. These areas are called Traffic Analysis Zones (TAZs). These TAZs are generally homogeneous areas and were delineated based on:

- population,
- land use,
- census geography,
- physical landmarks, and
- governmental jurisdictions.

The MTP 2045 study area and TAZ structure are the same as those established in the MTP 2040. The study area is divided into 277 TAZs. There are 265 TAZs in Montgomery County, and 12 TAZs in Christian County. The study area also contains 41 external stations. A map of the TAZ's is shown in Figure 1.

Except for Fort Campbell, the study area is comprised of the entirety of Montgomery County, TN; and the southernmost portion of Christian County, KY. Local jurisdictions within the study area include Clarksville, TN; Oak Grove, KY; and a portion of Hopkinsville, KY.

Figure 1: MTP 2045 Model TAZs



2.2 Base Year (2016) Model Socioeconomic Data Update

The previous TDM had a 2010 base year that used housing, income, employment, and school attendance data as model inputs. These values were updated by the MPO to reflect the new base year, 2016. This section describes the procedures used to update the model files to create the updated base year socioeconomic data.

Household Data Update

Montgomery County

Model data for the number of households in each TAZ in Montgomery County was provided by the MPO. This data was developed from the previous model's base year and adjusted by the MPO based on the known growth within the study area.

Christian County

Household data for the Christian County TAZs were updated from the previous model's 2010 data using aerial imagery analysis to locate obvious areas of growth. First, Google Earth's "historical imagery" feature was used to locate the 2010 households using 2010 aerials. Then, 2015 aerial imagery (the most recent available) was used to find the areas of growth and a household count corresponding to the growth was estimated and assigned to the TAZ where the development was located. A corresponding population change was also developed for these locations using 2010 population per household. Finally, the estimated changes were added to the 2010 household and population data to obtain the updated 2016 data in Christian County.

Table 1 displays the updated household data within the study area by the portion of each county within the study area. It is important to note that the model socioeconomic data will not match the Census 2010 or American Community Survey estimates for Montgomery County. This is due to the exclusion of Fort Campbell (a population of about 6,100 persons) from the study area.

Table 1: Study Area Households and Population, Base Year 2016

Variable	Montgomery County	Christian County	Study Area Total
Total Population	188,627	8,131	196,758
Household Population	184,854	8,131	192,985
Households	71,437	3,636	75,073

Source: CUAMPO, NSI, 2017

Employment Data Update

The employment values used in the model were provided by the CUAMPO and Kentucky Transportation Cabinet (KYTC). The employment data for the Montgomery County TAZs was updated from the InfoUSA employer database that the MPO used in the previous plan update. After updating employer data within Montgomery County, the CUAMPO determined the employment by type, number of employees, and TAZ location. KYTC provided the employment data for the Christian County TAZs.

Table 2 displays the study area employment by type. For modeling purposes, employment variables were differentiated into the following categories:

- Retail (NAICS 44-45)
- Service (NAICS 52-55, 61-62, 71-72, 81, 92, 99)
- Basic or Non-Retail (NAICS 11, 21-23, 31-33, 42, 48-49, 51, 56)

Table 2: Study Area Employment Classifications, Base Year 2016

Variable	Description	Montgomery County	Christian County	Study Area Total
TOT_EMP	Total Employment	66,784	1,542	68,326
OTH_EMP	Other Employment	18,651	60	18,711
RET_EMP	Retail Employment	9,632	1,060	10,692
SE_EMP	Service Employment	38,501	422	38,923

Source: CUAMPO, KYTC

School Enrollment Data Update

The MTP 2045 TDM used school attendance data provided by the CUAMPO and the Clarksville-Montgomery County School System (CMCSS). School attendance figures include:

- Public and private elementary, middle, and high schools.
- Colleges and universities.
- Vocational and business schools.

The total school attendance in the study area in 2016 was 33,388. There are no Kentucky TAZs within the study area that have school enrollment. For modeling purposes, the

school attendance is measured by the number of students attending a school in a TAZ and not by the number of students residing in that TAZ.

TAZ Data

The socioeconomic data for each TAZ are included in the TDM files. This data has been updated for the new 2016 base year. The fields used in the TAZ layer are shown Table 3.

Table 3: TAZ Field Attributes

Attribute Name	Description
ID	Integer (4 bytes) TAZ ID
Area	Real (8 bytes) TAZ area in Map Units
TAZ_16	Integer (4 bytes) 2016 TAZ number
COUNTY	Character TAZ County location
TYPE	Integer (4 bytes) 1= Internal TAZ 2= External Station
MedInc_10	Integer (4 bytes) 2010 Median income
MedInc_10_CPI	Integer (4 bytes) 2010 Median income, CPI adjusted
School_Name	Character Schools located within TAZ
AREA_TYPE_16	Integer (1 byte) TAZ area type 1= CBD 2= Urban 3= Suburban 4= Rural
POP_16	Integer (4 bytes) 2016 Household population
HH_16	Integer (4 bytes) 2016 Occupied dwelling units/Households
AvgHHsize_16	Real (8 bytes) 2016 Average population/household
BASE_EMP_16	Integer (4 bytes) 2016 Non-Retail employment
RET_EMP_16	Integer (4 bytes) 2016 Retail employment
SER_EMP_16	Integer (4 bytes) 2016 Service employment
TOT_EMP_16	Integer (4 bytes) 2016 Total employment

Attribute Name	Description
SCHATT_16	Integer (4 bytes) 2016 School enrollment
POP_Chg_16-45	Integer (4 bytes) Change in population from 2016 to 2045
HH_Chg_16-45	Integer (4 bytes) Change in households from 2016 to 2045
EMP_Chg_16-45	Integer (4 bytes) Change in total employment from 2016 to 2045
Note: Each of the suffix “16” fields should be repeated for “26”, “36”, and “45” suffixes as well.	

3.0 Roadway Network

3.1 Network Line Layer

The simulation of travel patterns in a computer model requires a representation of the street and highway system in digital format. The TransCAD model creates such a network from a geographic line layer in GIS. The line layer dataview records contain descriptive information for each link and its properties. Turn prohibitions are also coded into the network at locations where certain movements are not allowed or physically cannot be made.

Adjustments were made to the model network to update it to the new base year. These adjustments included:

- number of lanes,
- speeds,
- functional classification,
- volume-delay function parameters (alpha and beta values), and
- daily traffic counts and traffic stations (to 2016 where possible)

In addition to the changes listed above, the updated TDM features a master network in the model's setup folder. This line layer contains the records for all roadway links used in the TDM process. The master network contains the data for the base year, Existing Plus Committed network, and all roadway test projects. Figure 2 displays the roadway network used in the TDM.

3.2 Functional Classification

Each link in the model's roadway network was assigned a functional classification based on the federal functional classification system. This system is also maintained by TDOT and KYTC. The functional classifications used in the TDM are shown in Table 4.

Figure 2: Roadway Functional Classification

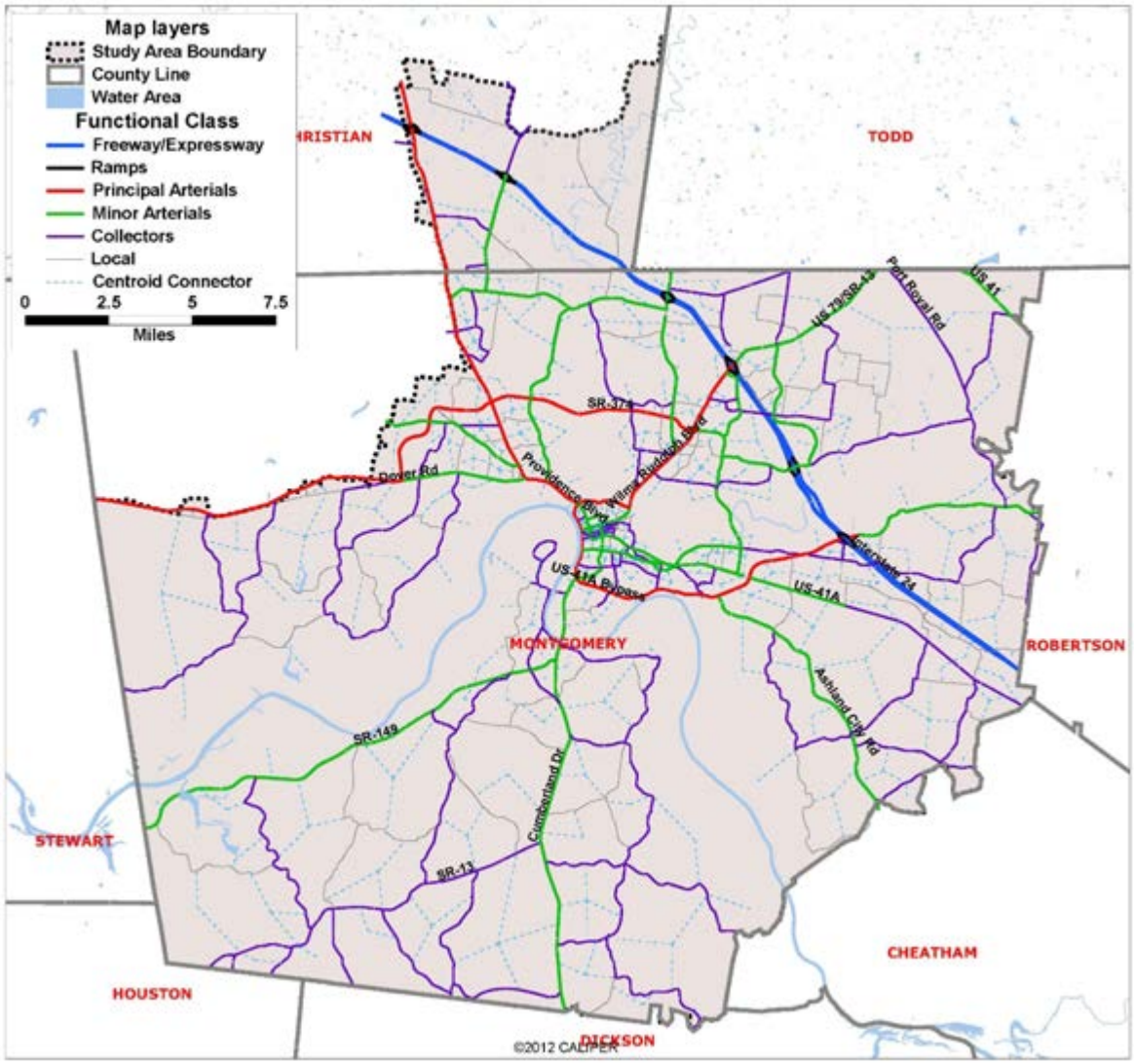


Table 4: Functional Classifications Used in CUAMPO Model

FHWA Functional Classification		Description	MPO Functional Classification Number
Rural	01	Interstate	1
	02	Other Principal Arterial	2
	06	Minor Arterial	6
	07	Major Collector	7
	08	Minor Collector	8
	09	Local	9
	N/A	Ramp	10
Urban	11	Interstate	11
	12	Freeway/Expressway	12
	14	Principal Arterial	14
	16	Minor Arterial	16
	17	Collector	17
	19	Local	19
	N/A	Ramp	20
Other	N/A	Centroid Collector	99

Source: FHWA, KYTC, TDOT

3.3 Free Flow Speed and Capacity

Free flow speeds and capacities are important TDM inputs that affect the traffic assignment model. The link speed calculations are the same as those used in the previous TDM. The model has been updated with new capacity factors, which are shown in Figure 3. These key model inputs were assigned to each individual network link. These inputs consider factors such as:

- Free Flow Speed
    - Roadway posted speed
    - Roadway functional classification
    - Location of roadway in urban or rural area
- Link Capacity
    - Roadway functional classification
    - Location of roadway in an urban or rural area

- Number of lanes
- Width of travel lanes
- Presence of a median or dividing feature
- Presence and width of shoulder on roadway

Figure 3: Model Capacity Factors

Link Capacity (LOS D)

Vehicles per lane per hour - vphpl

Functional Class		vphpl Directional
All Interstate		
2 Lanes		2,300
>2 Lanes		2,400
Principal Arterial		
Rural	Divided	1,700
Rural	Undivided	1,500
Urban	Divided	1,500
Urban	Undivided	1,300
Minor Arterial		
Rural	Divided	1,600
Rural	Undivided	1,350
Urban	Divided	1,400
Urban	Undivided	1,150
Collector		
Rural	Divided	1,350
Rural	Undivided	1,150
Urban	Divided	1,150
Urban	Undivided	950
Local		
Rural	2 Lane	900
Rural	>2 Lane	1,000
Urban	2 Lane	800
Urban	>2 Lane	900
Ramps		1,000
Centroid Connectors		9,999

SF = c x N x Fw x Fhv x Fp x Fe x Fd x Fctl x Fpark X (V/C)i

SF = Model vphpl for desired level of service
c = Ideal vphpl
N = Number of Lanes
(V/C)I = Rate of service flow for level of service D

Adjustment Factors

Acronym	Name	Facility Type	Lane	Shoulder	Factor
Fw	Lane & Shoulder Width	Interstate & Sys Ramp	<=10'	0-<2'	0.78
		Interstate & Sys Ramp	<=10'	2'-5'	0.83
		Interstate & Sys Ramp	<=10'	>5'	0.88
		Interstate & Sys Ramp	>10'	0-<2'	0.90
		Interstate & Sys Ramp	>10'	2'-5'	0.95
		Interstate & Sys Ramp	>10'	>5'	1.00
		Principal Arterial Div	<=10'	0-<2'	0.78
		Principal Arterial Div	<=10'	2'-5'	0.83
		Principal Arterial Div	<=10'	>5'	0.88
		Principal Arterial Div	>10'	0-<2'	0.92
		Principal Arterial Div	>10'	2'-5'	0.96
		Principal Arterial Div	>10'	>5'	1.00
		Principal Arterial Undiv	<=10'	0-<2'	0.78
		Principal Arterial Undiv	<=10'	2'-5'	0.82
		Principal Arterial Undiv	<=10'	>5'	0.86
		Principal Arterial Undiv	>10'	0-<2'	0.90
		Principal Arterial Undiv	>10'	2'-5'	0.95
		Principal Arterial Undiv	>10'	>5'	1.00
		Minor Arterial Div	<=9'	0-<2'	0.81
		Minor Arterial Div	<=9'	2'-5'	0.86
		Minor Arterial Div	<=9'	>5'	0.93
		Minor Arterial Div	>9'	0-<2'	0.94
		Minor Arterial Div	>9'	2'-5'	1.00
		Minor Arterial Div	>9'	>5'	1.05
		Minor Arterial Undiv	<=9'	0-<2'	0.77
		Minor Arterial Undiv	<=9'	2'-5'	0.83
		Minor Arterial Undiv	<=9'	>5'	0.88
		Minor Arterial Undiv	>9'	0-<2'	0.89
		Minor Arterial Undiv	>9'	2'-5'	0.95
		Minor Arterial Undiv	>9'	>5'	1.00
		Collector Div	<=9'	0-<2'	0.81
		Collector Div	<=9'	2'-5'	0.86
		Collector Div	<=9'	>5'	0.93
		Collector Div	>9'	0-<2'	0.96
		Collector Div	>9'	2'-5'	1.00
		Collector Div	>9'	>5'	1.05
		Collector Undiv	<=9'	0-<2'	0.81
		Collector Undiv	<=9'	2'-5'	0.85
		Collector Undiv	<=9'	>5'	0.90
		Collector Undiv	>9'	0-<2'	0.94
		Collector Undiv	>9'	2'-5'	1.00
		Collector Undiv	>9'	>5'	1.04
		Local 2 Lane	<=9'	0-<2'	0.65
		Local 2 Lane	<=9'	2'-5'	0.78
		Local 2 Lane	<=9'	>5'	0.90
		Local 2 Lane	>9'	0-<2'	0.85
		Local 2 Lane	>9'	2'-5'	1.00
		Local 2 Lane	>9'	>5'	1.04
		Local >2 Lane	<=9'	0-<2'	0.81
		Local >2 Lane	<=9'	2'-5'	0.85
		Local >2 Lane	<=9'	>5'	0.92
		Local >2 Lane	>9'	0-<2'	0.96
		Local >2 Lane	>9'	2'-5'	1.00
		Local >2 Lane	>9'	>5'	1.10
Fhv	Heavy Vehicle	Interstate			0.88
		Principal Arterial			0.90
		Minor Arterial			0.90
		Collector			0.92
		Local			0.97
Fp	Driver Population	Rural Interstate			0.90
		Urban Interstate			0.92
		System Ramp			0.92
		Principal Arterial			0.95
		Minor Arterial			0.98
		Collector			NA
		Local			NA
Fe	Driving Environment	Interstate			NA
		Rural Prin Art	Divided		1.00
		Rural Prin Art	Undivided		0.90
		Urban Prin Art	Divided		0.90
		Urban Prin Art	Undivided		0.80
		Rural Minor Art	Divided		1.00
		Rural Minor Art	Undivided		0.90
		Urban Minor Art	Divided		0.90
		Urban Minor Art	Undivided		0.80
		Rural Collector	Divided		1.00
		Rural Collector	Undivided		0.90
		Urban Collector	Divided		0.90
		Urban Collector	Undivided		0.80
		Rural Local	2 Lane		0.90
		Rural Local	>2 Lane		0.90
		Urban Local	2 Lane		0.80
		Urban Local	>2 Lane		0.80
Fd	Directional Distribution (Local only)	2 Lane	Divided		0.94
		>2 Lane	Divided		1.16
		2 Lane	Undivided		0.94
		>2 Lane	Undivided		1.10
Fctl	Center Turn Lane	Interstate			NA
		All Other			1.08
Fpark	On Street Parking	Any			0.95

Source: Nashville Model

3.4 Network Attributes

Table 5 displays the network attributes used on the links in the TDM, while Table 6 displays the attributes used in the node layer.

Table 5: CUAMPO Model Link Attributes

Attribute	Description
Length	Real (8 bytes)
Dir	Integer (2 bytes) 0 = Two-way link 1= One-way link, AB fields will be used -1= One-way link, BA fields will be used
State	Character State link is located within
NAME	Character Roadway name
External	Integer (4 bytes) External station of link
CNTStation	Character ADT count station
YEAR	Integer (4 bytes) ADT count year
ADT_16	Integer (4 bytes) 2016 Daily Traffic Count
Screenline	Integer (4 bytes) Screenline link is on
TollYear	Integer (4 bytes) Year tolls begin to apply
TOLL_16	Integer (4 bytes) 0= Roadway not tolled 1= Roadway is tolled
NO_TRK_16	Integer (1 byte) 0= No truck restrictions 1= Truck restrictions
NETWORK_16	Integer (2 bytes) 1= Network Road link 2= Centroid Connector 0 or null = Link will not be included in the model run
AB_FC_16	Integer (4 bytes) Refer to Table 4
BA_FC_16	Integer (4 bytes) Refer to Table 4
FC_DESC_16	Character General Function Class

Attribute	Description
MODEL_FC_16	Integer (4 bytes) Model functional class code
MODEL_FC_DESC_16	Character Model functional class description
URB_RUR_16	Character Link area location
TOTAL_LANES_16	Integer (2 bytes) Number of lanes for the roadway
AB_LANES_16	Integer (2 bytes) Number of lanes in AB direction
BA_LANES_16	Integer (2 bytes) Number of lanes in BA direction
ALPHA_16	Real (4 bytes) BPR Function Parameter
BETA_16	Real (4 bytes) BPR Function Parameter
POSTED_SPEED_16	Integer (4 bytes) Posted link speed (MPH)
AB_SPEED_16	Real (8 bytes) Link speed (MPH) in AB direction
BA_SPEED_16	Real (8 bytes) Link speed (MPH) in BA direction
AB_TT_16	Real (8 bytes) Link travel time in AB direction
BA_TT_16	Real (8 bytes) Link travel time in BA direction
Area_Type_16	Integer (4 bytes) Link area type 1= CBD 2= Urban 3= Suburban 4= Rural
Fw_16	Real (8 bytes) Capacity factor for lane and shoulder width
Fhv_16	Real (8 bytes) Capacity factor for heavy vehicles
Fp_16	Real (8 bytes) Capacity factor for driver population
Fe_16	Real (8 bytes) Capacity factor for driving environment
Fd_16	Real (8 bytes) Capacity factor for directional distribution
Fctl_16	Real (8 bytes) Capacity factor for center turn lanes

Attribute	Description
Fpark_16	Real (8 bytes) Capacity factor for on street parking
Fall_16	Real (8 bytes) Overall capacity factor
IDEAL_VPHPL_16	Real (8 bytes) Maximum capacity in vehicles/hour/lane
AB_VPHPL_16	Real (8 bytes) Capacity in AB direction in vehicles/hour/lane
BA_VPHPL_16	Real (8 bytes) Capacity in AB direction in vehicles/hour/lane
AB_CAPACITY_16	Integer (4 bytes) Capacity in AB direction
BA_CAPACITY_16	Integer (4 bytes) Capacity in BA direction
AB_CAP_AM_16	Integer (4 bytes) Morning capacity in AB direction
BA_CAP_AM_16	Integer (4 bytes) Morning capacity in BA direction
AB_CAP_MD_16	Integer (4 bytes) Mid-day capacity in AB direction
BA_CAP_MD_16	Integer (4 bytes) Mid-day capacity in BA direction
AB_CAP_PM_16	Integer (4 bytes) Afternoon capacity in AB direction
BA_CAP_PM_16	Integer (4 bytes) Afternoon capacity in BA direction
AB_CAP_NT_16	Integer (4 bytes) Nighttime capacity in AB direction
BA_CAP_NT_16	Integer (4 bytes) Nighttime capacity in BA direction
DAILY_FLOW	Integer (4 bytes) Total daily model volume
AB_DAILY_FLOW	Integer (4 bytes) AB directional daily model volume
BA_DAILY_FLOW	Integer (4 bytes) BA directional daily model volume
DAILY_TRK_FLOW	Integer (4 bytes) Total daily model truck volume
AB_DAILY_TRK_FLOW	Integer (4 bytes) AB directional daily model truck volume
BA_DAILY_TRK_FLOW	Integer (4 bytes) AB directional daily model truck volume
DAILY_TOT_VMT	Integer (4 bytes) Total daily vehicle miles travelled

Attribute	Description
DAILY_AB_VMT	Integer (4 bytes) AB directional daily vehicle miles travelled
DAILY_BA_VMT	Integer (4 bytes) BA directional daily vehicle miles travelled
DAILY_TOT_VHT	Integer (4 bytes) Total daily vehicle hours travelled
DAILY_AB_VHT	Integer (4 bytes) AB directional daily vehicle hours travelled
DAILY_BA_VHT	Integer (4 bytes) BA directional daily vehicle hours travelled
DAILY_TOT_VHD	Integer (4 bytes) Total daily vehicle hours delay
DAILY_AB_VHD	Integer (4 bytes) AB directional daily vehicle hours delay
DAILY_BA_VHD	Integer (4 bytes) BA directional daily vehicle hours delay
DAILY_AB_VOC	Real (8 bytes) AB directional volume/capacity
DAILY_BA_VOC	Real (8 bytes) BA directional volume/capacity
DAILY_MAX_VOC	Real (8 bytes) Higher of AB and BA volume/capacity
FIPS	Integer (4 bytes) Link FIPS code
County	Character Link County location
AB_SPEED_CONG_AM	Real (8 bytes) Morning AB directional congested speed
BA_SPEED_CONG_AM	Real (8 bytes) Morning BA directional congested speed
AB_SPEED_CONG_MD	Real (8 bytes) Mid-day AB directional congested speed
BA_SPEED_CONG_MD	Real (8 bytes) Mid-day BA directional congested speed
AB_SPEED_CONG_PM	Real (8 bytes) Afternoon AB directional congested speed
BA_SPEED_CONG_PM	Real (8 bytes) Afternoon BA directional congested speed
AB_SPEED_CONG_NT	Real (8 bytes) Nighttime AB directional congested speed
BA_SPEED_CONG_NT	Real (8 bytes) Nighttime BA directional congested speed
AB_TT_CONG_AM	Real (8 bytes) Morning AB directional congested travel time

Attribute	Description
BA_TT_CONG_AM	Real (8 bytes) Morning BA directional congested travel time
AB_TT_CONG_MD	Real (8 bytes) Mid-day AB directional congested travel time
BA_TT_CONG_MD	Real (8 bytes) Mid-day BA directional congested travel time
AB_TT_CONG_PM	Real (8 bytes) Afternoon AB directional congested travel time
BA_TT_CONG_PM	Real (8 bytes) Afternoon BA directional congested travel time
AB_TT_CONG_NT	Real (8 bytes) Nighttime AB directional congested travel time
BA_TT_CONG_NT	Real (8 bytes) Nighttime BA directional congested travel time
AB_TT_CONG_MAX	Real (8 bytes) Maximum AB directional congested travel time
BA_TT_CONG_MAX	Real (8 bytes) Maximum BA directional congested travel time
LOS	Character Link level of service score
FC_GROUP	Integer (2 bytes) Link functional classification group
Note: 1. Each of the suffix “16” fields should be repeated for EC, VIS, and SCE suffixes as well. 2. Volume-delay function parameter fields Alpha_16 and Beta_16 are based on BPR function. 3. In addition to the base year fields, each planned year should have a field called “PROJECT_[suffix]” of type Integer. This field should have a unique project number for each committed or planned project.	

Table 6: CUAMPO Model Node Attributes

Attribute	Description
Exp_Node_ID	Integer (4 bytes) For centroids keep the ID the same as TAZ number.
LONGITUDE	Integer (4 bytes) TCAD automatic field
LATITUDE	Integer (4 bytes) TCAD automatic field
CENTROID	Integer (4 bytes) TAZ number for centroid

3.5 Centroid Connectors

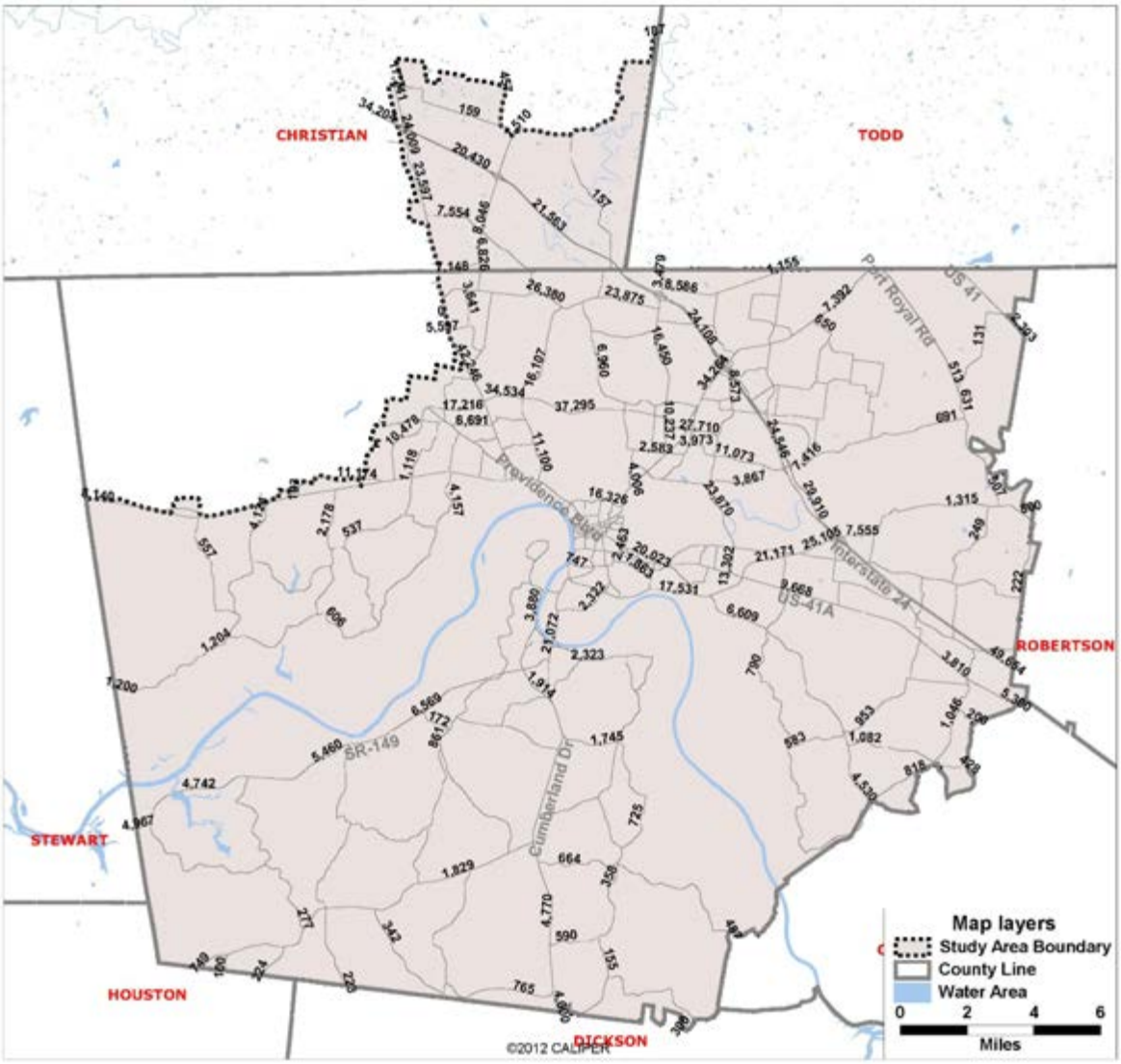
Centroid connectors are an imaginary roadway network links that connects the TAZ centroid to the adjacent roadway network at nodes. These links represent the local streets on the street and highway system that are not in the model network. Centroid connectors provide the model the ability to move trips generated from individual TAZs to the roadway network. The locations where centroid connectors access the model network are based on features such as neighborhood roadway entrances, driveways and parking lots.

During the TDM update, the centroid connectors were adjusted to match locations where traffic is most likely to access the model's roadways. This was accomplished by relocating the centroid for the TAZ to reflect the "center of mass" of developed land and/or moving the centroid connector roadway network access points to a location where trips generally enter or leave the TAZ. This changes the length of the centroid connectors and the travel times on the links to encourage modeled traffic to use certain access points to reflect the observed traffic.

3.6 Traffic Counts

The updated model also contains updated traffic counts in the roadway network. These counts come from TDOT and KYTC and are the most recent available. The update process included the verification of count stations upon the existing TDM links and ensuring that the ADTs are assigned to the correct link. Where a 2016 ADT was not available for a count station, the most recent count was factored to the base year using growth rate data from historical counts. The traffic ADTs used in the TDM are shown in Figure 4.

Figure 4: Roadway Traffic Counts



4.0 External Travel

There are two types of external travel trips: external-internal (EI) trips and external-external (EE) trips. EI trips have one end of the trip inside the study area, and the other outside. EE trips pass through the study area. They have no origin or destination within the study area itself.

Both trip types are assigned at external stations located on significant roadways that are at the periphery of the study area. These stations represent most trips that are crossing the study area boundary. Since there were no changes to the study area and no additional roadways added to the network crossing the study area boundary, the external stations are the same as the previous model. The locations of the TDM's external stations are shown in Figure 5.

External trips in the model are divided into auto trips (AUTO), commercial vehicle (CMVEH) trips, and truck (TRK) trips. Auto trips are those that are made in a personal vehicle, while commercial vehicle trips represent four-tire commercial vehicles. Commercial vehicles include delivery and service vehicles. Truck trips represent single-unit with six or more tires and multi-unit with three-plus axle combination trucks.

Similar to Internal-Internal AUTO trips (Section 5.1), the EI AUTO are divided into home-based work (HBW), home-based other (HBO), and non-home-based (NHB) trips. Home-based trips are those that have one trip end located at the traveler's household. Examples of home-based trips include travel from home to work, shopping, or other personal business. Non-home-based trips include travel to and from any location that does not involve the traveler's household. Examples of these trips can include travel from work to shopping, from school to daycare, and from work to a lunch location.

4.1 Development of EE Trips

The EE trips that pass through the study area are represented by a matrix in the model. This matrix represents the daily vehicle trips going from one external station to the other external stations of the study area.

Using the data from the 2040 MTP model update report, the percentage of the EE and EI trips, in vehicle trips, were calculated for each external station. These trips were then divided into auto and truck trips, using the percentages derived from the previous model. The previous model's external matrices for auto and truck trips were updated to reflect the closure of Gate 2 and Gate 5 at Fort Campbell to public traffic. This created a seed matrix for the distribution of EE vehicle trips by type. Using the updated EE trips and the seed trip distribution matrix, Fratar method was used to develop the new EE trip matrix by type.

Fratar method assumes that the distribution of future trips from a given origin zone is proportional to the present trip distribution.

The external travel trips at each station are shown in Table 7. Table 8 displays the distribution of the TDM's EE trips.

Figure 5: Model External Stations

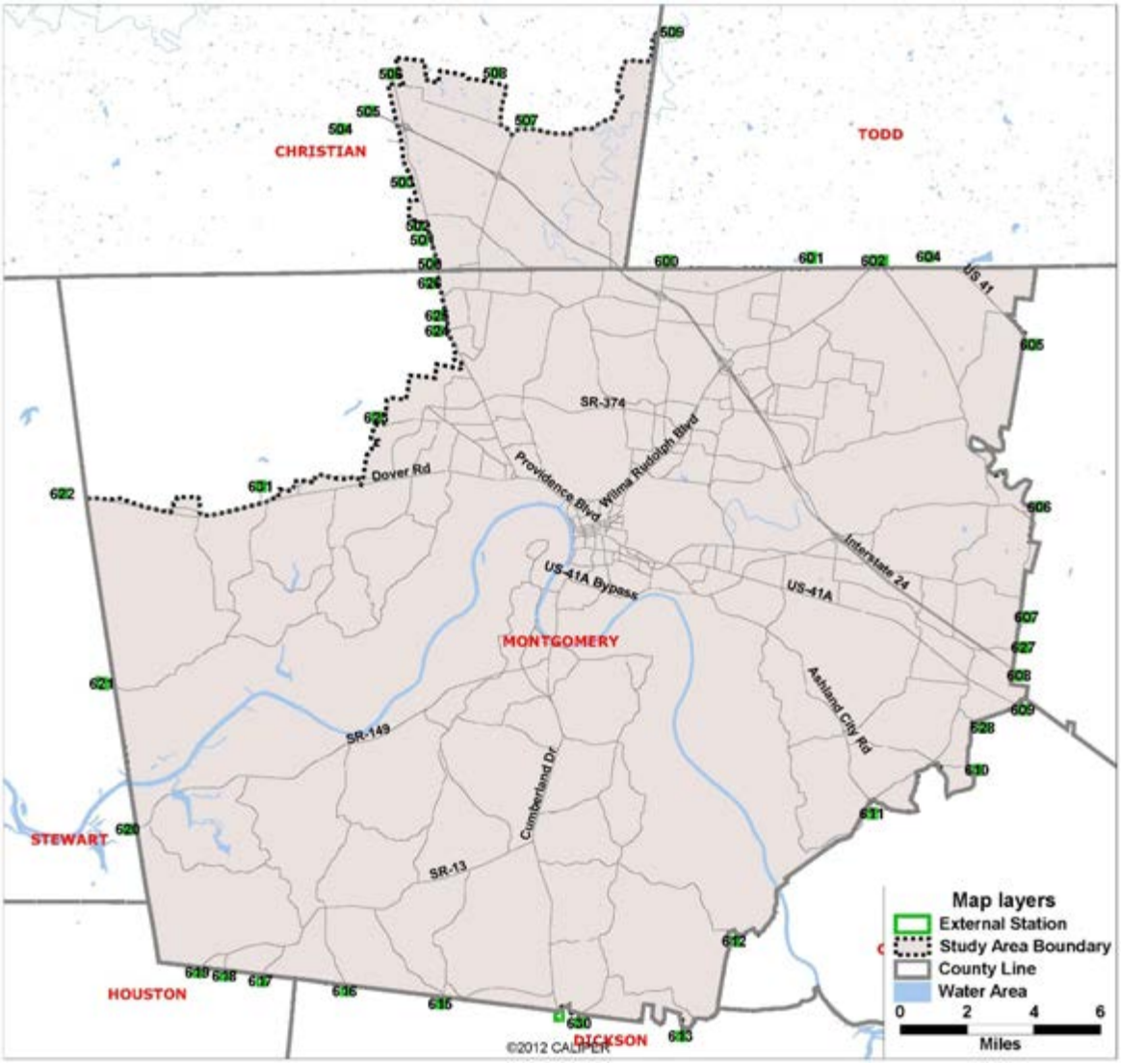


Table 7: Study Area External-External Trips

Station Number	Description	Station Count	Percent EE Trips	Percent EE AUTO	Percent EE TRK	EE AUTO Trips	EE TRK Trips
500	Ft Campbell Access/Gate 4	10,927	16.0%	94.0%	6.0%	1,642	105
501	Ft Campbell Access/Gate 5	0	13.2%	91.0%	9.0%	0	0
502	Ft Campbell Access/Gate 6	2,977	14.2%	90.9%	9.1%	384	38
503	Ft Campbell Access/Gate 7	6,363	13.6%	65.9%	34.1%	571	295
504	KY 117	4,280	13.6%	91.1%	8.9%	529	52
505	I-24	34,204	72.0%	70.0%	30.0%	17,232	7,385
506	Ft Campbell Blvd/US 41 A	17,241	58.0%	92.0%	8.0%	9,203	801
507	Pembroke Oak Grove Rd	1,510	0.0%	0.0%	0.0%	0	0
508	KY 109/Bradshaw Rd	457	0.0%	0.0%	0.0%	0	0
509	KY 1453	187	0.0%	0.0%	0.0%	0	0
600	Trenton Rd/SR 48	3,479	0.0%	0.0%	0.0%	0	0
601	Tylertown Rd/SR 249	1,155	13.5%	97.9%	2.1%	152	3
602	US 79/SR 13	7,175	13.3%	90.8%	9.2%	866	88
603	Port Royal Rd	1,045	10.0%	93.3%	6.7%	98	7
604	US 41	1,973	94.6%	90.0%	10.0%	1,679	187
605	US 41	2,303	88.6%	90.0%	10.0%	1,837	204
606	SR 76	800	14.6%	94.2%	5.8%	110	7
607	Harmony Church Rd	300	13.6%	90.0%	10.0%	37	4
608	I-24	49,654	47.0%	74.0%	26.0%	17,274	6,069
609	Madison St/US 41 A	5,300	13.8%	97.0%	3.0%	710	22
610	Old Clarksville PK	428	12.5%	98.0%	2.0%	52	1
611	Ashland City Rd	3,728	5.2%	94.4%	5.6%	182	11
612	Chapel Hill Rd	487	12.8%	98.0%	2.0%	61	1
613	Ryes Chapel Rd	300	11.4%	92.5%	7.5%	32	3
614	Cumberland Dr	4,000	9.8%	91.1%	8.9%	357	35
615	Marion Rd	606	12.7%	95.0%	5.0%	73	4
616	Chambers Rd	223	14.3%	90.0%	10.0%	29	3
617	Thorne Hollow Rd	224	15.0%	93.3%	6.7%	31	2
618	Ellis Mill Rd	100	14.3%	100.0%	0.0%	14	0
619	SR 13	749	13.2%	97.0%	3.0%	96	3
620	SR 149	4,967	10.2%	90.0%	10.0%	455	51
621	Lylewood Rd	1,200	13.3%	93.8%	6.3%	150	10
622	Dover Rd	8,140	15.0%	96.9%	3.1%	1,187	38

Station Number	Description	Station Count	Percent EE Trips	Percent EE AUTO	Percent EE TRK	EE AUTO Trips	EE TRK Trips
623	Lafayette Rd/101st Airborne	8,899	14.1%	100.0%	0.0%	1,251	0
624	Ft Campbell Access/Gate 1	5,597	14.3%	94.0%	6.0%	753	48
625	Ft Campbell Access/Gate 2	0	14.2%	94.4%	5.6%	0	0
626	Ft Campbell Access/Gate 3	5,918	13.9%	97.0%	3.0%	799	24
627	Sango Rd	400	0.0%	0.0%	0.0%	0	0
628	Knox Rd	200	0.0%	0.0%	0.0%	0	0
630	Old Hwy 48	100	0.0%	0.0%	0.0%	0	0
631	101st Airborne Division Rd	1,000	0.0%	0.0%	0.0%	0	0

Source: NSI, 2017

Table 8: Expanded 24-Hour EE Trip Table for All Vehicles

TAZ	500	501	502	503	504	505	506	507	508	509	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	630	631	Total
500	0.0	0.0	0.0	0.0	9.8	358.6	123.7	0.0	0.0	0.0	0.0	1.7	9.6	1.1	0.0	0.9	1.2	0.6	321.8	13.1	0.6	2.1	0.7	0.3	4.1	0.8	0.3	0.3	0.1	1.1	5.4	1.7	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	873.6
501	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
502	0.0	0.0	0.0	0.0	2.3	89.8	28.9	0.0	0.0	0.0	0.0	0.4	2.2	0.3	0.0	0.7	0.3	0.1	75.5	3.0	0.1	0.5	0.2	0.1	1.0	0.2	0.1	0.1	0.0	0.3	1.3	0.4	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	210.9
503	0.0	0.0	0.0	0.0	4.2	240.8	43.8	0.0	0.0	0.0	0.0	0.6	3.4	0.4	0.0	3.0	0.4	0.2	120.4	4.5	0.2	0.7	0.2	0.1	1.5	0.3	0.1	0.1	0.0	0.4	1.9	0.6	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	432.9
504	9.8	0.0	2.3	4.2	0.0	0.0	59.4	0.0	0.0	0.0	0.0	0.8	4.7	0.5	0.0	3.1	0.6	0.3	167.2	6.1	0.3	1.0	0.3	0.1	2.0	0.4	0.1	0.2	0.1	0.5	2.6	0.8	6.6	7.2	4.5	0.0	4.7	0.0	0.0	0.0	0.0	290.4
505	358.6	0.0	89.8	240.8	0.0	0.0	2,236.6	0.0	0.0	0.0	0.0	27.5	184.1	20.4	0.0	8.4	21.8	10.7	7,789.1	208.9	9.3	36.6	10.8	5.5	78.0	14.2	5.6	5.8	1.9	17.6	103.9	30.5	229.2	235.7	164.3	0.0	161.7	0.0	0.0	0.0	0.0	12,307.0
506	123.7	0.0	28.9	43.8	59.4	2,236.6	0.0	0.0	0.0	0.0	0.0	10.3	58.0	6.9	0.0	1.7	7.5	3.5	1,943.6	78.7	3.5	12.6	4.1	1.8	24.9	5.0	1.7	1.9	0.7	6.5	32.4	10.4	84.3	93.4	56.6	0.0	59.8	0.0	0.0	0.0	0.0	5,002.2
507	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
508	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
509	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
601	1.7	0.0	0.4	0.6	0.8	27.5	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.1	0.0	26.7	1.1	0.0	0.2	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.1	0.4	0.1	1.2	1.3	0.8	0.0	0.8	0.0	0.0	0.0	0.0	77.7
602	9.6	0.0	2.2	3.4	4.7	184.1	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.6	0.3	151.9	6.1	0.3	1.0	0.3	0.1	1.9	0.4	0.1	0.1	0.1	0.5	2.5	0.8	6.6	7.3	4.4	0.0	4.7	0.0	0.0	0.0	0.0	477.1
603	1.1	0.0	0.3	0.4	0.5	20.4	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	17.9	0.7	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.8	0.9	0.5	0.0	0.6	0.0	0.0	0.0	0.0	52.3
604	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	933.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	933.1
605	0.9	0.0	0.7	3.0	3.1	8.4	1.7	0.0	0.0	0.0	0.0	2.9	25.0	0.3	933.1	0.0	1.7	2.4	2.3	2.5	1.4	1.8	1.9	3.4	2.1	1.1	2.4	2.0	1.9	1.9	1.7	2.7	2.3	3.4	1.2	0.0	1.8	0.0	0.0	0.0	0.0	1,020.8
606	1.2	0.0	0.3	0.4	0.6	21.8	7.5	0.0	0.0	0.0	0.0	0.1	0.6	0.1	0.0	1.7	0.0	0.0	19.4	0.8	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.8	0.9	0.6	0.0	0.6	0.0	0.0	0.0	0.0	58.5
607	0.6	0.0	0.1	0.2	0.3	10.7	3.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	2.4	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	20.5
608	321.8	0.0	75.5	120.4	167.2	7,789.1	1,943.6	0.0	0.0	0.0	0.0	26.7	151.9	17.9	0.0	2.3	19.4	0.0	0.0	0.0	9.1	32.9	10.6	4.6	65.0	12.9	4.5	5.0	1.9	16.8	84.8	27.0	218.5	241.1	147.3	0.0	155.0	0.0	0.0	0.0	0.0	11,672.8
609	13.1	0.0	3.0	4.5	6.1	208.9	78.7	0.0	0.0	0.0	0.0	1.1	6.1	0.7	0.0	2.5	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.2	2.6	0.5	0.2	0.2	0.1	0.7	3.4	1.1	8.9	9.9	6.0	0.0	6.3	0.0	0.0	0.0	0.0	366.1
610	0.6	0.0	0.1	0.2	0.3	9.3	3.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.4	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	26.8
611	2.1	0.0	0.5	0.7	1.0	36.6	12.6	0.0	0.0	0.0	0.0	0.2	1.0	0.1	0.0	1.8	0.1	0.1	32.9	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.1	0.5	0.2	1.4	1.6	1.0	0.0	1.0	0.0	0.0	0.0	0.0	96.1
612	0.7	0.0	0.2	0.2	0.3	10.8	4.1	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	1.9	0.0	0.0	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.5	0.5	0.3	0.0	0.3	0.0	0.0	0.0	0.0	31.2
613	0.3	0.0	0.1	0.1	0.1	5.5	1.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	3.4	0.0	0.0	4.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	17.2
614	4.1	0.0	1.0	1.5	2.0	78.0	24.9	0.0	0.0	0.0	0.0	0.3	1.9	0.2	0.0	2.1	0.2	0.1	65.0	2.6	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	1.1	0.3	2.8	3.1	1.9	0.0	2.0	0.0	0.0	0.0	0.0	196.1
615	0.8	0.0	0.2	0.3	0.4	14.2	5.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	1.1	0.0	0.0	12.9	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.6	0.6	0.4	0.0	0.4	0.0	0.0	0.0	0.0	38.4
616	0.3	0.0	0.1	0.1	0.1	5.6	1.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.4	0.0	0.0	4.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	15.9
617	0.3	0.0	0.1	0.1	0.2	5.8	1.9	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.0	0.0	0.0	5.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.0	0.2	0.0	0.0	0.0	0.0	16.8
618	0.1	0.0	0.0	0.0	0.1	1.9	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.9	0.0	0.0	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	7.1
619	1.1	0.0	0.3	0.4	0.5	17.6	6.5	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.0	1.9	0.1	0.0	16.8	0.7	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.8	0.5	0.0	0.5	0.0	0.0	0.0	0.0	49.3
620	5.4	0.0	1.3	1.9	2.6	103.9	32.4	0.0	0.0	0.0	0.0	0.4	2.5	0.3	0.0	1.7	0.3	0.2	84.8	3.4	0.2	0.5	0.2	0.1	1.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	4.0	2.5	0.0	2.6	0.0	0.0	0.0	0.0	252.6
621	1.7	0.0	0.4	0.6	0.8	30.5	10.4	0.0	0.0	0.0	0.0	0.1	0.8	0.1	0.0	2.7	0.1	0.0	27.0	1.1	0.0	0.2	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	0.0	0.8	0.0	0.0	0.0	0.0	80.0
622	14.0	0.0	3.3	4.9	6.6	229.2	84.3	0.0	0.0	0.0	0.0	1.2	6.6	0.8	0.0	2.3	0.8	0.4	218.5	8.9	0.4	1.4	0.5	0.2	2.8	0.6	0.2	0.2	0.1	0.4	0.0	0.0	0.0	10.6	6.4	0.0	6.8	0.0	0.0	0.0	0.0	612.1
623	0.0	0.0	0.0	0.0	7.2	235.7	93.4	0.0	0.0	0.0	0.0	1.3	7.3	0.9	0.0	3.4	0.9	0.4	241.1	9.9	0.4	1.6	0.5	0.2	3.1	0.6	0.2	0.2	0.1	0.8	4.0	1.3	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	625.3
624	0.0	0.0	0.0	0.0	4.5	164.3	56.6	0.0	0.0	0.0	0.0	0.8	4.4	0.5	0.0	1.2	0.6	0.3	147.3	6.0	0.3	1.0	0.3	0.1	1.9	0.4	0.1	0.1	0.1	0.5	2.5	0.8	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	400.8
625	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626	0.0	0.0	0.0	0.0	4.7	161.7	59.8	0.0	0.0	0.0	0.0	0.8	4.7	0.6	0.0	1.8	0.6	0.3	155.0	6.3	0.3	1.0	0.3	0.1	2.0	0.4	0.1	0.2	0.1	0.5	2.6	0.8	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	411.5
627	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
628	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
630	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
631	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	873.6	0.0	210.9	432.9	290.4	12,307.0	5,002.2	0.0	0.0	0.0	0.0	77.7	477.1	52.3	933.1	1,020.8	58.5	20.5	11,672.8	366.1	26.8	96.1	31.2	17.2	196.1	38.4	15.9	16.8	7.1	49.3	252.6	80.0	612.1	625.3	400.8	0.0	411.5	0.0	0.0	0.0	0.0	36,672.9

Source: NSI, 2017

4.2 Development of EI Trips

The EI trips are added to the model during the trip generation step as productions and attractions at each of the external stations. The EI trips are divided into:

- CMVEH
- Freight or TRK
- HBW
- HBO
- NHB

Using data from the previous model, the percentages of vehicle trips by type at each external station were calculated for all except the EI truck trips. The EI truck trips were calculated during the steps mentioned in Section 4.1. The vehicle trips for the CMVEH, HBW, HBO, and NHB purposes were then calculated using the developed trip percentages and the remainder of the total EI trips minus the EI TRK trips. The calculated EI trips are in vehicles trips. However, the internal trip model uses person trips for HBW, HBO, and NHB trip purposes. Hence, the calculated HBW, HBO, and NHB trips at external stations were converted to person trips using auto occupancy factors by trip purpose.

Table 9 displays the external stations and their corresponding EI vehicle trips. Table 10 displays the EI vehicle trips by trip purpose for each external station.

Table 9: External Station EI Data

Station Number	Description	Station Count	Percent EI Trips	Percent EI AUTO	Percent EI TRK	EI AUTO Trips	EI TRK Trips
500	Ft Campbell Access/Gate 4	10,927	84.0%	96.9%	3.1%	8,898	282
501	Ft Campbell Access/Gate 5	0	86.8%	97.0%	3.0%	0	0
502	Ft Campbell Access/Gate 6	2,977	85.8%	96.9%	3.1%	2,477	78
503	Ft Campbell Access/Gate 7	6,363	86.4%	96.8%	3.2%	5,322	175
504	KY 117	4,280	86.4%	97.0%	3.0%	3,587	112
505	I-24	34,204	28.0%	96.9%	3.1%	9,287	300
506	Ft Campbell Blvd/US 41 A	17,421	42.0%	97.0%	3.0%	7,017	220
507	Pembroke Oak Grove Rd	1,510	100.0%	96.7%	3.3%	1,460	50
508	KY 109/Bradshaw Rd	457	100.0%	97.9%	2.1%	447	10
509	KY 1453	187	100.0%	94.7%	5.3%	177	10

Station Number	Description	Station Count	Percent EI Trips	Percent EI AUTO	Percent EI TRK	EI AUTO Trips	EI TRK Trips
600	Trenton Rd/SR 48	3,479	100.0%	96.8%	3.2%	3,366	113
601	Tylertown Rd/SR 249	1,155	86.5%	96.7%	3.3%	966	33
602	US 79/SR 13	7,175	86.7%	96.9%	3.1%	6,026	195
603	Port Royal Rd	1,045	90.0%	97.0%	3.0%	913	28
604	US 41	1,973	5.4%	100.0%	0.0%	107	0
605	US 41	2,303	11.4%	96.3%	3.7%	253	10
606	SR 76	800	85.4%	97.1%	2.9%	663	20
607	Harmony Church Rd	300	86.4%	94.7%	5.3%	245	14
608	I-24	49,654	53.0%	96.9%	3.1%	25,502	808
609	Madison St/US 41 A	5,300	86.2%	96.9%	3.1%	4,426	142
610	Old Clarksville PK	428	87.5%	97.1%	2.9%	364	11
611	Ashland City Rd	3,728	94.8%	97.0%	3.0%	3,429	107
612	Chapel Hill Rd	487	87.2%	97.1%	2.9%	412	12
613	Ryes Chapel Rd	300	88.6%	96.8%	3.2%	257	9
614	Cumberland Dr	4,000	90.2%	96.9%	3.1%	3,496	112
615	Marion Rd	606	87.3%	97.1%	2.9%	514	15
616	Chambers Rd	223	85.7%	94.4%	5.6%	181	11
617	Thorne Hollow Rd	224	85.0%	94.1%	5.9%	179	11
618	Ellis Mill Rd	100	85.7%	100.0%	0.0%	86	0
619	SR 13	749	86.8%	97.0%	3.0%	631	20
620	SR 149	4,967	89.8%	97.0%	3.0%	4,328	133
621	Lylewood Rd	1,200	86.7%	97.1%	2.9%	1,010	30
622	Dover Rd	8,140	85.0%	96.9%	3.1%	6,701	215
623	Lafayette Rd/101st Airborne	8,899	85.9%	96.9%	3.1%	7,408	241
624	Ft Campbell Access/Gate 1	5,597	85.7%	96.8%	3.2%	4,644	151
625	Ft Campbell Access/Gate 2	0	85.8%	96.9%	3.1%	0	0
626	Ft Campbell Access/Gate 3	5,918	86.1%	96.9%	3.1%	4,938	157
627	Sango Rd	400	100.0%	97.7%	2.3%	391	9
628	Knox Rd	200	100.0%	95.0%	5.0%	190	10
630	Old Hwy 48	100	100.0%	100.0%	0.0%	100	0
631	101st Airborne Division Rd	1,000	100.0%	97.0%	3.0%	970	30

Source: NSI, 2017

Table 10: EI Trips by External Station

Station Number	CMVEH	FRT	HBW	HBO	NHB
500	139.7	282.2	2,189.5	4,379.1	2,189.5
501	0.0	0.0	0.0	0.0	0.0
502	38.9	78.5	609.5	1,219.0	609.5
503	1,845.9	175.5	869.1	1,738.2	869.1
504	56.3	112.1	882.7	1,765.4	882.7
505	2,531.9	299.6	1,688.7	3,377.4	1,688.7
506	110.2	219.6	1,726.8	3,453.5	1,726.8
507	48.2	49.5	353.1	706.1	353.1
508	0.0	9.7	111.8	223.6	111.8
509	0.0	9.8	44.3	88.6	44.3
600	53.0	112.6	828.4	1,656.7	828.4
601	10.0	33.3	239.1	478.1	239.1
602	313.4	194.7	1,428.2	2,856.4	1,428.2
603	29.9	27.9	220.7	441.4	220.7
604	0.5	0.0	26.6	53.2	26.6
605	1.3	9.7	62.9	125.7	62.8
606	21.7	19.5	160.4	320.8	160.4
607	11.4	13.6	58.5	117.0	58.5
608	6,954.2	808.4	4,637.1	9,274.2	4,637.1
609	69.5	142.1	1,089.1	2,178.1	1,089.1
610	1.8	10.7	90.5	181.0	90.5
611	53.8	106.8	843.8	1,687.5	843.8
612	4.3	12.5	101.9	203.9	101.9
613	8.5	8.6	62.2	124.3	62.2
614	182.0	112.0	828.5	1,656.9	828.5
615	14.0	15.3	125.0	250.0	125.0
616	8.4	10.6	43.0	86.0	43.0
617	7.9	11.2	42.8	85.6	42.8
618	5.4	0.0	20.1	40.2	20.1
619	9.9	19.7	155.2	310.4	155.2
620	254.6	133.5	1,018.4	2,036.8	1,018.4
621	10.4	30.0	249.9	499.8	249.9
622	105.3	214.8	1,648.9	3,297.9	1,648.9
623	157.7	240.5	1,812.5	3,625.0	1,812.5

Station Number	CMVEH	FRT	HBW	HBO	NHB
624	73.0	151.3	1,142.7	2,285.4	1,142.7
625	0.0	0.0	0.0	0.0	0.0
626	77.5	156.8	1,215.1	2,430.2	1,215.1
627	0.0	9.3	97.7	195.4	97.7
628	0.0	10.0	47.5	95.0	47.5
630	0.0	0.0	25.0	50.0	25.0
631	0.0	30.0	242.5	485.0	242.5

Source: NSI, 2017

5.0 Trip Generation

This section describes the procedures used to determine the number of trips that begin or end in a given traffic zone. Trip generation is the estimation of the amount of person trips that are produced and attracted to each TAZ. Trip rates for the various types of trips are based upon the land use properties and demographic characteristics of each TAZ.

The model considers the following internal trip purposes:

- HBW
- HBO
- NHB
- CMVEH
- FRT, a.k.a. TRK

5.1 Internal Travel Model

For home-based trips, the productions refer to the home end, and the attractions refer to the non-home end of the trip. For NHB, CMVEH, and FRT trips, productions and attractions refer to the origin and destination respectively.

The model uses cross-classification trip production models for the home-based and non-home based trip purposes. This means that trip rates that vary by household type are applied at the zonal level. The trip attraction models are linear regression equations that relate zonal employment and households to trip attractions. For the commercial vehicle and freight vehicle trip purposes, the model applies a linear regression equation that relates zonal employment and households to trip productions and attractions. These equations are based on the Quick Response Freight Manual.

The trip production and attraction models were developed from those used in the MTP 2040. These trip models were refined as needed during the calibration process and adjusted to meet the Tennessee model calibration guidelines. The final trip generation production and attraction models for HBW, HBO, and NHB trips are shown Tables 11 and 12 respectively. The trip rates for CMVEH and FRT trips are shown in Table 13.

Table 11: Trip Production Rates

Trip Purpose	HH Size	Vehicle Ownership (Number of Vehicles)				
		0 VEH	1 VEH	2 VEH	3 VEH	4+ VEH
HBW	1 HH	0.8115	0.8639	1.0412	1.3263	1.5826
	2 HH	1.3079	1.3079	1.3079	1.5502	1.6424
	3 HH	1.7599	1.7599	1.7599	2.0340	2.1498
	4+ HH	1.9458	1.9458	1.9458	2.3612	2.6790
HBO	1 HH	1.6351	1.7699	2.1561	2.7193	3.2257
	2 HH	3.0033	3.0033	3.0033	3.4279	3.6063
	3 HH	4.2308	4.2308	4.2308	4.8096	5.0553
	4+ HH	5.0620	5.0620	5.0620	6.1442	7.0115
NHB	1 HH	0.6126	0.7033	0.9043	1.1000	1.2807
	2 HH	1.3153	1.3856	1.4640	1.5303	1.5847
	3 HH	2.1357	2.1955	2.2845	2.3422	2.3935
	4+ HH	3.4309	3.5597	3.6419	3.6924	3.8525

Source: TDM

Table 12: Trip Attraction Rates

Trip Purpose	Employment Type			
	Retail	Service	Non-Retail	HH
HBW	1.9212	1.4298	1.7798	0.0000
HBO	9.6037	1.9492	0.6498	1.0272
NHB	4.3460	1.2720	0.5300	0.5300

Source: TDM

Table 13: Commercial Vehicle and Freight Vehicle Trip Rates

Trip Purpose	Employment Type			
	Retail	Service	Non-Retail	HH
CMVEH	0.8376	0.3923	0.8388	0.2223
FRT	0.1624	0.0398	0.1601	0.0552

Source: TDM

5.2 Special Generators

A special generator is a land use with unusually low or high trip generation characteristics when compared to the established trip generation rates. For the CUAMPO TDM there were three locations identified as special generators:

- Austin Peay State University
- Gateway Medical Center
- Draughons Junior College

The rates developed for the TDM's special generators are in vehicle trips. These trips were then converted to person trips using the model's vehicle occupancy rates. This makes the special generator trips consistent with the trip rates developed in the above section. Table 14 displays the special generator trips used in the updated TDM. The model update splits the special generator trips at Austin Peay among the zones where parking occurs on campus, and not by being placed in the main campus TAZ.

Table 14: Special Generators Trips

Facility	Vehicle Trips	Person Trips
Austin Peay State University	11,876	18,646
Gateway Medical Center	5,526	8,676
Draughons Junior College	728	1,143

Source: TDM

5.3 Balancing Productions and Attractions

Productions and attractions are balanced at the study area level for all trip purposes. This means that the area-wide trip attractions match the amount of area-wide trip productions. HBW and HBO trips are balanced by holding the productions as a constant. The NHB trips are balanced by holding the attractions as a constant. This reflects that the trips produced at the households or trip origins must be equal to the total number of trips attracted to the non-home ends or destinations. Table 15 shows the daily trips by trip purpose before and after balancing.

Table 15: Balanced Productions and Attractions

Trip Purpose	Before Balancing		After Balancing	
	Productions	Attractions	Productions	Attractions
HBW	127,283	130,472	127,283	127,283
HBO	314,163	332,049	314,163	314,163
NHB	177,679	168,616	177,964	177,964
CMVEH	63,214	63,214	63,214	63,214
FRT	12,366	12,366	12,366	12,366

5.4 Summary

As a member of the Tennessee Model Users Group (TNMUG), TDOT has adopted a set of guidelines that help with TDM development. These guidelines are contained in two documents. The first is the *Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee*[2], which was last updated in 2016. The second is the *Travel Model Validation and Reasonableness Checking Manual, 2nd Edition*.[3] Using these guidelines, several key statistics for trip generation were monitored, which are shown in Table 16.

Table 16: Modeled vs Benchmark Trip Rates

Trip Rate	Modeled	Low Benchmark	High Benchmark
Person Trips per Person	3.2	3.3	4.0
Person Trips per Household	8.2	8.0	10.0
HBW Trips	20.8%	12.0%	24.0%
HBO Trips	51.5%	45.0%	60.0%
NHB Trips	27.6%	20.0%	33.0%

Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

These statistics are within the reasonable limits established by the TNMUG guidance except person trips per person which is slightly off from the recommended benchmark

[2] http://tnmug.utk.edu/wp-content/uploads/sites/47/2017/06/MinimumTravelDemandModel2016.pdf

[3] Travel Model Validation and Reasonableness Checking Manual, 2nd Edition. Travel Model Improvement Program.

range. No further adjustments were made since the model was performing well within all other benchmark ranges and persons were not directly used in the trip rates.

Development of the updated TDM also included a review of the logit model used to develop the household breakdowns used in the demographic data. Using data from the "Middle Tennessee Transportation and Health Study" conducted by Westat in 2013, a comparison of the observed household sizes in Montgomery County and the modeled household percentages was conducted. Based on this data, the logit model continues to perform well in estimating the household classifications for the model. Table 17 displays the household size breakdowns from Westat and the TDM.

Table 17: Montgomery County Household Size Breakdown

Household Size	Percentage		
	Westat	TDM	Difference
HHS1	24%	27%	+3%
HHS2	32%	29%	-3%
HHS3	19%	19%	0%
HHS4+	26%	25%	-1%

6.0 Trip Distribution

The next step in travel demand modeling is the trip distribution process. This function determines the destinations of trips produced in the trip generation model, and conversely, where the attracted trips originated.

6.1 Gravity Model

Many models are available for this process; however, the CUAMPO TDM effort used the traditional gravity model.

This model employs two relationships, the first of which is indirect:

> The shorter the travel time to the destination zone, the greater the number of trips will be distributed to it from the origin zone.

The second relationship is a direct one:

> The more attractions there are in a destination zone, the more trips will be distributed to it from the origin zone.

The generalized equation for this model is:

$$T_{ij} = \frac{(P_i)(A_j)(F_{ij})}{\sum_{j=1}^{n}(A_j)(F_{ij})(K_{ij})}$$

Where: T_{ij} = Trips distributed between zones i and j

P_i = Trips produced at zone i

A_j = Trips attracted to zone j

F_{ij} = Relative distribution rate (friction factors or impedance function) reflecting impedance between zone i and zone j

K_{ij} = Calibration parameter. This parameter is not used in the CUAMPO TDM

n = Total number of zones in study area

6.2 Impedance Matrix

The TDM uses a travel time impedance matrix for each zonal pairing within the study area. This matrix traced the shortest free-flow travel time path from zone i (the start of the trip) to zone j (the end of the trip). These values are placed in what is called a skim matrix. Intrazonal trips are unable to build a path for calculation purposes since i and j are the same zone in this case. When this occurred, the travel time in the skim matrix was computed by taking half of the average of travel time from zone i to its three closest zones.

6.3 Friction Factors

In a model of this type, friction factors determine the effect that spatial separation has on trip distribution between zones. This is the first relationship that was mentioned for the gravity model. These factors measure the probability of trip making at one-minute increments of travel time. Friction factors in the gravity model are an inverse function of travel time and each unique trip purpose has its own friction factors. This TDM effort uses the gamma function to derive the friction factors. Calibration of a gamma impedance function involves estimating the three parameters of the gamma function; a, b, and c. The gamma function parameter values used for each trip purpose are shown in Table 18.

Table 18: Gamma Function Parameter Values by Trip Purpose

Trip Purpose	a	b	c
HBO	390,676.5312	0.2560	0.0886
HBW	1.1614	0.0174	0.0425
NHB	1.0016	0.0056	0.1556
CMVEH	1.0000	0.0000	0.0800
FRT	1.0000	0.0000	0.1000

Source: TDM

6.4 Terminal Times

Terminal times reflect additional travel that is associated with a trip. These can be events such as parking or walking to vehicles and/or facilities. This factor was added to the beginning and end of each trip, using a terminal time of one and a half (1.5) minutes. This value was derived from the previous TDM.

6.5 Trip Length Frequency Distribution

As mentioned previously, the gravity model develops friction factors in one minute increments and accommodates various lengths of trips. The average trip lengths obtained from the model are displayed in Table 19. The average trip lengths that were estimated using NHTS data for 2010, and previous TDM modeling efforts, are included in the trip length table for comparison. Figures 6 through 8 show the modeled trip length frequency distribution for HBW, HBO, and NHB trips. These curves were compared to those used in the previous model and determined to be within an acceptable level of consistency.

Table 19: Average Trip Length by Trip Purpose

Trip Purpose	2016 Model Average Trip Length (min)	NHTS 2010 Average Trip Length (min)	2008 Model Average Trip Length (min)	2010 Model Average Trip Length (min)
HBW	24.2	20.44	17.67	21.74
HBO	19.5	17.60	16.20	19.53
NHB	17.4	17.70	16.32	18.31

Source: TDM, CUAMPO

Figure 6: Modeled HBW Trip Length Frequency Distribution

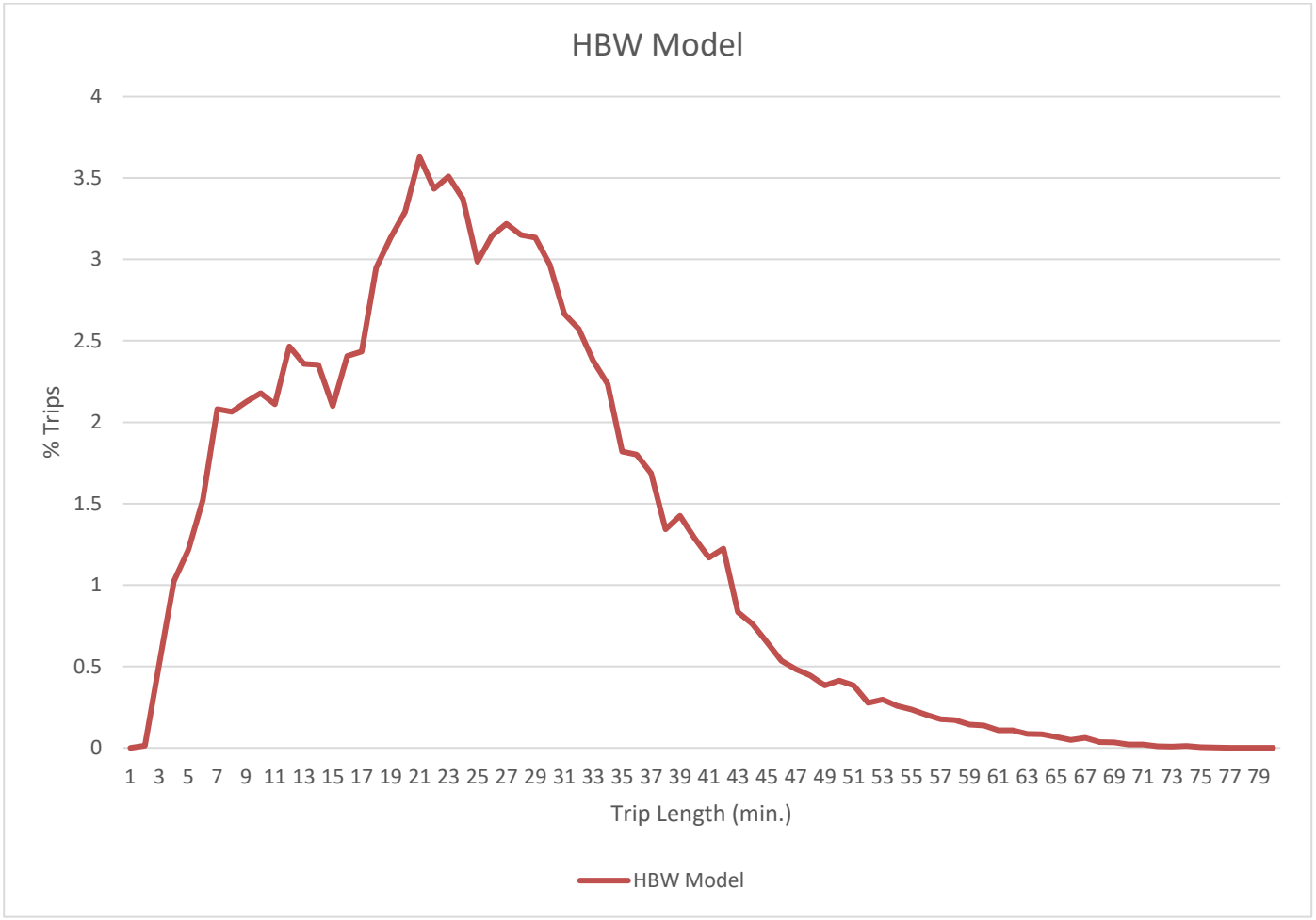


Figure 7: Modeled HBO Trip Length Frequency Distribution

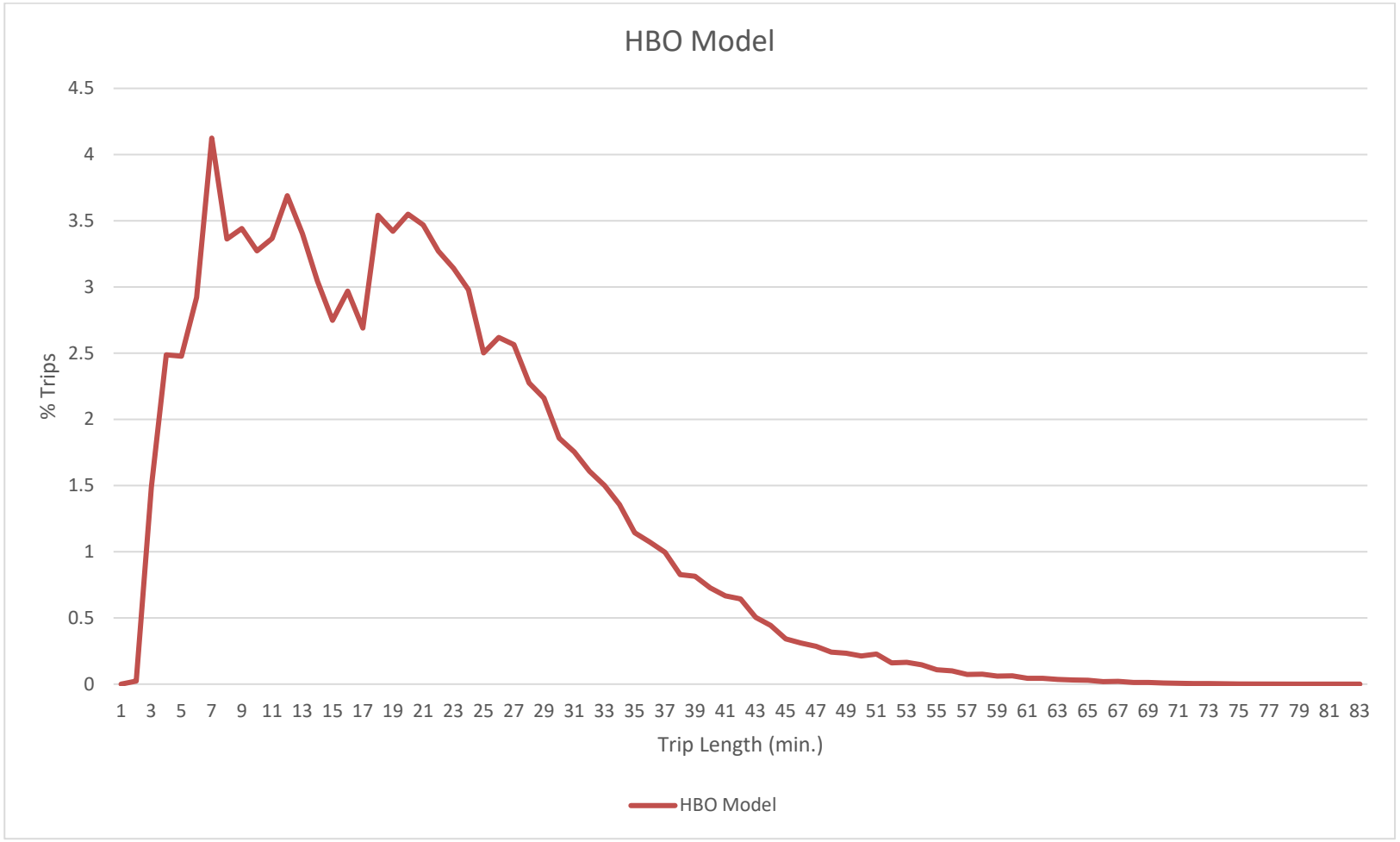


Figure 8: Modeled NHB Trip Length Frequency Distribution

6.6 Auto Occupancy Rates

The trip rates calculated in the Trip Generation step for HBW, HBO, and NHB trips are in person trips. In order for the TDM to assign vehicles to the roadway network, the amount of trips assigned must be in vehicle trips. This process is done using auto occupancy factors. It divides the amount of person trips by the corresponding occupancy factors shown in Table 20.

Table 20: Model Auto Occupancy Factors

Trip Purpose	Auto Occupancy Factor
HBW	1.14
HBO	1.65
NHBO	1.57
CMVEH	1.00
FRT	1.00

Source: TDM

7.0 Trip Assignment

Trip assignment is the final step in the traditional four step planning model. Traffic assignment models are used to estimate the traffic flows on a network. The main input to these models is a matrix of flows that indicate the volume of traffic between origin-destination (O-D) pairs. The other inputs to these models are network topology, link characteristics, and link performance functions.

The trips between each O-D pair are loaded onto the network based on the travel time or impedance of the alternative paths that could carry this traffic. The MTP 2045 model is a user equilibrium model with a generalized cost assignment that uses travel time as the cost.

7.1 BPR Volume-Delay Functions

The TDM link travel time was estimated by the Bureau of Public Roads (BPR) Volume-Delay function. The values that were used in the BPR formula are determined by facility type. The TDM has updated alpha and beta values which are assigned by a roadway's functional classification. The assignment process used in the TDM analyzes link and intersection delay. For segments, as traffic volume increases on a roadway and approaches its maximum capacity, the average speed on the roadway declines. After a point, the roadway speed declines past that of the free flow speed and indicates congestion. The intersection delay is calculated using intersection volume/capacity (VOC) ratios and intersection capacities on the intersection links.

The generalized equation for the BPR formula is:

$$T = T_0 * (1 + \alpha * (\frac{v}{c})^{\beta})$$

Where: T = Congested travel time

T_0 = Free flow travel time

v = Assigned link volume

c = Capacity

α, β= BRP coefficients

This allows for the calculation of the roadway's peak hour travel:

$$\text{Peak Hour Travel Speed} = (\text{Free Flow Speed}) / (1 + \alpha * (\frac{v}{c})^{\beta}$$

The BPR coefficients used in the TDM are shown in Table 21.

Table 21: BPR Volume-Delay Function Parameters

Model Functional Class	Alpha	Beta
Rural Interstate	0.83	5.50
Rural Principal Arterial	0.71	2.10
Rural Minor Arterial	0.71	2.10
Rural Major Collector	0.60	1.60
Rural Minor Collector	0.60	1.60
Rural Local	0.60	1.60
Rural Other	0.60	1.60
Rural On/Off Ramp	0.71	2.10
Urban Interstate	0.83	5.50
Urban Expressway	0.71	2.10
Urban Principal Arterial	0.71	2.10
Urban Minor Arterial	0.71	2.10
Urban Collector	0.60	1.60
Urban Local	0.60	1.60
Urban Other	0.60	1.60
Urban On/Off Ramp	0.71	2.10
Centroid Connector	0.15	4.00

Source: TDM

8.0 Model Validation

The purpose of model validation is to make the adjustments necessary to replicate the base-year traffic conditions as closely as possible. In practice, this means making the link assignment volumes approximate the traffic estimates, based on actual counts, within acceptable limits of deviation. Generally speaking, the lower the volume, the greater the relative deviation that is acceptable. Conversely, the greater the amount of traffic, the greater the degree of accuracy required. This is because the ultimate purpose of the model is to determine whether additional vehicular capacity will be needed on any given roadway at a designated future date. Where existing volumes are low, the model assignment may deviate from actual conditions by 40 or 50 percent without affecting the projected need for additional capacity. On the other hand, in the case of a heavily traveled interstate route, a deviation of 20 percent may be significant (i.e., alter the projection of required capacity). The validation process is intended to ensure that the model is performing within the limits that define acceptable ranges of deviation from observed "real-world" values.

As stated previously, the TNMUG uses the *Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee* and the *Travel Model Validation and Reasonableness Checking Manual, 2nd Edition,* as guidelines for the validation of TDMs. The following criteria were used to validate the CUAMPO TDM:

- Vehicle Miles Travelled (VMT) by Region and Facility Type
- Percent Root Mean Square Error (RMSE) by Functional Class
- Percent RMSE by Volume Group
- Percent Error/Deviation by Roadway Facility
- Coefficient of Determination (R^2)
- Screenlines and Cutlines
- Cordon Lines

8.1 VMT by Region and Facility Type

The VMT of a roadway link is calculated by multiplying the vehicle volume on a link by its length in miles. The validation of the TDM looks at the VMT of the entire study area, as well as the individual functional classification of roadways in the study area that classified as a collector or higher. Table 22 displays the VMT of the study area as well as the VMT that was calculated using data obtained from the 2015 Highway Performance Monitoring System (HPMS.) At this time, the 2016 HPMS data is not available.

Table 22: VMT by Region and Functional Classification

Functional Classification	Model VMT	HPMS 2015 VMT	Difference	Percent Difference	Percent Difference Limit
Regional*	4,270,513	4,177,254	93,259	2.23%	+/- 2-5
Freeways/Expressways	1,210,751	1,204,522	6,229	0.52%	+/- 6-7
Principal Arterials	1,258,285	1,292,559	-34,274	-2.65%	+/- 10-15
Minor Arterials	1,272,585	1,192,158	80,427	6.75%	+/- 10-15
Collectors	528,892	488,015	40,877	8.38%	+/- 20-25

*Values do not include Local streets

Source: NSI, HPMS

8.2 Percent RMSE

The RMSE measure was chosen because when comparing model flows versus counts, sometimes a straight aggregate sum by link group can be misleading. The sum of all traffic counts for a particular link group may be close to the sum of the corresponding traffic flows, but individual link flows may still be very different than their corresponding link count. However, the RMSE statistic does not convey information about the magnitude of the error relative to that of the counts. Therefore, the Percent Root Mean Square Error (Percent RMSE or % RMSE) is often computed. This measure expresses the RMSE as a percentage of the average count value. The Percent RMSE is defined below:

$$\%RMSE = \frac{\sqrt{\sum_j (Model_j - Count_j)^2 / (Numberofcounts)}}{\left(\sum_j Count_j / Numberofcounts\right)} * 100$$

Validation results by ADT group and functional class are shown in Table 23 and Table 24 respectively.

Table 23: RMSE by ADT Group

ADT Range	Number of Observations	Total Count[1]	Total Model Volume[2]	% RMSE	% RMSE Limit[3]
ADT<5,000	113	193,717	232,174	62.4	45.0 - 100.0
5,000 <= ADT < 10,000	40	281,132	287,068	27.5	35.0 - 45.0
10,000 < =ADT < 15,000	14	167,617	186,087	25.8	27.0 - 35.0
15,000 < =ADT < 20,000	15	258,334	240,482	19.4	25.0 – 30.0
20,000 < =ADT < 30,000	28	697,449	688,350	12.8	15.0 – 27.0
30,000 < =ADT <50,000	10	381,720	364,722	9.0	15.0 – 25.0
Areawide	220	1,979,969	1,998,883	22.9	35.0 – 45.0

Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

Table 24: RMSE by Roadway Functional Class

Functional Class	Number of Observations	Total Count[1]	Total Model Volume[2]	% RMSE	% RMSE Limit[3]
Rural Freeway/Interstate	6	167,844	158,178	8.8	20
Rural Principal Arterial	4	60,564	58,446	18.2	30
Rural Minor Arterial	15	72,839	74,739	11.7	40
Rural Major Collector	18	39,348	47,782	53.0	70
Rural Minor Collector	37	32,515	36,598	68.8	70
Urban Freeway/Interstate	6	157,128	163,914	8.0	20
Urban Principal Arterial	24	634,596	614,755	14.6	30
Urban Minor Arterial	48	603,080	618,460	20.2	40
Urban Collector	47	184,128	196,664	49.9	70
Areawide	220	1,979,969	1,998,883	22.9	35.0-45.0

Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

(1) Total Count represents the sum of average daily traffic estimates for all KYTC and TDOT count locations (area wide), all count locations on principal arterials, all locations on minor arterials, all on major/minor collectors.
(2) Total Model Volume is the sum of model-generated traffic volumes for all network links associated with KYTC and TDOT count locations (area wide), all links associated with count locations on principal arterials, all links associated with locations on minor arterials, and all links associated with count locations on collectors.
(3) % RMSE Limit is the maximum acceptable magnitude of the error relative to that of the counts conducted by KYTC and TDOT.

8.3 Percent Error

The next measure of model validation is the percent error, or percent deviation, of the model's assigned traffic volumes to the observed traffic counts. Tables 25 and 26 display the validation results by ADT group, ADT and lane group, and by facility category respectively.

Table 25: Percent Deviation by ADT Group

ADT Range	Number of Observations	Total Count[1]	Total Model Volume[2]	% Dev	% Dev Limit[3]
ADT<1,000	47	20,416	33,634	64.7	200.0
1,000 < =ADT < 2,500	35	55,102	66,964	21.5	100.0
2,500 <= ADT < 5,000	31	118,199	131,576	11.3	50.0
5,000 <= ADT < 10,000	40	281,132	287,068	2.1	25.0
10,000 < =ADT <25,000	45	785,894	773,622	-1.6	20.0
25,000 < =ADT < 50,000	22	719,226	706,019	-1.8	15.0
Areawide	220	1,979,969	1,998,883	1.0	5.0

Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

Table 26: Percent Deviation by Facility Type

Facility Type	Number of Observations	Total Count[1]	Total Model Volume[2]	% Dev	% Dev Limit[3]
Freeway	12	324,972	322,092	-0.9	+/- 7.0
Arterial	91	1,371,079	1,366,400	-0.3	+/- 15.0
Collector	102	255,991	281,044	9.8	+/- 25.0

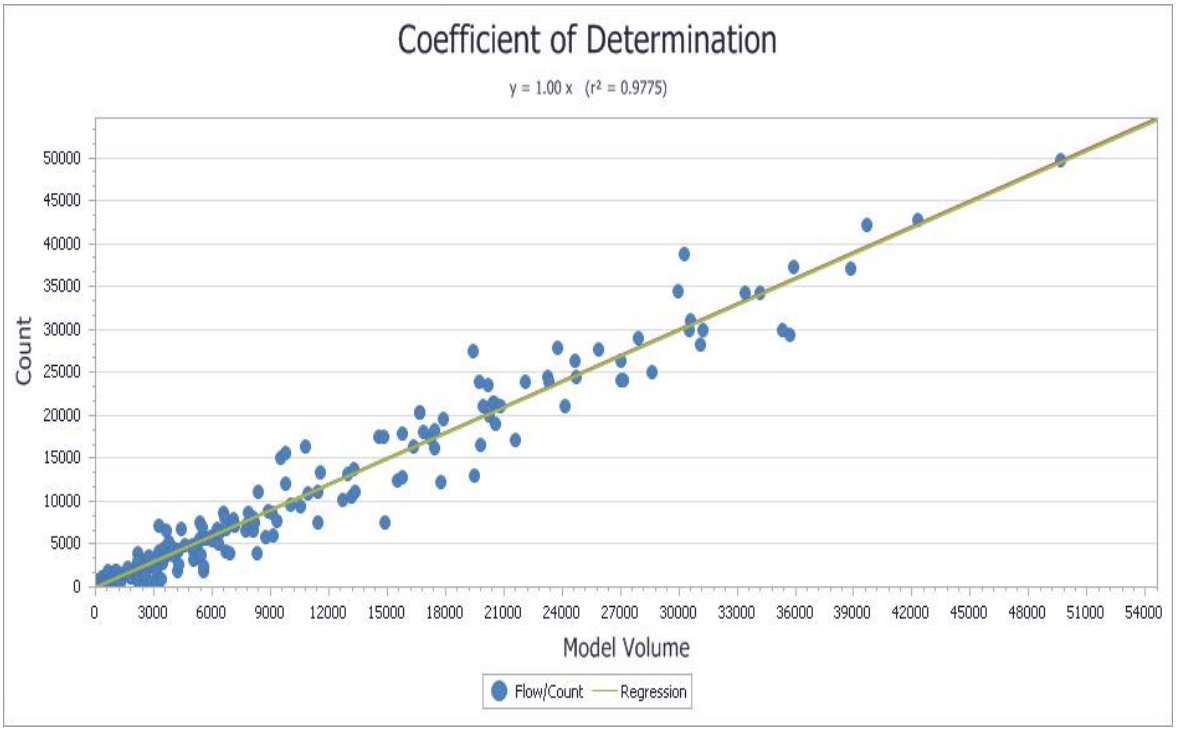
Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

(1) Total Count represents the sum of average daily traffic estimates for all KYTC and TDOT count locations (area wide), all count locations on principal arterials, all locations on minor arterials, all on major/minor collectors.
(2) Total Model Volume is the sum of model-generated traffic volumes for all network links associated with KYTC and TDOT count locations (area wide), all links associated with count locations on principal arterials, all links associated with locations on minor arterials, and all links associated with count locations on collectors.
(3) % Dev Limit is the maximum acceptable plus/minus percentage deviation from estimated base-year (2016) average daily traffic (ADT) based on counts conducted by KYTC and TDOT.

8.4 Coefficient of Determination

The coefficient of determination (R^2) provides a correlation between the observed traffic volumes from KYTC and TDOT and the estimated TDM volumes. The TNMUG guidelines recommend a minimum R^2 of 0.88. The areawide coefficient of this TDM effort was 0.96 and a scatter plot of the results is shown in Figure 9.

Figure 9: Modeled Volume vs Traffic Count Plot



8.5 Screenlines, Cutlines, and Cordon Lines

In travel demand modeling, screenlines and cutlines are used to assess how well the model replicates major trip movements and travel between different subareas of the study area. Screenlines often go from boundary cordon to boundary cordon within a study area and are usually a significant physical feature within the study area such as rail lines, rivers, etc. Cutlines extend across corridors and contain multiple facilities and assist with validation of corridor flows within the TDM. Figure 10 shows the screenlines and cutlines used in the model validation, while Table 27 displays the results of the screenline analysis.

Figure 10: MTP 2045 Screenlines

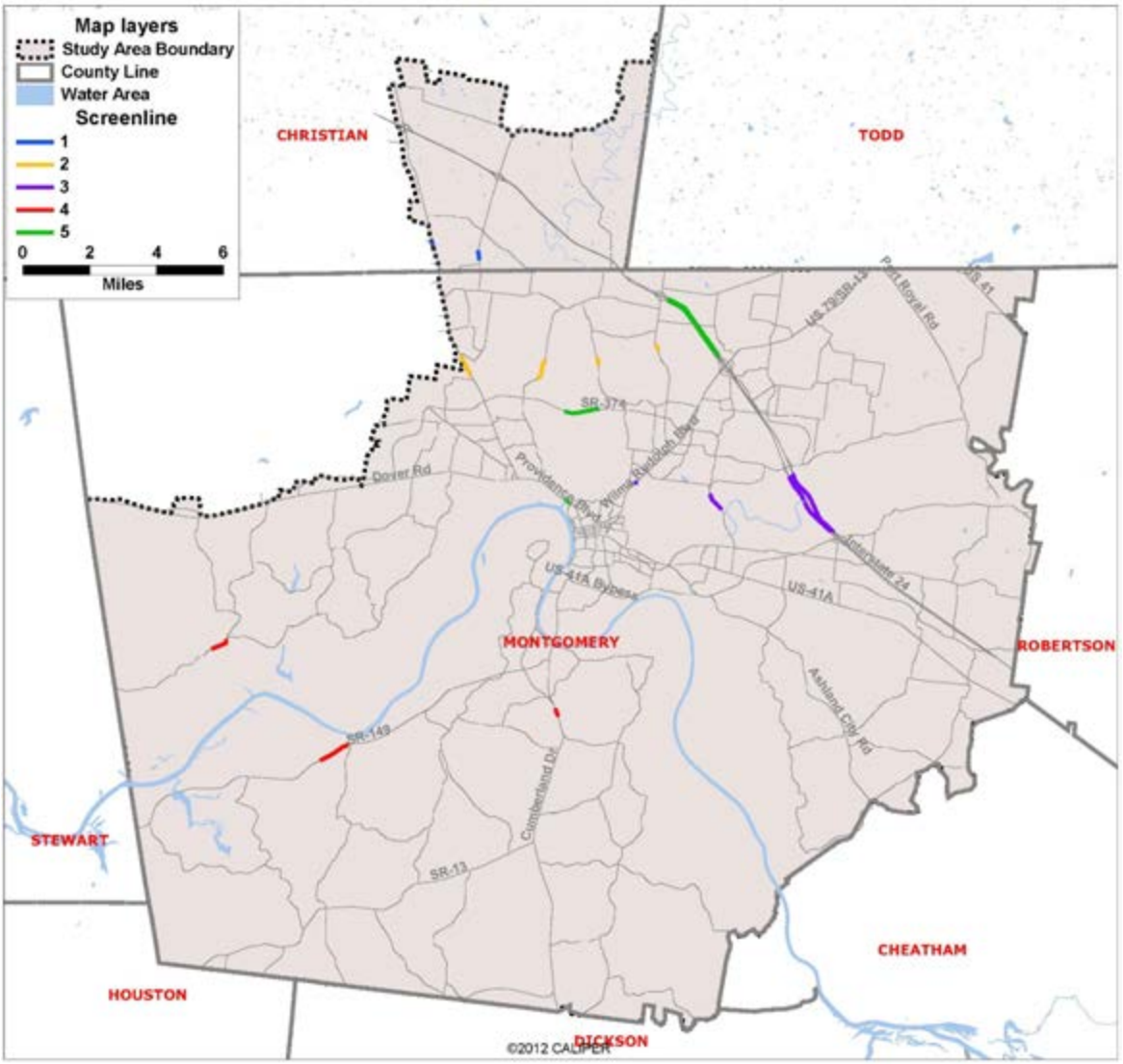


Table 27: Screenline and Cutline Analysis

Line Number	Type	Number of Observations	Total Count[1]	Total Model Volume[2]	% Dev	Allowable % Dev
1	Screenline	2	33,253	33,767	1.5	+/-20.0
2	Screenline	4	81,763	79,044	-3.3	+/-15.0
3	Screenline	4	113,640	119,223	4.9	+/-15.0
4	Screenline	3	19,779	20,803	5.2	+/-20.0
5	Screenline	4	128,193	132,386	3.3	+/-15.0

Source: Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee; NSI, 2017

(1) Total Count represents the sum of average daily traffic estimates for all KYTC and TDOT count locations (area wide), all count locations on principal arterials, all locations on minor arterials, all on major/minor collectors.
(2) Total Model Volume is the sum of model-generated traffic volumes for all network links associated with KYTC and TDOT count locations (area wide), all links associated with count locations on principal arterials, all links associated with locations on minor arterials, and all links associated with count locations on collectors.

An analysis of the study area boundary's cordon lines was also conducted in order to determine if the external station TDM volumes matched those of the traffic counts. Based on the TNMUG guidance, all external station link model volumes should be within +/- one (1) percent of the observed traffic counts. The results of the cordon analysis are shown in Table 28.

Table 28: Cordon Analysis

External Station	Description	Model Volume	Count Volume	Volume/Count
500	Ft Campbell Access/Gate 4	10,925	10,927	1.00
501	Ft Campbell Access/Gate 5	0	0	1.00
502	Ft Campbell Access/Gate 6	2,975	2,977	1.00
503	Ft Campbell Access/Gate 7	6,359	6,363	1.00
504	KY 117	4,275	4,280	1.00
505	I-24	34,190	34,204	1.00
506	Ft Campbell Blvd/US 41 A	17,237	17,241	1.00
507	Pembroke Oak Grove Rd	1,508	1,510	1.00
508	KY 109/Bradshaw Rd	454	457	0.99
509	KY 1453	185	187	0.99
600	Trenton Rd/SR 48	3,476	3,479	1.00
601	Tylertown Rd/SR 249	1,150	1,155	1.00
602	US 79/SR 13	7,146	7,175	1.00
603	Port Royal Rd	1,041	1,045	1.00

External Station	Description	Model Volume	Count Volume	Volume/Count
604	US 41	1,918	1,973	0.97
605	US 41	2,084	2,303	0.90
606	SR 76	796	800	1.00
607	Harmony Church Rd	296	300	0.99
608	I-24	49,641	49,654	1.00
609	Madison St/US 41 A	5,293	5,300	1.00
610	Old Clarksville PK	424	428	0.99
611	Ashland City Rd	3,722	3,728	1.00
612	Chapel Hill Rd	483	487	0.99
613	Ryes Chapel Rd	295	300	0.98
614	Cumberland Dr	3,996	4,000	1.00
615	Marion Rd	602	606	0.99
616	Chambers Rd	218	223	0.98
617	Thorne Hollow Rd	220	224	0.98
618	Ellis Mill Rd	96	100	0.96
619	SR 13	745	749	0.99
620	SR 149	4,962	4,967	1.00
621	Lylewood Rd	1,196	1,200	1.00
622	Dover Rd	8,136	8,140	1.00
623	Lafayette Rd/101st Airborne	8,893	8,899	1.00
624	Ft Campbell Access/Gate 1	5,594	5,597	1.00
625	Ft Campbell Access/Gate 2	0	0	1.00
626	Ft Campbell Access/Gate 3	5,914	5,918	1.00
627	Sango Rd	398	400	1.00
628	Knox Rd	197	200	0.99
630	Old Hwy 48	99	100	0.99
631	101st Airborne Division Rd	997	1,000	1.00

The validation effort concluded that the CUAMPO study area travel demand forecasting model performs within the established limits of acceptable deviation from base-year estimated volumes.

9.0 Future Year Model Development

Future year models were developed to forecast traffic that the study area will experience based on its anticipated growth. This includes forecast socioeconomic data, external travel, and special generator data. Forecast models also require updates to the roadway network based on projects that are expected to occur or have allocated funding in the near future.

9.1 Future Year Socioeconomic Data Development

To adequately forecast future transportation system needs, future projections of demographic variables are needed.

The forecast socio-economic data for the study area was provided by the CUAMPO. Further information on the methodology implemented can be obtained from the MPO. The forecast population and households are displayed in Table 29. The forecast employment is displayed in Table 30.

Table 29: Population and Households by Year

Variable	2016	2026	2036	2045
Total Population	196,758	250,249	295,483	339,954
Households	75,073	96,393	113,806	130,489

Source: CUAMPO

Table 30: Employment by Year

Variable	2016	2026	2036	2045
TOT_EMP	68,326	92,611	111,007	129,119
OTH_EMP	18,711	25,027	30,234	35,622
RET_EMP	10,692	13,987	16,378	18,721
SE_EMP	38,923	53,597	64,397	74,778

Source: CUAMPO

School enrollment forecast data was developed by Neel-Schaffer, Inc. and the Clarksville-Montgomery County School System (CMCSS). This involved increasing the school enrollment in each TAZ to match population growth until each school achieved the capacity threshold set by CMCSS. Additionally, new schools were forecasted to be built in high population growth areas based on the CMCSS's growth

plan[4]. This process resulted in a school attendance of 42,362 students in 2026, 49,749 students in 2036, and 55,108 students in 2045.

9.2 Existing Plus Committed (E+C) Network

The base year network was defined as the street and highway system that existed in year 2016. Once the base year network was calibrated, the E+C network was developed which included committed projects. Committed projects are those improvements for which:

- construction was either completed or begun since 2016,
- a contract for construction has been awarded,
- have completed the National Environmental Policy Act (NEPA) phase, or
- have funding for right-of-way and/or construction programmed in the MPO's Transportation Improvement Program.

The committed projects are listed in Table 31 and shown in Figure 11.

Committed projects were added to the base network using the following procedure:

- New routes were coded with the proposed number of lanes, and with the posted speed and volume-delay function attributes that reflect the project's functional classification.
- Widened roadways change the number of lanes to the appropriate amount in each direction as well as the lane configuration field required by the network.
- All E+C projects were flagged in the 'PROJECT_VIS' field using a unique project ID.

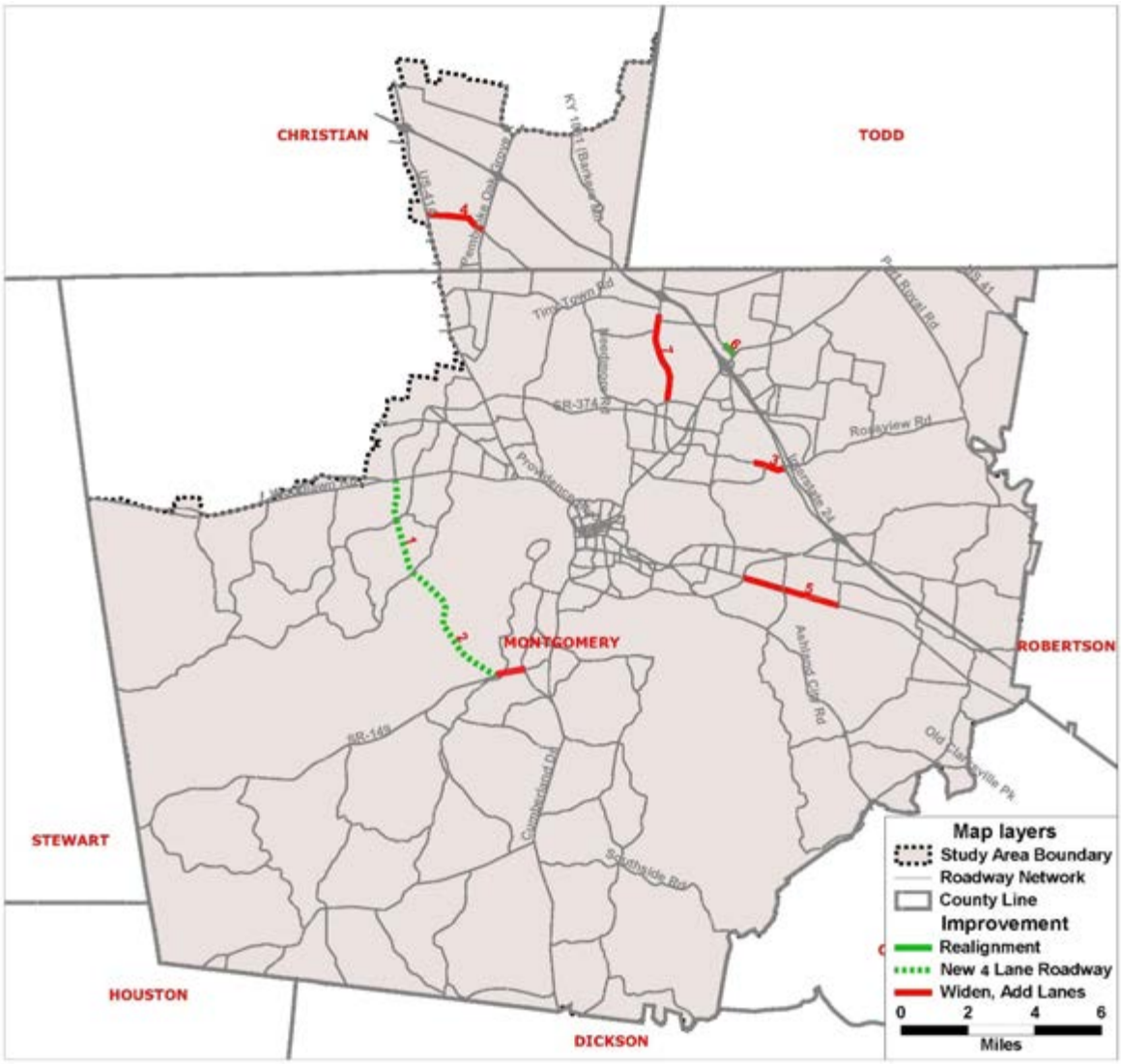
[4] https://cmcss.net/documents/operations/10yearplan.pdf

Table 31: Existing + Committed Projects

Project ID	TIP ID	Roadway	Location	Improvement
1	6	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway
2	5	SR-374 Ext/SR-149	Dotsonville Rd to River Rd	New 4 Lane Roadway, Widen to 5 Lanes
3	66	SR-237 (Rossview Rd)	I-24 to 400 feet west of Keysburg Rd	Widen from 2 to 5 Lanes
4	13	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes
5	1	SR-112/US 41A (Madison St)	SR-76 to McAdoo Rd/Sango Rd	Widen from 2 to 5 Lanes
6	65	Oakland Rd	US 79 to Oakland Rd	2 Lane Realignment
7	N/A	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes

Source: CUAMPO

Figure 11: Existing + Committed Projects



9.3 External Station Growth

The base year traffic counts at each external station were projected to 2026, 2036, and 2045 using growth factors developed based on historic traffic counts at the external stations. Development of the growth rates used the following methodology:

- Developed an average annual growth rate using historical traffic counts from 2010 through 2016
- If the calculated average annual growth rate is less than one (1) percent, then the growth rate for that station was set at one (1) percent.
- If the calculated average annual growth rate is more than three (3) percent, then the growth rate for that station was set at three (3) percent.
- If the calculated average annual growth rate is between one (1) percent and three (3) percent, then the calculated average annual growth rate was used with no changes.
- Three external station growth rates were adjusted, as they are not likely to experience high growth rates for a period of time longer than the recent trends suggest.
    - The first of these stations is ID 505, I-24 at the northern end of the study area. The calculated average growth rate of 9.4 percent was adjusted to 1.7 percent, reflecting the growth rate of I-24 on the southern end of the study area.
    - The second station is ID 506, Fort Campbell Boulevard. The growth rate was adjusted in consultation with KYTC, who advised that 2016 traffic volumes were less than originally reported.
    - The third station is ID 623, 101st Airborne Division Parkway. Recent housing developments near this roadway resulted in large volume growth from 2010 through 2016. This trend is not expected to continue in the long-term and the growth rate was adjusted to one (1) percent.
- Due to the fluctuating nature of Fort Campbell's deployment and force size, the traffic counts for these external stations were assumed to have no growth.

The final forecast growth rates for each external station and comparison of external travel forecast for the base year and target years is shown in Table 32.

The total traffic at each station was then divided into EI and EE trips with the assumption that there would not be a significant change in the distribution from the base year. In addition, both EI and EE forecast trips were also separated into auto and truck trips.

Table 32: External Station Forecast Growth

External Station	Description	Forecast Growth Rate	2016 Volume	2026 Volume	2036 Volume	2045 Volume
500	Ft Campbell Access/Gate 4	0.0%	10,927	10,927	10,927	10,927
501	Ft Campbell Access/Gate 5	0.0%	0	0	0	0
502	Ft Campbell Access/Gate 6	0.0%	2,977	2,977	2,977	2,977
503	Ft Campbell Access/Gate 7	0.0%	6,363	6,363	6,363	6,363
504	KY 117	1.0%	4,280	4,728	5,222	5,712
505	I-24	1.7%	34,204	40,484	47,918	55,768
506	Ft Campbell Blvd/US 41 A	1.0%	17,241	19,045	21,037	23,008
507	Pembroke Oak Grove Rd	1.0%	1,510	1,668	1,842	2,015
508	KY 109/Bradshaw Rd	1.0%	457	505	558	610
509	KY 1453	1.0%	187	207	228	250
600	Trenton Rd/SR 48	3.0%	3,479	4,675	6,283	8,198
601	Tylertown Rd/SR 249	1.7%	1,155	1,369	1,623	1,892
602	US 79/SR 13	1.0%	7,175	7,926	8,755	9,575
603	Port Royal Rd	1.0%	1,045	1,154	1,275	1,395
604	US 41	1.0%	1,973	2,179	2,407	2,633
605	US 41	1.0%	2,303	2,544	2,810	3,073
606	SR 76	1.0%	800	884	976	1,068
607	Harmony Church Rd	3.0%	300	403	542	707
608	I-24	1.7%	49,654	58,773	69,567	80,967
609	Madison St/US 41 A	1.5%	5,300	6,138	7,109	8,113
610	Old Clarksville PK	1.0%	428	471	518	565
611	Ashland City Rd	1.1%	3,728	4,169	4,661	5,154
612	Chapel Hill Rd	1.4%	487	557	637	719
613	Ryes Chapel Rd	1.0%	300	331	366	400
614	Cumberland Dr	1.9%	4,000	4,820	5,807	6,868
615	Marion Rd	1.0%	606	669	739	809
616	Chambers Rd	1.0%	223	246	272	298
617	Thorne Hollow Rd	1.9%	224	270	326	385
618	Ellis Mill Rd	3.0%	100	134	181	236
619	SR 13	1.0%	749	827	914	1,000
620	SR 149	1.0%	4,967	5,487	6,061	6,628
621	Lylewood Rd	1.0%	1,200	1,326	1,464	1,601
622	Dover Rd	1.2%	8,140	9,160	10,309	11,465
623	Lafayette Rd/101st	1.0%	8,899	9,830	10,858	11,876

External Station	Description	Forecast Growth Rate	2016 Volume	2026 Volume	2036 Volume	2045 Volume
624	Ft Campbell Access/Gate 1	0.0%	5,597	5,597	5,597	5,597
625	Ft Campbell Access/Gate 2	0.0%	0	0	0	0
626	Ft Campbell Access/Gate 3	0.0%	5,918	5,918	5,918	5,918
627	Sango Rd	1.0%	400	442	488	534
628	Knox Rd	1.0%	200	221	244	267
630	Old Hwy 48	1.0%	100	110	122	133
631	101st Airborne Division Rd	1.0%	1,000	1,105	1,220	1,335

9.4 Special Generator Growth

Following the development of the forecast socioeconomic data, an analysis of the affected special generators was conducted and adjustments were made. These include growth for Austin Peay State University (up to 17,000 students in 2045) and Draughons Junior College (up to 1,100 students in 2045). It was assumed that the Gateway Medical Center would not likely undergo a significant expansion, or experience major employment growth, during the MTP timeframe.

Table 33 displays the base and horizon year special generator trips.

Table 33: Base and Forecast Special Generators Trips

Facility	2016 Person Trips	2026 Person Trips	2036 Person Trips	2045 Person Trips
Austin Peay State University	18,646	25,059	31,472	37,243
Gateway Medical Center	8,676	8,676	8,676	8,676
Draughons Junior College	1,143	1,583	2,022	2,418

Source: TDM

9.5 Future Year Model Runs

The TDM was used to forecast traffic for the future years using the E+C network and forecast socioeconomic, external station, and special generator data. Interpolation was used where necessary to obtain a future year scenario between years 2016 and 2045.

TN TDOT Department of Transportation

Forecasting Office
Long Range Planning Division
505 Deaderick Street, Suite 900
Nashville, TN 37243

Metropolitan Planning Organization's Travel Demand Model Review Results

Final Review Comments

Model Owner	Clarksville MPO	
- MPO Contact Person	Stan Williams	
Model Developer	Neel-Schaffer	
- Consultant Contact Person	Vijay K. Kunada	
Date the Model Received	April 2, 2018	
Purpose	TDOT Final Review	
Reviewed by (Name)	Majid Khalilikhah Majid	Date 04/24/2018
Review Result	Concur (✓) / Revision Recommended ( )	
Accepted by Forecasting Office Supervisor	Jaehoon Kim Jaehoon Kim	Date 4/30
Accepted by Planning Application Manager		Date
Approved by Data Management Assistant Director	David Lee David Lee	Date 4/30/18

Forecasting Office
Long Range Planning Division
505 Deaderick Street, Suite 900
Nashville, TN 37243

General Comments
The new Metropolitan Transportation Plan (MTP) of the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) requires the MPO to update its previous Travel Demand Model (TDM). This includes updating the model master network, socioeconomic data, and models parameters. The model is developed based on the traditional trip-based four-step modeling approach.
Model Input Data
According to the consultant's response email, the difference in population is a result of the exclusion of Fort Campbell from the CUAMPO study area. Thus, it is justified. Also, the tech memo is revised according to my comments and details are added regarding how Google Earth's "historical imagery" feature was used, what was the year of google images, how the centroid connectors were adjusted within the network, and how and why the previous model's external matrix were used.
Trip Generation
In line with my comments, trips categories are defined in tech memo. Also, TDOT benchmarks were added to the tables for comparison between model results and TDOT guideline standards.
Traffic Assignment
After revision, the model meets the %RMSE required for rural minor collectors.
Overall Review Comments
All of my comments from first review are addressed. Generally, the model performs well. It meets all of the TDOT's standards in Minimum Travel Demand Model Calibration and Validation Guidelines Updated 2016. The model should be run using a TransCAD version 7 platform with a build number 12395 or up.

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

RE: FW: Final 2016 Base Model and Draft Future Y ear Models- Clarksville MPO

2 messages

Hulker , Daniel A (KYTC) <Daniel.Hulker@ky.gov> Wed, May 2, 2018 at 2:00 PM
To: Stan Williams <stan.williams@cityofclarksville.com>
Cc: "Thomson, Scott S (KYTC)" <Scott.Thomson@ky.gov>, "Harrod, Justin D (KYTC)" <Justin.Harrod@ky.gov>

I have no comments.

From: Stan Williams [mailto:stan.williams@cityofclarksville.com]
Sent: Tuesday, April 24, 2018 2:25 PM
To: Thomson, Sco S (KYTC) <Scott.Thomson@ky.gov>; Hulker, Daniel A (KYTC) <Daniel.Hulker@ky.gov>; Loyselle, Maridely M (KYTC) <maridely.loyselle@ky.gov>; Wi , Thomas W (KYTC) <Thomas.Witt@ky.gov>; Vijay Kunada <Vijay.Kunada@neel-schaffer.com>
Subject: Fwd: FW: Final 2016 Base Model and Dra Future Year Models- Clarksville MPO

Scott and Daniel, do you all have any comments on the 2045 Future Yr Model (available back on March 30). If you so, get to VJ asap! If not, simply indicate such w a reply to this email.

---------- Forwarded message ----------
From: Vijay Kunada <vijay.kunada@neel-schaffer.com>
Date: Tue, Apr 24, 2018 at 9:06 AM
Subject: FW: Final 2016 Base Model and Draft Future Year Models- Clarksville MPO
To: Stan Williams <stan.williams@cityofclarksville.com>

It was sent to KYTC and TDOT on March 30, 2018.

See below.

Vijay K. Kunada, P.E., PTOE, PTP | Vice President / Office Manager | Neel-Schaffer, Inc. | 337-232-6111

From: Vijay Kunada
Sent: Friday, March 30, 2018 9:28 AM
To: 'David Lee' <David.Lee@tn.gov>; 'Thomson, Scott S (KYTC)' <Scott.Thomson@ky.gov>; 'Hulker, Daniel A (KYTC)' <Daniel.Hulker@ky.gov>; 'Jonathan Russell' <jonathan.russell@tn.gov>
Cc: 'Jill Hall' <jill.hall@cityofclarksville.com>; 'Stan Williams' <stan.williams@cityofclarksville.com>; 'Jaehoon Kim' <Jaehoon.Kim@tn.gov>; 'Loyselle, Maridely M (KYTC)' <maridely.loyselle@ky.gov>
Subject: Final 2016 Base Model and Draft Future Year Models- Clarksville MPO

All,

We have completed the development of base and future models and uploaded the files to our FTP site. You can download the base and future model files and corresponding report and an updated model user's manual using the following shapefile link.

https://neel-schaffer.sharefile.com/d-sf5c77e793b74a608

Please let me know if you run into any issues with the download or have any questions.

Thanks,

Vijay

……..

Vijay K. Kunada, P.E., PTOE, PTP

Vice President / Office Manager

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Stan Williams <stan.williams@cityofclarksville.com> Wed, May 2, 2018 at 2:02 PM
To: "Hulker, Daniel A (KYTC)" <Daniel.Hulker@ky.gov>, Vijay Kunada <Vijay.Kunada@neel-schaffer.com>
Cc: "Thomson, Scott S (KYTC)" <Scott.Thomson@ky.gov>, "Harrod, Justin D (KYTC)" <Justin.Harrod@ky.gov>

Daniel, OK we are proceeding forward w the MTP update. Thank you.
[Quoted text hidden]

Appendix F:
Historic and Forecast Funding Development

Clarksville, TN MTP 2045 Update

Historic Funding and Forecast

Historic Project Funding by Jurisdiction

Tennessee

Source TN	2014	2015	2016	2014-2016 Totals	2017	4 Year Totals	Annual Average
S-STP/STBG	$ 19,110,338.00	$ 904,992.00	$ 12,183,084.00	**$ 32,198,414.00**	$ 19,699,929.00	$ 51,898,343.00	**$ 12,974,586**
L-STP/STBG	$ 1,461,733.00	$ 714,548.00	$ 1,270,040.00	**$ 3,446,321.00**	$ 871,505.00	$ 4,317,826.00	**$ 1,079,457**
RSTP/STBG	$ -	$ -	$ 907,361.00	**$ 907,361.00**	$ 406,300.00	$ 1,313,661.00	**$ 328,415**
HSIP	$ 228,915.00	$ 8,879,678.00	$ 4,150,532.00	**$ 13,259,125.00**	$ 1,287,118.00	$ 14,546,243.00	**$ 3,636,561**
RHSIP	$ -	$ -	$ 28,009.00	**$ 28,009.00**	$ -	$ 28,009.00	**$ 7,002**
PHSIP	$ -	$ 95,000.00	$ 14,000.00	**$ 109,000.00**	$ 2,000.00	$ 111,000.00	**$ 27,750**
RPHSIP	$ -	$ -	$ 20,000.00	**$ 20,000.00**	$ 569,291.00	$ 589,291.00	**$ 147,323**
NHPP	$ 1,363,218.00	$ 2,257,588.00	$ -	**$ 3,620,806.00**	$ -	$ 3,620,806.00	**$ 905,202**
BRR-S	$ 23,147.00	$ -	$ -	**$ 23,147.00**	$ -	$ 23,147.00	**$ 5,787**
NHS	$ 330,096.00	$ -	$ -	**$ 330,096.00**	$ -	$ 330,096.00	**$ 82,524**
FLAP	$ 1,100,000.00	$ -	$ 223,000.00	**$ 1,323,000.00**	$ -	$ 1,323,000.00	**$ 330,750**
CMAQ	$ 96,000.00	$ 1,592,000.00	$ 2,632,472.00	**$ 4,320,472.00**	$ 4,417,107.00	$ 8,737,579.00	**$ 2,184,395**
ENH	$ -	$ 652,476.00	$ -	**$ 652,476.00**	$ -	$ 652,476.00	**$ 163,119**
SRTS	$ -	$ -	$ -	**$ -**	$ 20,520.00	$ 20,520.00	**$ 5,130**
TOTAL:	$ 23,713,447.00	$ 15,096,282.00	$ 21,428,498.00	**$ 60,238,227.00**	**$ 27,273,770.00**	$ 87,511,997.00	**$ 21,877,999**
CPI Factor	1.030	1.032	1.020		1.000		
2017 Dollars	$ 24,423,558.55	$ 15,575,709.17	$ 21,867,212.54	$ 61,866,480.26	$ 27,273,770.00	$ 89,140,250.26	**$ 22,285,063**

****STP funding changed in 2017 to STBG funding****

Kentucky

Source KY	2014	2015	2016	2014-2016 Totals	2017	3 Year Totals	Annual Average
S-STP	$ 2,773,880.00	$ 6,887,626.00	$ 5,550.00	**$ 9,667,056.00**	$ -	$ 9,667,056.00	**$ 2,416,764**
HSIP	$ 1,274,729.00	$ -	$ -	**$ 1,274,729.00**	$ -	$ 1,274,729.00	**$ 318,682**
KYD	$ -	$ 88,250.00	$ -	**$ 88,250.00**	$ -	$ 88,250.00	**$ 22,063**
RHPD (rail)	$ -	$ 400,500.00	$ -	**$ 400,500.00**	$ -	$ 400,500.00	**$ 100,125**
Totals:	$ 4,048,609.00	$ 7,376,376.00	$ 5,550.00	**$ 11,430,535.00**	$ -	$ 11,430,535.00	**$ 2,857,634**
CPI Factor	1.030	1.032	1.020		1.000		
2017 Dollars	$ 4,169,846.71	$ 7,610,634.68	$ 5,663.63	$ 11,786,145.02	$ -	$ 11,786,145.02	**$ 2,946,536**

Clarksville 2006-2016

Construction	Enhancements	Safety	Bridge	Overlay	Maintenance	ACTUAL TOTAL	2017 Dollars	Annual Average
$23,831,565	$21,418,740	$7,509,296	$0	$27,848,000	$8,947,340	$89,554,941	$98,420,880	$8,947,353

Montgomery County 2006-2016

Construction	Enhancements	Safety	Bridge	Overlay	Maintenance	ACTUAL TOTAL	2017 Dollars	Annual Average
$0	$0	$1,459,664	$7,434,678	$13,459,179	$2,150,664	$24,504,185	$26,930,099	$2,448,191

Oak Grove 2010-2016

	2010	2011	2012	2013	2014	2015	2016	TOTAL	Average
Operating	51,804	150,539	43,247	42,723	98,952	20,848	13,016	421,129	60,161
Capital	93,671	256,804	178,759	130,004	29,997	19,950	124,500	833,685	119,098
Business Park					280,000			280,000	40,000
Total	145,475	407,343	222,006	172,727	408,949	40,798	137,516	1,534,814	219,259
CPI Factor	1.124	1.086	1.064	1.047	1.030	1.032	1.020		
2017 Dollars	**163,514**	**442,374**	**236,214**	**180,845**	**421,217**	**42,104**	**140,266**	**1,626,535**	**232,362**

Christian County

Indicated that on average $100,000 annually is spent on Transportation projects in the Study Area portion of the County.

Federal & State Funding Forecast Thru 2045
Clarksville MPO Study Area
(Adjusted for KYTC Forecast)

	Tennessee 3.00%	Kentucky 4.00%	Clarksville 3.00%	Montgomery Co 3.00%	Oak Grove 4.00%	Christian Co 4.00%	Total	Tennessee	Kentucky
Year			$0.79						
2017	**$22,285,063**	**$7,361,160**	**$8,947,353**	**$2,448,191**	**$232,362**	**$101,000**	**$41,375,128**	**$33,680,607**	**$7,694,522**
2018	$27,544,160	$7,655,606	$2,507,642	$666,588.40	$241,656	$105,040	$38,720,693	$30,718,390	$8,002,303
2019	$50,541,035	$7,961,830	$2,205,472	$335,008.47	$251,323	$109,242	$61,403,911	$53,081,516	$8,322,395
2020	$16,633,535	$8,280,304	$2,734,240	$726,823.25	$261,376	$113,611	$28,749,889	$20,094,598	$8,655,291
2021	$25,082,034	$8,611,516	$10,070,325	$2,755,461	$271,831	$118,156	$46,909,322	$37,907,819	$9,001,502
2022	$25,834,495	$8,955,976	$10,372,434	$2,838,124	$282,704	$122,882	$48,406,616	$39,045,054	$9,361,562
2023	$26,609,530	$9,314,216	$10,683,607	$2,923,268	$294,012	$127,797	$49,952,430	$40,216,406	$9,736,025
2024	$27,407,816	$9,686,784	$11,004,116	$3,010,966	$305,773	$132,909	$51,548,364	$41,422,898	$10,125,466
2025	$28,230,051	$10,074,256	$11,334,239	$3,101,295	$318,003	$138,225	$53,196,069	$42,665,585	$10,530,484
2026	$29,076,952	$10,477,226	$11,674,266	$3,194,334	$330,724	$143,754	$54,897,256	$43,945,552	$10,951,704
2027	$29,949,261	$10,896,315	$12,024,494	$3,290,164	$343,953	$149,505	$56,653,691	$45,263,919	$11,389,772
2028	$30,847,738	$11,332,167	$12,385,229	$3,388,869	$357,711	$155,485	$58,467,199	$46,621,836	$11,845,363
2029	$31,773,171	$11,785,454	$12,756,786	$3,490,535	$372,019	$161,704	$60,339,669	$48,020,491	$12,319,177
2030	$32,726,366	$12,256,872	$13,139,490	$3,595,251	$386,900	$168,172	$62,273,051	$49,461,106	$12,811,944
2031	$33,708,157	$12,747,147	$13,533,674	$3,703,109	$402,376	$174,899	$64,269,362	$50,944,939	$13,324,422
2032	$34,719,401	$13,257,033	$13,939,684	$3,814,202	$418,471	$181,895	$66,330,687	$52,473,288	$13,857,399
2033	$35,760,983	$13,787,314	$14,357,875	$3,928,628	$435,210	$189,171	$68,459,181	$54,047,486	$14,411,695
2034	$36,833,813	$14,338,807	$14,788,611	$4,046,487	$452,618	$196,738	$70,657,074	$55,668,911	$14,988,163
2035	$37,938,827	$14,912,359	$15,232,270	$4,167,881	$470,723	$204,607	$72,926,668	$57,338,978	$15,587,689
2036	$39,076,992	$15,508,854	$15,689,238	$4,292,918	$489,552	$212,792	$75,270,344	$59,059,147	$16,211,197
2037	$40,249,302	$16,129,208	$16,159,915	$4,421,705	$509,134	$221,303	$77,690,567	$60,830,922	$16,859,645
2038	$41,456,781	$16,774,376	$16,644,712	$4,554,356	$529,499	$230,156	$80,189,880	$62,655,850	$17,534,031
2039	$42,700,484	$17,445,351	$17,144,054	$4,690,987	$550,679	$239,362	$82,770,917	$64,535,525	$18,235,392
2040	$43,981,499	$18,143,165	$17,658,375	$4,831,717	$572,706	$248,936	$85,436,398	$66,471,591	$18,964,808
2041	$45,300,944	$18,868,892	$18,188,126	$4,976,668	$595,614	$258,894	$88,189,138	$68,465,739	$19,723,400
2042	$46,659,972	$19,623,647	$18,733,770	$5,125,968	$619,439	$269,249	$91,032,047	$70,519,711	$20,512,336
2043	$48,059,771	$20,408,593	$19,295,783	$5,279,747	$644,217	$280,019	$93,968,131	$72,635,302	$21,332,829
2044	$49,501,564	$21,224,937	$19,874,657	$5,438,140	$669,985	$291,220	$97,000,504	$74,814,361	$22,186,142
2045	$50,986,611	$22,073,934	$20,470,897	$5,601,284	$696,785	$302,869	$100,132,380	$77,058,792	$23,073,588
Stage I 2018-2026	$256,959,608	$81,017,714	$72,586,342	$19,551,868	$2,557,401	$1,111,617	$433,784,550	$349,097,818	$84,686,732
Stage II 2027-2036	$343,334,709	$130,822,322	$137,847,351	$37,718,043	$4,129,531	$1,794,969	$655,646,925	$518,900,103	$136,746,822
Stage III 2037-2045	$408,896,929	$170,692,103	$164,170,289	$44,920,573	$5,388,058	$2,342,009	$796,409,962	$617,987,792	$178,422,171
Total	**$1,009,191,246**	**$382,532,139**	**$374,603,982**	**$102,190,484**	**$12,074,990**	**$5,248,595**	**$1,885,841,437**	**$1,485,985,712**	**$399,855,724**

Figures in RED indicate revenue identified in the 2017-2020 TIP

Funding Forecast Thru 2045
Clarksville MPO Study Area
(Adjusted for KYTC Forecast)

	Total 100.0%	Capacity 60.0%	Reconstruction 15.0%	Enhancements 0.8%	Safety 4.0%	Bridge 11.0%	Overlay 8.0%	Maintenance 1.2%
Year								
2017	$41,375,128	$24,825,077	$6,206,269	$331,001	$1,655,005	$4,551,264	$3,310,010	$496,502
2018	$38,720,693	$23,232,416	$5,808,104	$309,766	$1,548,828	$4,259,276	$3,097,655	$464,648
2019	$61,403,911	$36,842,346	$9,210,587	$491,231	$2,456,156	$6,754,430	$4,912,313	$736,847
2020	$28,749,889	$17,249,933	$4,312,483	$229,999	$1,149,996	$3,162,488	$2,299,991	$344,999
2021	$46,909,322	$28,145,593	$7,036,398	$375,275	$1,876,373	$5,160,025	$3,752,746	$562,912
2022	$48,406,616	$29,043,970	$7,260,992	$387,253	$1,936,265	$5,324,728	$3,872,529	$580,879
2023	$49,952,430	$29,971,458	$7,492,865	$399,619	$1,998,097	$5,494,767	$3,996,194	$599,429
2024	$51,548,364	$30,929,018	$7,732,255	$412,387	$2,061,935	$5,670,320	$4,123,869	$618,580
2025	$53,196,069	$31,917,641	$7,979,410	$425,569	$2,127,843	$5,851,568	$4,255,686	$638,353
2026	$54,897,256	$32,938,354	$8,234,588	$439,178	$2,195,890	$6,038,698	$4,391,780	$658,767
2027	$56,653,691	$33,992,214	$8,498,054	$453,230	$2,266,148	$6,231,906	$4,532,295	$679,844
2028	$58,467,199	$35,080,320	$8,770,080	$467,738	$2,338,688	$6,431,392	$4,677,376	$701,606
2029	$60,339,669	$36,203,801	$9,050,950	$482,717	$2,413,587	$6,637,364	$4,827,174	$724,076
2030	$62,273,051	$37,363,830	$9,340,958	$498,184	$2,490,922	$6,850,036	$4,981,844	$747,277
2031	$64,269,362	$38,561,617	$9,640,404	$514,155	$2,570,774	$7,069,630	$5,141,549	$771,232
2032	$66,330,687	$39,798,412	$9,949,603	$530,645	$2,653,227	$7,296,376	$5,306,455	$795,968
2033	$68,459,181	$41,075,509	$10,268,877	$547,673	$2,738,367	$7,530,510	$5,476,735	$821,510
2034	$70,657,074	$42,394,244	$10,598,561	$565,257	$2,826,283	$7,772,278	$5,652,566	$847,885
2035	$72,926,668	$43,756,001	$10,939,000	$583,413	$2,917,067	$8,021,933	$5,834,133	$875,120
2036	$75,270,344	$45,162,207	$11,290,552	$602,163	$3,010,814	$8,279,738	$6,021,628	$903,244
2037	$77,690,567	$46,614,340	$11,653,585	$621,525	$3,107,623	$8,545,962	$6,215,245	$932,287
2038	$80,189,880	$48,113,928	$12,028,482	$641,519	$3,207,595	$8,820,887	$6,415,190	$962,279
2039	$82,770,917	$49,662,550	$12,415,638	$662,167	$3,310,837	$9,104,801	$6,621,673	$993,251
2040	$85,436,398	$51,261,839	$12,815,460	$683,491	$3,417,456	$9,398,004	$6,834,912	$1,025,237
2041	$88,189,138	$52,913,483	$13,228,371	$705,513	$3,527,566	$9,700,805	$7,055,131	$1,058,270
2042	$91,032,047	$54,619,228	$13,654,807	$728,256	$3,641,282	$10,013,525	$7,282,564	$1,092,385
2043	$93,968,131	$56,380,879	$14,095,220	$751,745	$3,758,725	$10,336,494	$7,517,451	$1,127,618
2044	$97,000,504	$58,200,302	$14,550,076	$776,004	$3,880,020	$10,670,055	$7,760,040	$1,164,006
2045	$100,132,380	$60,079,428	$15,019,857	$801,059	$4,005,295	$11,014,562	$8,010,590	$1,201,589
Stage I 2018-2026	$433,784,550	$260,270,730	$65,067,682	$3,470,276	$17,351,382	$47,716,300	$34,702,764	$5,205,415
Stage II 2027-2036	$655,646,925	$393,388,155	$98,347,039	$5,245,175	$26,225,877	$72,121,162	$52,451,754	$7,867,763
Stage III 2037-2045	$796,409,962	$477,845,977	$119,461,494	$6,371,280	$31,856,398	$87,605,096	$63,712,797	$9,556,920
Total	**$1,885,841,437**	**$1,131,504,862**	**$282,876,216**	**$15,086,731**	**$75,433,657**	**$207,442,558**	**$150,867,315**	**$22,630,097**

Federal & State Funding Forecast Thru 2045	
Clarksville Transit System	
	Inflation Percentage
Year	3.00%
2017	$5,904,592
2018	$6,081,730
2019	$6,264,182
2020	$6,452,108
2021	$6,645,671
2022	$6,845,041
2023	$7,050,392
2024	$7,261,904
2025	$7,479,761
2026	$7,704,154
2027	$7,935,278
2028	$8,173,337
2029	$8,418,537
2030	$8,671,093
2031	$8,931,226
2032	$9,199,163
2033	$9,475,137
2034	$9,759,392
2035	$10,052,173
2036	$10,353,738
2037	$10,664,351
2038	$10,984,281
2039	$11,313,810
2040	$11,653,224
2041	$12,002,821
2042	$12,362,905
2043	$12,733,792
2044	$13,115,806
2045	$13,509,280
Stage I	
2018-2026	**$61,784,942**
Stage II	
2027-2036	**$90,969,074**
Stage III	
2037-2045	**$108,340,270**
Total	**$261,094,286**

Clarksville Transit System

Historic Funding 2010-2016

Revenue	2010	2011	2012	2013	2014	2015	2016	Total	Annual Average
Federal	$1,606,980	$2,033,330	$2,023,659	$2,152,200	$2,145,799	$2,305,865	$3,541,455	$15,809,288	$2,258,470
State	$858,916	$956,477	$879,800	$939,156	$1,053,217	$1,046,192	$1,121,690	$6,855,448	$979,350
Local	$1,279,883	$1,464,413	$1,665,499	$1,587,876	$1,414,146	$1,877,951	$1,934,344	$11,224,112	$1,603,445
Direct Funds	$608,837	$681,076	$733,477	$798,708	$846,403	$858,944	$814,169	$5,341,614	$763,088
Total	**$4,356,626**	**$5,137,307**	**$5,304,447**	**$5,479,953**	**$5,461,579**	**$6,090,967**	**$7,413,674**	**$39,244,553**	**$5,606,365**
CPI Factor	1.124	1.086	1.064	1.047	1.030	1.032	1.020		
2017 Dollars	**$4,895,035**	**$5,579,981**	**$5,642,185**	**$5,739,955**	**$5,625,129**	**$6,284,404**	**$7,565,457**	**$41,332,147**	**$5,904,592**

CPI

To account for the time value of money while developing the region's historical average annual funding, historical funding amounts by year were brought to 2017 dollars by using Consumer Price Index (CPI) data provided by the Bureau of Labor Statistics.

The data obtained contains the CPI by month and year from 1980 to 2017 for the south urban region. These values were averaged to a yearly value and then a CPI factor was developed (as shown in the table below) for each year based upon the ratio of that year to 2017. This CPI factor was applied to previous years to adjust the funding in that year to 2017 dollars.

Bureau of Labor Statistics

Consumer Price Index - All Urban Consumers
Series Id: CUUR0300SA0,CUUS0300SA0
Not Seasonally Adjusted
Area: **South urban**
Item: All items
Base Period: 1982-84=100
Years: 1980 to 2017

Average Annual Inflation Rate

1980-2017	**2.86%**
1990-2017	**2.24%**
2000-2017	**1.96%**
2010-2017	**1.38%**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Year	2017 FACTORS	Annual Change
1980		78.5		80.6		82.2		82.7		84.2		85.8	81.9	**1980**	**2.899**	
1981		87.8		89.0		90.4		91.9		93.0		94.3	90.7	**1981**	**2.618**	10.74%
1982		95.1		94.7		97.0		97.6		98.0		97.8	96.5	**1982**	**2.461**	6.39%
1983		98.0		98.8		99.6		100.2		101.2		101.3	99.7	**1983**	**2.382**	3.32%
1984		102.4		103.1		103.6		104.3		105.1		105.3	103.8	**1984**	**2.288**	4.11%
1985		105.7		106.4		107.1		107.6		108.3		108.7	107.1	**1985**	**2.217**	3.18%
1986		108.9		107.9		108.7		108.7		109.4		109.7	108.9	**1986**	**2.180**	1.68%
1987	110.2	110.7	111.1	111.5	111.8	112.2	112.6	112.9	113.5	113.8	114.1	114.0	112.4	**1987**	**2.113**	3.21%
1988	114.1	114.4	114.8	115.4	115.6	116.1	116.6	117.0	117.7	118.2	118.3	118.5	116.4	**1988**	**2.040**	3.56%
1989	118.9	119.2	119.8	120.8	121.3	121.7	122.0	122.1	122.5	123.0	123.2	123.4	121.5	**1989**	**1.954**	4.38%
1990	124.6	125.4	126.0	126.1	126.5	127.3	127.8	128.7	129.7	130.7	130.9	130.9	127.9	**1990**	**1.857**	5.27%
1991	131.4	131.7	131.9	132.1	132.5	132.8	133.0	133.3	133.8	134.1	134.4	134.3	132.9	**1991**	**1.787**	3.91%
1992	134.4	134.9	135.5	135.9	136.2	136.7	136.8	137.0	137.3	137.8	138.1	137.9	136.5	**1992**	**1.740**	2.71%
1993	138.4	139.1	139.7	140.2	140.7	140.8	140.9	141.5	141.6	142.2	142.3	142.2	140.8	**1993**	**1.686**	3.15%
1994	142.5	142.9	143.6	143.8	144.3	144.7	145.0	145.5	145.8	145.9	146.0	146.1	144.7	**1994**	**1.641**	2.77%
1995	146.7	147.4	148.0	148.4	148.8	149.1	149.2	149.7	149.8	150.5	150.4	150.3	149.0	**1995**	**1.594**	2.97%
1996	151.1	151.5	152.4	153.2	153.5	154.0	154.0	154.1	154.5	154.9	155.1	155.1	153.6	**1996**	**1.546**	3.09%
1997	155.7	156.1	156.5	156.7	156.6	157.0	157.0	157.1	157.5	157.8	157.8	157.3	156.9	**1997**	**1.513**	2.15%
1998	157.6	157.8	158.2	158.5	158.8	159.1	159.3	159.5	159.5	159.8	159.6	159.6	158.9	**1998**	**1.494**	1.27%
1999	159.9	160.0	160.6	161.5	161.6	161.7	162.2	162.6	163.2	163.6	163.5	163.6	162.0	**1999**	**1.466**	1.95%
2000	164.1	164.8	166.5	166.7	166.7	167.5	168.0	168.0	168.5	168.5	168.6	168.4	167.2	**2000**	**1.420**	3.21%
2001	169.3	170.2	170.6	171.4	171.7	172.2	171.6	171.5	172.2	171.7	171.0	170.3	171.1	**2001**	**1.388**	2.33%
2002	170.6	171.0	172.1	173.1	173.2	173.5	173.6	173.8	174.2	174.9	174.9	174.6	173.3	**2002**	**1.370**	1.29%
2003	175.1	176.4	177.5	177.4	176.8	177.2	177.3	177.9	178.3	178.1	177.5	177.5	177.3	**2003**	**1.339**	2.31%
2004	178.2	179.1	180.1	180.9	182.0	182.9	182.6	182.6	182.8	183.7	183.7	183.3	181.8	**2004**	**1.306**	2.54%
2005	183.6	184.7	185.9	187.3	187.3	187.8	188.5	189.4	192.0	192.5	190.7	190.1	188.3	**2005**	**1.261**	3.58%
2006	191.5	191.8	192.8	194.7	195.5	196.3	197.0	197.1	195.8	194.7	194.3	194.8	194.7	**2006**	**1.220**	3.40%
2007	195.0	196.0	197.9	199.6	200.8	201.7	201.6	201.0	201.7	202.2	203.4	203.5	200.4	**2007**	**1.185**	2.91%
2008	204.5	205.1	206.7	208.1	210.0	212.3	213.3	212.4	212.7	210.1	205.6	203.5	208.7	**2008**	**1.138**	4.15%
2009	204.3	205.3	206.0	206.7	207.3	209.3	208.8	209.0	208.9	209.3	209.7	209.5	207.8	**2009**	**1.142**	-0.40%
2010	210.1	210.0	211.2	211.5	211.4	211.2	211.0	211.3	211.8	212.0	212.0	212.5	211.3	**2010**	**1.124**	1.68%
2011	213.6	214.7	217.2	218.8	219.8	219.3	219.7	220.5	220.4	220.0	220.0	219.5	218.6	**2011**	**1.086**	3.44%
2012	220.5	221.8	223.3	224.3	223.4	223.0	222.7	223.9	225.1	224.5	223.4	223.1	223.2	**2012**	**1.064**	2.12%
2013	223.9	225.9	226.6	226.2	226.3	227.1	227.5	227.8	227.9	227.4	226.8	227.1	226.7	**2013**	**1.047**	1.55%
2014	227.7	228.7	230.1	231.3	231.8	232.3	232.0	231.6	231.8	231.1	229.8	228.5	230.6	**2014**	**1.030**	1.70%
2015	226.9	227.9	229.3	230.0	230.9	232.0	231.7	231.3	230.9	230.9	230.4	229.6	230.1	**2015**	**1.032**	-0.18%
2016	229.5	229.6	231.0	232.0	232.9	233.8	233.3	233.6	234.1	234.3	234.0	234.2	232.7	**2016**	**1.020**	1.11%
2017	235.5	236.1	236.2	236.7	236.8	237.3	236.9	237.9	239.6	239.1	238.9	238.5	237.5	**2017**	**1.000**	2.05%

Source: https://data.bls.gov/pdq/SurveyOutputServlet?series_id=CUUR0300SA0,CUUS0300SA0

Stage Cost Calculations

As discussed in Chapter 10, each MTP project cost was developed in 2017 dollars based on the project type and length. Other than the projects in the TIP, the remaining MTP projects implementation year is unknown. So, to develop the project cost in the year of expenditure dollars, the following methodology was used:

The mid-point of each plan stage period was used to determine how many years would be used to develop the inflation factor. For Stage 1, this mid-point was 2022; for Stage 2, 2031; and Stage 3, 2041. This corresponds to five (5) years of inflation for Stage 1, fourteen (14) years for Stage 2, and twenty-four (24) years for Stage 3. The compound growth rate of the inflation for each state (three percent for Tennessee and four percent for Kentucky) was used to determine the inflation factor for the project cost based on the number of years identified for each stage. Each project cost in 2017 dollars was then multiplied by the proper inflation factor, based on state and Stage, to obtain the corresponding cost in the year of expenditure dollars.

Clarksville MTP 2045 Update
Test Projects - Stage Cost Calculation

NSID	Route	Location	Improvement	Length (mi)	2017 Total Cost	State	Stage I Factor	Stage I Cost	Stage II Factor	Stage II Cost	Stage III Factor	Stage III Cost
7	SR-48 (Trenton Rd)	0.25 miles north of SR-374 to0.40 miles south of I-24	Widen from 2 to 5 Lanes	3.70	$25,974	TN	1.159	$30,104	1.535	$39,870	2.033	$52,805
101	US 79/SR-13 (Gutherie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes	1.40	$9,828	TN	1.159	$11,391	1.535	$15,086	2.033	$19,980
102	SR-149/SR-13	River Rd to Zinc Plant Rd	Widen from 2/3 to 5 Lanes	3.10	$21,762	TN	1.159	$25,222	1.535	$33,405	2.033	$44,242
103	SR-374 (North Pkwy)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes	1.70	$11,934	TN	1.159	$13,832	1.535	$18,319	2.033	$24,262
104	North-East Connector Ph 1	Ted Crozier Blvd to Wilma Rudolf Blvd to Trenton Rd	New 4/5 Lane Roadway	3.60	$48,600	TN	1.159	$56,327	1.535	$74,601	2.033	$98,804
105	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway	2.00	$27,000	TN	1.159	$31,293	1.535	$41,445	2.033	$54,891
106	Lafayette Rd	Walnut Grove Rd to Ft Campbell Gate	Widen from 2 to 5 Lanes	0.43	$3,019	TN	1.159	$3,499	1.535	$4,634	2.033	$6,137
107	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement	--	$1,035	TN	1.159	$1,200	1.535	$1,589	2.033	$2,104
108	KY-400 (State Line Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	1.40	$4,508	KY	1.217	$5,486	1.766	$7,961	2.563	$11,554
109	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL	2.90	$9,338	KY	1.217	$11,364	1.766	$16,491	2.563	$23,933
110	KY-115 (Pembroke)	I-24 to KY-1453 (Barker's Mill Rd)	Reconstruct with CTL	1.90	$6,118	KY	1.217	$7,446	1.766	$10,804	2.563	$15,680
111	Oatts-Riggins Rd	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	New 3 Lane Roadway	1.50	$9,113	KY	1.217	$11,090	1.766	$16,093	2.563	$23,355
112	KY-1453 (Elmo Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	4.10	$13,202	KY	1.217	$16,067	1.766	$23,315	2.563	$33,837
201	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes	2.10	$14,742	TN	1.159	$17,086	1.535	$22,629	2.033	$29,970
202	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes	5.50	$38,610	TN	1.159	$44,749	1.535	$59,266	2.033	$78,494
203	North-East Connector Ph 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway	3.70	$49,950	TN	1.159	$57,892	1.535	$76,673	2.033	$101,548
204	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes	0.40	$2,808	TN	1.159	$3,254	1.535	$4,310	2.033	$5,709
205	Hugh Hunter/Gritton Church Rd	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction	1.90	$4,261	KY	1.217	$4,938	1.766	$7,524	2.563	$10,920
206	Ft Campbell Gate 4 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	1.20	$7,290	KY	1.217	$8,449	1.766	$12,874	2.563	$18,684
207	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	3.00	$40,500	KY	1.217	$46,940	1.766	$71,523	2.563	$103,802
208	Ft Campbell Gate 5 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	1.50	$9,113	KY	1.217	$10,561	1.766	$16,093	2.563	$23,355
209	KY-109 (Bradshaw Rd)	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	Reconstruct with CTL	1.00	$3,220	KY	1.217	$3,732	1.766	$5,687	2.563	$8,253
301	I-24	KY/TN State Line to SR-76	Widen from 4 to 6 Lanes	10.70	$123,050	TN	1.159	$142,615	1.535	$188,882	2.033	$250,161
302	I-24	SR-76 to SR-256 in Robertson County	Widen from 4 to 6 Lanes	8.60	$98,900	TN	1.159	$114,625	1.535	$151,812	2.033	$201,064
303	Needmore Rd	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL	0.90	$2,898	TN	1.159	$3,359	1.535	$4,448	2.033	$5,892
304	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes	1.00	$7,020	TN	1.159	$8,136	1.535	$10,776	2.033	$14,272
305	Whitfield Rd/Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL	0.20	$644	TN	1.159	$746	1.535	$989	2.033	$1,309
306	I-24	US 41A (Ft Campbell Blvd) to TN State Line	Widen from 4 to 6 Lanes	7.80	$89,700	KY	1.217	$103,962	1.766	$158,410	2.563	$229,901
401	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway	1.20	$7,290	TN	1.159	$8,449	1.535	$11,190	2.033	$14,821
402	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway	1.00	$6,075	TN	1.159	$7,041	1.535	$9,325	2.033	$12,350
403	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway	3.70	$22,478	TN	1.159	$26,051	1.535	$34,503	2.033	$45,697
404	Dixie Bee Rd Ext	Sango Rd to US 41A	New 2 Lane Roadway	0.70	$4,253	TN	1.159	$4,929	1.535	$6,528	2.033	$8,645
405	SR-374 (Richview Rd) Ext	SR-112 (Madison St) to US 41A Bypass	New 4 Lane Roadway	1.00	$13,500	TN	1.159	$15,647	1.535	$20,723	2.033	$27,446
406	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway	0.90	$5,468	TN	1.159	$6,337	1.535	$8,393	2.033	$11,115
407	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway	0.70	$4,253	TN	1.159	$4,929	1.535	$6,528	2.033	$8,645
408	New Roadway	9th St to 10th St	New 2 Lane Roadway	0.10	$608	TN	1.159	$704	1.535	$933	2.033	$1,235
409	8th St connector	Needmore Rd to Patterson Ln	New 2 Lane Roadway	1.90	$11,543	TN	1.159	$13,378	1.535	$17,718	2.033	$23,466
410	I-24	Dunlop Ln	New Interstate Interchange	--	$33,750	TN	1.159	$39,116	1.535	$51,806	2.033	$68,614
411	SR-374 (Richview Rd)	Memorial Dr to US 41A (Madison St)	Widen from 3 to 5 Lanes	0.80	$5,616	TN	1.159	$6,509	1.535	$8,621	2.033	$11,417
412	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 ro 5 Lanes	2.00	$14,040	TN	1.159	$16,272	1.535	$21,551	2.033	$28,543
501	College St (SR 48)	N 2nd St (US 41A) to Kraft St	Widen to 6 Lanes	1.40	$9,828	TN	1.159	$11,391	1.535	$15,086	2.033	$19,980
502	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes	1.80	$12,636	TN	1.159	$14,645	1.535	$19,396	2.033	$25,689
503	Dunbar Cave Road	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	Widen to 4 Lanes	4.00	$28,080	TN	1.159	$32,545	1.535	$43,103	2.033	$57,087
504	SR 13/48	River Road to Old Highway 48	Center Turn Lane	1.30	$4,186	TN	1.159	$4,852	1.535	$6,426	2.033	$8,510
505	College St (SR 48)	Riverside Dr to N 2nd St (US 41A)	Widen to 4 Lanes	0.30	$2,106	TN	1.159	$2,441	1.535	$3,233	2.033	$4,281
506	Providence Blvd (US 79)	US 41 to Red River Providence	Widen to 6 Lanes	1.50	$10,530	TN	1.159	$12,204	1.535	$16,164	2.033	$21,407
507	I-24	@ Dixie Bee Road	New interchange	--	$33,750	TN	1.159	$39,116	1.535	$51,806	2.033	$68,614
508	I-24	@ Exit 8 WB Off Ramp	Widen to 2 Lanes	0.30	$5,933	TN	1.159	$6,876	1.535	$9,106	2.033	$12,061
509	Madison Street	10th Streetreet to Pageant Lane	Widen to 4 Lanes	0.50	$3,510	TN	1.159	$4,068	1.535	$5,388	2.033	$7,136
510	Needmore Road	Wilma Rudolph Road to Trenton Road	Widen to 4 Lanes	0.90	$6,318	TN	1.159	$7,323	1.535	$9,698	2.033	$12,844
511	Riverside Drive	Providence Blvd to Cumberland Dr	Road Diet	2.30	$3,150	TN	1.159	$3,651	1.535	$4,835	2.033	$6,404
512	Rossview Road	Wilma Rudolpf Blvd (US 79) to Dunbar Cave Rd	Widen to 5 Lanes	2.80	$19,656	TN	1.159	$22,781	1.535	$30,172	2.033	$39,961
513	Tiny Town Road	US 41A to Trenton Rd	Widen to 6 Lanes	6.80	$47,736	TN	1.159	$55,326	1.535	$73,275	2.033	$97,047
514	Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes	1.70	$11,934	TN	1.159	$13,832	1.535	$18,319	2.033	$24,262
515	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes	3.00	$21,060	TN	1.159	$24,409	1.535	$32,327	2.033	$42,815
516	SR-374 Ext	SR-13/48 to SR-12	New 2 Lane Roadway & Bridge	5.50	$101,250	TN	1.159	$117,349	1.535	$155,419	2.033	$205,841
517	SR 237 (Rossview Rd)	International Blvd to Browning Way	Reconstruct with CTL	1.60	$5,152	TN	1.159	$5,971	1.535	$7,908	2.033	$10,474
518	SR 76	I-24 to Woodson Rd	Reconstruct with CTL	0.70	$2,254	TN	1.159	$2,612	1.535	$3,460	2.033	$4,582
519	KY-911	UAS 41A to KY-115	Widen from 3 to 5 Lanes	1.85	$12,987	KY	1.217	$15,805	1.766	$22,935	2.563	$33,286

	Tennessee 3.00%		Kentucky 4.00%	
2017	$1,000		$1,000	
2018	$1,030		$1,040	
2019	$1,061		$1,082	
2020	$1,093		$1,125	
2021	$1,126		$1,170	
2022	$1,159	1.159	$1,217	1.217
2023	$1,194		$1,265	
2024	$1,230		$1,316	
2025	$1,267		$1,369	
2026	$1,305		$1,423	
2027	$1,344		$1,480	
2028	$1,384		$1,539	
2029	$1,426		$1,601	
2030	$1,469		$1,665	
2031	$1,513	1.535	$1,732	1.766
2032	$1,558		$1,801	
2033	$1,605		$1,873	
2034	$1,653		$1,948	
2035	$1,702		$2,026	
2036	$1,754		$2,107	
2037	$1,806		$2,191	
2038	$1,860		$2,279	
2039	$1,916		$2,370	
2040	$1,974		$2,465	
2041	$2,033	2.033	$2,563	2.563
2042	$2,094		$2,666	
2043	$2,157		$2,772	
2044	$2,221		$2,883	
2045	$2,288		$2,999	

Stage I
Stage II
Stage III

Line Items

During the public survey conducted in March 2018, the public was asked on how they wish to spend the region's transportation dollars. The results of this question are shown in Chapter 2, Figure 2.6 which show a desire for capacity improvements, safety, and maintenance. The public also displayed a strong desire for additional bike/ped facilities. These facilities have historically been funded in a sparse manner within the region, leading to an increase in capacity funding that would allow for bike/ped facilities to be built at the same time as other capacity projects. These results, combined with historical funding for various improvement types, were used as a guide to allocate funds to the capacity and line item categories as shown on Page F-5 of Appendix F.

IMPROVE Act Projects

The recently passed IMPROVE Act in the State of Tennessee allows the state to raise additional revenue for a variety of transportation projects. TDOT has provided a list of projects, shown below, that could be funded using IMPROVE Act funds when they are available. IMPROVE Act funds would be in addition to those listed in the financial forecast discussed in Chapter 9.

County	Program	Route	Project Description	Length	Project Status	IMPROVE Act Investments
MONTGOMERY	Interstate	I-24	FROM TN STATE LINE TO SR-76 (EXIT 11)	0.01	Pending	$150,105,000
MONTGOMERY	Maintenance	I-24	"CLARKSVILLE" WELCOME CENTER RENOVATION	0.01	Pending	$3,000,000
MONTGOMERY	Trade	SR-149/374	SR-374; FROM DOTSONVILLE ROAD TO SR-149, SR-149 FROM SR-374 TO RIVER ROAD (RE-BUDGETED-ROW)	2.9	Pending	$118,600,000
MONTGOMERY	Trade	SR-374	FROM DOTSONVILLE ROAD TO US-79 (SR-76) (RE-BUDGETED-ROW&STAGE CONST)	2.9	Pending	$45,100,000
MONTGOMERY	Urban Growth	SR-48	(TRENTON ROAD), FROM SR-374 TO I- 24	3.63	Preliminary Engineering	$36,700,000
				5 Projects	Estimated Total to Completion:	$353,505,000

Appendix G:
Comments Received During the MTP Process

TDEC Comments received on July 31st, 2018, regarding the draft MTP. MPO responses are in red.

1. Reduce banner height at the top of the pages to fit more text on the page and shorten the overall document length.

We have spoken with the MPO about this issue and we will explore if this can be done in a timely manner.

2. Table ES.2: One of the prioritization criteria described is the 'Balance Benefits vs. Cost' and in Table 10.3, how are the benefits calculated? How do we know what they are and their value?

A brief description of what the benefits are will be provided within the table in the next draft. The MPO has the worksheets used to calculate these values.

3. Page 1/13: I don't know how to make it simple, but the area is now (at least at this time) having to conduct conformity analysis due to the recent South Coast decision. The paragraph at the bottom of page 1/13 makes it sound like the area just became maintenance.

We will add text that clarifies this in the next draft.

4. Page 1/14: At the top of the page, should we state standards are "lowered", or "made more stringent" instead of "higher"? The second paragraph does not seem to make sense. What is intended here?

The next draft will state "made more stringent" instead. The second paragraph is an error from when the report was changed based on the South Coast decision for air quality. This paragraph will be removed.

5. Are all the objectives in Chapter 3 currently measured such that we can evaluate performance of the MTP?

Some objectives can be measured using data that the MPO has, while others can be obtained from the TDM. However, some objectives are subjective.

6. Page 4/10: Does EPA set CAFE standards as indicated here?

The EPA sets the GHG standards, while the NHTSA sets and enforces the CAFE standards. This will be corrected in the next draft.

7. Table 4.3 appears to have incorrect information on the NAAQS.

A portion of the Nitrogen Dioxide row is missing, affecting the remainder of the table and will be corrected in the next draft.

8. Table 4.5 and description above: What does the word "Test" in the title here mean? Why are these "Test" projects?

A brief description of the MTP test projects will be added prior to the table for the sake of clarity.

9. Table 6.10: This table looks like it needs column headers.

This will be corrected in the next draft.

10. Page 6/26: This indicates we have hydrogen refueling in Clarksville. Is this true, where?

This information has been updated by the AVF locator since the draft was first submitted. All of the AVF data will be updated to reflect this in the next draft.

11. Page 6/55: The discussion above figure 6.17 may need to reference from "2002 through 2015" instead of "2012 through 2015"; similar for text above figure 6.18.

This will be corrected in the next draft.

12. Page 6/67: The last sentence, consider replacing "burden" with "demand".

We will make this change in the next draft.

13. Table 8.2: This table indicates a decrease in Collector centerline miles – is this due to reclassification of a roadway in the future?

This is a result of the realignment of Oakland road in the Existing + Committed projects. The original alignment is removed from the network and the new alignment is shorter than the original.

14. Table 8.2: This table may have an error – the bottom 2 sections have the same title – the bottom sections may need to be "delay".

This will be corrected in the next draft.

15. Table 8.3: This table appears to be duplicated in part.

This will be corrected in the next draft.

16. The picture on page 8/21 appears to not be from the U.S. – the bike lane traffic is going in the wrong direction.

We will select a new picture for the next draft.

17. Page 8/32: What is a DMU vehicle?

This acronym will be spelled out in the next draft.

18. Page 8/33: second bullet – slowest rate compared to what? The statement is not clear.

This will be clarified in the next draft.

19. Table 8.10: Third column, should this be "To"?

This will be changed in the next draft.

20. Page 8/39 Why is rail growth out to only 2040, not 2045?

The data provided by TDOT through Transearch only covers the years 2012 and 2040. This will be clarified in the next draft.

21. Page 9/5: Is the statement at the bottom of page 9/5 about the MPO not receiving CMAQ funds – is this correct?

This is an error from when the report was changed based on the South Coast decision for air quality. This paragraph will be removed.

22. Section 10.1: does the TDM forecast of congestion also inform project identification for future projects? How is this information used in project prioritization?

The congestion forecast was not used to identify potential test projects, which instead relies on public input, state agencies, and the MPO. However, the reduction of congestion based on TDM model runs is used in project prioritization.

23. Table 10.3: The row regarding points for minority and low income groups – this should point out that the impact, as indicated here, is a negative impact. What happens if the impact is positive? Does the project gain additional points?

This is addressed by a special note in Table 10.2. This note will be added to the end of Table 10.3

24. Page 11/29: In the call-out box on the right, isn't this more than 4 times the state average?

This will be corrected in the next draft.

TDOT Planning Comments received on August 7th, 2018, regarding the draft MTP. MPO responses are in red.

PIN 124656.00, widen I-24 from TN state line to SR-76 (Exit 11). This project probably will be let by the end of 2021, but it's on Page 11/15 of the MTP as a Visionary Project. Total cost is about $130,000,000. Should it remain visionary?

If this project is let by the timeframe anticipated, the MTP can be amended to include it in the appropriate stage. The cost of the project would have precluded other beneficial projects from being scheduled in Stage II.

PIN 124659.00, I-24 Clarksville Welcome Center Renovation. 0.1 miles. Total cost is around $3,250,000 and probably will be let by the end of 2022. I didn't find it in the MTP.

This project would be covered under the Enhancement Line Item and can be programed in the TIP at the appropriate time.

PIN 123071.00, SR-48 from near SR-374 to near I-24. Recently we've increased total project cost to $46,400,000.

This will be updated in the next draft.

PIN 101285.02, SR-112 (US-41A) intersection improvements at SR-76 in Clarksville. This has a spring 2019 letting but I couldn't find it in the MTP.

This project can be added to the list of potential intersection projects in Chapter 10, which will allow it to be included in the TIP.

We added a couple of pedestrian projects at the end of last year. I don't know where you'd put them in your MTP. PIN 126901.00 is a $2,000,000 11,800 foot sidewalk on the E. side of SR-12 from Quinn Road to the KY state line, including 50 ADA ramps and 8 pedestrian signals. PIN 126902.00 is 9,300 feet of 5-foot sidewalk along both sides of SR-13 from S. of Center Pointe Road to Holiday Drive. It has 4,900 feet of drainage, 150 ADA ramps, and 12 pedestrian signals. Cost is around $5,000,000. Both are enhancement-type projects managed by TDOT.

These projects can be funded through the Enhancement Line Item. These projects would be programmed in the TIP since the money is identified in the MTP.

TDOT Comments received on September 7th, 2018, regarding the draft MTP.

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Required Changes- Items related to rules, regulations, eligibility, and factual information that must be addressed				
1	General	The MPO's metropolitan planning area, as defined by agreement between the MPO and the Governor, includes the entirety of Montgomery County, Tennessee, including the portion which covers Fort Campbell. The MPO is responsible for carrying out the metropolitan transportation planning process across the entirety of the metropolitan planning area, again, including the portion of the MPA which covers Fort Campbell. It appears that the MPO is accounting for the transportation impacts of the Fort in its planning process, including the traffic generated by the Fort (captured through the travel demand model at external stations located at the entry/ exit gates to the Fort), and through coordination and consultation with Fort Campbell's planners. However, it looks like there are opportunities to clarify the impact of the Fort on the region, such as identifying the Fort as a major employment center in the region. Accordingly, TDOT recommends that the MPO clarify in the MTP that the planning process is being carried out across the entire MPA, not just the "study area" which excludes the Fort. This could be done through a narrative explaining how the MPO coordinates with the Fort and considers the Fort in planning for the region, and the limited role the MPO plays in addressing infrastructure planning for the Fort. This should also be done through clearer maps which address the entire MPA,	The report figures will be updated to change references of Study Area Boundary to Travel Demand Model Boundary. Additional map features will add the boundary for Fort Campbell within the MPA, and an overall MPA boundary. Where possible, additional information about Fort Campbell will be added in the next draft of the report. A note will also be left in chapter about why Fort Campbell is excluded from the TDM area.	As I understand it, Ft. Campbell isn't excluded from the TDM area, the traffic is captured at the external stations.

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Required Changes- Items related to rules, regulations, eligibility, and factual information that must be addressed				
1. *continued*	General	including the Fort (the MPO might consider shading the Fort in a way to represent the unique situation in this area). TDOT also recommends the MPO move away from defining a "study area" that differs from the MPA, as this appears to create confusion and gives the impression that the MPO is not planning for the entirety of the MPA. The study area represents a modeling network and should be represented and explained as such.		
2.	3-8	The MPO needs to include the PMs adopted to date, including baselines, and a discussion of how the Plan's policies, programs, and projects support the States' targets. At a minimum this should include the information in the MTP Addendum submitted to TDOT for the current Plan. Since the MTP will be adopted by the Executive Board after November 16, 2018, the MPO may want to consider including PM2 and PM3 so that the Plan doesn't need to be amended right after adoption. Refer to 450.324 - Development and content of the metropolitan transportation plan – in the May 27, 2016 Planning Rule.	The adopted performance measures and their targets are included in Chapter 6. The MPA's baseline performance is also covered in the chapter. An additional section will be added at the end of Chapter 6 that summarizes the baseline performance and targets. The PM2 and PM3 TPMs that Clarksville is subject to are also included in the performance measure tracking. 450.324 will be referred to in the next draft.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Required Changes- Items related to rules, regulations, eligibility, and factual information that must be addressed				
3.	Chapter 9	Fiscal Constraint – Refer to 450.324 - Development and content of the metropolitan transportation plan – in the May 27, 2016 Planning Rule. Page 9.15 - How did the MPO develop these numbers and reach these conclusions? There is no historical information presented, nor is there a discussion of inflation factors or the methodology used. No information for local governments is included. What is the amount and source of local match for roadway and associated improvements? Where are the current and projected O&M costs for roadways, bikeways, greenways, sidewalks, and transit? This information is needed for all jurisdictions, including TDOT and KYTC. What is the source of the funds used to pay for O&M costs? There is no mention of the IMPROVE Act other than for public transit on page 9-14. This Act is having a significant impact on state and local funding, and is allowing projects to be accelerated. The MPO may want to refer to the Johnson City MTPO's 2045 MTP adopted earlier this year, specifically Chapter 5 and Appendix II.	450.324 will be referred to in the next draft. Additional information about the transit funding will be added to Page 9.15. An Appendix will be added that shows the historic funding data received from CTS and forecast development. The development of the O&M costs and their relationship to the line item funding will be described in Chapter 11 and Appendix F. The IMPROVE Act will be referenced on Page 9-5 in the next draft.	OK
4.	Chapter 11	Pages 11-3 thru 11-9 - Why don't the total costs of Tables 11.3, 11.4, and 11.5 reconcile with the Estimated Fiscally-Constrained MTP Project Costs for each Stage from Table 11.1? This does not demonstrate fiscal constraint.	Table 11.1 reflects only the roadway capacity projects in the study area. It will reflect the capacity projects and line items in the next draft. Fiscal constraint for the line item funding will be addressed in the next draft.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Required Changes- Items related to rules, regulations, eligibility, and factual information that must be addressed				
5.	Chapter 11	PIN 124656.00, widen I-24 from TN state line to SR-76 (Exit 11). This project probably will be let by the end of 2021, but it's on Page 11/15 of the MTP as a Visionary Project. Total cost is about $130,000,000. Should it remain visionary? If it's being let in 2021, it will need to go in the new TIP. Including it now in the fiscally constrained list will keep the MPO from having to do a Plan amendment and new CDR next year. PIN 124659.00, I-24 Clarksville Welcome Center Renovation. 0.1 miles. Total cost is around $3,250,000 and probably will be let by the end of 2022. I didn't find it in the MTP. If it's being let in 2021, it will need to go in the new TIP and needs to be in the MTP. PIN 123071.00, SR-48 from near SR-374 to near I-24. Recently TDOT increased total project cost to $46,400,000. PIN 101285.02, SR-112 (US-41A) intersection improvements at SR-76 in Clarksville. This has a spring 2019 letting but isn't in the MTP. Inclusion of these projects will obviously change the Financial Plan.	If PIN 124656.00 is let by the timeframe anticipated, the MTP can be amended to include it in the appropriate stage. The cost of the project would have precluded other beneficial projects from being scheduled in Stage II. This project can be included in Stage II if desired, but it will change Stage II and Stage III. PIN 124659.00 would be covered under the Enhancement Line Item and can be programed in the TIP at the appropriate time. The cost for PIN 123071.00 will be updated in the next draft. The project for PIN 101285.02 will be included in Table 10.7.	

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
6.	Executive Summary	Excellent Executive Summary.	Thank you	
7.		Overall this is a very well written, easy to read Plan. Good use of graphics to illustrate the points discussed in the text. "A picture is worth a thousand words."	Thank you	
8.	1-18	1st paragraph – MPOs aren't required to set their own targets. They may adopt the State's. This is correctly stated in Chapter 6. Why doesn't Table 1.2 include the MPOs' Target Required Date? State Target Setting – July 2, 2017 – State Highway Safety Offices report the 3 identical HSIP targets in the HSP to NHTSA. August 31, 2017 – State DOTs report 2014-2018 HSIP targets in the HSIP Annual Report to FHWA.	The first paragraph will have a change to reflect the proper information on TPM targets. Table 1.2 does not contain the MPO's Target Required Date since it is affected by two states. The state submission deadlines for their targets are discussed in Chapter 6.	OK
9.	1-21 and General	1.3 – Does the Clarksville area exhibit these trends? If so, how do the trends impact transportation and mobility, both now and in the future? Throughout the MTP there's a lot of discussion of requirements, trends, and issues at the Federal and national levels. The Plan could be enhanced by providing examples of how Federal requirements are applied and implemented locally, and indicating if the Clarksville area exhibits trends not in line with national trends.	Where possible, this will be addressed in the next draft.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
10.	1-25	1st paragraph – Chapter 3 is Visioning and Performance Measures. 2nd paragraph – There's no mention of the AQ conformity process and review by the IAC. Just to clarify, the MPO adopts the Plan, and the Federal agencies approve the CDR. Neither TDOT nor FHWA/FTA/EPA approves the Plan. 3rd paragraph – TN doesn't currently have an administrative adjustment process for Plans. Also applies to 1st paragraph in the block on p. 1-26.	The first and second paragraphs will be corrected in the next draft. References to administrative adjustment will be removed in the next draft.	OK
11.	1-26	Last sentence – mention of TIP amendments and adjustments probably isn't necessary since this is a discussion of the MTP.	This change will be in the next draft.	OK
12.	1-27	It may help to clarify that the TIP is a 4-yr. document that is updated every 3 yrs.	This will be changed for the next draft.	OK
13.	2-6	The process is somewhat different with air quality conformity.	This change will be in the next draft.	OK
14.	2-11	Kudos on the number of responses to the survey. To what does the MPO attribute the increase from the previous Plan survey?	Electronic social media	OK
15.	2-12	2% for walking or biking for recreational or health purposes seems low. How does this number compare to the statewide percentage?	This is based on responses to the public survey, for which this question was specifically created. Statewide and national percentages were unavailable for comparison. Research from the ACS shows that just over 4% of work trips in the MPA counties are by walking or cycling.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
16.	2-13	2.2 - Was the question "What is your primary method of transportation?" or "What is your primary method of transportation to work or school?" Those are two different questions that could elicit different responses.	The question asked as part of the survey was "What is your primary method of transportation." This was meant to cover all trips within the MPA, including shopping and personal trips.	OK
17.	2-16	Are there projects to address on congestion and safety on Wilma Rudolph Blvd.? 3rd bullet – do not support efforts?	There is a section at the end of Chapter 11 that recommends a study on Wilma Rudolph Blvd to address these concerns. The third bullet will be corrected in the next draft.	OK
18.	3-4	What is a Blueway? Not familiar with that term.	This term will be clarified in the next draft.	OK
19.	4-10	Last sentence – numeric outputs that may be utilized? are utilized? This may be a good place to discuss the Clarksville area's air quality history and status.	The change to the last sentence will be in the next draft. A quick section on the region's air quality history and status will be included in the next draft.	OK
20.	Chapter 4	The MPO may want to consider placing this chapter later in the document. At this point in the Plan, the reader isn't familiar with the projects in the tables and how they were derived.	This chapter could be moved to between Chapters 10 and 11. Optionally, a sentence can be added that refers the reader to Chapter 10 to explain these projects.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
21.	4-35	2nd sentence – is this a true, scientifically based statement? Is human behavior the only cause of the increase in GHGs?	This sentence was improperly worded and will be adjusted in the next draft.	OK
22.	5-8	Any reason(s) why Montgomery is growing and Christian is not?	State income tax, housing, schools and other quality of life	OK
23.	5-9	Table 5-2 is just dropped into the document with no discussion or mention in the main text.	A line will be added at the end of the paragraph before to introduce this table.	OK
24.	5-11	Why isn't Ft. Campbell on the list of Largest Employers? It's mentioned on 5-13. Table 5.3 should be Largest Employers in the MPA. Refer to Comment #1. Review tables throughout the document to make sure the MPA is captioned and accurately represented.	It is not included in the Clarksville Area Chamber of Commerce Table, which is the source for Table 5.3 The employment for Fort Campbell will be added to this table in the next draft.	OK
25.	5-17	Why aren't Hankook Tire and Trane considered specialized freight-generating industries?	Specialized freight generating industries are based on location quotients, which compare a disproportionate amount of employment in an industry when compared to the state or nation.	OK
26.	6-29	PlanGo isn't the current Statewide Plan.	This will be updated in the next draft.	OK
27.	6-30	No distinction between a bike lane and a buffered bike lane?	This will be added in the next draft.	OK
28.	6-35	Clarksville Greenway and Blueway Master Plan info is in Figure 6.11, not Figure 6.12.	This will be updated in the next draft.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
29.	6-39	Can Fig. 6-13 be made larger?	This figure will be enlarged in the next draft.	OK
30	6-36 & 6-41	What are the items labeled "Existing" and "Proposed" in the legend of these two figures?	Bike and Ped facilities	OK
31.	6-43	Can Fig. 6-15 be made larger?	This figure will be enlarged in the next draft.	OK
32.	6-44	Is Clarksville Greenway really 9 mile long? It looks closer to 5 on Google.	Alltrails.com and the City of Clarksville website list the trail at 9 miles. This can be corrected if it is determined to be wrong.	OK
33.	6-45	"The KYTC has a policy that requires consideration of incorporating pedestrian and bicycling facilities on any new, or reconstructed, state-maintained roadways." – TDOT's Multimodal Access Policy requires the same consideration on TN roadways.	This will be added to the next draft.	OK
34.	6-53	Isn't Exit 8 the Rossview Rd exit? The first two paragraphs on this page seem redundant. Also, which grant funds this shuttle? CMAQ?	These paragraphs will be consolidated and adjusted in the next draft.	OK
35.	6-55 6-56	Figure 6.17 shows fixed route ridership from 2002 to 2015, not 2012. Same for Figure 6.18 and Lift ridership	The text in the report will reflect the correct years in the next draft.	OK
36.	6-57	Footnote 6: NTA or NTD?	This will be corrected in the next draft.	OK
37.	6-67	The 2nd sentence is confusing. Average age or % of population?	This will be corrected in the next draft.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
38.	6-82	Can labels be added to the rail lines displayed in Figure 6.27? The narrative only mentions two lines, but there are three shown within the MPA.	This will be added in the next draft. The third rail line serves the airport and Fort Campbell and will be adjusted to reflect the proper terminus within the MPA.	OK
39.	6-88	Table 6.27 displays the breakdown of alcohol involvement for crashes, not Table 6.26	This will be corrected in the next draft.	OK
40.	6-88	Should the first column in Table 6.27 be renamed?	This will be corrected in the next draft.	OK
41.	6-93	Table 6.30 shows the ten segments with the highest crash frequencies, not 6.29.	This will be corrected in the next draft.	OK
42.	6-93	Table 6.31 shows the ten segments with the highest crash rates, not 6.29.	This will be corrected in the next draft.	OK
43.	6-93	Table 6.32 shows the ten intersections with the highest crash frequencies, not 6.31.	This will be corrected in the next draft.	OK
44.	6-93	Figure 6.29 illustrates the locations with highest crash frequencies and rates, not 6.30.	This will be corrected in the next draft.	OK
45.	6-110 – 6-116	Very good section on Safety and Security, tailored to the area.	Thank you.	OK
46.	7-11	E+C – How is committed funding defined? Programmed in TIP or local CIPs? Constructed or open to traffic? Last sentence – why was it assumed that Gateway Medical Center would not undergo a significant expansion when the medical field is a growing industry and Montgomery Co. is a growing county?	The E+C funding will be further defined in the next draft. The Gateway Medical Center is not expected to undergo a significant expansion at its current location due to the buildup around it and lack of ability to expand outwards.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
47.	8-1	Same paragraph repeated twice at beginning of chapter 8.	This will be corrected in the next draft.	OK
48.	8-21	Bike/Ped recommendations are in Figure 6.11, not 6.12.	This will be corrected in the next draft.	OK
49.	8-22	"The Clarksville Cycling Club provided a detailed list of recommendation, shown in the Appendix…" – Which appendix?	This will be corrected to show Appendix D in the next draft.	OK
50.	8-26	"Pedestrian signal heads and mid-block crossings should be employed where volumes are high." – Does the MPO or the City conduct pedestrian counts?	Not at present.	OK
51.	8-33	Does KYTC have any truck counts for Christian County?	This data was requested from KYTC and we were informed that it was not available.	OK
52.	8-40	The official name of the RTA is the RTA of Middle Tennessee. Also, "studies are currently being conducted" for the feasibility of rail in the area. What studies are currently being conducted? The Northwest Corridor Study was finalized years ago, and TDOT is not aware of any on-going studies. If there are, please list them.	This will be corrected in the next draft.	OK
53.	8-41	"The inclusion of a general-purpose port would eliminate these costly trips and reduce traffic." – A new port wouldn't really eliminate trips, would it? It may be more accurate to say it would shift the mode of a number of trips. Suggested re-write of sentence under Port Service – "This addition has also been identified as a project in TDOT's state freight plan." Isn't the reason the Clarksville Regional Airport has no scheduled commercial flights is its proximity to BNA?	The text revisions will be included in the next draft. Currently, the BNA is why there are no commercial flights. However, Outlaw Field is still considering its inclusion.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
54.	8-46	Same paragraph repeated in Systems Management and Operation section.	This will be corrected in the next draft.	OK
55.	8-47	Do TDOT and KYTC currently provide incident management services in the Clarksville area? If not, is there a need for them over the life of the Plan?	These services currently do not "patrol" and provide emergency service to the MPA on a 24/7 basis. However, they assist with larger incidents.	OK
56.	8-49	Has the MPO considered participating in TDOT's CMA program? Has the MPO identified corridors where a CMA would be a viable option?	Yes. Currently City Dept. is addressing.	OK
57.	9-5	"The Clarksville MPO currently does not qualify for CMAQ funds…" – This is not an accurate statement.	This was written before the conformity analysis became necessary and will be removed in the next draft.	OK
58.	9-7, 9-8	The first two funding sources listed in this section identify what percentage of local tax revenues they generate, but they only add up to 83%. Can the last 17% be identified as well? These numbers appear to be for local government in general. Where are the figures specific to the Clarksville MPO's member jurisdictions?	The remaining sources will be identified in the next draft. The current numbers are for local government in general. If area-specific figures for the member jurisdictions are available, this can be placed in the next draft.	OK
59.	10-7	Local standards may be different, but the TDOT standard for shared-use paths is 10ft wide. Using that width will likely give the MPO more accurate planning-level project cost estimates.	The next draft will feature a cost based on the TDOT standard.	OK

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Questions/Comments - Items for clarification or further consideration				
60.	11-2	First paragraph says the plan covers 2016-2045, but Stage I starts at 2018. Under "Bicycle and Pedestrian Plans" only sidewalks are mentioned. What about bicycles? In addition, it may be appropriate to go into further detail than just "they can be developed at the same time as other highway improvements." Those routes are mainly on local facilities and have no planned improvements that TDOT is aware of.	A note will be added at the end of the paragraph that will explain why the tables reflect 2018, since 2016 and 2017 have already passed. The reference to bicycle projects in relation to the level of concern will be addressed in the next draft, as well the additional detail requested about project timing for the sidewalks.	OK
61.	Appendix	The public outreach effort should be commended.		

Comment Number	Document Page No.	Comment	MPO Response	Final TDOT Response September 7, 2018
Product/Process Improvements - Observations on content, grammar, structure, and other stylistic components				
62.	3-6	"Through MAP-21 and the FAST Act, the FHWA and FT have created…" should be FTA.	This will be corrected in the next draft.	OK
63.	5-1	Is the abbreviation for Micropolitan Statistical Area correct?	The abbreviation is correct; however, it is not used anywhere else in the report and will be removed in the next draft.	OK
64.	5-16	Big blue box and the paragraph beneath it have the same text.	This will be corrected in the next draft.	OK
65.	6-42	Should the sentence about Fort Campbell Boulevard sidewalks be bulleted like those that follow it on the remainder of the page?	This will be corrected in the next draft.	OK
66.	Chapter 8	Should Section captions say "Needs" rather than "Need"? It varies throughout the chapter. Page 8-33 – Trucking Needs?	This will be changed in the next draft to say "Needs" instead of "Need".	OK
67.	8-51	…TDOT is working on a review….	This will be corrected in the next draft.	OK

EPA Comments received on September 14th, 2018, regarding the draft conformity reports. MPO responses are in red.

Thanks for sending the raft Conformity etermination Report for review. I have the following comment

In the Background sections of both Kentucky's and Tennessee's reports, please include language to reflect that this conformity determination is prepared as a result of the o uth oast II ecision.

The following section is the revised section based on the EPA's comments:

1.0 Background

The Clarksville MPcc onsists of Montgomery ounty, Tennessee and the southernmost portion of Christian County, e ntucky. The planning area is shown in i gure 1.2 of the MTP 2045, available from the MP. n uly 18, 1997, the Environmental Protection g ency EPA) developed a revised 8-hour ozone standard of 0.0 parts per million ppm), which was more stringent than the previous ozone standard. a r esult of the change, the Pdd esignated the Clarksville-Hopkinsville area (which is made up of Montgomery ounty, Tennessee and Christian ounty, entucky) as nonattainment for the 8-hour average ozone NAA,, and designated a basic ozone nonattainment area.

However, both counties have since been redesignated as tai nment with a Maintenance Plan for 8-hour ational m bient r ua lity tand ard (NAAQS) ozone standard. The Clarksville-Hopkinsville area is still reu ired to perform conformity analysis for the following three areas

- The e ntucky donut (which encompasses ri stian o unty but is not part of the MPA)
- The e ntucky MP area (which is the portion of Christian o unty within the MPA)
- The Tennessee MP area (which is the entirety of Montgomery ounty, with the ece ption of rt Campbell)

In 2015, the Clarksville MP stopped demonstrating conformity for the 2008 8-hour ozone standard due to the revocation of the 1997 8-hour ozone standard by EPA. The decision to revoke the 1997 ozone standard was vacated by the o uth Coast II Decision on b. 16, 2018, via CA ase No. 15-1123. a result, the Clarksville MPO must demonstrate conformity for the MTP and TIP. fect ive on April 23, 2018, H i ssued the Interim Guidance on Conformity Reu irements for the 1997 ozone standard dated p ril 23, 2018, which states that new MTP and TIP updates and amendments that include the addition of a project that is not e empt from transportation conformity may not proceed until conformity with the 1997 ozone NAA i s determined. This conformity determination complies with FHWA's April 23, 2018 guidance until further notice is given.

ii le the MP is designated tai nment with a Maintenance Plan, and thus has a 5-year planning cycle, the conformity analysis must be conducted every four (4) years for MTPs and TIPs, as per 40 R

.. 104. It must also conduct the analysis each time the MT or TI is updated, as per 0 F 3. The Fort a mpbell Army base is considered an et ernal station for the purpose of transportation confor ity. In addition, transportation conformity reu irements are applicable for any roadway that receives funding or approved under Title 23 or 9 through the .S . epartment of Transportation .S . DOT . Fort Campbell does not contain any roada ys that meet these conditions and is therefore e empt from conformity reu irements.

TDEC Comments received on September 20th, 2018, regarding the draft conformity reports. MPO responses are in red.

I attempted to replicate one of the MOVES runs. It turns out, the emissions I calculated for NOx were different. So I checked the other two runs for Montgomery County. The emissions I calculated for NOx for 2026, 2036 and 2045 were: 2.46, 1.81 and 1.74 tons/year, respectively. It took a while, but what I found was that the input databases did not include the ramp fractions. This may account for the differences. I did not check the KY MOVES runs, but suspect it may have the same issue. The VOC results were the same.

Thank you for bringing this to our attention. It appears that when we cleared and then updated the input files for our previous model runs, MOVES provided us the symbol showing the input was accepted; however, it used the default values instead. We re-imported the ramp fractions and obtained the values that you obtained. All of the MOVES model runs for Montgomery and Christian Counties will be re-run and the reports updated in the next draft to reflect these changes.

Appendix D to the CDR: Table D-8: It would be helpful to include the fuel formulation numbers in the left-hand column so they can be identified and compared in the fuel supply table.

This will be added to the next draft.

In looking at the CDR and MTP, maybe I missed it, but where do we have a list of all the projects with a determination of the projects' regional significance or exempt status? I'm assuming that all of the projects in the CDR's Table A-1 are proposed as non-exempt, regionally significant, and the impacts of which are modeled. What are the remaining projects? We need to have the IAC concur on which of those are exempt from transportation conformity as per 93.126 and 127.

The IAC and MPO will need to determine which projects are non-exempt, regionally significant and which ones are not. Once those determinations have been made, we can add a column to the relevant tables in the MTP and CDRs. At this time, all of the projects in the MTP and those provided by KYTC have been modeled in MOVES and treated as non-exempt.

Would the tables in Appendix E be more informative if the emissions are grouped by source types?

Currently, the Post Processing tab of the MOVES software does not provide breakdowns beyond what is shown in the Appendix E tables.

KYTC Comments received on October 2nd, 2018, regarding the draft MTP. MPO responses are in red.

1. **Page 1–5**: Revise the list of local government to identify Oak Grove, **Kentucky**.

This will be revised in the next draft.

2. **Page 1–21**, **3rd paragraph**: The statement in the 3rd paragraph of this page, appears to be an opinion. Revise to provide information data source of the statement. Otherwise, please remove paragraph.

This will be addressed in the next draft either through revision and removal.

3. Executive Summary Table ES–3: It would be helpful a more description of the projects.

This table is intended to show only the most pertinent project data. Since this is a planning document, detailed descriptions of the exact alignments and needs of the projects are unavailable.

4. Page 2–8: Bullet #6, revise to *"**Demonstrating explicit"** consideration and response to public input received during the development of the metropolitan transportation plan and the TIP*;

This will be addressed in the next draft.

5. Page 5–19: Revise to add to the section that FHWA/FTA are the agencies making the conformity determination.

This will be addressed in the next draft by adding a small sentence to page 4-11, where the conformity analysis is mentioned.

6. Page 5–19: We would like to see a freight study looking at the needs and identify trip generation of freight in the MPA area, especially since the MPO may become a TMA.

This will be addressed in the next draft by adding a section at the end of the report that explains why the study could be explored by the MPO.

7. Page 6–45: We would like to see a bicycle/pedestrian study since the MPO may become a TMA.

This will be addressed in the next draft by adding a section at the end of the report that explains why the study could be explored by the MPO.

Displays received at the Clarksville public meeting from Joey Smith of the Montgomery County Health Department regarding the need for sidewalks at schools.

Martin Street has a Sidewalk Priority Score of 40-47 pts

Hazelwood Road has a Sidewalk Priority Score of 12-15 pts

PISGAH SIDEWALK STUDY
• 900' of Sidewalk
• Would connect a school with 2 Subdivisions
Over 380 homes with safe access
• Could result in reduction of transportation assets
• This area is only a 12 on the Sidewalk priority matrix

Dunlop Lane has a
Sidewalk Priority Score of 29-33 pts
Rossview Road has a
Sidewalk Priority Score of 8-11 pts
SCHOOL
20

S.R. 237
Justification for
Safe Routes to
Schools funding
School Built
18 years ago
STATE HIGHWAY

S.R. 374
School Built
49 years ago
Justification for
Safe Routes to
Schools funding
STATE HIGHWAY

Schools Serve Many Roles

Actual Trip Generators of Schools:

- They are Elementary, Middle, High School **5 points**
- They serve as Parks and Greenways **4 points**
  - Ballfields, playgrounds, and green spaces are used EVERY day by the public.
  - We literally co-locate City and County Parks and Parks & Recreation Programs at schools
- Schools serve as Civic Centers **3 points**
  - Frequently used for public activities. Where does the city hold their public hearings for street projects and where do people go to vote? That's right; their nearest public schools used as civic centers.
- Schools are emergency shelters and hospitals under EMA authority **3 points**
  - Many schools have EMS stations co-located on the campus
- Many host local church and other non-profit services **2 points**

Other:

- Most have sidewalks that don't connect to any other sidewalks **5 points**
  - For missing segments within ¼ mile.
- Every school building sits in a 30 mph zone **2 points**

Total Actual Score: 24 points

When surrounded by single or multi-family development on a major roadway; a three school campus is serving over 4,000 people daily. This should tip the pedestrian priority scale at over 50 points.

Comment received from Mr. White via email and MPO response.

From: Stan Williams
To: [redacted]
Subject: Fwd: MTP 2045 Draft Report
Date: Thursday, December 06, 2018 12:05:20 PM

---------- Forwarded message ---------
From: **Stan Williams** <stan.williams@cityofclarksville.com>
Date: Thu, Dec 6, 2018 at 12:00 PM
Subject: Re: MTP 2045 Draft Report
To: [redacted]

Mr. White, thank you for your feedback. Unfortunately just because a project is listed in the Major Transportation Plan (MTP) it is not a guarantee said project will be constructed. When a project is listed in the MTP, it becomes eligible to use federal funding for the environmental, design, right-of-way, utility and construction phases. Next, said funding must be obligate in the Transportation Improvement Program (TIP) to begin said phases. The current 2017-2020 TIP is posted on the website (www.cuampo.com).

Until the environmental and design phases are completed for any project, the amount of right-of-way easements and acquisitions need can not be determined accurately. Dunbar Cave Rd. is not a federal nor state designated route, thus the majority of funding to make any improvements will require local/city dollars. The project is not include in the 17-20 TIP, no do I anticipate it being included in short - mid yrs. TIPs. That is why it is listed in Stage III, (2037 to 2045).

Hope this addressed your concerns. My advise is, enjoy your home and drive safely!

On Mon, Dec 3, 2018 at 5:27 AM [redacted] wrote:

> I have a question regarding the MTP 2045 draft report, specifically Table ES.3, Page ES.11, Map ID 503, Dunbar Cave RD. It lists an improvement of widening Dunbar Cave Rd to 4 lanes, from Wilma Rudolph to Rossview Rd.
>
> I have some concerns regarding this, particularly on the section of Dunbar Cave past Warfield Blvd. This road has a number of houses very close to the existing roadway. How will this widening be accomplished, will it result in Houses being demolished for road construction, will it result in residents losing significant portions of their property/front yards, how much of this will be lost, and if so what will be done to ensure the safety of the families whose homes will be significantly closer to the new roadways. In addition, it is very likely that this project would have a substantial negative impact on property values in this area, particularly for those homes that lose significant portions of their front yard and homes being closer to the road. How will the city and/or county compensate these home owners for the short and long term loss of property value.

I have only lived in this area for 3 years, but I realize something will need to be done to alleviate the traffic. This road already has a significantly greater volume of traffic than I expected and had I known this before hand, I probably would not have purchased the home. And while I also recognize that this project is not anticipated to begin for approx. 20+ years, but if I can expect to lose part of my front yard, and have my home closer than it already is to the roadway, I don't expect to remain there and will move away from Clarksville if that's the case.

Thanks for your attention to my concerns.

Comment from received from Mrs. Jarvis at the Oak Grove public meeting.

COMMENT SHEET FOR THE
CLARKSVILLE URBANIZED AREA MPO
2045 METROPOLITAN TRANSPORTATION PLAN (MTP)

If you have additional comments, please complete this form and return it to:

Mail: Mr. Stan Williams, MPO Director
Clarksville MPO
329 Main Street

Clarksville, TN 37040

Phone: (931) 645-7448
Fax: (931) 645-7481
E-mail: Stan.williams@cityofclarksville.com

COMMENTS:

Hwy 115 - Speed limit needs to be reduced. Several fatalities have happened on the last few years. We also have residents who walks this road as a way to get to City Hall & shopping. This road needs to be widened with sidewalks.

Hwy 911 - Needs to be a 5 lane road with sidewalks with the racetrack coming, walmart & several businesses on 41-A this road is very dangerous

Hwy 400 needs to be widened with sidewalks

All 3 of these state roads are major thorough ways through the City of Oak Grove going to Clarksville, TN, Hopkinsville, KY & Nashville, TN

When accidents happen on I-24 between exits 86 & 89 & around these exits the City of Oak Grove shuts down due to the traffic exiting off the highway trying to go around.
41-A
115
911 & 400 become impossible.

(Optional)
Name: Theresa Jarvis
Addres: [redacted]

Phone: [redacted]
E-mail:

MPO response to Mrs. Jarvis' email.

1/3/2019 City of Clarksville Mail - comments @ Public Meeting on 12.03.18

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

comments @ Public Meeting on 12.03.18

1 message

Stan Williams <stan.williams@cityofclarksville.com> Thu, Jan 3, 2019 at 10:10 AM
To: theresajarvis@yahoo.com

Mrs. Jarvis, thank you for your comments during the public meeting on 12.03.18. I'm providing the following as a response: 1) KY115 - a speed study would need to be conducted and accident reports analysed to help determine if the current speed limit should be reduced. Both segments are listed, ID # 109 & 110 in Stage I (2018 -2026) on pg. 11/5 in the 2045 Major Transportation Plan (MTP). In order for the project to move forward, KYTC will need to include PE - NEPA (N) and PE - Design (D) funding in the upcoming 2020- 20023 Transportation Improvement Program (TIP). 2) KY911 - in the 2011-2014, 2014 - 2017 and current 2017-2020 TIP, there was funding allocated for PE-ND, Right-of-Way (row), Utilities and Construction as a 5-lane. In aprx. late 2017, KYTC reduced the cross-section to a 3-lane. It's my understanding that row acquisition is about to begin. 3) KY400 - is listed. ID # 108 in Stage I on pg. 11/5 in the MTP. In order for the project to move forward, KYTC will need to include PE-N/D funding in the upcoming TIP. 4) I-24 - the MPO is about to have a freight operations plan conducted in an effort to identify actions/improvements to help relieve congestion on Fed/State/Local roadways when traffic is diverted off of I-24 within the MPO study area.

Hope this very brief summary explains what is needed to move projects forward. Anytime you have additional questions/comments, contact me at your convenience.

TJcmnts120318.pdf
45K

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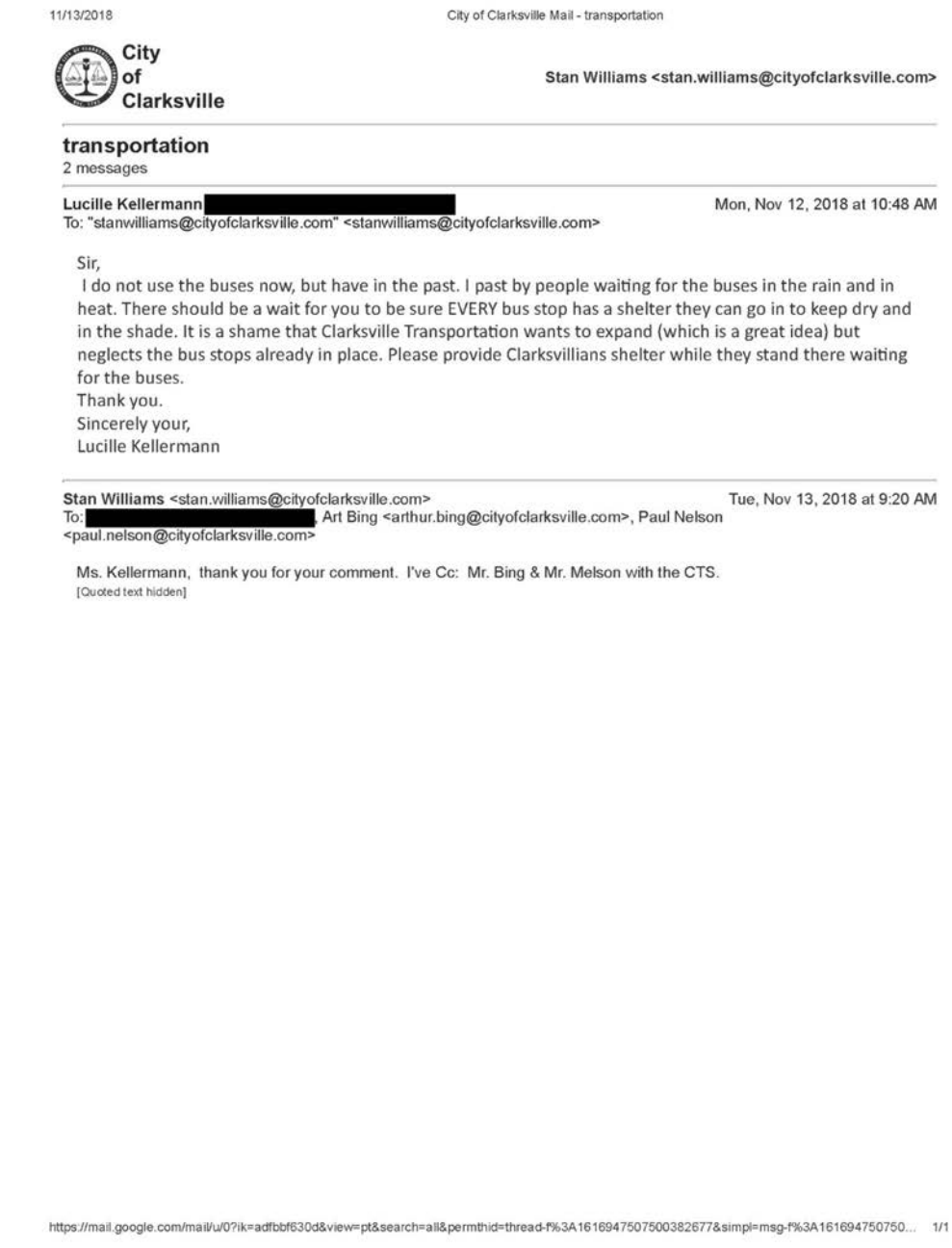
There is currently a project in the TIP and MTP to widen KY-911 to three lanes from US 41A to KY-115. A project has been added to the MTP's Vision projects list (project 519) in Table 11.8 so that this request can be explored in future transportation plans.

KY-400 could receive funding to widen the roadway or add sidewalks through the Enhancement Line Item in the Staged Improvement Program. This funding category is used on an as-needed basis and could be used to program a project for KY-400 if the need becomes warranted.

Comment received from Ms. Kellerman via email and MPO response.



11/13/2018 City of Clarksville Mail - transportation

City of Clarksville

Stan Williams <stan.williams@cityofclarksville.com>

transportation
2 messages

Lucille Kellermann [redacted] Mon, Nov 12, 2018 at 10:48 AM
To: "stanwilliams@cityofclarksville.com" <stanwilliams@cityofclarksville.com>

Sir,
I do not use the buses now, but have in the past. I past by people waiting for the buses in the rain and in heat. There should be a wait for you to be sure EVERY bus stop has a shelter they can go in to keep dry and in the shade. It is a shame that Clarksville Transportation wants to expand (which is a great idea) but neglects the bus stops already in place. Please provide Clarksvillians shelter while they stand there waiting for the buses.
Thank you.
Sincerely your,
Lucille Kellermann

Stan Williams <stan.williams@cityofclarksville.com> Tue, Nov 13, 2018 at 9:20 AM
To: [redacted], Art Bing <arthur.bing@cityofclarksville.com>, Paul Nelson <paul.nelson@cityofclarksville.com>

Ms. Kellermann, thank you for your comment. I've Cc: Mr. Bing & Mr. Melson with the CTS.
[Quoted text hidden]

https://mail.google.com/mail/u/0?ik=adfbbf630d&view=pt&search=all&permthid=thread-f%3A1616947507500382677&simpl=msg-f%3A161694750750... 1/1

Comment received from Marc Corrigan of TDEC and MPO Response.

It does appear, based on the project description in the CDR for SR-374 that this change was made to the MTP and CDR.

After consultation with TDOT and FHWA, it was decided to re-run the Travel Demand Model and MOVES emissions analysis with SR-374 as a 4-lane roadway to maintain consistency with the 2017-2020 TIP. The MTP and conformity reports reflect this change. All modeling files will be made available upon request.

Sign-in Sheet from Oak Grove Public Meeting

SIGN-IN SHEET

The Clarksville Urbanized Area
Metropolitan Planning Organization (MPO)
Draft 2045 MTP - Public Meeting/Oak Grove, KY
December 3, 2018 at 5:00-7:00 p.m.

NAME	AGENCY
1. Misty Cutshall	City of Oak Grove
2. Jeffrey W Davis Sr	City of Oak Grove
3. Angelica O'Malley	City of Oak Grove
4. [signature]	City of Oak Grove
5. Dana Richardson	Neel-Schaffer
6. Vijay Kunada	Neel-schaffer
7. Bonnie Hughey	
8. Theresa Jarvis	City of Oak Grove
9. Jill Hall	Clarksville MPO
10. Rhea Gingsby	Oak Grove, Ky
11. RON GREGSBY	OAK GROVE KY

SIGN - IN SHEET (continued)
Draft 2045 MTP Public Meeting/Oak Grove, KY
December 3, 2018 at 5:00-7:00 p.m.

	Name	Email
12.	Stan Williams	MPO
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		

Sign-in Sheet from Clarksville Public Meeting

SIGN-IN SHEET

The Clarksville Urbanized Area
Metropolitan Planning Organization (MPO)
Draft 2045 MTP - Public Meeting/Clarksville Library
December 4, 2018 at 5:00-7:00 p.m.

	NAME	AGENCY
1.	Jeffrey Tyndall	RPC
2.	Dana Richardson	Neel-Schaffer
3.	Vijay Lenada	Neel-Schaffer
4.	Kimberly Pettitt	Reliant Realty
5.	Jan Preston	TDOT
6.	Joey Smith & Molly Smith	Montgomery Co Health Dept
7.	Michael Dean	NAI Clarksville
8.	Jill Hall	Clarksville MPO
9.	Randy Whetsell	Reliant Realty, ERA Powered
10.	Maya Kubich	Reliant Realty ERA Powered
11.		MC Comm

SIGN - IN SHEET (continued)
Draft 2045 MTP - Public Meeting/Clarksville Library
December 4, 2018 at 5:00-7:00 p.m.

	Name	Email
12.	Walker Woodall	
13.	William B Allen	
14.	M. Emery Hartz	emeryhartz@yahoo.com
15.	Chris Rasnic	
16.	Amelia Hartz	amelia hartz@aol.com
17.	Arthur Bing	
18.	Rashidah Leverett	
19.	SUE Ellen Yates	babsueellen@bellsouth.net
20.	Melinda Kelly-Majors	MKellyrich@hotmail.com
21.	Nikki Clark	nikkiyone@gmail.com
22.	Nick Powell	nbpowell@mcgtn.net
23.	OTIS R COFFEY	ocoffey1@gmail.com
24.	RUSSELL CRIN	Retiredarmy98@bellsouth.Net

Clarksville MPO Draft 2045 Metropolitan Transportation Plan
FHWA & FTA Comments

Date Due:

Comment Number	Document Page No.	FHWA / FTA Comment	Clarksville Reponses	TDOT Follow up
A. Required Changes: Comments that identify discrepancies with federal law, regulation, or policy.				
A1	General	The MPO's 2013 amended PPP calls for at least one public meeting during development of the MTP, with Level 1 outreach for this meeting. The only public outreach documented in the draft MTP is related to the public outreach survey. While the survey is a valuable tool, it is unclear whether the MPO has followed the policies in the PPP related to this public meeting. Please clarify and provide any additional documentation available to reflect additional public outreach.	Based on our past experience and to provide better opportunity for public input, the survey was utilized. The survey was made available to all stakeholders and the general public, with invites sent through several media outlets (shown in Appendices B and C) accessible to all individuals. The results were excellent with over 2,100 responses. In addition, all MPO meetings were available to the public to provide input and the survey was promoted at those meetings. There are two upcoming Level 1 public meetings available for additional input. An appendix will be added after the upcoming public and stakeholder meetings that detail these activities. The list and an example contact letter are attached. Also the respondents from the survey that	OK

			asked to be updated on the MTP process will be contacted.	
A2	General	In all cases where the MPO identifies State-level PM1, PM2, and PM3 targets that the MPO is supporting, please also identify relevant statewide baseline values, not just those for the MPA.	The requested data was added to the tables in the new draft.	Where is this addition?- **The requested changes were made to Tables 6.4 (pg. 6-9), 6.6 (pg. 6-12), 6.12 (pg. 6-24), 6.39 (pg. 6-109), 6.42 (pg. 119), 6.43 (pg. 6-120), and 6.44 (pg. 6-120). Freight TPM data was included on Page 6-80.**
A3	General	Revenue Forecasting – see pages 9-9, 9-16, 11-2, 11-3, appendix f FHWA/FTA hold significant concern and questions with the MPO's revenue forecasting, including: 1. The MPO appears to be forecasting revenue by using historical data which likely is not entirely applicable to future funding sources, including Federal funding sources that are defunct, such as NHS, ENH, SRTS, as well as sources which are discretionary in nature and/or have specific eligibilities which may not align to	1. The majority of the defunct programs have been merged into other programs, with exception to SRTS, such as the NHS becoming part of the NHPP. It is anticipated that discretionary funding sources will continue through some future program. Based on previous experience, we felt comfortable forecasting future revenue based on this historical data to develop the historic average annual funding levels. 2. Forecast funding estimates do not include the IMPROVE Act since the info obtained from TDOT is a fact sheet that covers the entire state and cannot be used at the regional level.	1. Needs clarification – **Since transportation funding sources usually change with each transportation bill we used the historical average funding, which will include defunct programs. These defunct programs include S-STP, L-STP, and RSTP in MAP 21 becoming part of the STGBP in the FAST ACT; NHS in MAP 21 becoming part of the NHPP in the FAST Act; and ENH, which became TAP under MAP 21, is now part of the STBGP of FAST**

		the projects identified in the MTP, such as CMAQ, FLAP, R/P/RPHSIP. Please clarify why these programs were included in the revenue forecast. 2. The revenue forecast for the Tennessee portion of the MTP does not appear to include any State funding sources, including the increased revenue from the IMPROVE Act. Please clarify. 3. Please justify why the MPO is applying a Consumer Price Index rate to the historical funding for 2014-2016, which artificially inflates the revenue that went to the region in these years. 4. The MPO appears to be forecasting revenue for years 2018, 2019, and 2020, even though this information can be found in the TN STIP/MPO's TIP. Why did the MPO elect to forecast this revenue instead of using actual revenue? 5. The revenue forecast appears to be based on	3. The application of the Consumer Price Index was used to develop the annual average funding in a constant 2017 dollars, accounting for inflation. 4. The actual TIP costs were used in 2018-2020 for the staged program years. 5. The inflation rates for revenue forecasting were provided by TDOT and KYTC respectively. 6. The $100,000 spent in Christian County was inflated to keep it consistent with the forecasting method. 7. The breakdowns were defined the results of the public survey, and by past experience, determined by which project types in the historic funding fit a particular line-item in the MTP, or a capacity project. 9. TDOT has stated that alternative transportation funding does not	Act We still anticipate other discretionary funding sources, such as CMAQ, FLAP, and R/P/RPHSIP to be available in one form or another. Though the MTP currently does not specifically identify projects that may be eligible for all of these discretionary funding sources, line item funding sources (such as safety, enhancement, maintenance, etc.) were identified that could be used for eligible projects as they come up during the MPO project selection process. The Current TIP has FLAP (2017 and 2018) and CMAQ (2017 through 2020) funds in the revenue forecast. 2. Please contact TDOT for breakdown of regional level funding sources. IMPROVE Act projects were

		inflationary rates of 3% in TN and 4% in KY. What is the source of these rates? Why do they vary between the two states? 6. Christian County, KY indicated to the MPO that on average, $100,000 is spent on transportation projects in the county annually. Based on this information, why did the MPO elect to apply a growth rate to this revenue? 7. How are the "breakdown" of project categories defined? This is unclear in the plan. Please provide definitions for each category. 8. What is the source of the percentages informing the "breakdown" of revenue by project category – i.e. where does the 60% of revenue for capacity come from, the 15% for reconstruction, etc? 9. Section 9.3 (page 9-16) states that bicycle/pedestrian funding is based on the MPO's STBG allocation, yet the revenue forecast	have a set funding value for each metropolitan area each year. As a result, the forecast funding for bicycle and pedestrian projects is bas-ed on historic forecast levels, and not the current program. 10. All project costs were developed in 2017 dollars. As a project was selected for a particular stage of the Stage of the Staged Improvement Program, an inflation factor corresponding to the "mid-point" of the Stage was applied to develop the project cost during that stage. The MPO has a spreadsheet detailing these calculations that can be added to a new draft if desired.	provided in Appendix F. 3. OK- where is this index? – **The CPI is provided by the Bureau of Labor Statistics for the South Urban Region. Information will be added to the final report that displays the methodology and data and more information can be found in the "CPI" section of Appendix F.** 4. Needs clarification – **Revenue forecasts were conducted for the entire plan period using the same methodology. However, for Stage 1, the costs and revenues were assumed to be coming from TIP. Revenue forecast for capacity improvements for Stage 1 on TN side came out to be $211 million but the TIP project costs were $261 million. Hence**

		includes now-defunct bike/ped funding sources (ENH, SRTS). Please clarify. 10. The MTP does not appear to include an adjustment of project costs based on year of expenditure. If this has indeed occurred, there is no explanation of how project costs have been inflated throughout the various Stages of the MTP. Please clarify.		no new projects were added to TN side for Stage 1 beyond the projects identified in TIP. The TN revenues will be adjusted in the final report and more information can be found in the "Forecast Funding and the TIP" section in the attached Appendix F Narrative Additions document. But, on KY side the revenue forecast for capacity improvements for Stage 1 came out to be $50.8 million but the TIP project costs were $14.8 million. Three projects were added on KY side to use the remaining revenue for KY area. 5. OK- who specifically provided these rates? Brian Hurst – TDOT and Maridely Loyselle – KYTC. 6. Needs clarification – Funding forecast methodology used includes developing

				an annual average funding from all sources including local funding, such as Christian County funds, in 2017 dollars and then forecasting that amount to future years using the inflation rates. 7. Needs clarification – A narrative section was added to Page 11-4 to clarify these categories. 8. MTP response #8 missing?- Tables that show the development of these breakdowns will be included in the final report, with more information available in the "Line Items" section of Appendix F. 9. Needs clarification- does not address the comment specifically – STBG funding is allocated to the various MPOs and rural areas within the state on an "as programed" basis,

				meaning that there is currently no information available to develop an annual average. Based on the desire and push for more bike/ped facilities within the area expressed by local citizens and stakeholders, we anticipate that the area will receive at least the funding comparable to what was funded through the now-defunct TAP. 10. Adjustment of project costs needs to be addressed more clearly; also include calculations spreadsheet as mentioned – **The spreadsheet and a description of the calculations will be added to the appendices of the final report. This information can be found in the "Stage Cost Calculations" section of Appendix F.**

A4	General – Chapter 3	Recommend clarifying how the TAM framework has been implemented to monitor and manage transit assets, and describe the performance system used to evaluate the performance and condition of the transportation system with respect to the performance measures and targets.	Section 3.3 was expanded in the new draft to discusses this, using the TAM to explain the process.	OK
A5	General – Chapter 10	Recommend clarifying how transit funding uses are prioritized based on the condition of their assets to achieve or maintain a state of good repair (SGR).	CTS has stated that: "Funding is first used to satisfy operating needs. Remaining and capital only funds are used to repair and replace assets as needed with safety concerns addressed first." This was addressed in the new draft.	OK – added on page 10-3
A6	6-119	This section provides specific examples of activities and policies of the MPO in supporting the State's safety targets, but does not provide similar narrative for the condition and system performance targets, outside of a general incorporation into the project scoring criteria. Please provide.	This section was expanded to provide examples and activities and polices that the MPO can conduct to support the condition and system performance targets.	OK

B. Additional Comments & Questions: General comments & questions to improve clarity, accuracy, and readability.				
B1	General	FHWA/FTA appreciate the efforts of the Clarksville Urbanized Area MPO in developing a highly comprehensive, readable plan that paints a good picture of transportation needs and priorities in the Clarksville region while being easy-to-read and understand.	Thank you. With the help of a good consultant team and State/ Federal agencies we are trying to produce a high quality product, within budget and on schedule.	OK
B2	General	Consider adding a List of Acronyms, as they are numerous throughout the document.	This was added to the new draft.	OK
B3	General	*A comment for future updates to the MTP:* As CUAMPO is on the verge of qualifying as a TMA, consider establishing a more robust evaluation of traffic congestion that will support the TMA requirements of 23 CFR 450.322 – Congestion Management Process (CMP) (i.e. strategies, performance measures, data management, etc.). This may facilitate the MTP update when CUAMPO qualifies as an TMA. Unless a separate CMP document is created, Chapter 8 has the potential	The MPO will consider the development of a CMP and further analysis of traffic congestion, finances, strategies, and performance measures to be used in the future.	OK – Concur - Chapter 8 Transportation Demand Management strategies will be very relevant for future TMA qualification.

		to incorporate many of these requirements.		
B4	General – Table of Contents	Consider adding the Executive Summary to the Table of Contents.	This was added to the new draft.	OK – page ES-1
B5	General – Chapter 6	Please identify freight bottlenecks and the National Highway Freight Network (including Critical Urban/Rural Freight Corridors) in the Clarksville MPA. Chapter 6 might be a good place for this, but wherever the MPO sees fit would suffice.	Currently the data available from TDOT and KYTC show there are no freight bottlenecks within the MPA. The list of routes on the NHFN was added to the new draft.	Based on information received, no freight bottlenecks were confirmed within the MPA
B6	General – Chapters 6 & 8	Chapters 6 & 8 contains a significant amount of very valuable information regarding current and future transportation systems and needs, but the connection between this information and the project scoring criteria could be somewhat strengthened, maybe through the addition of a sentence or two at the end of each section explaining the relevant scoring criteria. It seems obvious enough, but I often found myself wondering, what is the MPO doing with all this great information and valuable observations?	Additional content was added to the new draft to bridge this gap.	OK – page 6-3 and 8-2

B7	ES-1, 1-1	By the date of plan adoption, the plan will be covering a period of twenty-seven years, not twenty-nine. Consider revising.	This was adjusted in the new draft.	OK – ES-1
B8	1-3	Recommendation to add a reference to Figure 1.2 in the narrative regarding the Metropolitan Planning Area.	This was added to the new draft.	OK – page 1-6
B9	1-3	Typo, 2nd paragraph: "... all areas expected to **be** urbanized..."	This was adjusted in the new draft.	OK
B10	1-7	Please indicate that FHWA is FHWA-TN and FHWA-KY, and that FTA is FTA-Region 4.	This was adjusted in the new draft.	OK
B11	1-10	1st paragraph: Consider adding the regulatory reference to the FAST Act (i.e. 23 CFR § 450, Subpart C).	This was added to the new draft.	OK
B12	1-10	The quote in the box is not found in FHWA's *The Transportation Planning Process Briefing Book: Key Issues for Transportation Decisionmakers, Officials, and Staff*. Rather, it can be found on FHWA's website at https://www.fhwa.dot.gov/planning/processes/metropolitan/. Please revise.	This was adjusted in the new draft to match the proper references.	OK
B13	1-12	To the list of Federal requirements of the MTP, please clarify:	This was adjusted in the new draft.	OK

		• The MTP is required to include current and projected transportation demand of people and goods; • The MTP is required to include a system performance report evaluating the condition and performance of the transportation system.		
B14	1-13	To clarify, Transportation Management Area designation is based on the urbanized area population, not the population of the MPA. According to 2017 Census estimates, the population of the Clarksville, TN--KY Urbanized Area was 176,696.	This was adjusted in the new draft.	OK – FHWA: 176,696 population, while draft states 177,000 population- **The final report will display the exact value.**
B15	1-14	Montgomery and Christian counties are not designated maintenance areas for any air quality standards; rather, the area is expected to continue to perform transportation conformity as an anti-backsliding measure as a result of being a former maintenance area for the 1997 Ozone NAAQS. Please clarify.	This was adjusted in the new draft.	OK – page 1-13
B16	1-15	Question: what mechanisms did the MPO take to ensure that the MTP is consistent with the plans and	A small paragraph was added to the new draft that clarifies this.	OK – page 1-14

		processes provided on this page? Any documentation to this effect, such as a more explicit demonstration of consistency between the SHSP and the MTP, could help to clarify this.		
B17	1-18	This appears to be the first use of the acronym 'TPM'. Please define.	This was added to the new draft.	OK
B18	1-19, 1-20	As presented, this table could be made much clearer to more thoroughly represent the national transportation performance measures. Would suggest the table be broken into columns which represent the Category, Performance Measure, Performance Target/Metric, and Timing of Targets. Please also note that Safety targets are based on a five-year rolling average, not safety metrics in a calendar year, but these targets are set annually.	This table was adjusted in the new draft.	OK pages 1-19 – 1-22
B19	1-20	Recommendation to note that the CMAQ performance measures do not apply to the Clarksville urbanized area.	A note was added to the table in the new draft to clarify this.	OK – asterisk page 1-22
B20	1-26	The quote from 23 CFR 450.104 varies slightly from the current version. Specifically, the last line is	This was adjusted in the new draft.	OK – page 1-28

		not in the CFR, and the next to the last line is not an exact quote. Please revise.		
B21	2-4	Last line: the word "plan" after PPP is redundant, as the acronym includes the word "plan". Consider revising.	This was adjusted in the new draft.	Still needs revising- bottom of page 2-4 "PPP Plan"- **The final report will remove the word "Plan"**
B22	2-5	This appears to be the first use of the acronym "LEP". Please spell out.	This was added to the new draft.	OK
B23	2-8, 2-9	This is a good summary of Federal requirements for consultation with stakeholders, but there is limited information documenting the actual consultation activities that took place and what feedback was received. Please identify who these stakeholders are in the Clarksville region, how they were consulted with, and any feedback that was received. Consider adding this to the Appendix discussion on public involvement and stakeholder outreach.	An appendix will be added after the upcoming public and stakeholder meetings that detail these activities.	OK – Appendix A: Public Outreach Strategy Appendix B: Survey Letter, Flier, and Mailing List Appendix C: Webpage and Social Media Announcements
B24	2-11	Question: what projects specifically were added from the survey? It's somewhat difficult to tell from just the map in Figure 2.9.	A new table was added to the new draft to address this.	OK – table 2.1 added on page 2-12

B25	2-12	Question: how does the information regarding means of travel gathered from the survey align with information from the Census? Do the two seem to reflect similar findings?	A new bullet was added to the new draft to address this.	OK – box at bottom of page 2-12
B26	2-14 & 3-4	Based on the public survey results in Ch. 2, a repetitive concern was that services did not connect with desired destinations. This concern did not appear to be reflected in the objectives of Goal #3. How is the feedback from the public coordinated with the transit agencies? For example, could an objective be to revisit transit routes as the population and destinations evolve?	CTS has stated that: "Strategic plans, operational analyses, and public hearings and surveys are conducted routinely to aid in route and service planning." New bullet points were added to page 3-4 to address these efforts.	OK
B27	3-3 – 3-6	The objectives provided could be made somewhat more specific, measurable, time-based to provide more valuable in assessing achievement of these objectives and alignment with both Federal and CUAMPO performance measures. Table 3.2 could be made more specific by addressing the relationship of the MTP objectives to these performance measures.	This will be considered for the next MTP update.	Still no changes made to Table 3.2 – **The final column will contain changes in the final report that further breakdown the goals and objectives that can address the performance measures.**

B28	4-1	As previously stated, please provide documentation for the consultation with state/local environment, resource, land use, etc. agencies.	As in B23, an appendix will be added after the upcoming public and stakeholder meetings that detail these activities.	Appendices added (see above)
B29	4-4	For Noise, please add 23 CFR 772 to the Relevant Regulations. For Recreation Areas, Historic Structures, and Archaeological Sites, please add 23 CFR 774 to the Relevant Regulations.	These references were added to the new draft.	OK
B30	4-10, 4-11	Please clarify the air quality status as previously stated in Comment B15.	This was updated in the new draft.	OK – page 4-10
B31	4-10	Please remove the word "principal" from "six criteria pollutants".	This was updated in the new draft.	OK
B32	4-11	Typo: "numberic" should be "numeric".	This was updated in the new draft.	OK
B33	4-11	Suggest revising "transportation model" to more clearly identify it (perhaps as the "Travel Demand Model").	This was updated in the new draft.	OK
B34	4-11	Table 4.3: the standard for Ozone is 70 ppb, not 53. Please revise.	This was updated in the new draft.	OK
B35	4-15	The items identified as "environmental benefits" of wetlands are not actually benefits of wetlands. These seem to be more general characteristics, or	This was adjusted to reflect that the identified items are actually protection needs.	OK

		perhaps protections, of wetlands. Please revise for clarity.		
B36	5-5	This map might be enhanced by an identification of the location of the major employers identified on page 5-11 (recognizing that some are not at a single site, such as the School System, while others might be).	The map was updated in the new draft and will show the HQ locations of the major employers.	OK – page 5-6
B37	6-2, 6-3	Consider aligning this discussion to FHWA classifications – Interstate, Other Freeways, Principal/Minor Arterial, etc – as well as dividing into urban/rural, as this is critically important to Federal-aid eligibility.	This was adjusted in the new draft.	OK
B38	6-15, 6-15	Volume to capacity ratio is usually expressed as "V/C ratio". "VOC" is generally the abbreviation for volatile organic compounds.	This was updated in the new draft.	OK
B39	6-73	References to the tables in the blue box at the bottom of the page appear to be flipped (i.e. the referenced to Table 6.20 should be to Table 6.21, and vice versa).	This was updated in the new draft.	OK
B40	6-87	Please add the number of fatalities and serious injury crashes to Table 6.25, to better align this with Federal performance measures. Please also add 2017 crash data, in	The 2017 data will be added to Table 6.25. The in-depth data needed for the remainder of the analysis cannot be added to the rest of the section.	OK

		order to provide the most recently-available crash data.	KYTC was unable to provide 2017 data. It will be added to the final report.	
B41	6-89	Typo: missing a space between "6.29" and "displays".	This was updated in the new draft.	OK – bottom of page 6-90
B42	6-90	While crash frequency is critical to safety analysis, crash severity is often considered of more critical importance to ranking high-crash locations. Accordingly, an intersection such as SR-374 at SR-48, which is 14th on the listing in Table 6.28, would generally be a higher priority than many of the intersections above it. Consider addressing this.	A line was added to the new draft on page 6-89 that will address this. The table is merely informative and shows the highest crash frequencies. The new line will point out the importance of crash severity in the process.	OK – table and line on page 6-89
B43	6-94, 6-95	Consider ranking the segments in Tables 6.30 and 6.31 by priority. If these are already ranked somehow, please explain.	These tables are not meant to assign priority, but are designed to show the relative ranking of the locations based on crash frequency and crash rate.	May need to add a line of clarification addressing that the tables are meant to show the relative ranking of the locations based on crash frequency and crash rate- **A sentence will be added to the final report that states that the tables show the relative ranking of the segments by their crash frequencies and rates and are not used to infer an order of priority.**

B44	6-109	Did KYTC set safety targets for 2015-2019? If so, please provide.	KYTC recently provided this data. It has been added to the new draft.	OK – page 6-110
B45	6-111	Question: how does the CUAMPO assist in the implementation of the recommendations listed in Table 6.41?	Upon MPO review of the accident reports, if said behavior is contributing to the cause of the crash, the MPO will work with TDOT/KYTC local maintenance, and the City/County highway departments, to develop and deploy potential improvements. As this process evolves, the MPO will establish new procedures for the evaluation of the crashes and establish, or work with, a local safety coalition for this purpose.	Add a similar explanation to the "special safety issues" section – **A similar explanation will be added to the final report.**
B46	6-116	Recommend describing the second STRAHNET route as "US-41A, from Screaming Eagle Boulevard (Fort Campbell, Gate 4) north to I-24, Exit 86"	This was adjusted in the new draft.	OK – page 6-17
B47	8-2	The presentation of the figure on this page is somewhat misleading, making it seem as though all three metrics are growing at the same rate (through arrows of the same size), when in fact they are growing at drastically different rates. Consider revising for clarity.	This was adjusted in the new draft.	Arrow sizes may still be misleading? Page 8-2 – **The size of the arrows will be revised for the final report.**
B48	8-3, 8-4	The data in the tables "Daily Vehicle Hours Traveled (VHT)" and "Daily	This table was corrected in the next draft.	OK

		Vehicle Hours of Delay (VHD)" are the same. Please revise.		
B49	8-18	The text notes that there are 16 bridges in "poor" condition, while Table 8.5 only lists 15 bridges. Please clarify.	This table was updated in the new draft. During the update, this was also corrected.	OK
B50	8-18	The Sufficiency Rating for several of the bridges listed in Table 8.5 has changed since the drafting of this table. Please revise with updated information.	TDOT has provided updated information about the sufficiency ratings of these bridges. These ratings are shown in the new draft.	Do these changes still reflect the current sufficiency ratings? **– The data received from TDOT on August 5, 2018 contains the sufficiency ratings for the bridges listed in Table 8.5.**
B51	8-18	The statement "Table 8.5 displays the MPA's bridges in poor condition by their sufficiency ratings" is incorrect. The sufficiency ratings aren't what determines the bridge rating – that's determined by the ratings from inspections using the National Bridge Inspection Standards (NBIS). The NBIS ratings don't always correspond to the sufficiency ratings. For example, Rawlings Road bridge over Blooming Grove Creek has a very high sufficiency rating, but is rated poor because one of the bridge elements (the deck) is in "serious" condition. Poor deck conditions	The table is meant to show them in the order of lowest sufficiency rating. The text was adjusted to reflect how the poor rating works.	OK

		only lower the sufficiency rating a small amount. Please clarify.		
B52	8-18	Recommend explaining the "poor" designation in more detail. Saying that these bridges are in "poor" condition would likely be misunderstood by the public. Bridges are rated based on the conditions of their decks, superstructure, substructure, and stream channel and channel protection. It may be that only one of these elements, such as the deck, is in poor condition, while the other elements of the bridge may be in fair, good, or very good condition. If any one of the elements is rated "poor", then the bridge is also rated "poor". The Poplar Springs Road bridge, for example, with a high Sufficiency Rating of 93.9, has only the deck in "poor" condition, but the superstructure and substructure are in "good" condition, with the stream channel in "very good" condition.	This was updated in the new draft.	OK
B53	8-18	In Table 8.5, the Ringgold Road structure over IC Railroad has been replaced with a 30" pipe. It's no	This was removed in the new draft.	OK

		longer considered a bridge since it is less than 20' in length.		
B54	8-31	Question: does the planning-level cost estimate for the fixed commuter rail service discussed on this page include both capital and operating expenses? Consider clarifying.	This was addressed in the new draft.	OK
B55	8-38	Please revise the reference to the Tennessee State Freight Plan to reflect the 2018 update. Consider providing goals from the 2018 Tennessee Statewide Multimodal Freight Plan in a similar fashion to the goals provided for Kentucky.	This has been updated in the new draft.	OK
B56	8-45 – 8-47	To what "Objectives" do the mentioned technologies relate? What "Outcomes, Outputs, or Activities" could be stated in association with these objectives? Also, it may be helpful to mention how ITS projects listed on the TIP are coordinated with the Clarksville Regional Intelligent Transportation System Architecture and Deployment Plan.	This has been updated in the new draft.	Still need to address TIP ITS projects are coordinated with Clarksville Regional Intelligent Transportation System Architecture and Deployment Plan. **Requested text being added to the final.**
B57	9-2	NHPP funding is 90/10 on interstates only for projects that add HOV lanes or auxiliary lanes.	This was adjusted in the new draft.	OK

		It's 80% if lanes for single occupancy vehicles are added. Same for STBG, CMAQ, and NHFP.		
B58	10-2	Doesn't TDOT maintain a cost estimating tool for use by MPOs in generating cost estimates for planning projects? Was this tool the source of these estimates? If not, were these estimates generated solely from project lettings in the Clarksville MPA or statewide?	The process for the cost estimates was explained on Page 10-1.	May need more clarification of cost estimating tool – **MPO does not have the mentioned cost estimation tool. Costs for projects in the TIP used the TIP cost for the Staged Improvement Program. Projects costs for those not listed in the TIP were developed using the methodology described on Page 10-1. The spreadsheet used to develop the cost estimates will be added to the Appendix.**
B59	10-7	How are high-priority M&O projects identified and prioritized? What is the source of these projects, and how are they advanced? Consider clarifying, and describing this identification/prioritization process, the role of the Regional ITS Architecture, etc.	The high-priority M&O projects were identified by the stakeholders and the state departments. The projects are brought forth for implementation on the basis of need and added to the TIP.	This explanation may need to be made more clear on page 10-7. **Revised text added to the Final**
B60	10-9	National, state, and MPO goals include the provision of a well-maintained transportation system, but the MPO's project scoring does	The project scoring criteria is used only for the roadway capacity projects analyzed as part of the MTP. Maintenance projects cannot be modeled and the MPO's	Add a clarification line(s) addressing this on 10-8-

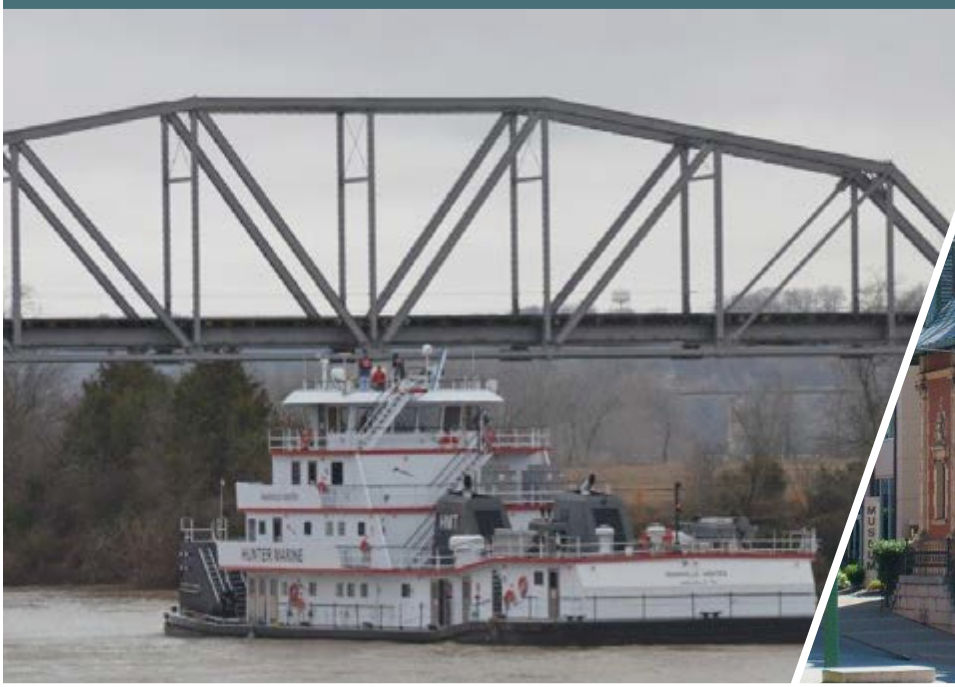
		not appear to include any measures related to infrastructure condition. Please clarify.	maintenance needs are covered in line-item funding. Prioritization of the maintenance projects is on a case-by-case basis, determined by the MPO.	**Sentences to clarify this will be added to the final report.**
B61	11-3	The narrative for the Stage I projects states that these projects total $295.8 million, while they appear to total approximately $536.7 million. Please revise.	This has been updated in the new draft.	OK – page 11-4
B62	11-6	The narrative for the Stage II projects states that these projects total $377.3 million, while they appear to total approximately $730.6 million. Please revise.	This has been updated in the new draft.	OK
B63	11-8	The narrative for the Stage III projects states that these projects total $452.7 million, while they appear to total approximately $879.6 million. Please revise.	This has been updated in the new draft.	OK
B64	11-10	Does the MPO measure effectiveness of the fiscally-constrained project list by any of the other measures previously identified in the plan? Why does the MPO choose to only present changes in VMT, VHT, and VHD versus other measures related to safety, infrastructure condition, etc?	There are no models at the planning level for safety, infrastructure, etc. This makes measuring these items subjective. However, the project scoring criteria can be used to infer the impact these projects would have.	May need some more clarification – **In-depth analysis of other measures (safety, infrastructure, etc.) requires specialized software that are costly and time-consuming to use.**

B65	11-22	Typo: under Bicycle and Pedestrian Projects, next to last sentence, should that be "Many of these **bicycle and pedestrian** projects are on roadways that TDOT and KYTC currently…"?	This has been updated in the new draft.	OK
B66	11-22	Similar to Ch.11.2, etc., consider including a list of "Visionary" ITS projects in this section.	The MPO has identified a visionary ITS project and added it to the new draft on page 11-22.	OK
B67	11-23	In addition to improving freight conditions, consider the statements made in the first paragraph as they relate to Incident Management noted in Ch.6.6 Security, Ch.8 Systems Management and Operation. As examples: How is incident management evaluated and improved upon utilizing the Clarksville Regional Intelligent Transportation System and Clarksville Regional Intelligent Transportation System Architecture and Deployment Plan? How is data from the system managed?	Brief statements were added to these sections to address this in the new draft.	Need to confirm that these statements were added page 6-12?? **– The use of ITS in Security applications was added to the bottom of Page 6-116. The section will provide examples in the final report.**
B68	11-29	The narrative states that the statewide crash rate for such a facility is 3.29, while the emphasis box states it is 2.39. Please clarify and revise.	This was corrected in the new draft.	Is the crash rate 2.69 or 2.39?- **Both the narrative and the emphasis box were incorrect in the previous drafts. The 2.69 is the proper value.**

B69	11-29	Typo: last paragraph, second bullet, should read "TWLTL".	This was adjusted in the new draft.	OK
B70	Appendix E	Please provide documentation related to TDOT's validation of the CUAMPO travel demand model (i/e approval letter, correspondence, etc).	This was added to the new draft at the end of the appendix.	OK

Clarksville Urbanized Area

Metropolitan Planning Organization



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