APPENDIX A

Public Participation & Stakeholder Involvement Plan

Tri-County Land Use & Transportation Study

PUBLIC PARTICIPATION & STAKEHOLDER INVOLVEMENT PLAN

May 12, 2008

Authored By: Terri H. Sterling, APR

Sterling COMMUNICATIONS

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CHAPTER 1: PLAN INTRODUCTION

1.1 PROJECT / PURPOSE

1.1 | project / purpose

PROJECT

In April 2008, the Nashville Area Metropolitan Planning Organization began a land use and transportation study of Sumner, Wilson and Robertson counties in northern middle Tennessee. The study is intended to provide the MPO with a (sub) regionally endorsed Land Use Plan that can be used by local governments to update local land use and major thoroughfare plans. The results of this study will be incorporated into the MPO's 2035 Long Range Transportation Plan. The foundation of the study's findings and results is rooted in stakeholder input.

PURPOSE OF THIS PLAN

The purpose of this Plan is to guide and direct the scope and process of identifying, engaging, informing and learning from key stakeholders. This plan and its organization are in keeping with the Nashville Area Metropolitan Planning Organization Public Participation Plan adopted July 18, 2007 by the MPO Executive Board.

2.0

CHAPTER 2: PUBLIC INVOLVEMENT ORGANIZATION

2.1 IDENTIFICATION OF AUDIENCES & STAKEHOLDER INVOLVEMENT
2.2 PUBLIC OUTREACH & MEETING ORGANIZATION
2.3 STAKEHOLDER INTERVIEW LIST

2.1 identification of audiences & stakeholder involvement

As preparation for the development of a public participation and stakeholder involvement plan, the consultant team will assist the MPO in finalizing the study area to ensure that it does not present a barrier to a variety of public and stakeholder voices from being heard. To assist in this regard, the consultant will identify methods of incorporating various target audiences into the public outreach effort. Each audience will be brought into the process at appropriate points in the project effort. The audiences preliminarily identified for this effort include:

STEERING COMMITTEE

The primary oversight group associated with this project effort is comprised of staff from the MPO, local municipalities, the RTA, and other regional partners identified by the consultant and the MPO project manager. The team will meet with the project steering committee on a monthly basis, as requested by the MPO project manager. Meetings are to be substantive on project delivery issues as well as collaborative on moving essential planning elements through analysis, alternatives development, refinement and implementation.

Tri-County Steering Committee

Phil Armour, Reg. Planning Director, GNRC	615.862.8849	paramour@gnrc.org
Tom Brashear, Planning Director, Wilson County	615.449.2836	tombrashear@charter.net
Michael Briggs, Planner, Sumner County	615.442.1162	mbriggs@sumnertn.org
Rick Gregory, Planning Director, City of Goodlettsville	615.851.2202	rgregory@cityofgoodlettsville.org
Gina Holt, Asst. City Manager, City of Springfield	615.382.2200	ginaholt@bellsouth.net
George James, Planning Director, City of Springfield	615.382.2200	gjames@springfield-tn.org
Bridget Jones, Director, Cumberland Region Tomorrow	615.986.2699	bridget@ cumberlandregiontomorrow.org
Cajun Joyner, Acting Planning Director, City of Mt. Juliet	615.754.2554	sjoyner@cityofmtjuliet.org
Lisa Keylon, City Planner, City of Mt. Juliet	615.754.2554	lkeylon@cityofmtjuliet.org
Addam McCormick, Codes/Planning Dir., City of White House	615.616.1019	amccormick@cityofwhiteouse.org
Mike Moulton, Planning Director, Gallatin TN	615.451.6097	mmoulton@sumnertn.org
Fred Rogers, Planning Director, City of Hendersonville	615.264.5316	frogers@hvilletn.org
Michael Skipper, Director, Nashville Area MPO	615.862.7186	skipper@nashvillempo.org

2.1 identification of audiences & stakeholder involvement

Jim Svoboda, City Planner, City of Gallatin	615.452.5400	jim.svoboda@gallatin-tn.gov
Magi Tilton, Planning Director, City of Lebanon	615.443.2824	tiltonm@lebanontn.org
Melinda Wagner, Planning Director, City of Portland	615.325.6776	mwagner@cityofportlanttn.gov
Jeanne Stevens, Dir. Of Long-Range Planning, TDOT	615.741.3421	Jeanne.stevens@state.tn.us
Tameka Macon, Planning/Air Quality Specialist, FHWA/Nashville	615.781.5767	Tameka.macon@ftwa.dot.gov
Tony Dittmeier, Transportation Program Specialist, FTA/Atlanta	404.865.5612	Tony.dittmeier@fta.dot.gov
Diane Thorne, Executive Director, RTA	615.862.8841	dthorne@gnrc.org

MPO BOARD

At the discretion of the MPO project manager, the consultant team will present study updates and/ or findings to the MPO Board at the beginning, midpoint, and end of the project scope. The board will serve as the central policy making agency, and ultimate client.

STAKEHOLDERS

The consultant team will conduct up to twenty-five (25) one-on-on interviews or small group discussions with project stakeholders. Project stakeholders are defined as individuals important to the data collection efforts of the study, or to the implementation of the resulting plan for the study area.

Stakeholder Groups

Transportation*	Agency Staff
Public Safety	Agency Staff
Business/Chambers of Commerce	Business Leaders/Business Owners
Downtown Alliances/Visitors' Bureaus	Staff/Key Leaders
Developers/Builders	Key Owners/Leaders
Economic Development	Agency Staff/Key Leaders
Parks and Recreation	Agency Staff/Key Leaders
Public Works/Environmental/Water Resources	Agency, Authority Staff
County/City/Town	Staff/Elected Officials
Historic Preservation	Staff/Key Leaders
Schools/Education	Staff/School Board Members
Non-Profits	Staff/Key Volunteers/Leaders
Real Estate	Brokers

* The consultant will engage stakeholders in transportation-related industries and in Federal, state, and local agencies as referenced in Section 4.0 of the Nashville Area MPO Public Transportation Plan.

2.1 identification of audiences & stakeholder involvement

Stakeholder interviews will be conducted in June 2008. One day of interviews will be held in each county, respectively, at a central location.

In addition, identified stakeholders included the MPO's Northeast Corridor Mobility Study and City of Gallatin's Comprehensive Plan consultant teams. Three meetings will be held with each of the consultant teams leading these efforts during the planning process (six total). The first and second meetings will occur during previously scheduled events (community-at-large open house - Task 5.0 and stakeholders presentation for feedback - Task 6.0).

LOCAL AUTHORITIES

Beyond one-on-one sessions as part of the stakeholder outreach group, the team will meet with groupings of affected local governments as part of a final series of public meetings associated with the draft and final project deliverables (Task 8.0). Optional: separate meetings with representatives of the broader planning efforts in the region may be provided as an additional service at the client's request.

2.2 | public outreach & meeting organization

PUBLIC OUTREACH

The consultant team will use specific techniques throughout the public outreach effort depending on the meeting type, format and audience. Methods are based on those identified in Section 2.0 of the Nashville Area MPO Public Participation Plan. These may vary based on many factors as set forth in this plan.

MEETING ORGANIZATION

STEERING COMMITTEE

- Total number of meetings
  - 8 + 1 (optional) total.
  - Limited to a maximum of two hours each (with exception of Steering Committee meetings # 3, 4 per below).
- Timing
  - Tasks 4.0,5.0,6.0,7.0,8.0.
  - Steering Committee meeting # 3 will occur concurrent (on the same day as scheduled SC meeting) with up to two workshops to review goals and measures of effectiveness prepared by the Consultant for Task 5.0.
  - Steering Committee meeting # 4 will occur concurrent with a one-day planning workshop for Task 6.0.
  - Morning preferred meeting time.
- Location (characteristics / suggested venues)
  - Conference room.
  - Seating to accommodate consultant team and Steering Committee members to be provided by the MPO.
  - Meetings will be held at the MPO main office.
  - Adequate free parking available.
- Room set up
  - Group roundtable arrangement with tables and chairs
- Pre-meeting tasks
  - Meeting notification will occur through the MPO office via Michael Skipper
- Materials / equipment needs
  - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
  - Notetaking the primary method for capturing input and decisions.
  - Minutes of each meeting will be provided via e-mail to Michael Skipper at the MPO office within one week following each meeting.

2.2 | public outreach & meeting organization

COMMUNITY AT LARGE SESSIONS – QUALITY GROWTH EDUCATION

- Total number of meetings
  - 6 total.
  - Two-part sessions limited to two hours each.
- Timing
  - Task 4.0.
- Location (characteristics / suggested venues)
  - Robertson, Sumner and Wilson counties.
  - Large space such as school gym/cafeteria, community center or comparable meeting room.
  - Meeting venue well-known throughout the community.
  - Adequate free parking available.
  - The day/date/time/duration of the sessions will be determined by the MPO staff and Steering Committee with input from the Consultant. Considerations include choosing a day of the week to encourage the largest attendance (usually Monday, Tuesday and Thursday are the best days); date (stay away from holidays or the middle of summer); time of day (late afternoon to early evening is a preferred time; however, in certain circumstances, other times of day are preferred); and duration of the meeting (two hours to three hours is the preferred length for public meetings).
- Room set up
  - Attendees will be invited to register when they enter in order to receive further information and/or notice of additional meetings via email or the U.S. postal service. Registration is optional.
  - Light refreshments (bottled water and cookies) may be provided by the MPO.
- Pre-meeting tasks
  - Meeting notification will occur through the MPO office via Michael Skipper.
- Materials / equipment needs
  - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
  - Each session will include presentations and time for question and answer sessions.
  - A note-taker will be positioned to record comments, questions, ideas and concerns on large flip charts. Material from the flip charts is compiled, organized and shared among consultant team members and the client.
  - A comment card table(s) will be established so attendees can complete a short questionnaire at the meeting. The card can also be faxed or mailed to an established address at a later time.
  - Comments can also be taken via the Web site (see Web site section for more detail).

COMMUNITY AT LARGE OPEN HOUSE

- Total number of meetings
  - 4 total.
  - Limited to three hours each.
- Timing
  - Tasks 5.0,6.0.
- Location (characteristics / suggested venues)
  - Robertson, Sumner and Wilson counties.
  - Large space such as school auditorium, community center or comparable meeting room.
  - Meeting venue well-known throughout the community.
  - Located in study area.
  - Adequate free parking available.
  - The day/date/time/duration of the open houses will be determined by the MPO staff and Steering Committee with input from the Consultant. Considerations include choosing a day of the week to encourage the largest attendance (usually Monday, Tuesday and Thursday are the best days); date (stay away from holidays or the middle of summer); time of day (late afternoon to early evening is a preferred time; however, in certain circumstances, other times of day are preferred); and duration of the meeting (two hours to three hours is the preferred length for public meetings).
- Room set up
  - To provide multiple opportunities for substantive dialogue and input, information stations posted with clear, easy to understand signage, are established around the large open space in a sequential order. Each station is staffed by a "content expert" who will be surrounded by two to three large visuals (maps, schematics, diagrams, photos, aerials, fact boards, etc.) that relate specifically to a defined topic. Members of the public will move from station to station singly or in small groups to talk one-on-one with those individuals who are most knowledgeable about the particular topic area and who can answer specific questions that the public may have.
  - If an introduction or presentation is desired or necessary in this format, it must be very short and repeated throughout the duration of the open house.
  - A note-taker will be positioned at each information station to record comments, questions, ideas and concerns on large flip charts. This method is much preferred to a court reporter as hundreds of comments can be gathered. Material from the flip charts is compiled, organized and shared among consultant team members and the client.
  - Attendees will be invited to register when they enter the open house in order to receive further information and/or notice of additional meetings via email or the U.S. postal service. Registration is optional.
    - ☐ Large, clear, easy-to-read door, station and table signage will be used

throughout the venue.
- ☐ A comment card table(s) will be established so attendees can complete a short questionnaire at the meeting. The card can also be faxed or mailed to an established address at a later time.
- ☐ Comments can also be taken via the Web site (see Web site section for more detail).
- ☐ Light refreshments (bottled water and cookies) may be provided by the MPO.

- Pre-meeting tasks
  - o Meeting notification will occur through the MPO office via Michael Skipper.
  - o Consultant teams for Northeast Corridor Mobility Study and City of Gallatin's Comprehensive Plan Update will be specifically invited.
- Materials / equipment needs
  - o Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
  - o A note-taker will be positioned at each information station to record comments, questions, ideas and concerns on large flip charts. This method is much preferred to a court reporter as hundreds of comments can be gathered. Material from the flip charts is compiled, organized and shared with the entire development team.
  - o A comment card table(s) will be established so attendees can complete a short questionnaire at the meeting. The card can also be faxed or mailed to an established address at a later time.
  - o Comments can also be taken via the Web site (see Web site section for more detail).

MPO BOARD

- Total number of meetings
  - o 2 total.
  - o Limited to a maximum of two hours each.
- Timing
  - o Tasks 5.0, 8.0.
  - o Morning preferred meeting time.
- Location (characteristics / suggested venues)
  - o Conference room.
  - o Seating to accommodate consultant team and MPO members to be provided by the MPO.
  - o Meetings will be held at the MPO main office.
  - o Adequate free parking available.

- Room set up
  - Group roundtable arrangement with tables and chairs.
- Pre-meeting tasks
  - Meeting notification will occur through the MPO office via Michael Skipper.
- Materials / equipment needs
  - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
  - Each session will include presentations and time for question and answer.
  - Notetaking the primary method for capturing input and decisions.
  - Minutes of each meeting will be provided via e-mail to Michael Skipper at the MPO office within one week following each meeting.

STAKEHOLDER INTERVIEWS

- Total number of meetings
  - 25 interviews total (up to 3 per interview) with key community and opinion leaders.
  - Approximately 1 hour each in duration.
  - Interviews will be scheduled 1.5 hours apart to allow time for groups to depart and enter without overlap.
- Timing
  - Task 4.0.
- Location (characteristics / suggested venues)
  - Robertson, Sumner and Wilson counties.
  - A detailed schedule of interviews will be developed, with one full day of interviews taking place at a central location in each county. Flexibility and accommodation will be used to ensure that the necessary people are interviewed, and additional location/ times will be established on a case-by-case basis. However, the goal is to contain the interviews within a five-day period (±5 interviews per day for maximum efficiency).
  - Conference room.
  - Seating to accommodate consultant team members and up to three participants to be provided by the MPO.
  - Adequate free parking available.
- Room set up
  - Group roundtable arrangement with tables and chairs.
- Pre-meeting tasks
  - A detailed schedule of interviews will be developed, with one full day of interviews taking place at a central location in each county.
  - A prepared discussion guide will be used to lead the discussion, with flexibility to listen to participants about other related issues that might be important.

    - Meeting notification will occur through the MPO office via Michael Skipper with assistance from the Consultant.
- Materials / equipment needs
    - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
    - Notetaking the primary method for capturing input.
    - Minutes of each meeting will be documented via interviewers' notes.

STAKEHOLDER OUTREACH

- Total number of meetings
    - 6 total.
    - Limited to a maximum of two hours each.
- Timing
    - Tasks 5.0, 6.0, 8.0.
    - Morning preferred meeting time.
- Location (characteristics / suggested venues)
    - Seating to accommodate Nashville Tri-County Transportation and Land Use Study consultant team members and the consultant teams for Northeast Corridor Mobility Study and City of Gallatin's Comprehensive Plan Update to be provided by the MPO.
    - Meetings will be held at the MPO main office.
    - Adequate free parking available.
- Room set up
    - Group roundtable arrangement with tables and chairs.
- Pre-meeting tasks
    - Meeting notification will occur through the MPO office via Michael Skipper with assistance from the Consultant.
- Materials / equipment needs
    - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
    - Meeting with include presentation and time for question and answer.
    - Notetaking the primary method for capturing input.
    - Minutes of each meeting will be provided via e-mail to Michael Skipper at the MPO office within one week following each meeting.

2.2 | public outreach & meeting organization

LOCAL AUTHORITIES

- Total number of meetings
  - 3 total (optional: separate meetings with representatives of the broader planning efforts in the region may be provided as an additional service at the client's request).
  - Limited to a maximum of two hours each.
- Timing
  - Task 8.0.
- Location (characteristics / suggested venues)
  - Robertson, Sumner, Wilson Counties.
  - Meeting venue well-known throughout the community.
  - Located in study area.
  - Conference room.
  - Seating to accommodate consultant team members and representatives of affected local governments within the study area and those responsible for broader planning efforts in the region to be provided by the MPO.
  - Adequate free parking available.
- Room set up
  - Presentations and time for question and answer sessions.
- Pre-meeting tasks
  - Meeting notification will occur through the MPO office via Michael Skipper with assistance from the Consultant.
- Materials / equipment needs
  - Materials and equipment needs will be either supplied by the Consultant or coordinated through the MPO office.
- Methods for gathering and summarizing input (one or more of the following)
  - Notetaking the primary method for capturing input.

WEB SITE

While developing a project-specific Web site is not included in the Scope of Work, it is an option that could be executed separately.

If there is not a project-specific Web site, it is recommended that a "button" be placed on the MPO Web Site Home Page that leads the visitor to a project-specific area where information can be published on an ongoing basis. An online comment card should be available to visitors. An online card not only is a good tool for collection of ongoing input; it also allows the construction of an email database of interested parties and stakeholders throughout the project.

Key Locations

Robertson County: Springfield Public Library
Sumner County: Edward Ward Carmack
Hendersonville: The Martin Curtis
Portland: Elmer Hinton Memorial
Westmoreland Public Library
White House Inn Library
Mt. Juliet: Harvey Freeman
Lebanon-Wilson County Library
Watertown Library

Newspapers

The News Examiner (Gallatin)
The Tennessean (Nashville/Davidson County)
The Lebanon Democrat
El Crucero
The Hendersonville Star News
La Campana
La Noticia
The Tennessean/Robertson AM

Public Housing Authorities

Lebanon Housing Authority
49 Lake Drive
Lebanon, TN 37088
(615) 444-1872

Gallatin Housing Authority
401 N. Boyers Avenue
Gallatin, TN 37066
(615) 452-1661

Portland Housing Authority
107 Potts Avenue
Portland, TN 37148
(615) 325-4559

Springfield Housing Authority
808 Rose Hill Circle
Springfield, TN 37172
(615) 384-4591

Senior Centers

Robertson County Senior Citizens Center
601 S. Locust Street
Springfield, TN 37172
(615) 384-6367

Mt. Juliet/West Wilson County Senior Citizens Center
City Hall Building
2034 N. Mt. Juliet Road
Mt. Juliet, TN 37122
(615) 758-9114

Madison Station Senior Center
301 Madison Street
Madison, TN 37155
(615) 254-1791

Senior Citizens of Hendersonville
223 Campus Drive
P.O. Box 2414
Hendersonville, TN 37077
(615) 822-8758

Lebanon Senior Citizens Center
670 Coles Ferry Pike
P.O. Box 712
Lebanon, TN 37088
(615) 449-4600

White House Citizens in Action
105 College Street
White House, TN 37188
(615) 672-5974

Other Organizations

United Way of Robertson County
101 5th Avenue West, Suite. 25
Woodard Hall Building
Springfield, TN 37172
(615) 384-8160

United Way of Wilson County
P.O. Box 3541
Lebanon, TN 37088
(615) 443-1871

United Way of Sumner County
103 Hazel Path Court, Suite. 5
Hendersonville, TN 37075
(615) 826-2977

2.3 | stakeholder interview list

LIST OF PARTICIPANTS

Magi Tilton, Planning Director – Lebanon
Rick Jones, Planning Commission – Lebanon
Jeff Baines, Commissioner Public Works – Lebanon
Jody Vance, Public Works and Transportation Committee – Lebanon
Randy Robertson, City Manager – Mt. Juliet
Lisa Keylon, City Planner – Mt. Juliet
Jason Holleman, City Attorney – Mt. Juliet
Don Chambers, Lojack
GC Hickson, JECDB
Diane Fletcher, JECDB
Deborah Varallo, Varallo PR
Mark Hinesley, Mt. Juliet Chamber
Kenny Martin, Mt. Juliet
Tom Brashear, Planning Director – Wilson County
Roy Major, Major Dairy
Dr. Jim Tams, Wilson County Planning Commission
Laura McMurray, Wilson County Schools
Danny Stewart, CEO Advanced Propane
Dan Stewart, Board Member Utility District
Michael Briggs, Planner – Sumner County
Mike Honeycutt, Planning Commission – Sumner County
Mike Moulton, Planning Director – Sumner County
Anthony Holt, Planning Commission Chair – Sumner County
Ron Cooper, State Planning Office
Dan Downs, Planning Commission – Sumner County
Dr. Charles Lee, Union University
Rick Gregory, Planning Director – Goodlettsville
Jack Tompkins, City Engineer – Goodlettsville
David Wilson, Goodlettsville Chamber
Tom Tucker, Economic Development Director – Goodlettsville
Jim Galbreath, Planning Commission Chair – Goodlettsville
Melinda Keene, Planner - Portland
Allen Dwyer, Alderman - Portland
Ken Wilber, Mayor of Portland
Dennis Cook, Mactec
Jim Svboda, Planning Director – Gallatin
Nick Tuttle, City Engineer – Gallatin
Kevin Chastaine – Gallatin
Fred Rogers, Planning Director – Hendersonville
Janet Harp, Planning Commission – Hendersonville
Stewart, Developer
Charlie, Principal Ragan Smith
George James, Development and Planning Director – Springfield
Robert Farmer, City Planner – Springfield
Allan Ellis, Public Works – Springfield
Gina Holt, Assistant City Manager – Springfield
David Brewer, City Engineer – Springfield
Paul John Nutting, City Manager – Springfield
Bill Thompson, Planning Commission Chairman – White House
Angie Carrier, City Administrator – White House
Ashley Smith, Parks and Recreation Director – White House
Addam McCormick, City Planner – White House
Bryan Collins, State of TN ECD
Scott Prowse, State of TN ECD
Bill Jones, Furniture Center
Ken Cherry, City of Springfield
Robert Farmer, City Planner – Springfield
Larry Fleeman, F&L Contractors
Rod Kirk, Robertson County Chamber
Samuel Ramsey, Burchells
James Brown, USDA/NRCS
Matt Burnett, Burnett Builders
Cheryl Elliott, Robertson County Soil Conservation
Bob Hoge, Robertson County Planner
Roger Lemasters, Springfield Water/WW Director
Bill Locke, Robertson County Board of Education
Gina Head, City of Springfield
Kelvin Pennel, Robertson County Chamber
Howard Bradley, Robertson County Mayor
Martha Wilkinson, Planning Director Robertson County
Bob Bibb, State Representative 66th District

APPENDIX B

Economic & Market Analysis

Tri-County Transportation and Land Use Study

Nashville, Tennessee

Economic & Market Analysis

Prepared by:

Basile Baumann Prost Cole & Associates, Inc.
177 Defense Highway, Suite 10
Annapolis, MD 21401

October 3, 2008

1. INTRODUCTION

1.1 study purpose

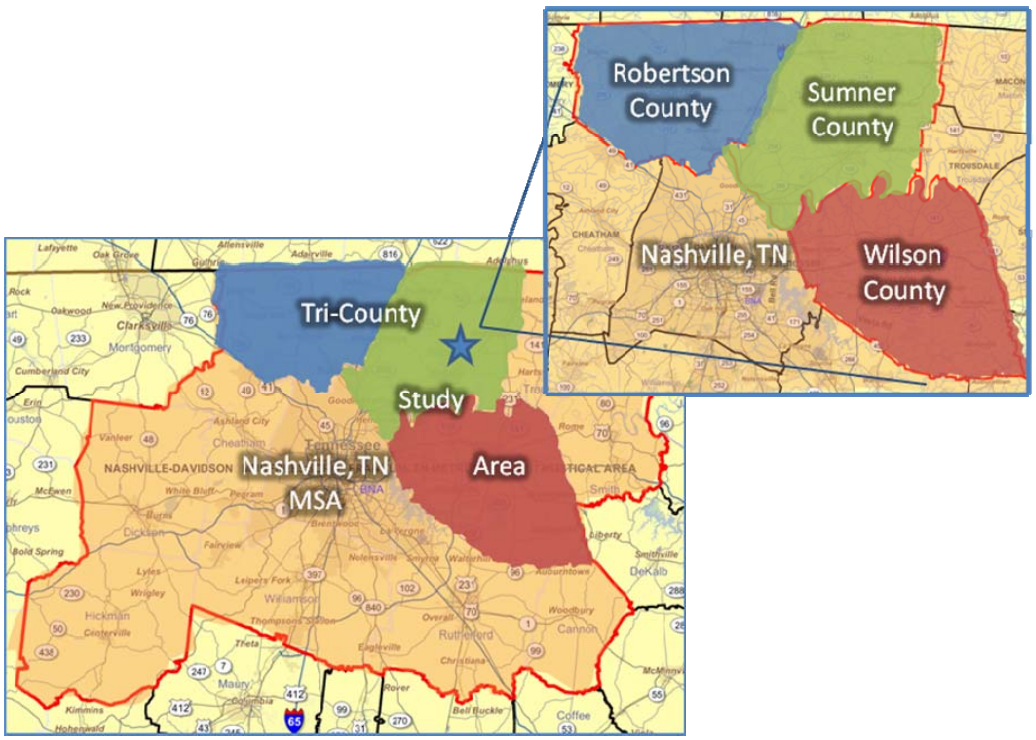
This economic and market study as part of the *Tri-County Transportation & Land Use Study* (Robertson, Sumner and Wilson Counties) assesses the economic and market demand and supply of the Tri-County study area at a macro and micro level.

This includes an assessment of the competitive market and economic position of the Nashville region vis-à-vis other regions in terms of economic demand drivers, quality of life issues, and other economic, market and demographic factors. At the micro level, this includes an analysis of the trends, issues, and opportunities in the Tri-County study area related to the current and future market for office, industrial, retail and residential uses. This information will provide the economic and market foundation for the preparation of the model and alternative growth scenarios.

Understanding emerging real estate trends, demographics, and economic conditions is an important step to identifying where and when growth is occurring in the region and for land use/transportation planning for communities. This analysis will help the local jurisdictions and the metropolitan planning organization (MPO) with a better understanding of the existing and projected growth in the region and the Tri-County study area that leads to a multi-jurisdictional land use plan that promotes a more efficient transportation system.

TRI-COUNTY STUDY AREA

Exhibit 1-1: Tri-County Study Area



The Tri-County Study Area includes Robertson County, Sumner County and Wilson County. These counties form the portion of the Nashville Metropolitan Statistical Area (MSA)[1] northeast of Nashville-Davidson County. The study area is bound on the north by the Tennessee-Kentucky border; on the east by the boundaries Macon, Trousdale, Smith and DeKalb counties; on the south by Cannon, Rutherford, Davidson and Cheatham counties; and on the west by Montgomery County. Insterstate-65, Interstate-40 and Nashville Pike are three major corridors running through the study area.

1.2 work completed

To identify macro- and micro-based economic and market analysis for the Tri-County area, the project team completed the following tasks:

- Assessment of regional assets business and industry (competitive market position)
- Overview of top regional industries and economic drivers
- Field visits to the Tri-County Study Area and other select areas of the Nashville MSA
- Stakeholder interviews with key business and property owners and real estate brokers
- Discussions with residents, property owners, developers, and business owners
- Evaluation of key demographic and economic conditions and trends in Tri-County Study Area and surrounding market areas
- Analysis of current conditions and trends in the office, industrial, retail and residential markets
- Preliminary strengths, constraints and opportunities of the study area and regional office, industrial, retail and residential markets
- Preliminary future demand potential for office, industrial, retail and residential development within the Tri-County study area and the region

[1] The full technical name is the Nashville-Davidson-Murfreesboro-Franklin, TN metropolitan statistical area, which will be abbreviated as the Nashville MSA from this point on in the study.

2. Regional Context & Asset Overview

2.1 competitive position of Nashville MSA business & industry

OVERVIEW

This section provides an economic and market overview of the Nashville MSA, and its competitive position in the Southeast region and the U.S. Determining the Nashville MSA's competitive position provides a macro-level perspective of the general economic and market opportunities available to the area's sub-regions, and provides a context within which to explore the specific economic and market opportunities of Robertson, Sumner and Wilson counties – the Tri-County Study Area.

KEY FINDINGS

- The Nashville area's major competitive strengths lie in its low cost of living, high quality of life, supportive business climate, and high-quality labor force.
- Nashville's cost of living is highly competitive with comparable regions in the Southeast and across the country, with particularly low housing costs compared to the rest of the U.S.
- Logistics infrastructure, government taxes & spending, and strong incentives/support for business site location are the major strengths for Nashville's business climate.
- Labor costs in the Nashville region are moderate compared to other benchmark regions. This provides the dual benefit of providing appealing wages and salaries to workers while maintaining reasonable business costs in terms of labor.

NASHVILLE MSA VS. OTHER BENCHMARK REGIONS

In order to gauge the Nashville region's economic and market competitive position, the project team assessed the Nashville MSA against other comparable metropolitan regions within the Southeast region and across the U.S. Based on discussions with key stakeholders, the project team selected several regions for benchmarking in regards to quality of life, business and labor force factors. These regions were comparable in terms of regional location, size and population, economic/demographic characteristics, real estate market characteristics, and cost of living.

These metropolitan regions include:

- Atlanta, GA
- Austin, TX
- Birmingham, AL
- Columbus, OH
- Charlotte, NC

- Memphis, TN
- Raleigh-Durham, NC

These cities were used for comparison to the extent that relevant data was available. Other cities were also included for other factor comparisons as was relevant and appropriate.

KEY ECONOMIC/MARKET FACTORS

The consulting team compared the Nashville MSA with benchmark metropolitan regions in three general areas:

1. Quality of Life
2. Business Climate
3. Labor Force/Labor Market

Analysis of factors in these three areas provide insight into the Nashville region's competitive position among other major metropolitan regions in the Southeast and other areas of the U.S.

QUALITY OF LIFE

Even more so today than in the past, non-economic factors play a role in where residents, employees and employers want to be located. There are several factors that contribute to a metropolitan region's quality of life. These factors include, but are not limited to: cost of living, quality of schools, climate, transportation/infrastructure, recreational amenities and parks, entertainment options and cultural attractions and quality of the neighborhoods.

In addition to its low cost of living and high quality of schools, the Nashville region enjoys a high quality of life with its affordable housing in a range of diverse neighborhoods, education, arts and music, seasonal / mild climate, nationally recognized amateur and professional sporting events (Tennessee Titans NFL football and Nashville Predators NHL hockey), abundant parks and recreational areas and lively cultural base, including a world class symphony.

Recent quality of life accolades that the Nashville has received include:

- Ranked among the Top 100 Places to Live in America based on education, employment, economy, crime, parks, recreation and housing (*Relocate-America*, 2008)
- Ranked 22nd in *AmericanStyle* magazine's annual Top 25 Arts Destination reader poll
- Ranked 2nd Most Affordable and Friendliest City in a survey that asked travelers to rank 25 top U.S. cities in 45 categories, ranging from food and shopping to people, culture, nightlife and more (*Travel + Leisure* and CNN Headline News, 2008)
- The Today Show named Nashville one of America's five most friendliest cities
- Ranked No. 79 in 100 Best Places to Live and Launch based on business friendliness and lifestyle offerings (CNNMoney.com)

Exhibit 2-1 provides an overall cost of living index as well as indices for major basic costs for the Nashville MSA and several other major U.S. metropolitan areas.[2] Overall, the cost of living in Nashville region is below the national average (100) and all of the comparison regions with the exception of the Knoxville, Tennessee region. Housing costs in Nashville (78.3) are particularly low compared to the national average, and the region has relatively lower costs in groceries, housing, utilities, transportation, health care and miscellaneous goods than most of the other comparison regions.

Exhibit 2-1: Cost of Living Index for Nashville MSA and Benchmark Regions 2007

City	Index	Groceries	Housing	Utilities	Transportation	Health Care	Misc Goods
Nashville, TN	***88.1***	***90.5***	***78.3***	***87.7***	***94.3***	***85.5***	***93.8***
Charlotte, NC	89.7	99.1	75.6	83.2	92.3	104.3	96.8
Austin, TX	96.2	92.3	87.1	91.5	100.0	99.3	104.9
Atlanta, GA	96.1	98.7	91.8	84.9	103.5	103.4	98.7
Columbus, OH	97.4	96.3	95.9	102.3	103.5	104.1	94.9
Birmingham, AL	92.1	96.6	77.6	98.8	96.1	99.4	98.0
Knoxville, TN	87.0	89.5	75.2	89.8	87.2	89.3	94.5
Memphis, TN	89.3	90.4	76.5	83.8	92.2	97.1	99.0
Raleigh-Durham, NC	89.8	96.6	79.8	90.5	93.4	96.3	93.4
Lexington, KY	98.2	95.4	90.1	109.0	97.3	99.4	102.7
Louisville, KY	97.5	89.6	89.6	109.1	110.2	97.3	99.8

Source: ACCRA Cost of Living Index, 2007

The Nashville MSA rated relatively lower than comparable regions in terms of the quality of public schools (Exhibit 2-2) in 2007. However, it did rank above one of its major competitors, Atlanta, another large and economically prominent metropolitan area in the Southeast region.

Exhibit 2-2: Public Schools Quality Ratings (2007)

Metropolitan Area	Rating
Raleigh-Durham, NC	91
Austin, TX	80
Knoxville, TN	54
Columbus, OH	51
Birmingham, AL	41
Nashville, TN	***35***
Atlanta, GA	28

Source: Expansion Management, Logistics Today, 2004

[2] The index is based on the national average for these costs, which is rated at 100. Therefore a rating below 100 means the cost is below the national average for that category; a score above 100 means the respective cost is above the national average.

BUSINESS CLIMATE

Many factors contribute to the business climate of a metropolitan area. *Expansion Management and Logistics Today* magazine, two publications covering national site location and business expansion, conduct a periodic analysis and rating of major metro areas across the U.S. called the 5-Star Business Opportunity Metro Ratings. These ratings provide a measure of each metro area's strengths and weaknesses in terms of different factors contributing to an attractive business climate for relocating or expanding firms.

Exhibit 2-3: Select "5-Star Business Opportunity" Metro Ratings* (2007)

Metropolitan Area	Overall Rating	Logistics Infrastructure	Healthcare Costs	Taxes & Govt. Spending	Reputation Among Site Consultants
Austin, TX	99	83	32	99	97
Raleigh-Durham, NC	99	72	88	75	99
Knoxville, TN	97	85	65	92	98
Nashville, TN	***95***	***93***	***65***	***92***	***98***
Birmingham, AL	93	94	77	59	94
Atlanta, GA	90	96	8	80	98
Columbus, OH	88	92	63	17	88

* All ratings are percentile with 99 being the highest & 1 being the lowest

Source: Expansion Management, Logistics Today, 2007

Among benchmark regions, Nashville rates highly overall with a 95 out of 99 rating. This puts it above the Birmingham, Atlanta and Columbus regions. The Nashville metro also rated very highly in Logistics Infrastructure (third behind Atlanta and Birmingham), Taxes & Government Spending (second behind the Austin region), and Reputation Among Site Consultants (second behind the Raleigh-Durham region).

LABOR FORCE/LABOR MARKET

Factors related to the quality and cost of the labor force area are also important to the economic and market prospects of a metropolitan region.

In terms of median hourly wages ($14.50) and mean annual salaries ($37,970), the Nashville area is comparable with benchmark regions such as Birmingham, AL and Louisville, KY (Exhibit 2-4). Median hourly wages range from $13.53 (Knoxville, TN) to $17.36 (Raleigh-Durham, NC). Mean annual salaries range from $37,350 (Lexington, KY) to $46,540 (Raleigh-Durham, NC). With midrange wages and salaries, Nashville has the dual appeal of a moderate labor costs for businesses and relatively competitive compensation to appeal to potential new employees.

Exhibit 2-4: Cost of Labor – Nashville MSA and Benchmark Regions 2007

City	Median Hourly	Mean Annual
Nashville, TN	***$14.50***	***$37,970***
Charlotte, NC	$15.31	$41,200
Austin, TX	$14.88	$41,330
Atlanta, GA	$15.48	$42,170
Columbus, OH	$15.56	$40,770
Birmingham, AL	$14.25	$37,700
Knoxville, TN	$13.53	$35,740
Memphis, TN	$13.81	$36,870
Raleigh-Durham, NC	$17.36	$46,540
Lexington, KY	$14.19	$37,350
Louisville, KY	$14.36	$37,410

Source: Bureau of Labor Statistics 2007

The education level of workers is a major factor contributing to the quality of a region's workforce. Exhibit 2-5 shows the "College Educated Worker Ratings" component from the Expansion Management/Logistics Today metro business opportunity analysis. The Nashville metropolitan area has a rating of 84 of 99, putting it just behind Atlanta (89) and Columbus (88), and above Knoxville (81) and Birmingham (78).

Exhibit 2-5: College Educated Worker Ratings (2007)

Metropolitan Area	Rating
Raleigh-Durham, NC	93
Austin, TX	91
Atlanta, GA	89
Columbus, OH	88
Nashville, TN	***84***
Knoxville, TN	81
Birmingham, AL	78

Source: Expansion Management, Logistics Today, 2007

Taken together, the Nashville region's cost of labor and worker education ratings make the region competitive in terms of having a relatively low-cost and fairly well-educated workforce. These conditions position the Nashville MSA for further job and economic growth in the future by providing an appealing environment for both employees and employers.

2.2 top industries & economic drivers

An analysis of the Nashville MSA's top industries and economic drivers provides further context for gauging the Tri-County Study Area's economic and market opportunities. By exploring the industries and economic factors that drive the region's economy, regional opportunities that the study area can potentially capture can be assessed.

KEY FINDINGS

- The Nashville region is nationally prominent in the Healthcare, Logistics and Music industries
- Manufacturing employment is strong relative to other benchmark regions
- The region's strength in the logistics industry of Transportation & Distribution provides significant potential for relocation and expansion of warehousing, distribution and manufacturing firms
- The cluster of major healthcare and hospital management firm headquarters provides demand for potential future expansion of this sector
- In addition to providing unique cultural and entertainment amenities in the Nashville area, the thriving music industry provides potential to draw more music industry firms and related employment to the region in the future

TOP INDUSTRIES

The Services industry is the most dominant in the Nashville MSA in terms of employment, making up almost 40% of the region's total employment (Exhibit 2-6). Retail Trade is the second largest employment industry in the MSA, with 17% of total employment, followed by Government (10%), Manufacturing (9%) and Finance, Insurance & Real Estate (8%).

This concentration of employment in the Services and Retail Trade industries is comparable to other major metropolitan areas. The relatively high concentration of government employment is most likely reflective of Nashville's status as the state capital, making a center for state-level government employment.

Exhibit 2-6: Top 5 Industries by Employment – Nashville MSA (2008)

Industry	Employment	Percent of Total Employment
Services	400,885	38.5%
Retail Trade	173,447	16.6%
Government	101,801	9.8%
Manufacturing	96,440	9.3%
Finance, Insurance & Real Estate	84,045	8.1%

Source: Woods and Poole, BBPC, 2008

Although looking at employment by industry provides some insight into the key industries in the Nashville MSA, a more discerning method of determining the region's competitive industry strengths is by comparing its proportion of employment in specific industries to the proportion of employment in those industries in the U.S. This can be determined by performing location quotient analysis, in which a particular industry's percentage of total employment at the regional level (in this case, the level of the Nashville MSA) is compared to that same industry's percentage of total employment at a larger level (the national level) as an overall ratio.

The resulting ratios denotes the region's relative concentration of employment compared to national level, and therefore shows industries in which the region may specialize or have a competitive advantage. Generally, location quotients of greater than 1 (a 1:1 ratio) show that regional employment in that industry is greater than national employment, and therefore may present a competitive strength for the area. Location quotients less than 1 show that employment concentration in an industry is lower than at the national level and that industry does not represent a strength for the region's economy.

Exhibit 2-7 shows the five industries in the Nashville MSA that have the highest location quotients. These include Government; Manufacturing; Transportation, Communications & Public Utilities; Agriculture & Mining; and Services.

Exhibit 2-7: Top 5 Industries by Location Quotient – Nashville MSA (2008)

Industry	Location Quotient
Government	2.95
Manufacturing	2.59
Transportation, Communications & Public Utilities	1.26
Agriculture & Mining	1.06
Services	0.94

Source: Woods and Poole, ESRI, BBPC, 2008

Government has a location quotient of almost 3, meaning that the proportion of government employment almost three times greater than national average. As mentioned before, this is likely due to relatively high concentration of state government employment in state capital regions, like Nashville.

The location quotient analysis reveals other trends, including:

- The proportion of Manufacturing employment in region over 2.5 times greater than at national level, showing that the manufacturing industry has a relatively stronger presence in Nashville than on average nationally.
- Transportation, Communication & Public Utilities (TCPU) industry also represents large proportion of regional employment relative to national industry (location quotient of 1.3), showing relative strength in this industry.
- The proportion of employment in Agriculture & Mining and Services industries is close to national average (location quotients close to 1).

Overall, in terms of private industry employment (not including employment in the Government sector), Manufacturing and TCPU are industries that potentially represent competitive advantage for Nashville region and may warrant a potential focus for growth in the Tri-County Study Area.

KEY ECONOMIC DRIVERS AND INDUSTRY CLUSTERS

In addition to examining employment in the major industry categories, it is useful to look at specific sub-industry categories or sectors that represent strengths for the Nashville MSA. Furthermore, looking at clusters of certain similar or interrelated sectors provides insight into specific competitive advantages that go beyond concentration of employment.

Discussions with stakeholders and research of industry clusters/economic drivers revealed that the Nashville MSA has particular economic strengths and a competitive advantage in three sectors/clusters:

- Healthcare
- Logistics/distribution/warehousing
- Music recording, publishing, etc.

The project team explored each of these sectors to determine their specific roles as economic drivers of the Nashville region's economy.

HEALTHCARE

The Healthcare sector represents a major economic strength for the Nashville MSA. Regarded as the "healthcare services industry capital," the region is home to approximately 300 healthcare companies, including 19 publicly-traded firms.[3] Exhibit 2-8 shows some of the major healthcare firms headquartered in the Nashville area.

Exhibit 2-8: Top Healthcare Firm Headquarters – Nashville MSA (2006)

Company	Annual Sales	Total Employment	State Rank by Employment[4]
HCA, Inc.	$24.5 billion	191,000	2
Community Health Systems, Inc.	$3.7 billion	34,300	7
LifePoint Hospitals, Inc.	$1.1 billion	20,000	11
National Healthcare Corporation	$542.4 million	12,000	17
Caremark Rx, Inc.	$33.0 billion	11,133	21
Ardent Health Services, LLC	$1.6 billion	11,100	22

Source: Tennessee Department of Economic & Community Development, 2006

These firms include the healthcare management giant, HCA, Inc., which was the second largest employer in Tennessee in 2006 with over 190,000 employees and a major contributor to the region's economy with $24.5 billion in annual sales (2006). Other major healthcare firms include the publicly-traded Community Health Systems, Inc. ($3.7 billion in 2006 sales; 34,300 employees in 2006) and LifePoint Hospitals, Inc. ($1.1 billion in 2006 sales; 20,000 employees in 2006). Overall, the six healthcare firms in

Exhibit 2-8 represent over $64 billion in annual sales and 280,000 employees. All of the firms are within the top 25 largest employers in the state.
In addition to the large, positive economic impact the healthcare industry already has on the Nashville MSA, the potential for future growth and greater economic impacts is present:

[3] MarketWatch, 2007
[4] Ranking is based on total employment for headquarters across all industries, not solely the healthcare industry.

- The related biotechnology sector also represents a strong growth segment in Nashville, which will further enhance the healthcare industry's future growth and competitive strength on a national level.
- Support from academic and research institutions such as Vanderbilt University and Medical Center should also provide enhanced future growth for this sector and increase its prominence in the U.S. economy.
- Strong infrastructure support, a planned life sciences center for growing companies, and access to capital are all means by which Nashville hopes to grow this sector.[5]

LOGISTICS

Nashville has taken advantage of its strategic location in establishing and promoting its nationally-prominent logistics sector. The center of the Nashville MSA is within 650 miles of the half the U.S. population. In addition, the region is the nexus for three interstate highways, more than 5 U.S. highways, and many major state routes.[6]

Exhibit 2-9: Select Top 50 U.S. Logistics Metros 2000

Metropolitan Area	National Rank
Nashville, TN	**2**
Atlanta, GA	3
Columbus, OH	16
Memphis, TN	19
Birmingham, AL	21

Source: Expansion Management, Logistics Today, 2004

Expansion Management and *Logistics Today* magazines, two authoritative publications provide research and analysis on the logistics industry, ranked Nashville's logistics sector as the second strongest in the country (behind Savannah, Georgia) in 2000 (Exhibit 2-9). This put Nashville in front of several other regional competitors including Atlanta, Columbus, Memphis and Birmingham.

In addition, Nashville was rated as a "Five-Star Logistics Metro," being in the top 20% of all U.S. metro areas in strength of the Logistics sector. Nashville's strongest Logistics subsector is Transportation & Distribution, one of the most important and growing subsectors at the national and international level.

[5] Nashville Area Chamber of Commerce.
[6] Nashville Area Metropolitan Planning Organization

MUSIC INDUSTRY

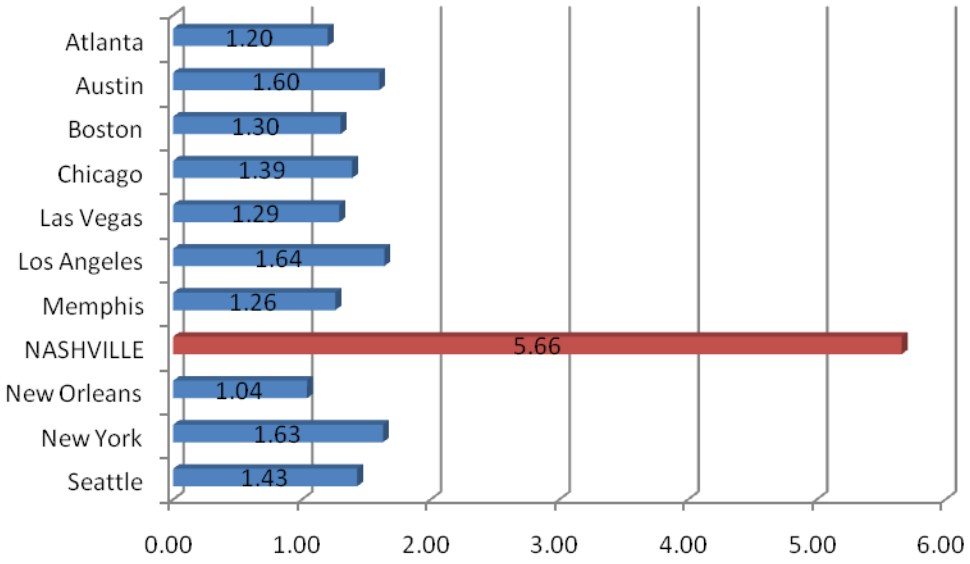
Nashville has long been recognized as "Music City," denoting its national fame and prominence in the music industry. The Nashville MSA is home to more than 80 record labels, 130 music publishers, more than 180 recording studios, 27 entertainment publications and some 5,000 working union musicians. The Nashville region has many cultural and music industry-related assets that contribute to this reputation:

- Music Row businesses
- Grand Ole Opry
- Ryman Auditorium
- Country Music Hall of Fame

From an economic perspective, the Nashville music industry has had very strong impacts compared to the other most prominent music industry markets. While New York City and Los Angeles may have more music related employment at 34,648 and 26,927 respectively (given their much larger populations), the Nashville region has more than five times the number of music related jobs per capita when compared to these other regions.[7]

In addition, among the 50 largest MSA's in the country, Nashville ranks third behind New York City (7,494 groups and artists) and Los Angeles (5,162 groups and artists) in terms of employment for musical groups and artists with 2,761 groups and artists.

Exhibit 2-10: Music Industry Employment: Core Component, Per Thousand People (2004)



Source: County Business Pattern Data, Cultural Policy Center at the University of Chicago, 2004

[7] *Chicago Music City-A Report on the Music City in Chicago*, The Cultural Policy Center at the University of Chicago, 2006

Exhibit 2-11 shows the Nashville music industry's economic impacts relative to four other major music industry centers in the U.S.

Exhibit 2-11: Economic Impacts - Nashville Music Industry vs. Other Major National Music Industry Centers (2006)

Region	Economic Impact	Sales Revenues	Total Jobs Created	Tax Revenues
State of Georgia	$989.9 million	$1.9 billion	8,943	$94.7 million
Austin, TX	$616.0 million	$969.0 million	11,200	$11.2 million
Seattle, WA	$1.3 billion	$2.2 billion	10,700	$45.8 million
Memphis, TN	$238 million	$1.7 billion	4,155	$5.8 million
Nashville, TN	***$6.38 billion***	***$2.6 billion***	***19,437***	***$76.1 million***

Source: Belmont University, 2006

Nashville's music industry has a greater overall economic impact on the region ($3.97 billion for direct and secondary spending + $2.42 in music related tourism) than the combined economic impacts of the four other comparison regions ($3.14 billion).

Other comparative figures further evidence the Nashville music industry's significant economic strength:

- The Nashville music industry generates more sales revenue annually ($2.6 billion) than any of the other five comparison regions, with the highest revenue-generating music industry subcategories in Record Production, Distribution & Music Publishing ($627.9 million) and music-related Radio & Television Broadcasting ($341.6 million).
- The Nashville music industry has created over 19,400 jobs, over 8,000 more jobs than created in Austin, TX, the next largest music industry employment generator.
- The Nashville music industry ($76.1 million) is second only to the State of Georgia's music industry ($94.7 million) in generating industry-related tax revenues

The economic strength and national prominence of the Nashville music industry may offer related economic and market opportunities in the Tri-County Study Area. This could include creating new music venues, music publishing facilities, recording space, and other music industry-related market opportunities.

2.3 economics & demographics

An analysis of the economic and demographic conditions of the Nashville MSA and Tri-County Study Area provides a context for economic and market potential for the Study Area. The current/existing economic and demographic conditions for the MSA and Study Area provide a perspective on the Study Area's position within the region and its respective share of the regional population and economy. Future economic and demographic trends, based on these existing conditions, are later used to determine future market and economic potential for the Study Area.

KEY FINDINGS

- The Tri-County Study Area makes up roughly one-fifth of the Nashville MSA's population and number of households.
- Similar to the MSA, the study area's population is concentrated toward young and middle-aged residents, with less than 10% of the population being over 65.
- Study area and MSA households are concentrated in the middle income brackets, with over one-third of all households making between $30,000 and $60,000 annually.
- The study area has a larger proportion of family households than the Nashville region as a whole (77% vs. 68%) and more persons per household on average (2.6 vs. 2.5), revealing a preponderance of larger, family-oriented households.
- Study area residents appear to have a strong demand for home improvement and garden supplies, sporting goods, and family dining venues. As these groups age, and more couples become empty nesters, they may also offer long-term demand for active adult or senior housing to enable them to age in place and remain close to friends and family.

EXISTING CONDITIONS

NASHVILLE MSA AND TRI-COUNTY STUDY AREA

The Tri-County Study Area has just under a quarter of the Nashville MSA population and households with about 323,000 residents and 122,000 households (compared to the Nashville MSA's 1.5 million residents and approximately 600,000 households). The median household income is about 4% higher in the Study Area ($58,236) than the MSA ($55,986). Household size varies between the Study Area and MSA. On average, the Study area has 2.6 persons per household compared to 2.5 persons per household in the MSA.

Exhibit 2-12: Selected Demographics - Tri-County Study Area and Nashville MSA (2007)

	Tri-County Study Area	Nashville MSA	Study Area as % of MSA
Population	322,989	1,507,461	21.4%
Households	122,500	594,722	20.6%
Median Household Income	$58,236	$55,986	104.0%
Average Household Size	2.61	2.47	105.6%

Source: ESRI, BBPC, 2008

Examining the breakdown of family to non-family households (Exhibit 2-13), it appears this is most likely due to the higher percentage of family households in the Study Area (77%) compared to the MSA (68%). Family households include married couples with/without children and relatives living in the same residence. Non-family households include unmarried couples, unrelated roommates or singles, and are likely to be smaller than family households.[8]

Exhibit 2-13: Family Households vs. Non-Family Households - Tri-County Study Area and Nashville MSA (2007)

	Tri-County Households	Tri-County % of Total	MSA Households	MSA % of Total
Family Households	97,951	76.8%	408,065	67.5%
Non-Family Households	29,589	23.2%	196,476	32.5%
Totals	127,540	100.0%	604,540	100.0%

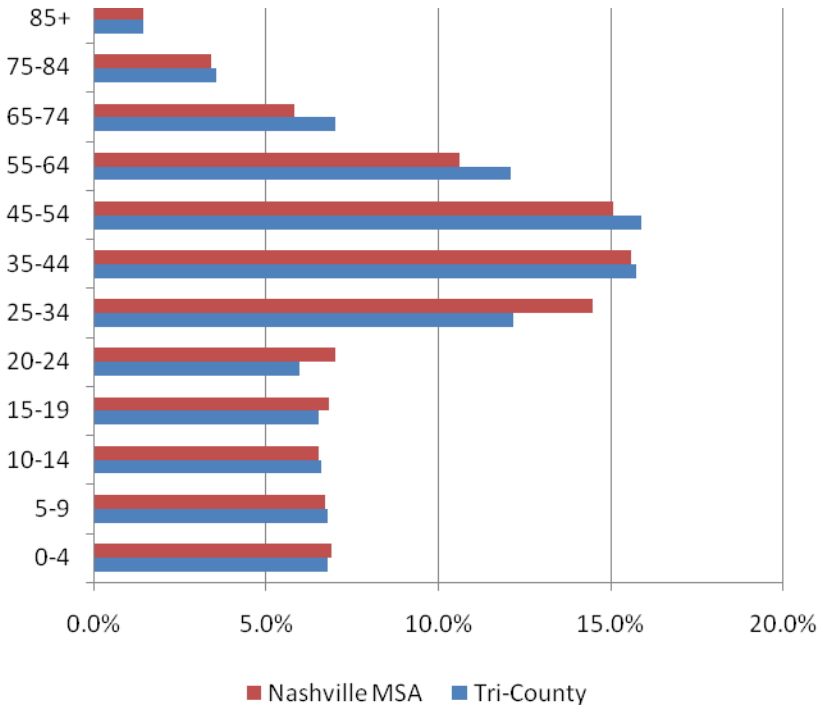
Source: ESRI, BBPC, 2008

Comparing the population by age cohort (Exhibit 2-14), the Tri-County Study Area and Nashville MSA have a similar makeup:

- The median age for the Study Area (38) and MSA (36) is similar, although the age 45-49 cohort makes up the largest portion of the Study Area and MSA population (about 8% of both populations).
- The Study Area and MSA populations are relatively young, being dominated by residents age 44 and younger (over 60% of both populations fall within the age 40-44 or younger cohorts).
- The population for both the MSA and Study Area is fairly well distributed between 0 and 44 years of age, while the size of the older cohorts gets progressively smaller.

[8] ESRI, 2008.

Exhibit 2-14: Population by Age Cohort - Tri-County Study Area and Nashville MSA 2007



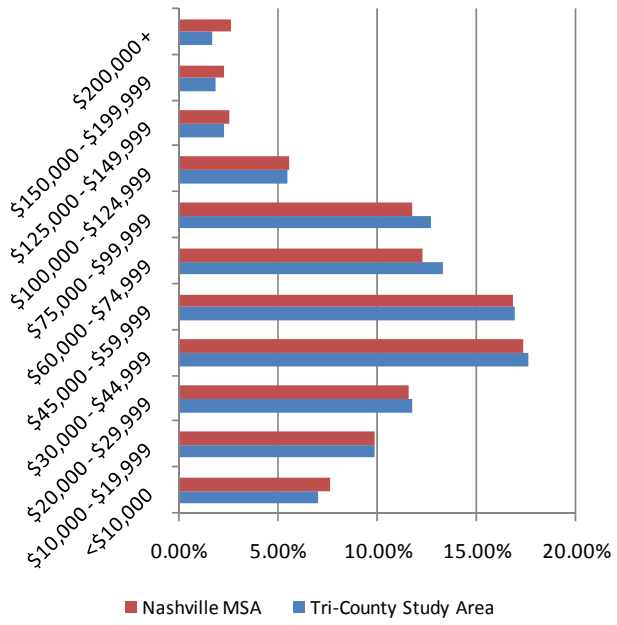
Source: ESRI, BBPC, 2008

Exhibit 2-15 displays the breakdown of Tri-County Study Area and Nashville MSA households by income.

The two areas exhibit similar patterns in household income:

- Households making between $30,000 and $44,999 annually dominate the Study Area and MSA, representing just over 17% of both areas.
- Households making between $45,000 and $59,999 are the second most prominent group, representing just under 17% of both areas.
- The majority of both the Study Area and MSA households (63%) make less than $60,000 annually.
- Only 13% of the MSA and 11% of the Study Area households make $100,000 or more annually.

Exhibit 2-15: Households by Income - Tri-County Study Area and Nashville MSA 2008



Source: ESRI, BBPC, 2008

TRI-COUNTY STUDY AREA AND SUBAREAS

Of the three subareas within the Tri-County Study Area, Sumner County has the largest population (155,320), representing almost half of the Study Area population (Exhibit 2-15). Wilson County has the second largest population (109,440), representing about one-third of the Study Area population, while Robertson County has the smallest population (64,630), representing less than one-fifth of the Tri-County population.

Exhibit 2-16: Selected Demographics - Robertson, Sumner, Wilson Counties and Study Area (2007)

	Population		Households		Median Household Income	Average Household Size
	Total	% of Total	Total	% of Total	Total	Total
Tri-County Study Area	322,989	100.0%	122,500	100.0%	$58,236	2.61
Robertson County	64,363	19.9%	23,880	19.5%	$53,638	2.67
Sumner County	152,235	47.1%	58,500	47.7%	$57,588	2.58
Wilson County	106,391	32.9%	40,120	32.8%	$61,919	2.62

Source: ESRI, BBPC, 2008

Looking across other categories reveals distinct characteristics of the three counties:

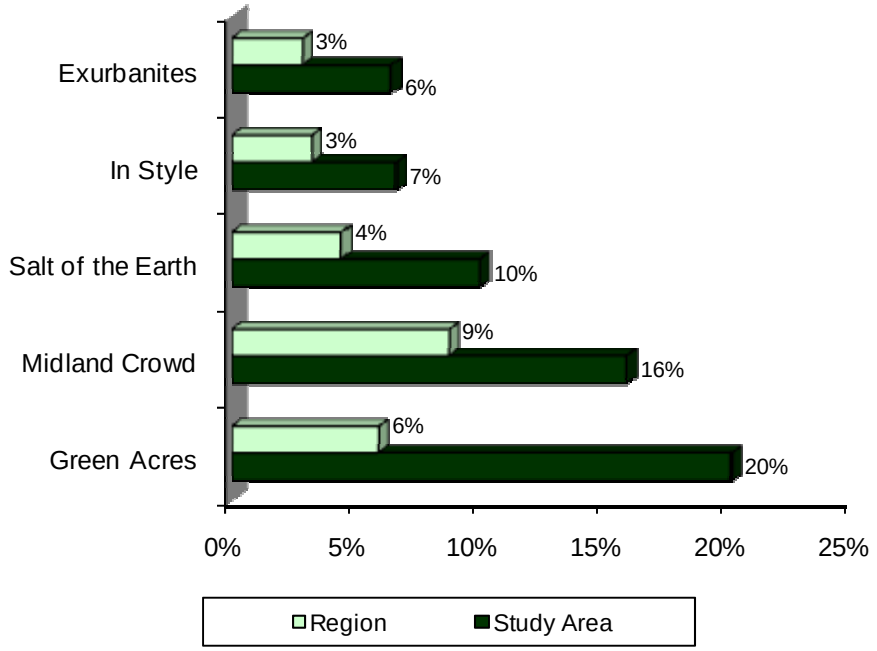
- Sumner County also has the largest number of households (58,500), followed by Wilson County (40,120) and Robertson County (23,880).
- Wilson County has the highest median income ($61,919), followed by Sumner County ($57,588) and Robertston County ($53,638).
- Average household size for Wilson County is similar to the Study Area average of 2.6 persons per household, while Robertson County is slightly higher at 2.7 persons per household and Sumner County is slightly lower at 2.5 persons per household.

TAPESTRY SEGMENT PROFILE

To identify the lifestyle characteristics and housing preferences of local residents, the project team performed an evaluation of top household tapestry segments. ESRI Business Information Solutions uses demographic information such as labor force characteristics, median income, age, and spending habits to categorize neighborhoods according to a trademarked Community Tapestry classification system.

The following table identifies the top tapestry segments in the Tri-County Study Area and their share of the region's households.

Exhibit 2-17: Top Tapestry Segment for Tri-County Study Area, and Nashville MSA 2007



Source: ESRI, BBPC, 2008

These segments share a number of common traits, including:

- **Married couples** – most residents are members of married-couple families, including those with children (mostly older children and teenagers). Empty nesters are a minor part of these segments.

- **Suburban and rural living** – single-family dwellings in exurban locations are the dominant lifestyle mode
- **Home and garden improvement** – most residents are do-it-yourselfers tackling lawn and garden and home improvement projects
- **Outdoor recreation** – residents take advantage of their proximity to rural and recreational spots by enjoying a variety of outdoor activities in their leisure time

Though these segments share traits, they each also have distinctive characteristics, as described below:

- **Green Acres** (20 percent of Tri-County households and 6 percent of regional households) – residents are primarily members of married couple families, many with older children and teenagers, and are of moderate income. Pets are considered family members as well. Residents are educated and employed in a variety of occupations, from health care to construction and manufacturing. Suburban communities close to the countryside are the preferred residence location for these households. Home and garden maintenance and outdoor recreational pursuits top their list of leisure time activities.
- **Midland Crowd** (16 percent of Tri-County households and 9 percent of regional households) – neighborhoods are located in rural locations and are comprised of housing built in the past few decades. Over half of residents are members of married-couple families and earn moderate incomes from a variety of occupations (including white-collar jobs and self-employment). Single-family homes in housing developments are the preferred choice of two out of three households.
- **Salt of the Earth** (10 percent of Tri-County households and 4 percent of regional households) – married couples (both with and without children) are the dominant household type in Salt of the Earth communities. Many households have multiple pets, primarily dogs or cats. Residents work in skilled labor occupations for manufacturing firms, in management and professional positions, and in unskilled labor jobs. Rural living in single-family dwellings predominates for these households. Home and garden improvement projects, dining out, baking, and outdoor recreational activities such as hunting and fishing are popular leisure time activities.
- **In Style** (7 percent of Tri-County households and 3 percent of regional households) – married couple families are the dominant household type, and most residents may be described as affluent professionals. Residents live in suburban communities in the metropolitan region, but prefer an urbane lifestyle. Townhomes in addition to single-family homes are popular; computer and Internet use is a daily necessity; financial planning is common; and healthy diet is key for these residents. Golfing is a popular leisure time pursuit.
- **Exurbanites** (6 percent of Tri-County households and 3 percent of regional households) – empty nester couples, followed by married couples with older children, dominate this segment. Residents are educated, affluent, and employed primarily in professional and management occupations. Roughly one-fifth have entered retirement. Households live in single-family dwellings in rural areas beyond the urban fringe. Financial planning, home and garden maintenance, and outdoor recreational activities are popular (e.g. boating, hiking, photography, and bird-watching).

The common interests of these tapestry segments indicate they may offer strong demand for home improvement and garden supplies, sporting goods, and family dining venues. As these groups age, and more couples become empty nesters, they may also offer long-term demand for active adult or senior housing to enable them to age in place and remain close to friends and family. This demand is explored in greater detail in the residential and retail market analysis sections, respectively.

2.4 industry & labor

Examining the industry and labor characteristics of the Nashville MSA and Tri-County Study Area gives insight into current labor force and employment factors and future trends. The current/existing industry and labor characteristics for the MSA and Study Area provide a perspective on the Study Area's respective share of the regional employment and labor supply. Future industry and labor trends, based on these existing conditions, are later used to determine future market and economic potential for the Study Area.

KEY FINDINGS

- Similar to the Nashville MSA, the Tri-County Study Area labor force is predominantly employed in the Services industry, which comprises 40% of the total study area labor force. Manufacturing (13%) and Retail Trade (13%) are the next most prominent labor force categories.
- The Services industry also dominates at-place employment in the study area, comprising 27% of total employment. Manufacturing the next largest employment industry in the study, representing a substantially larger portion of employment in they study area (16%) compared to the MSA (9%).
- In most industry categories, Tri-County Study Area employment is projected to grow at a greater rate than those industries at the MSA level from 2008-2035, with the greatest growth (compound annual) projected to occur in services (2.5%), Construction (2.4%) and Transportation/Utilities/Information (2.4%).
- Within the study area, Wilson County is projected to experience the highest employment growth rates overall from 2008 to 2035 (2.1% annually), with the most new jobs projected in Services (11,000), Retail Trade (7,700) and Construction (4,700).

EXISTING CONDITIONS

LABOR FORCE

An area's labor force is the employed population over 16 years of age. The total Nashville MSA labor force is just under 750,000, representing about half of the MSA's 1.5 million residents. Unemployment is slightly lower in the study area (4.6%) than in the MSA (5.3%).

Exhibit 2-18 provides the distribution of Nashville MSA and Tri-County Study Area labor force across major industry categories:

- The MSA labor force is highly-concentrated in the Services industry (325,000), which represents close to half of the total labor force (43%).
- Retail Trade (86,000) and Manufacturing (80,000) are the next largest labor force industry categories, representing 12% and 11% of the total labor force, respectively.
- Individually, all remaining categories represent less than 10% of the total labor force.

Exhibit 2-18: Labor Force Summary – Study Area and Nashville MSA (2007)

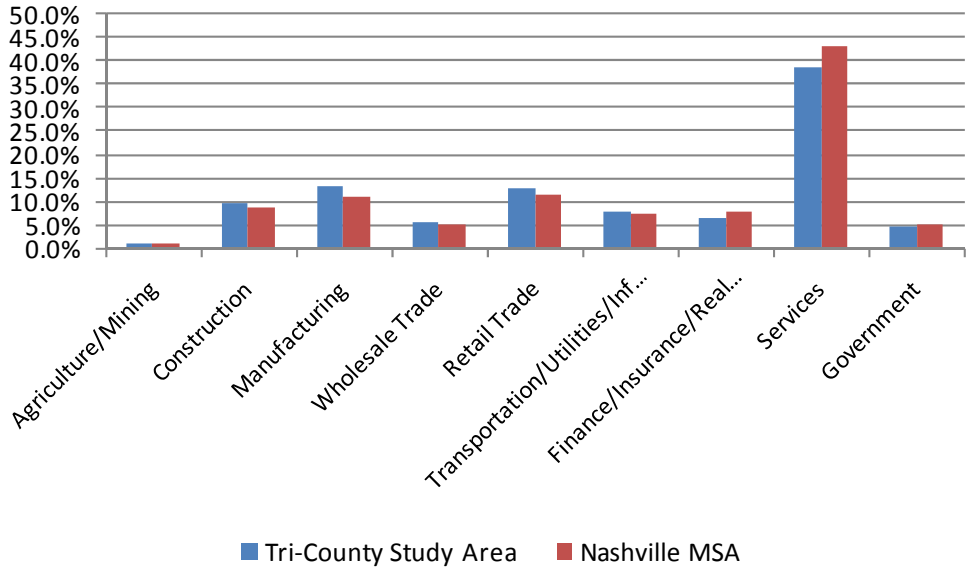
	Robertson County	Sumner County	Wilson County	Tri-County Study Area	Nashville MSA	SA as a % of MSA
Agriculture/Mining	753	528	381	1,662	5,995	27.7%
Construction	3,608	7,014	5,112	15,734	65,950	23.9%
Manufacturing	5,052	9,879	6,635	21,566	80,190	26.9%
Wholesale Trade	1,757	4,223	3,154	9,135	36,722	24.9%
Retail Trade	3,702	10,332	6,254	20,288	86,185	23.5%
Transportation/Utilities/Information	2,259	5,430	4,895	12,584	55,458	22.7%
Finance/Insurance/Real Estate	1,726	4,751	4,079	10,556	56,957	18.5%
Services	10,887	30,015	21,319	62,221	325,256	19.1%
Government	1,632	3,243	2,556	7,430	36,722	20.2%
Totals	*31,376*	*75,415*	*54,384*	*161,175*	*749,437*	*21.5%*

Source: ESRI, BBPC, 2008

Tri-County Study Area labor force (161,000) makes up just over 21% of the Nashville MSA labor force, but has a fairly similar distribution across the different industry categories:

- The Services industry (62,000) also dominates the Study Area, representing just under 40% of the Study Area's total labor force.
- Manufacturing (22,000) is the second largest industry groups within the Study Area, representing just over 13% of the total labor force.
- Retail Trade (20,000) is the third largest industry category, representing just under 13% of the Study Area labor force.

Exhibit 2-19: Labor Force – Study Area vs. Nashville MSA (2007)



Source: ESRI, BBPC, 2008

Within the Study Area, Sumner County (75,000) makes up the largest portion of the Tri-County labor force, representing almost half (47%). Wilson County's labor force (54,000) makes up about one-third of the total Study Area labor force, and Robertson County's labor force of 31,000 represents just under one-fifth of the Tri-County labor force (19%).

AT-PLACE EMPLOYMENT

At-place employment denotes the workers employed at establishments within a particular region. Total Nashville MSA labor force is approximately 1 million. The at-place employment exceeds the MSA's labor force (750,000) by about 250,000, showing that there is a higher concentration of jobs within the region compared to the region's labor force.

Exhibit 2-20 provides the distribution of Nashville MSA and Tri-County Study Area at-place employment across major industry categories:

- MSA employment/jobs are highly-concentrated in the Services industry (400,000), which represents approximately 40% of total MSA employment.
- Retail Trade (173,000) and Manufacturing (96,000) are the next largest employment industry categories, representing 17% and 10% of total employment force, respectively.

Exhibit 2-20: At-Place Employment Summary – Study Area and Nashville MSA (2008)

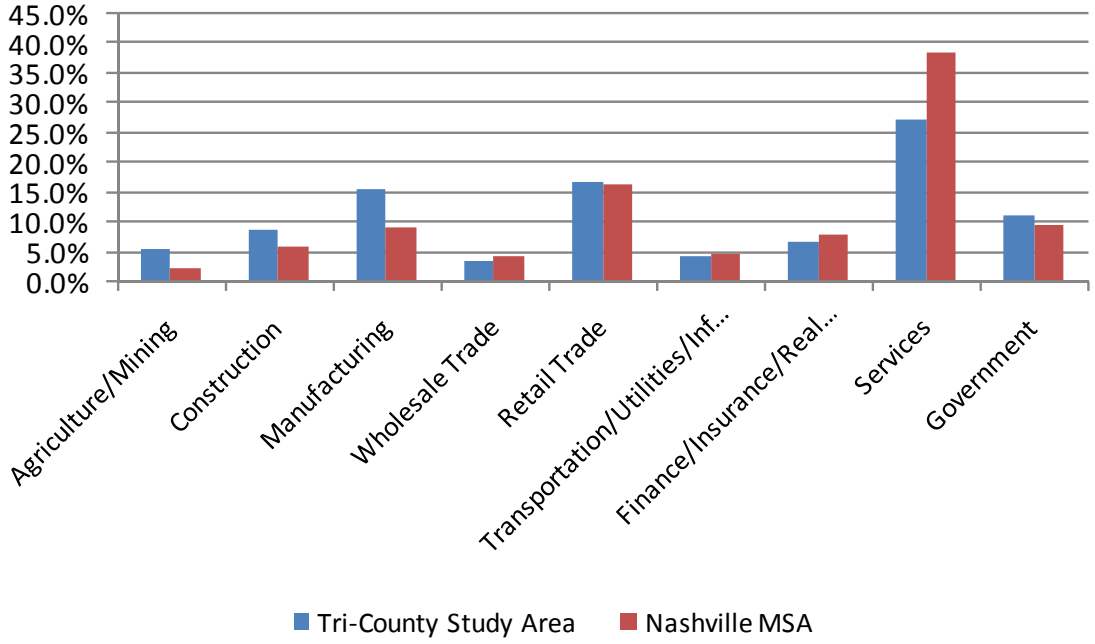
	Robertson County	Sumner County	Wilson County	Tri-County Study Area	Nashville MSA	SA as a % of MSA
Agriculture/Mining	2,460	2,850	2,520	7,830	26,810	29.2%
Construction	2,570	4,460	5,160	12,190	63,990	19.0%
Manufacturing	7,530	7,350	7,150	22,030	96,440	22.8%
Wholesale Trade	700	2,360	2,120	5,180	44,080	11.8%
Retail Trade	4,430	8,910	10,350	23,690	173,450	13.7%
Transportation/Utilities/Information	790	2,290	3,010	6,090	50,360	12.1%
Finance/Insurance/Real Estate	1,760	4,140	3,850	9,750	84,050	11.6%
Services	6,400	17,220	14,550	38,170	400,890	9.5%
Government	3,660	7,490	4,430	15,580	101,800	15.3%
Totals	*30,300*	*57,070*	*53,140*	*140,510*	*1,041,870*	*13.5%*

Source: Woods and Poole, BBPC, 2008

Tri-County Study Area employment (140,510) makes up 14% of the MSA's employment and has a somewhat distinct distribution across the different industry categories:

- Services also dominate Study Area employment, representing 27% of total employment, but this is relatively smaller than Services proportion of MSA employment (39%).
- Manufacturing, the Study Area's second largest employment sector, is more prominent in the Study Area (16%) than in the MSA as a whole (9%), showing that the study area may have a particular competitive strength in manufacturing.
- Retail Trade is the third largest employment sector in the Study Area, with a similar proportion of Study Area employment and proportion of MSA employment (both about 17%).

Exhibit 2-21: At-Place Employment – Study Area vs. Nashville MSA (2008)



Source: Woods and Poole, BBPC, 2008

Within the Tri-County Study Area, employment is concentrated both in Sumner County with 41% of total Study Area employment (57,070) and Wilson County with 38% of total employment (53,140). Robertson County only comprises about one-fifth of study area employment (21%) with just over 30,000 employees.

FUTURE TRENDS

TRI-COUNTY STUDY AREA AND NASHVILLE MSA EMPLOYMENT PROJECTIONS

Exhibits 2-22 through 2-27 show projected employment growth from 2008 to 2035 for the Robertson, Sumner and Wilson Counties, the Tri-County Study Area and the Nashville MSA. In addition to showing overall growth trends over the 22-year period, projected employment growth was broken down into the 2008-2020 and 2020-2035 periods in order to show more recent and longer-term trends.

From 2008-2035, annual growth is projected highest in the Construction, Transportation/ Utilities/Information, and Services industry categories, all with around 2.3% annual growth. All three of these industries showed greater projected growth in the short term (2008-2020) than in the long term (2020-2035). Overall, the Tri-County Study Area is projected to experience 1.8% annual growth in total employment from 2008 to 2035, adding an estimated 86,000 jobs compared with regional annual growth of 1.6%.

Exhibit 2-22: Projected Employment Growth – Tri-County Study Area 2008 – 2035

Tri-County Study Area	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020-2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Agriculture/Mining	7,830	8,190	8,680	0.38%	0.39%	850	0.38%
Construction	12,190	16,740	22,630	2.68%	2.03%	10,440	2.32%
Manufacturing	22,030	23,820	25,960	0.65%	0.57%	3,930	0.61%
Wholesale Trade	5,180	6,510	8,140	1.92%	1.50%	2,960	1.69%
Retail Trade	23,690	31,310	40,760	2.35%	1.77%	17,070	2.03%
Transportation/ Utilities/ Information	6,090	8,340	11,170	2.65%	1.97%	5,080	2.27%
Finance/Insurance/Real Estate	9,750	12,130	15,080	1.84%	1.46%	5,330	1.63%
Services	38,170	53,220	71,120	2.81%	1.95%	32,950	2.33%
Government	15,580	18,880	22,850	1.61%	1.28%	7,270	1.43%
Totals	140,510	179,140	226,382	2.04%	1.57%	85,872	1.78%

Source: Woods and Poole, BBPC, 2008

Across the board, the study area exhibited greater projected compound annual employment growth in all categories than did the MSA. This shows that overall and in all individual categories, the study area is projected to have greater percentage growth in employment than the MSA over the next 22 years.

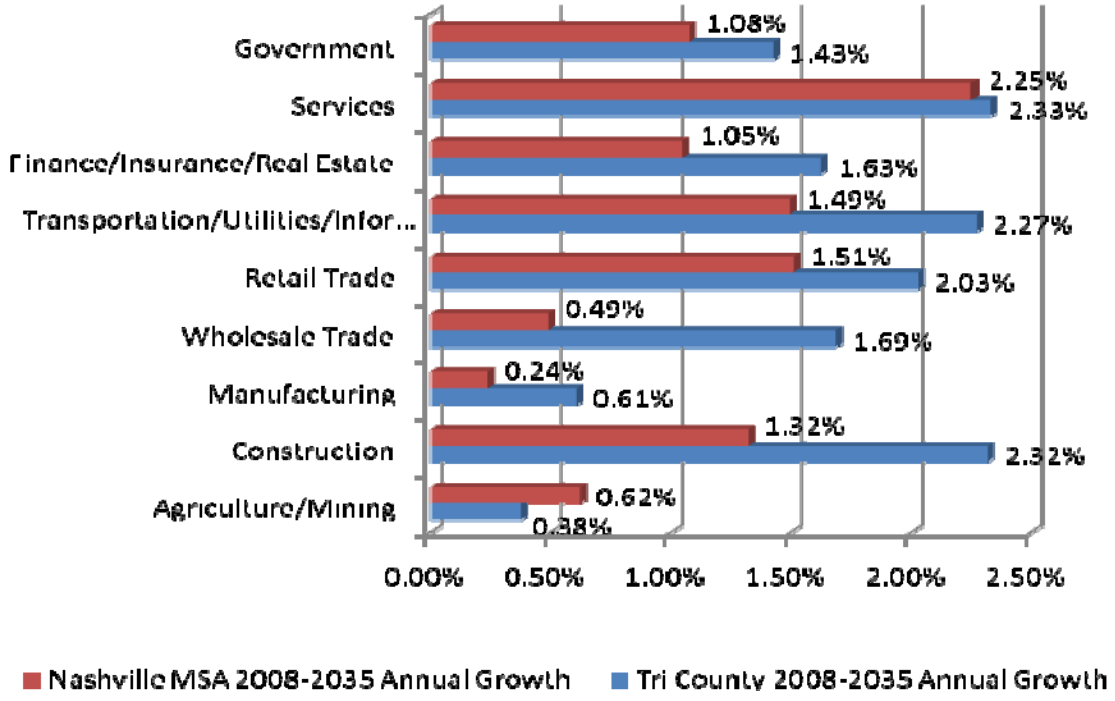
Exhibit 2-23: Projected Employment Growth – Nashville MSA 2008 – 2035

Nashville MSA	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020-2035)	Net Change (2008-2035)	% Annual Growth (2008-2035)
	2008	2020	2035				
Agriculture/Mining	26,810	28,980	31,720	0.65%	0.60%	4,910	0.62%
Construction	63,990	76,100	91,290	1.45%	1.22%	27,300	1.32%
Manufacturing	96,440	99,360	102,930	0.25%	0.24%	6,490	0.24%
Wholesale Trade	44,080	46,860	50,300	0.51%	0.47%	6,220	0.49%
Retail Trade	173,450	211,270	260,190	1.66%	1.40%	86,740	1.51%
Transportation/ Utilities/Information	50,360	61,410	75,180	1.67%	1.36%	24,820	1.49%
Finance/Insurance/Real Estate	84,050	96,110	111,440	1.12%	0.99%	27,390	1.05%
Services	400,890	543,490	731,490	2.57%	2.00%	330,600	2.25%
Government	101,800	116,680	136,030	1.14%	1.03%	34,230	1.08%
Totals	1,041,870	1,280,260	1,590,570	1.73%	1.46%	548,700	1.58%

Source: Woods and Poole, BBPC, 2008

Exhibit 2-24 provides a snapshot of the overall projected employment growth in the study area as compared to the MSA from 2008 to 2035. Projected employment growth is strongest in the Services industry for the two regions. The study area is projected to have a higher annual growth in employment in all industry categories except Agriculture & Mining from 2008 to 2035. In general, this shows that employment growth is relatively strong in the Tri-County Study Area compared to the rest of MSA. This may exhibit that the study area is well-positioned to capture new employment in the Nashville area in the future.

Exhibit 2-24: Projected Employment Growth – Study Area vs. Nashville MSA 2008 - 2035



Source: Woods and Poole, BBPC, 2008

Within the study area, Wilson County is forecasted to have the highest employment growth, projected to experience a 2.0% annual increase. Sumner County and Robertson County, in comparison, are projected to both experience a 1.6% annual increase in employment over the same period.

Exhibit 2-25: Projected Employment Growth – Robertson County 2008 – 2035

Robertson County	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020-2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Agriculture/Mining	2,460	2,470	2,500	0.03%	0.07%	40	0.06%
Construction	2,570	3,330	4,280	2.18%	1.68%	1,710	1.90%
Manufacturing	7,530	8,490	9,700	1.00%	0.89%	2,170	0.94%
Wholesale Trade	700	750	810	0.58%	0.52%	110	0.54%
Retail Trade	4,430	5,730	7,270	2.17%	1.89%	2,840	1.85%
Transportation/ Utilities/ Information	790	1,130	1,550	3.03%	2.13%	760	2.53%
Finance/Insurance/ Real Estate	1,760	2,140	2,610	1.64%	1.32%	850	1.47%
Services	6,400	8,950	11,710	2.83%	1.81%	5,310	2.26%
Government	3,660	4,710	5,970	2.12%	1.59%	2,310	1.83%
Totals	30,300	37,700	46,390	1.84%	1.39%	16,090	1.59%

Source: Woods and Poole, BBPC, 2008

The three counties differed in industry that represented their highest projected employment growth in terms of annual percentage. Transportation/Utilities/Information was the highest forecasted growth employment industry for Robertson County (2.5% projected annual increase), while Services was the highest growth employment industry for Sumner County (2.3% projected annual increase).

Exhibit 2-26: Projected Employment Growth – Sumner County 2008 – 2035

Sumner County	Forecast			% Annual Growth (2008- 2020)	% Annual Growth (2020-2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Agriculture/Mining	2,850	3,140	3,490	0.81%	0.70%	640	0.75%
Construction	4,460	5,810	7,500	2.23%	1.72%	3,040	1.95%
Manufacturing	7,350	7,900	8,590	0.60%	0.56%	1,240	0.58%
Wholesale Trade	2,360	3,190	4,250	2.54%	1.93%	1,890	2.20%
Retail Trade	8,910	10,990	13,670	1.76%	1.47%	4,760	1.60%
Transportation/ Utilities/ Information	2,290	3,050	4,000	2.42%	1.82%	1,710	2.08%
Finance/Insurance/Real Estate	4,140	4,650	5,270	0.97%	0.84%	1,130	0.90%
Services	17,220	23,530	31,970	2.64%	2.06%	14,750	2.32%
Government	7,490	8,590	9,990	1.15%	1.01%	2,500	1.07%
Totals	57,070	70,850	88,730	1.82%	1.51%	31,660	1.65%

Source: Woods and Poole, BBPC, 2008

Overall Wilson County is projected to have the highest number of new jobs (38,000) from 2008 to 2035 as well as the highest annual growth in employment of the three counties in the study area (2.0%). These projected new jobs represent over 44% of all projected new jobs in the Tri-County Study Area.

The highest projected employment growth from 2008 to 2035 for the County is in the Construction industry (2.8% projected annual growth). The Retail Trade (2.4%) and Services (2.4%) industries showed strong projected employment growth for Wilson County.

Exhibit 2-27: Projected Employment Growth – Wilson County 2008 – 2035

Wilson County	Forecast				% Annual Growth (2020-2035)		
	2008	2020	2035	% Annual Growth (2008- 2020)		Net Change (2008-2035)	% Annual Growth (2008- 2035)
Agriculture/Mining	2,520	2,580	2,690	0.20%	0.28%	170	0.24%
Construction	5,160	7,600	10,860	3.28%	2.40%	5,700	2.79%
Manufacturing	7,150	7,430	7,670	0.32%	0.21%	520	0.26%
Wholesale Trade	2,120	2,570	3,080	1.62%	1.21%	960	1.39%
Retail Trade	10,350	14,590	19,830	2.90%	2.06%	9,480	2.44%
Transportation/ Utilities/ Information	3,010	4,160	5,620	2.73%	2.03%	2,610	2.34%
Finance/Insurance/Real Estate	3,850	5,340	7,200	2.76%	2.01%	3,350	2.35%
Services	14,550	20,740	27,440	3.00%	1.88%	12,890	2.38%
Government	4,430	5,580	6,890	1.94%	1.41%	2,460	1.65%
Totals	53,140	70,590	91,260	2.39%	1.73%	38,120	2.02%

Source: Woods and Poole, BBPC, 2008

3. MARKET ANALYSIS

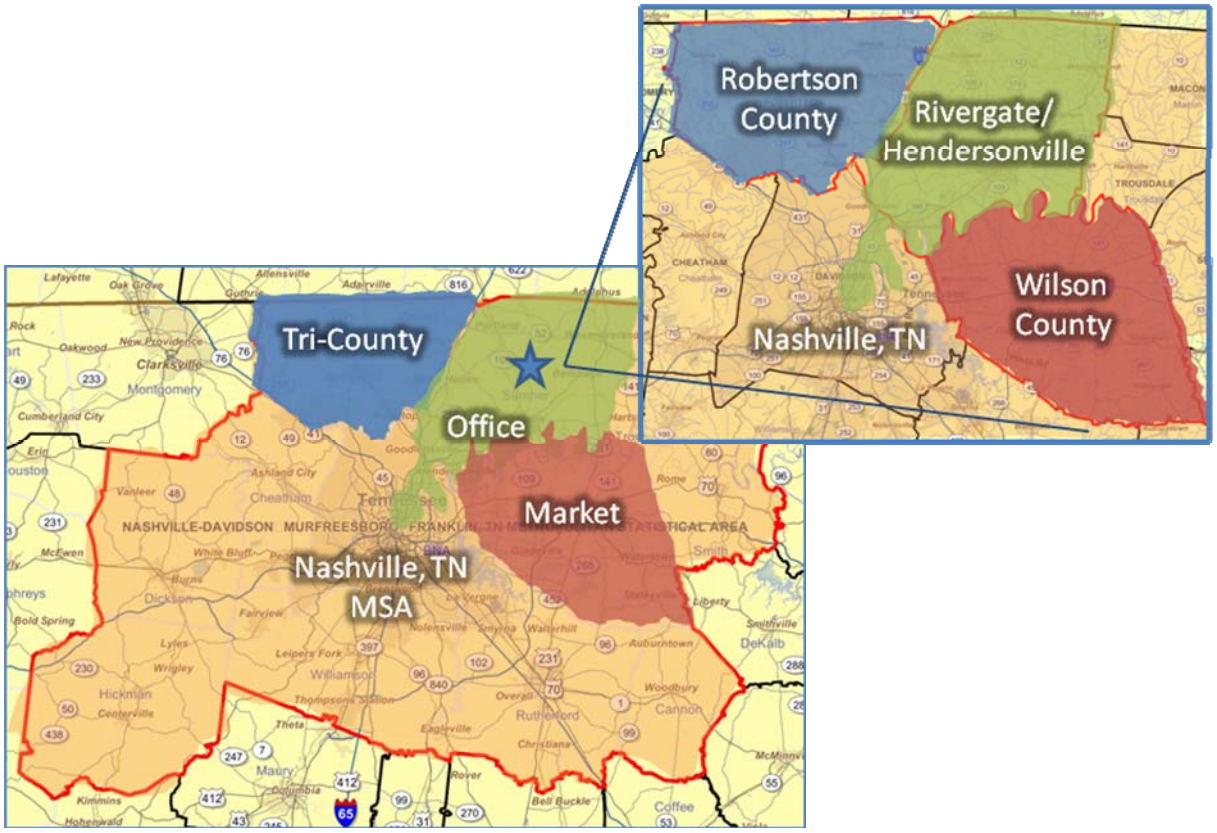
3.1 office market

OFFICE MARKET OVERVIEW

Evaluating trends in the office real estate market at the Nashville regional and Tri-County study area levels provide insight regarding the level of new office development (and associated employment) that may be expected over the near- and long-term. The identification of this future development (e.g. amount, type, etc.) may then be incorporated in baseline growth projections (e.g. growth which is projected based on existing conditions and trends) and alternative growth projections for land use and transportation planning.

The Tri-County study area is situated within the broad context of the Nashville regional office market and falls within three submarkets: 1) Rivergate-Hendersonville, which encompasses much of the land to the north and northeast of Nashville; 2) Wilson County; and 3) Robertson County.

Exhibit 3-1: Tri-County Office Submarkets and Nashville MSA



Since trends occurring in local submarkets as well as the larger Nashville regional market influence the potential for office development in the Tri-County study area, each of the surrounding submarkets and regional market have been analyzed to establish past trends and future outlook.

TRI-COUNTY OFFICE MARKET SNAPSHOT

Total Office Inventory	3.9 million SF
Office Vacancy Rate	10.5%
Recent Deliveries	133,000 SF
Under Construction	120,000 SF

KEY FINDINGS

Existing conditions and future trends in the Nashville regional and Tri-County office markets indicate the following:

- The Tri-County office market is a small but emerging player in the regional office market
- The Nashville regional office market inventory contains 58 million square feet of office space with 18 percent in the Downtown submarket (10.4 million square feet)
- Submarkets within the Tri-County study area contain 7 percent of the regional inventory (4 million square feet)
- The regional inventory is balanced across three space types (Class A, B, and C) appealing to a variety of occupants' needs
- The combined vacancy rate in the Rivergate/Hendersonville, Wilson County, and Robertson County submarkets, at 10.5 percent, is slightly higher than the regional vacancy rate of 9.3 percent
- Vacancy rates are lower in Wilson County (7.1 percent) and Robertson (3.7 percent), indicating relatively strong demand for space in those markets compared to supply
- From 1982-2008, the Nashville Office Market has seen average annual deliveries of 1.1 million square feet
- At the regional level, office development activity was a brisk 2.2 million square feet in the first quarter of 2008, undoubtedly benefiting from the relocation of several major corporations and organizations in the Nashville region (e.g. Nissan North America, Healthways, Vanderbilt Medical, and Verizon Wireless)
- Construction activity was relatively modest in submarkets surrounding the Tri-County study area (120,000 square feet under construction in the combined Rivergate/Hendersonville, Wilson County, and Robertson County submarkets)

Based on these recent trends and current conditions, the project team assumes that the Tri-County study area will experience modest office development and office-based employment growth relative to other parts of the region that have traditionally served as dominant office nodes.

INVENTORY

Together, the Rivergate/Hendersonville, Wilson County, and Robertson County office submarkets represented a relatively modest share of the Nashville regional office space inventory:

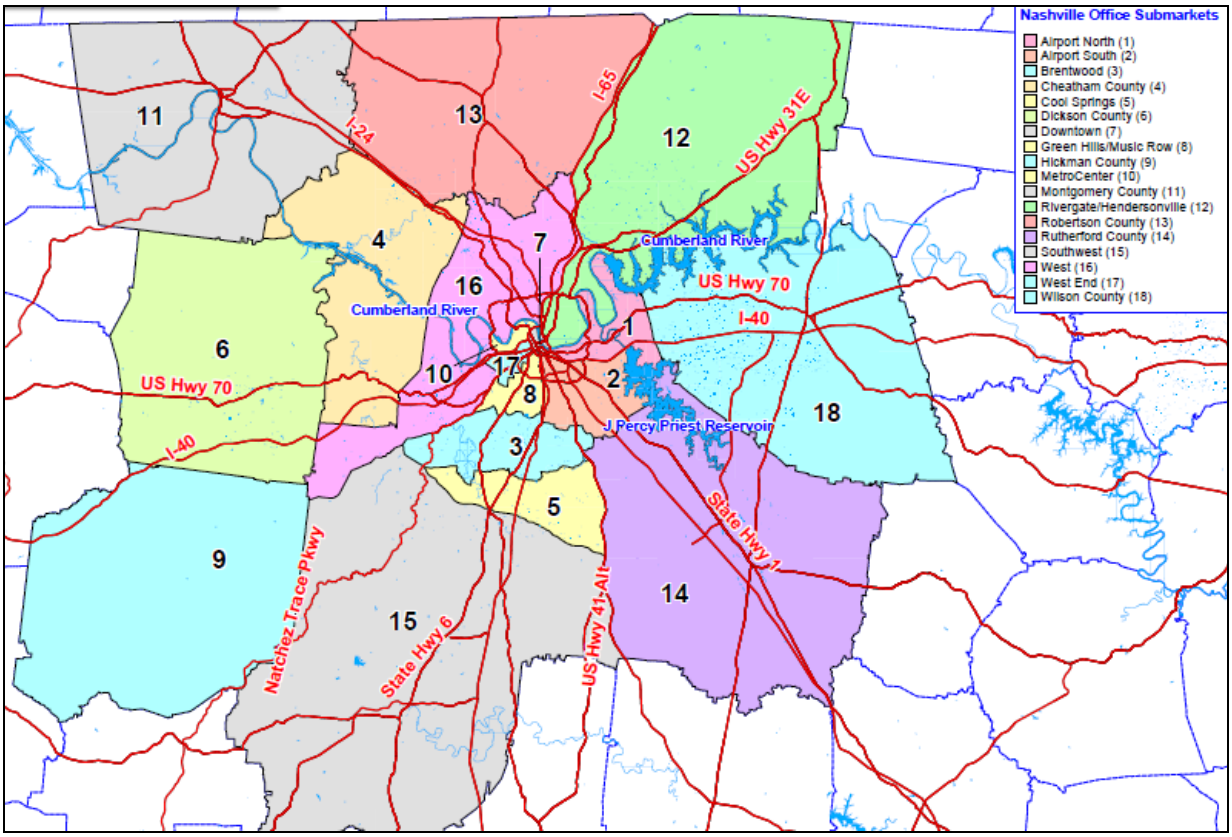
- Approximately 4 million square feet, or 7 percent of the region's 58 million square feet
- For reference, the Tri-County share of regional office space is slightly less than half of the downtown submarket's regional share (10 million square feet, or 18 percent of the regional inventory)
- At 10.5 percent (combined), the Rivergate/Hendersonville, Wilson County, and Robertson County office vacancy rate was on par with the regional vacancy rate of 9.3 percent
- Both the Wilson County and Robertson County submarkets have lower vacancy rates at 7.1 and 3.7 percent, respectively
- In contrast, the Rivergate/Hendersonville market has a higher vacancy rate at 13.9 percent

Exhibit 3-2: Nashville Selected Office Market and Submarkets 2008 (All Classes)

Market	Total Rentable Building Area (Square Feet)	% Vacant
Downtown	10,441,608	10.1%
West End	7,731,019	4.6%
Brentwood	6,584,411	7.4%
Cool Springs	6,420,366	8.2%
Airport North	5,519,186	17.1%
Green Hills/Music Row	5,243,043	3.8%
Airport South	5,061,764	14.2%
Rivergate/Hendersonville	***2,958,590***	***13.9%***
MetroCenter	2,579,245	4.9%
Rutherford County	2,438,693	8.4%
Wilson County	***987,399***	***7.1%***
West	887,161	3.7%
Southwest	697,733	25.9%
Maury County	403,554	5.8%
Robertson County	***107,215***	***3.7%***
Nashville Office Total	58,060,987	9.30%

Source: CoStar, BBPC, 2008

Exhibit 3-3: Nashville Office Submarkets 2008 (All Classes)



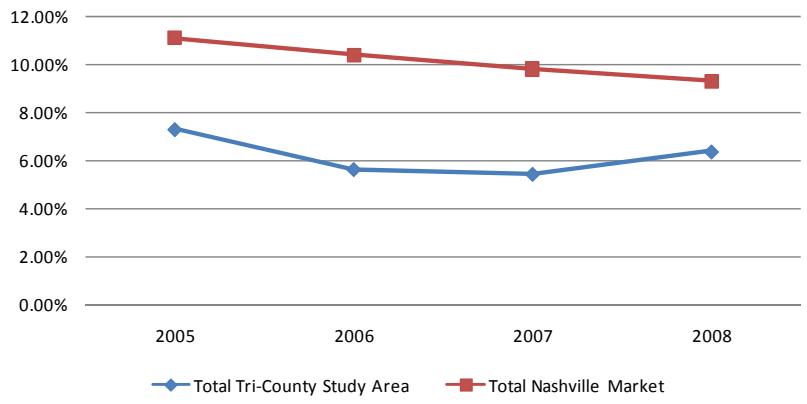
Source: CoStar, 2008

Exhibit 3-4: Tri-County Submarkets and Nashville Office Market 2008

Market	Total Rentable Building Area (Square Feet)	% Vacant
Robertson County	107,215	3.7%
Rivergate/Henderson	2,958,590	13.9%
Wilson County	987,399	7.1%
Total Tri-County Study Area	3,945,989	10.5%
Total Nashville Market	58,060,987	13.9%

The vacancy rates for the Nashville office market decreased modestly from 2005 to 2008. Vacancy dipped from about 11% in 2005 to just under 10% in 2008. Office vacancy rates in the Tri-County Study Area decreased from just over 7% in 2005 to just under 6% in 2007. However there was a slight increase in Tri-County office vacancy rates in 2008, when they climbed to just over 6%.

Exhibit 3-5: Nashville Office Market & Tri-County Study Area Vacancy Rate Trends 2005-2008



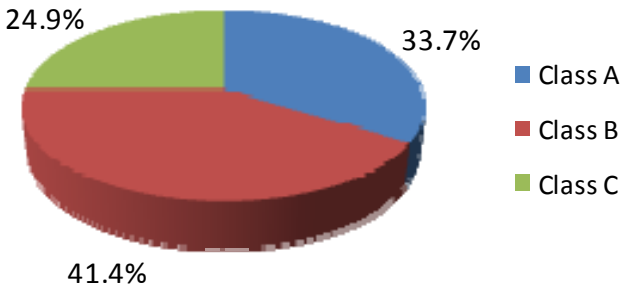
Source: CoStar, BBPC, 2008

With an inventory split roughly equally across Class A (33.7 percent), Class B (41.4 percent), and Class C (24.9 percent) space types, the Nashville regional office inventory provides a balanced space mix appealing to a variety of occupants' needs.

The regional inventory includes (as of first quarter 2008):

- 19 million square feet of Class A space in 172 buildings;
- 23 million square feet of Class B space in 877 buildings; and
- 14 million square feet of Class C space in 1,652 buildings.

Exhibit 3-6: Office Inventory by Office Class –Percent of Total Square Footage – Nashville MSA



Source: CoStar, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

CONSTRUCTION ACTIVITY

At the regional level, office development activity was brisk in the first quarter of 2008, but modest in submarkets surrounding the Tri-County study area:

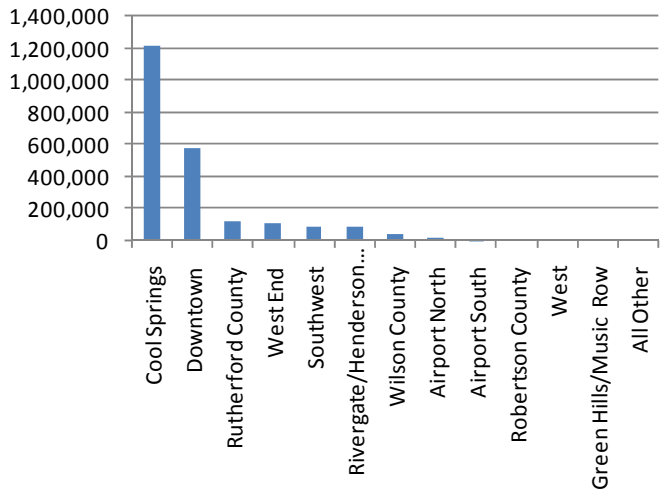
- Approximately 2.2 million square feet of space under construction in the Nashville office market
- Over half of office space under construction during this period in Nashville was located in the Cool Springs submarket, which has 1.2 million square feet of office space under construction across 10 buildings
- Downtown Nashville captured one quarter of all office space under construction in the region, with approximately 575,000 square feet under construction
- Rivergate/Hendersonville, though relatively modest in comparison to Cool Springs and Downtown, was the fifth most active office submarket with 80,000 square feet of space under construction
- Wilson and Robertson Counties were relatively less active submarkets, with 40,000 and 0 square feet under construction, respectively

Exhibit 3-7: Nashville Office Submarkets Ranked by Square Footage Under Construction 2008

Submarket	Total RBA Under Construction (Square Feet)	% of Nashville Market
Cool Springs	1,218,490	54.2%
Downtown	575,431	25.6%
Rutherford County	123,000	5.5%
West end	109,066	4.9%
Southwest	87,000	3.9%
Rivergate/Hendersonville	***80,000***	***3.6%***
Wilson County	***40,414***	***1.8%***
Airport North	10,791	0.5%
Airport South	4,500	0.2%
Robertson County	***0***	***0.0%***
West	0	0.0%
Green Hills/Music Row	0	0.0%
All Other	0	0.0%
Nashville Office Total	2,248,692	100.0%

Source: CoStar, 2008

Exhibit 3-8: Nashville Office Submarkets - Square Footage Under Construction 2008

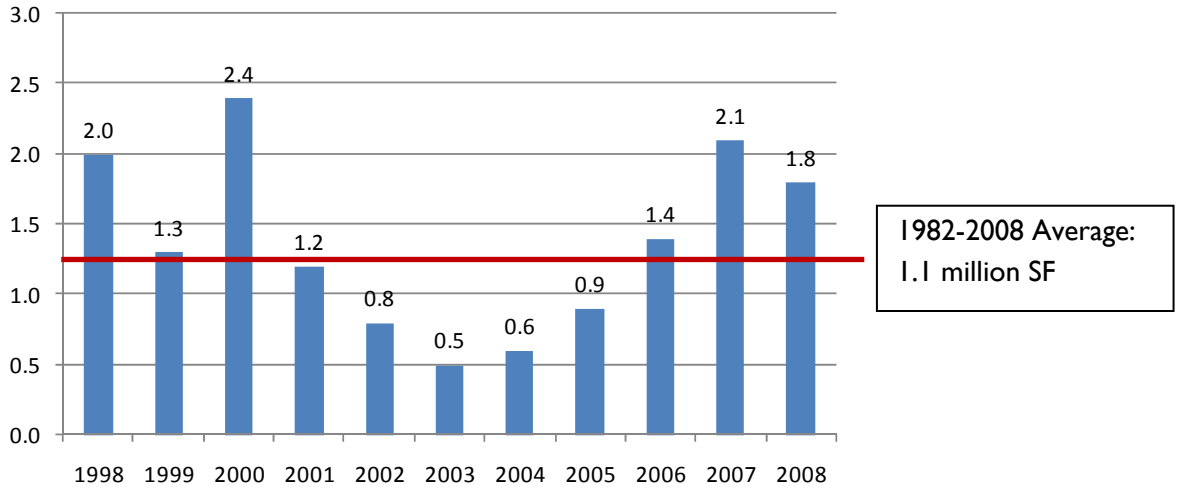


Source: CoStar, BBPC, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

Construction activity in the Nashville Office Market has fluctuated in the last couple decades (Exhibit 3-9), displaying peak activity in 1986, 2000 and most recently in 2007. Between 1982-2008, the market has seen deliveries averaging 1.1 million square feet annually.

Exhibit 3-9: Nashville Office Market – Historical Deliveries 1998-2008 (in millions of SF)



Source: CoStar, BBPC, 2008

Within the Tri-County Study Area, recent development has been focused in the Rivergate/Hendersonville submarket. Development activity in this submarket was limited as of first quarter 2008:

- One new office building (Parkside Plaza, a 53,000 square foot Class A office building that was 71 percent occupied as this quarter) was delivered in the Rivergate/Hendersonville office submarket
- One new office building (the 80,000 square foot Phase Four of the Northcreek Business Park, a Class B office building being built on a speculative basis) was under construction in this quarter

OFFICE SUMMARY – STRENGTHS, CONSTRAINTS AND OPPORTUNTIES

The Tri-County study area is situated within small, yet emerging, office submarkets in the Nashville region. The Rivergate/Hendersonville, Wilson County, and Robertson County submarkets have traditionally served as relatively minor locations for office uses, but offer potential for limited office development activity.

In particular, new office developments in the Tri-County study area could take advantage of growth in residential and retail markets with mixed-use developments offering live-work-play opportunities; the 400-acre Indian Lake Village in Hendersonville is an example of this type of development.

The following table summarizes key conclusions regarding the strengths, constraints, and opportunities related to the potential for new office development in the Tri-County study area.

Strengths	Constraints	Opportunities
▪ Brisk development activity at regional office market level ▪ Relatively low office vacancy rates in Wilson and Robertson Counties, indicative of strong demand for existing space ▪ Growing populations in Tri-County Study Area could create potential for live-work environment and demand for further office space	▪ Lack of strong office nodes and corridors compared to other parts of region (e.g. Downtown, Cool Springs) ▪ Limited commercial activity in submarkets within and around the Tri-County study area	▪ Office development within the context of mixed-use residential/retail/office environments ▪ Update space in Rivergate/ Hendersonville Submarket to promote greater occupancy ▪ Facilitate office development in Robertson County and Wilson County to meet existing demand

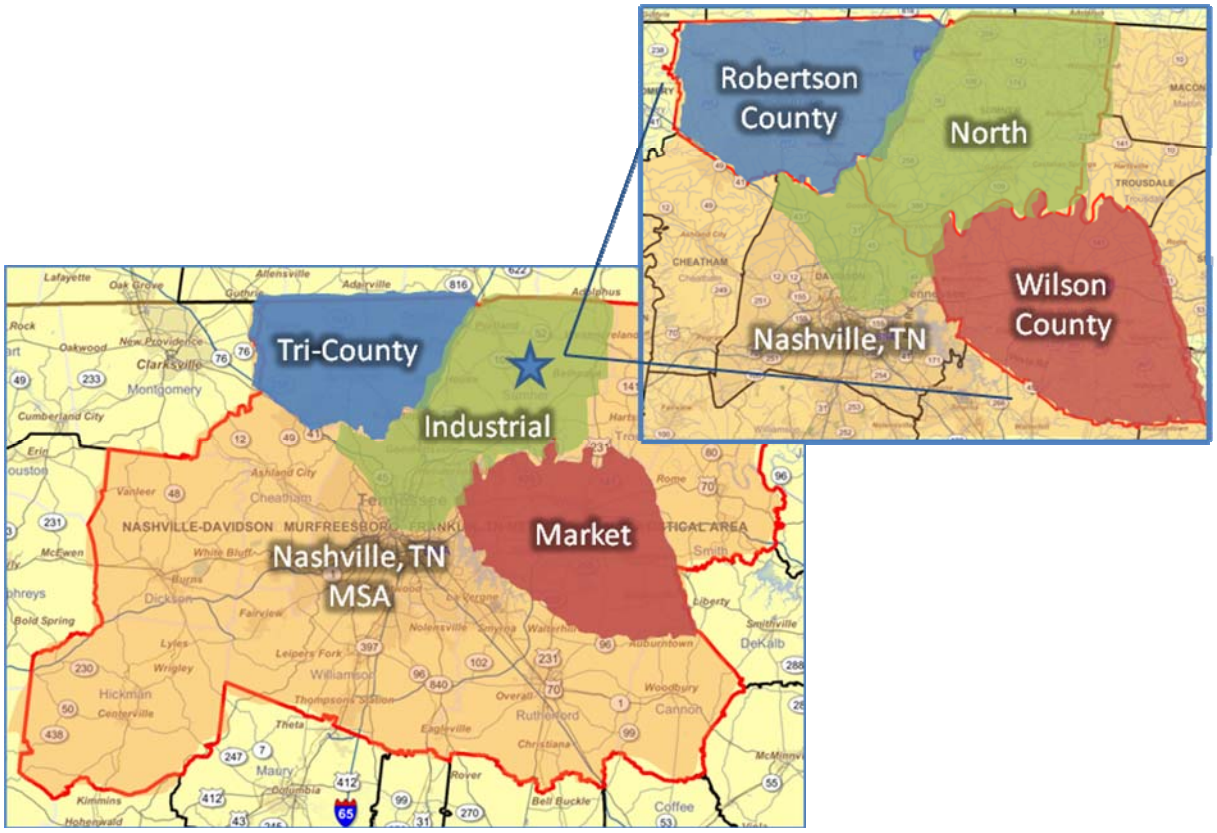
3.2 industrial market

INDUSTRIAL MARKET OVERVIEW

Industrial market activity in the region and Tri-County study area – as measured by construction levels, absorption of new space, and vacancy rates – provides guidance as to the potential near-term and long-term demand for new industrial space. This estimation of current demand may then be fed into baseline projections of future industrial development and associated employment growth for land use planning purposes.

The Tri-County study area falls within the Nashville regional industrial market and three industrial submarkets: 1) North Industrial (which encompasses Sumner County); 2) Wilson County; and 3) Robertson County.

Exhibit 3-10: Tri-County Industrial Submarkets and Nashville MSA



Source: CoStar, 2008

Demand for industrial space has been evaluated at the regional and submarket levels to understand the Tri-County Study Area's current competitive position and its near- and long-term potential for growth.

TRI-COUNTY INDUSTRIAL MARKET SNAPSHOT

Total Industrial Inventory	45.1 million SF
Industrial Vacancy Rate	15.8%
Recent Deliveries	278,000 SF
Under Construction	2.8 million SF

KEY FINDINGS

The Tri-County Study Area is home to a mix of industrial submarkets – one an established node in the region (North Industrial), one a rapidly emerging center for distribution space (Wilson County), and one a relatively minor industrial area (Robertson County). All considered, the Tri-County Study Area offers strong potential for industrial growth based on recent conditions and trends:

- Nashville regional industrial market is strong, and has become a national destination for distribution operations, having attracted major corporate headquarters and regional offices of distribution companies
- Tri-County Study Area offers one-third of the region's industrial inventory, much of which is located in the North Industrial market
- Warehouse space is by far the dominant type of industrial product available in Nashville, while flex/research and development is a very minor part of the industrial market
- Vacancy rates are higher in the Tri-County Study Area than the region, reflective of high levels of recent speculative construction
- Average annual deliveries in the Nashville Industrial Market were 2.4 million square feet from 1982-2008, over two times higher than the long-term annual average office deliveries
- Construction activity as of first quarter 2008 was a robust 3 million square feet, 1 million square feet higher than the level of office development under construction
- Wilson County is the dominant submarket for new industrial construction activity, catalyzed in part by the provision of sewer service in recent years and the explosion of developer interest in the SR 840 corridor

These conditions and trends foretell a bright future for the Nashville regional industrial market and the Tri-County Study Area, which has an opportunity to target large distribution companies and continue building off the critical mass of industrial space being established in Wilson County and already established in the North Industrial market.

INVENTORY

Industrial submarkets surrounding the Tri-County study area – the North, Robertson County, and Wilson County submarkets – together provide a major share of the region's industrial inventory:

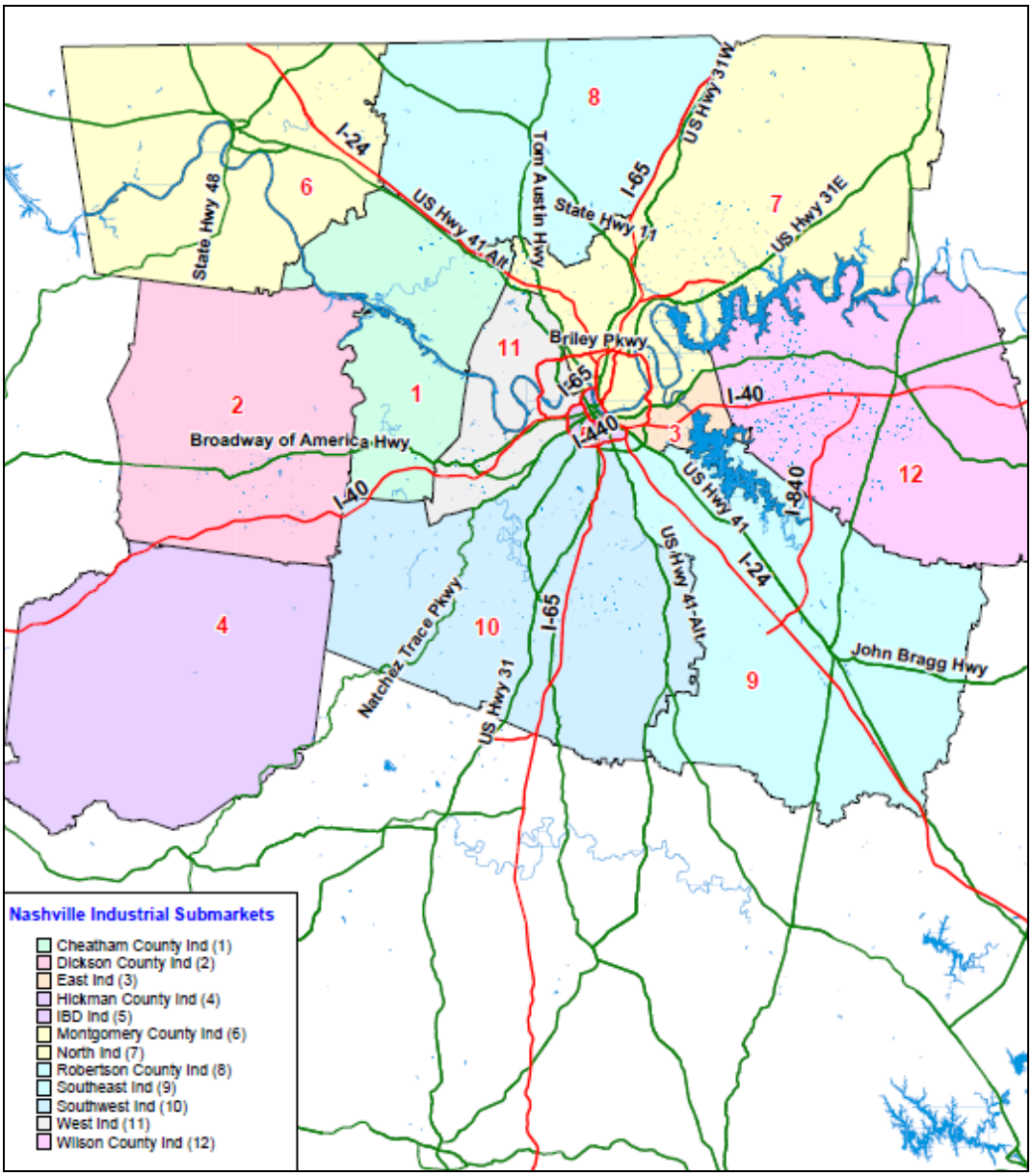
- Combined inventory is a substantial 30 percent, or 45 million square feet, of the region's 150 million square feet; this share of space is equivalent to the region's dominant submarket, the Southeast Industrial submarket, which offers 45 million square feet focused primarily along I-24
- With a combined vacancy rate of nearly 16 percent, the submarkets surrounding the Tri-County study area have relatively higher levels of vacant space than the region (at nearly 9 percent vacancy rate)

Exhibit 3-11: Nashville Selected Industrial Market and Submarkets 2008 (Flex & Warehouse)

Market	Total Rentable Building Area (Square Feet)	% Vacant
East Industrial	16,993,189	6.00%
IBD Industrial	18,910,144	7.30%
Maury County Industrial	3,045,807	5.30%
North Industrial	***29,825,133***	***10.8%***
Southeast Industrial	45,905,124	8.80%
Soutwest Industrial	15,529,663	4.80%
West Industrial	6,704,876	7.70%
Robertson County Industrial	***4,427,936***	***19.3%***
Wilson County Industrial	***10,870,546***	***17.2%***
Nashville Industrial Total	152,212,418	8.8%

Source: CoStar, BBPC, 2008

Exhibit 3-12: Nashville Industrial Submarkets 2008 (Flex & Warehouse)



Source: CoStar, 2008

Among the three industrial submarkets surrounding the Tri-County study area, the North industrial submarket is dominant in terms of its relatively high industrial space inventory and lower vacancy rate

- The North industrial submarket, with nearly 30 million square feet of industrial space, is a major industrial hub and second in size only to the Southeast Industrial submarket in terms of share of regional office inventory
- At 10.8 percent, the North Industrial submarket's vacancy rate is slightly higher than the regional vacancy rate but well below that of Wilson County (17.2 percent) and Robertson County (19.3 percent)

- Wilson County has traditionally served as a modest player in the regional industrial market, with 11 million square feet of space (roughly one-third of the inventory located in the North submarket)
- With 4 million square feet of space, Robertson County is among the smallest of the Nashville region's industrial submarkets, and also exhibits the highest vacancy rate at 19.3 percent

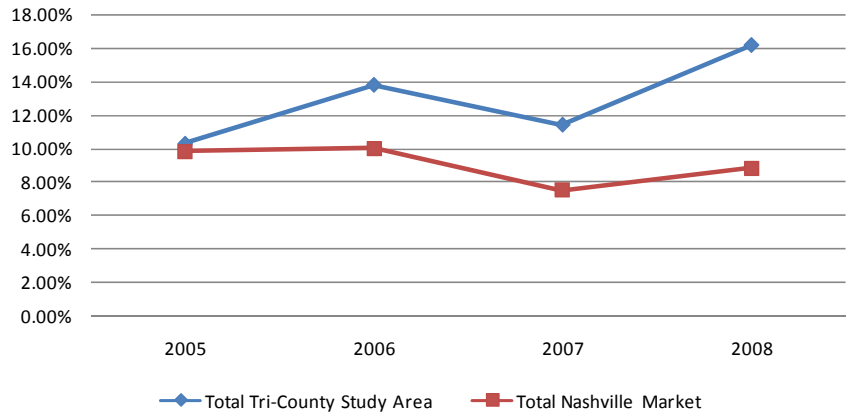
Exhibit 3-13: Tri-County Industrial Submarkets and Nashville Industrial Market 2008

Market	Total Rentable Building Area (Square Feet)	% Vacant
Robertson County	4,427,936	19.30%
North Industrial	29,825,133	10.80%
Wilson County	10,870,546	17.20%
Total Tri-County Study Area	45,123,615	15.77%
Total Nashville Market	152,212,418	8.8%

Source: CoStar, BBPC, 2008

Since 2005, vacancy rates in submarkets surrounding the Tri-County Study Area have surpassed vacancy levels in the region, reflective of large bulk distribution centers being built in these submarkets on speculative construction (with vacant deliveries increasing the vacancy rate in these years).

Exhibit 3-14: Nashville Industrial Market, North & Wilson County Submarkets - Vacancy Rate Trends 2005-2008 (Flex & Warehouse)



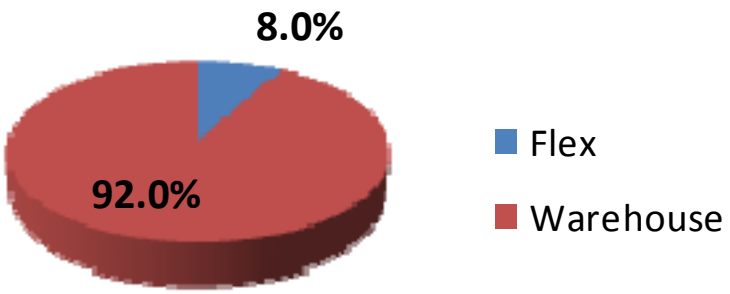
Source: CoStar, BBPC, 2008

Warehouse (including distribution) space is the overwhelmingly dominant type of industrial space in the Nashville region:

- Warehouse space represents 92 percent of the regional inventory
- The region has rapidly earned a national reputation as a preferred location for new distribution facilities, and the distribution space market is entering a growth cycle

- Relocation and expansion of large national and regional distribution operators supports the warehouse sector
- Flex/research & development space is a relatively minor piece of the regional industrial market, with a current inventory of 8 percent

Exhibit 3-15: Nashville Regional Industrial Inventory by Type – Square Footage



Source: CoStar, BBPC, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

CONSTRUCTION ACTIVITY

The Nashville regional industrial market is experiencing robust growth, and a dramatic expansion is occurring in Wilson County

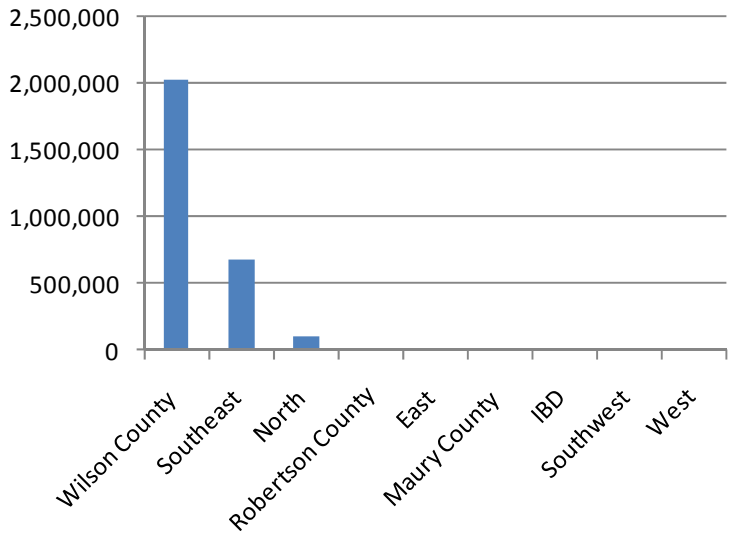
- Nearly 3 million square feet of new industrial space is under construction in the region – 1 million square feet more than the 2 million square feet of office space underway region-wide, and reflective of Nashville's emergence as a national distribution center
- Wilson County is home to two thirds of the regional industrial space under construction, which has been spurred in part by the County's investment in infrastructure to support growth (e.g. sewer service provision in recent years) and the County's strategic proximity to major transportation networks (SR 840, along which much of the new development is focused)
- The North Industrial and Robertson County submarkets are witnessing less development activity, with approximately 100,000 and 0 square feet under construction, respectively

Exhibit 3-16: Nashville Industrial Submarkets Ranked by Square Footage Under Construction 2008

Submarket	# of Buildings	Total RBA Under Construction (Square Feet)	% of Nashville Market
Wilson County	***5***	***2,023,400***	***72.0%***
Southeast	4	678,082	24.1%
North Industrial	***1***	***108,000***	***3.8%***
Robertson County	***0***	***0***	***0.0%***
East	0	0	0.0%
Maury County	0	0	0.0%
IBD	0	0	0.0%
Southwest	0	0	0.0%
West	0	0	0.0%
Nashville Industrial Total	10	2,809,482	100.0%

Source: CoStar, BBPC, 2008

Exhibit 3-17: Nashville Industrial Submarkets - Square Footage Under Construction 2008

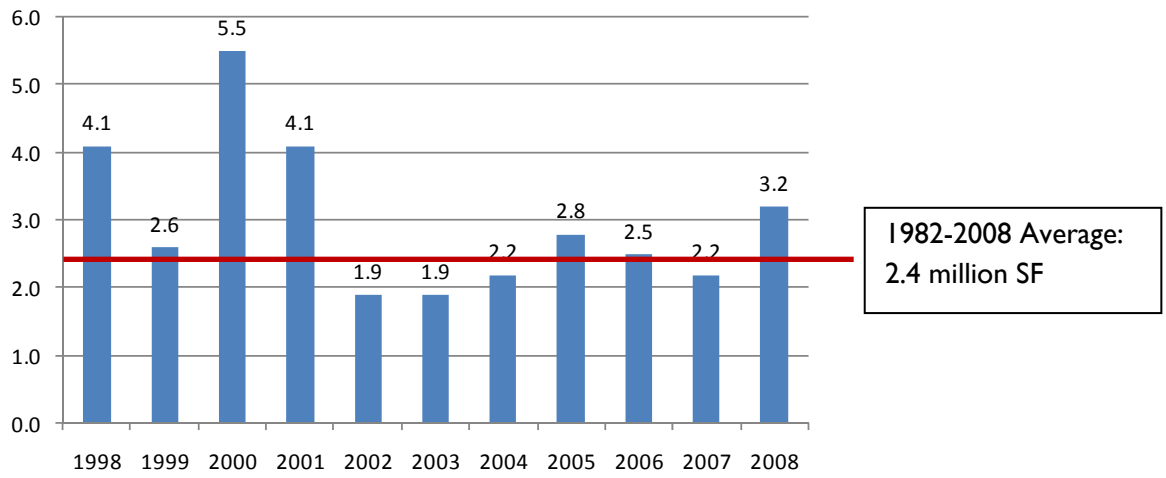


Source: CoStar, BBPC, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

Over the past nearly three decades, the Nashville region has witnessed a long-term average annual delivery of 2.4 million square feet of industrial space. Peak construction activity occurred in 1986 (3.9 million square feet) and 2000 (a robust 5.5 million square feet).

Exhibit 3-18: Nashville Industrial Market – Historical Deliveries 1998-2008



Source: CoStar, BBPC, 2008

Note: 2008 deliveries are for Q1-Q4 estimates, based on current under construction buildings

In recent years, Wilson County has led the Tri-County submarkets, with a high level of industrial construction. Most of this development is occurring on a speculative basis, indicating that developers have confidence in the strength of demand for space in this area. Selected recent deliveries and properties under construction in industrial submarkets surrounding the Tri-County Study Area include:

<u>Wilson County</u>

- Commerce Farms IV – 275,000 square feet in Wilson County, with half of the space already occupied
- Couchville Building I – 70,000 square feet of speculative construction
- Wilson Commerce Center – 550,000 square feet of speculative space
- 840 Business Center – 440,000 square feet of speculative construction
- Rockdale III in Wilson County – 300,000 square feet of speculative space
- 5510 Division Street – 30,000 square feet of space with 33 percent pre-leased

<u>North Industrial Submarket</u>

- 530 Red River Road – 290,000 square feet of space, with 35 percent pre-leased

Exhibit 3-19: Recent Deliveries and Properties Under Construction– Tri-County Industrial Submarkets - First Quarter 2008

Building	Submarket	Rentable Building Area (Square Feet)	% Occupied/ Preleased
DELIVERIES			
Commerce Farms IV	Wilson County	277,500	49%
UNDER CONSTRUCTION			
Couchville Building I	Wilson County	70,000	0%
Wilson Commerce Center – Building A	Wilson County	556,600	0%
840 Business Center	Wilson County	436,800	0%
Rockdale III	Wilson County	300,000	0%
530 Red River Road	North	288,000	35%
5510 East Division Street	Wilson County	30,000	33%
Subtotal:		**1,681,400**	

Source: CoStar, BBPC, 2008

INDUSTRIAL SUMMARY – STRENGTHS, CONSTRAINTS AND OPPORTUNTIES

The Tri-County Study Area is located within a major industrial hub in the Nashville region that offers nearly one-third of the region's industrial space. The North Industrial submarket is already an established industrial market, with nearly 30 million square feet of space, while Wilson County (and more specifically the SR 840 corridor) continues to experience a red-hot transformation into a center for distribution activities.

The Nashville region has cultivated a national reputation as a preferred location for distribution operations, and new development in the Tri-County Study Area can take advantage of this specialization by catering to the interests of national and regional corporations. Further, the development of high-quality retail and residential communities in the Tri-County Study Area will provide added attraction for these firms as they consider the Tri-County area as a location for their next headquarters or regional office.

The following table summarizes key conclusions regarding the strengths, constraints, and opportunities related to the potential for new industrial development in the Tri-County study area.

Strengths	Constraints	Opportunities
▪ Critical mass of industrial space in North Industrial and Wilson County submarkets to attract additional development ▪ Emergence of Wilson County as a hub for industrial development activity ▪ Favorable infrastructure provision in Wilson (e.g. sewer service and access to SR 840) ▪ Regional strength of warehouse sector and growing reputation as national location for distribution operations	▪ Limited demand for flex/research and development space ▪ Excess space in Robertson and Wilson Counties, as evidenced by high vacancy rates	▪ Focus recruitment on national headquarters and regional offices of large distribution operators to fill new space ▪ Expand retail and residential development proximate to industrial corridor in Wilson to provide added amenities for businesses

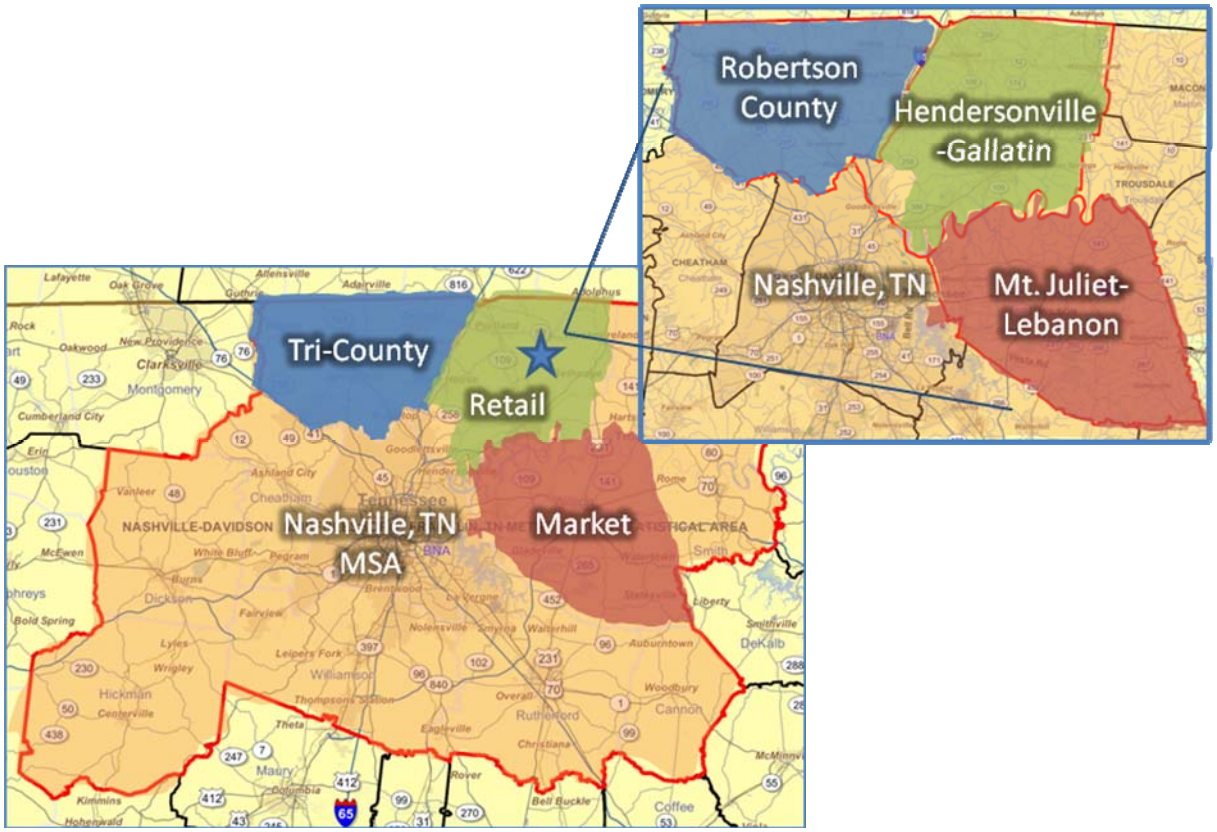
3.3 retail market

RETAIL MARKET OVERVIEW

The Tri-County study area is located within the Nashville regional retail market and three retail submarkets: 1) Hendersonville-Gallatin (which encompasses Sumner County); 2) Mt Juliet-Lebanon (which encompasses Wilson County); and 3) Robertson County.

Assessing retail development activity in the Nashville region and Tri-County Study Area offers a benchmark with which to predict future demand for retail space in Robertson, Sumner, and Wilson Counties, which may be incorporated in the transportation and land use planning growth alternatives.

Exhibit 3-20: Tri-County Retail Submarkets and Nashville MSA



Current conditions and trends at the regional and submarket levels have been evaluated and compared to assess the Tri-County Study Area's potential for future retail growth.

TRI-COUNTY RETAIL MARKET SNAPSHOT

Total Retail Inventory	11.7 million SF
Retail Vacancy Rate	3.1%
Recent Deliveries	96,000 SF
Under Construction	246,000 SF

KEY FINDINGS

With two established and growing retail nodes (in the Hendersonville-Gallatin and Mt Juliet-Lebanon submarkets), and a small but desirable node in Robertson County (as evidenced by very low vacancy rates) the Tri-County Study Area offers strong potential for retail growth as supported by recent conditions and trends:

- Nashville region is healthy despite national macroeconomic woes (credit crunch, troubled housing market, rising gas prices, etc.)
- Recruitment of major national corporations has supported (and will continue to support) spin-off retail goods and services development close to new corporate centers and residential communities
- The provision of high quality, amenity-rich retail environments is an important part of supporting the Nashville region's high quality of life, which in turn supports corporate expansion and household growth
- Tri-County Study Area represents roughly 15 percent of the regional space inventory, and continues to maintain this share with new developments underway
- Mixed-use developments, lifestyle centers, and power centers are the preferred retail product types being developed in the Tri-County Study Area
- Hendersonville-Gallatin and Mt Juliet-Lebanon (encompassing Sumner and Wilson Counties, respectively) offer a critical mass of retail space, while Robertson County is a minor player in the regional retail market

With strong fundamentals of a growing economy and high quality of life, the Nashville region is poised for continued retail growth. In the Tri-County Study Area, this development will likely take the form of additional mixed-use and lifestyle centers catering to area residents and employees, and be situated with convenient access to residential communities and corporate centers.

INVENTORY

The Tri-County Study Area is home to an expanding share of the region's inventory of shopping centers and retail buildings:

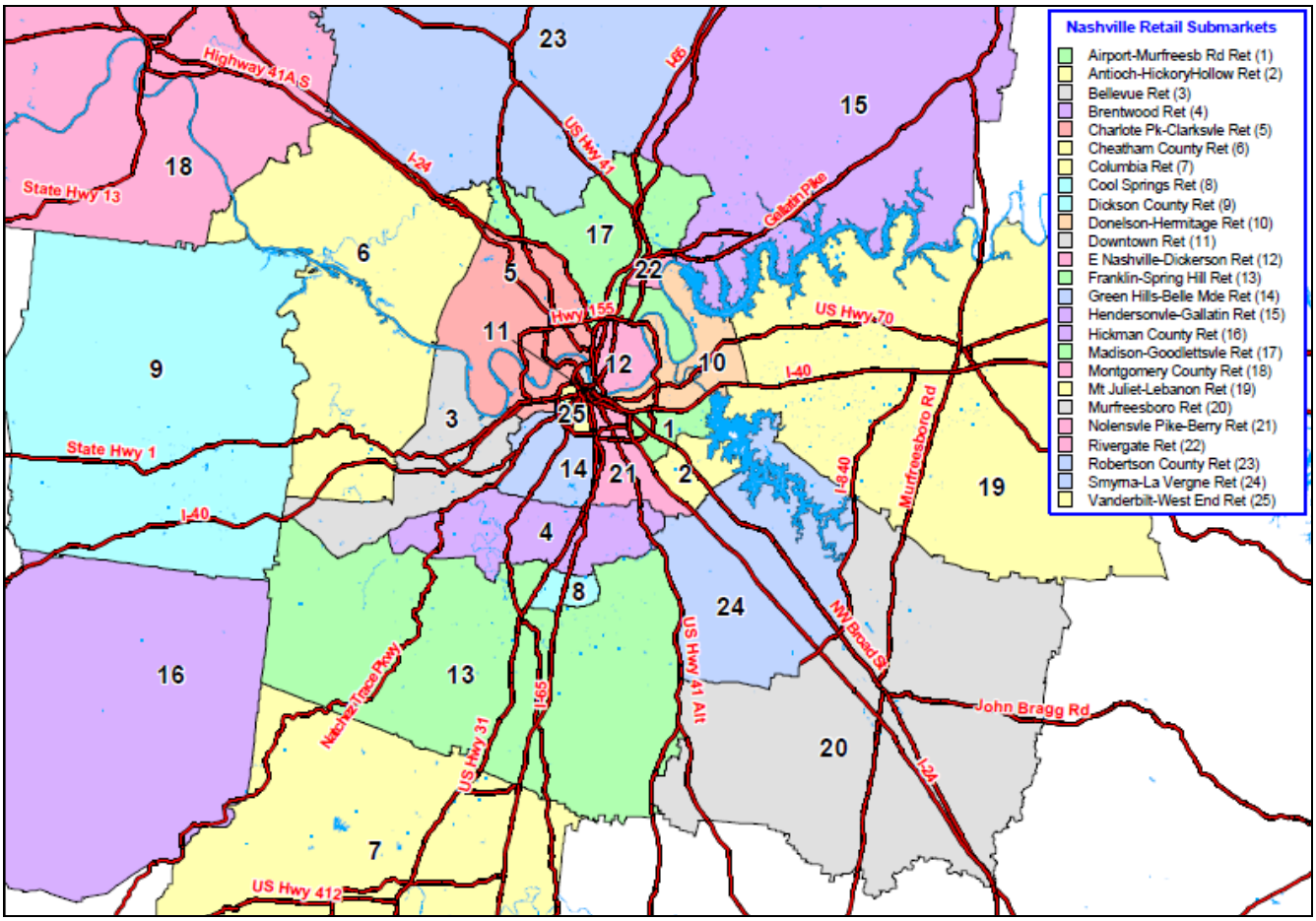
- Together, the Hendersonville-Gallatin, Mt Juliet-Lebanon, and Robertson County submarkets represent 15 percent (12 million square feet) of the region's retail inventory (82 million square feet)
- At 3.1 percent, the combined vacancy rate in the Tri-County retail submarkets is lower than the regional average vacancy of 5.8 percent and indicative of heightened demand for retail space in this growing area

Exhibit 3-21: Nashville Selected Retail Market and Submarkets 2008 (All Types)

Submarket	Total Rentable Building Area (Square Feet)	% Vacant
Airport - Murfreesboro	960,501	4.2%
Antioch - Hickory Hollow	4,333,394	7.5%
Bellevue	3,452,821	7.2%
Brentwood	2,358,918	3.4%
Charlotte Pk - Clarksville	2,682,800	3.4%
Columbia	3,862,122	9.0%
Cool Springs	5,653,465	3.1%
Donelson-Hermitage	5,734,521	4.6%
Downtown	3,992,392	6.7%
E Nashville-Dickerson	1,545,668	4.0%
Franklin-Spring Hill	4,337,455	7.9%
Green Hills-Belle Mde	3,043,542	3.6%
Hendersonville-Gallatin	***5,195,816***	***3.9%***
Madison Goodlettsville	2,542,799	9.6%
Mt Juliet-Lebanon	***5,054,724***	***4.7%***
Murfreesboro	8,990,391	7.3%
Nolensville Pike-Berry	7,032,472	7.6%
Rivergate	4,145,764	3.8%
Smyrna-La Vergne	2,491,783	6.9%
Vanderbilt-West End	2,974,083	3.0%
Robertson County	***1,457,109***	***0.8%***
Nashville Retail Total	81,842,540	5.8%

Source: CoStar, BBPC, 2008

Exhibit 3-22: Nashville Retail Submarkets 2008 (All Types)



Source: CoStar, 2008

Developers in the Tri-County Study Area are focusing new retail growth in Hendersonville, Gallatin, and Mount Juliet:

- New development in the Hendersonville-Gallatin and Mt Juliet-Lebanon submarkets build from an existing critical mass of retail space (each submarket offers 5 million square feet)
- Robertson County is a relatively minor player in the regional retail market, with 1.5 million square feet of space
- Vacancy rates are low in each of the Tri-County Study Area submarkets (below the regional average of 5.8 percent), suggesting strong demand to support further retail expansion
- Robertson County exhibits a particularly low vacancy rate (0.8 percent), suggesting there is relatively strong demand for space in the County

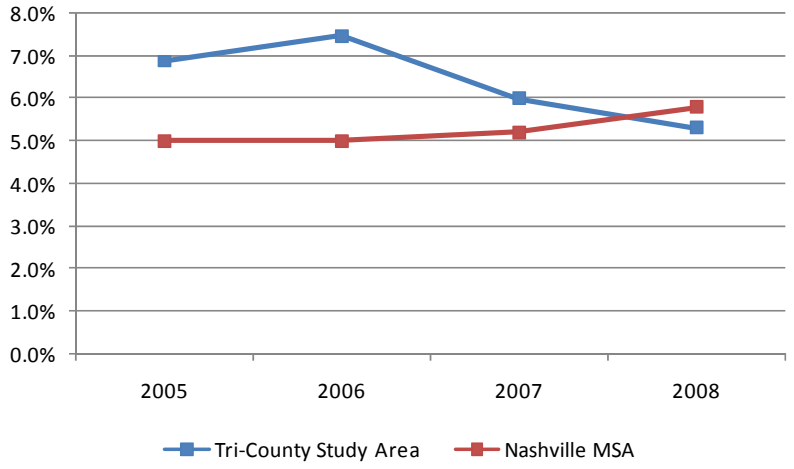
Exhibit 3-23: Tri-County Retail Submarkets and Nashville Retail Market 2008

Market	Total Rentable Building Area (Square Feet)	% Vacant
Robertson County	1,457,109	0.80%
Henderson-Gallatin	5,195,816	3.90%
Mt Juliet-Lebanon	5,054,724	4.70%
Total Tri-County Study Area	11,707,649	3.1%
Total Nashville Market	81,842,540	5.8%

Source: CoStar, BBPC, 2008

Retail vacancy rates rose between 2005 and 2006, but have since dipped to below the average Nashville MSA vacancy rates. This may be in part due to the growth in residential population in the study area in recent years, and therefore heightened demand for retail.

Exhibit 3-24: Nashville Retail Market, North & Wilson County Submarkets - Vacancy Rate Trends 2005-2008 (All Types)



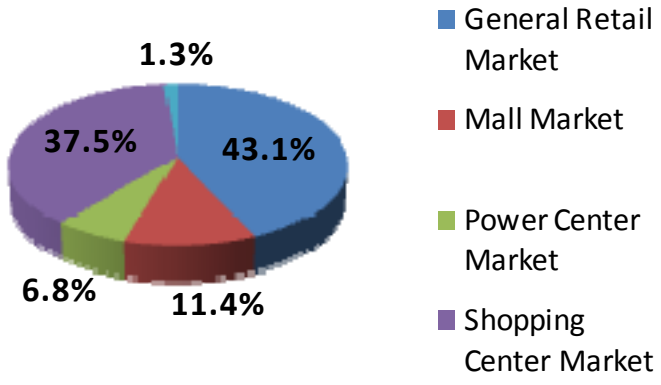
Source: CoStar, BBPC, 2008

The Nashville region is home to a broad mix of retail development product types, ranging from traditional malls to more recently constructed power centers, but recently delivered space is focusing primarily on development of a few key product types (especially in outlying suburban markets):

- Power centers
- Lifestyle centers
- Mixed-use developments

As these development types gain in popularity, the traditional shopping mall format is losing currency (and some malls in the region are being redeveloped with other uses).

Exhibit 3-25: Retail Inventory by Type –Percent of Total Square Footage– Total Nashville Industrial Market



Source: CoStar, BBPC, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

CONSTRUCTION ACTIVITY

New construction of retail space is strong in Nashville and moderate in the Tri-County Study Area:

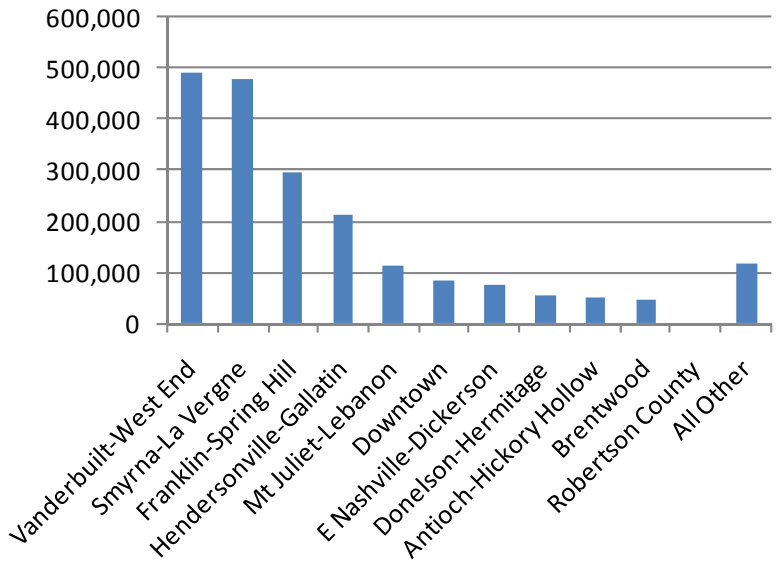
- Over 2 million square feet of new retail space is under construction in the region, the same level of office space underway
- New construction in the Tri-County Study Area represents 15 percent of all the space underway in the region, which is on par with the Tri-County Study Area's current share of the retail inventory
- The Hendersonville-Gallatin submarket has attracted 10 percent of the regional inventory under construction, two-thirds higher than its current share (6 percent) of the existing regional retail inventory
- Mixed-use development, lifestyle centers, and power centers are dominant new construction types in Hendersonville, Gallatin, and Mount Juliet, where developers are taking advantage of the live-work-play mantra
- No new space is under construction in Robertson County, so vacancy (0.8 percent) in that submarket is likely to remain very low in the near-term

Exhibit 3-26: Nashville Selected Retail Submarkets Ranked by Square Footage Under Construction 2008

Submarket	# of Buildings	Total RBA Under Construction (Square Feet)	% of Nashville Market
Vanderbilt-West End	2	493,440	24.5%
Smyrna-La Vergne	2	478,750	23.8%
Franklin-Spring Hill	3	294,786	14.6%
Hendersonville-Gallatin	6	213,454	10.6%
Mt. Juliet-Lebanon	4	111,729	5.5%
Downtown	4	83,200	4.1%
East Nashville-Dickerson	2	73,816	3.7%
Donelson-Hermitage	4	52,289	2.6%
Antioch-Hickory Hollow	2	49,274	2.4%
Brentwood	2	47,871	2.4%
Robertson County	***0***	***0***	***0.0%***
All Other	9	115,418	5.7%
Nashville Industrial Total	40	2,014,027	100.0%

Source: CoStar, BBPC, 2008

Exhibit 3-27: Nashville Retail Submarkets - Square Footage Under Construction 1Q 2008

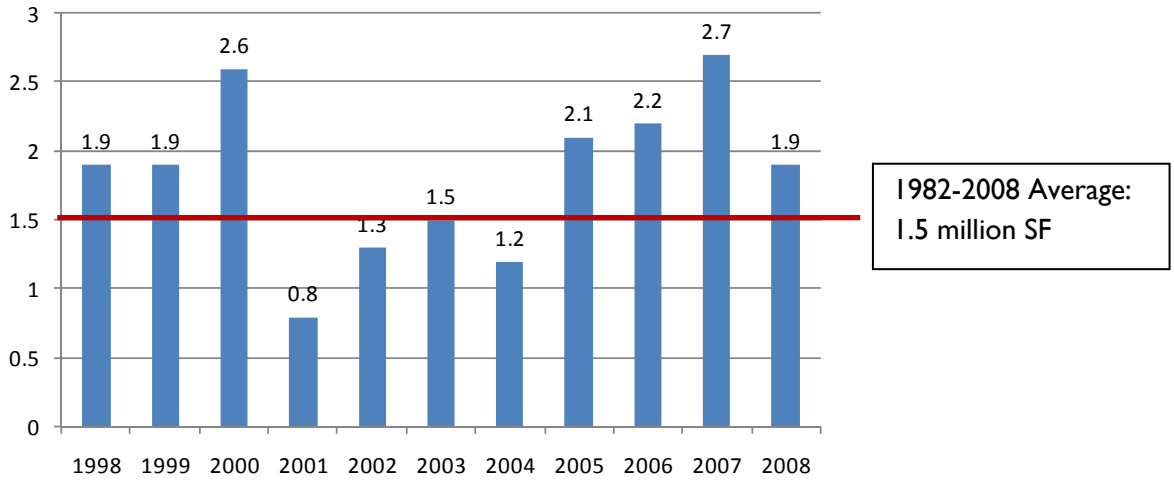


Source: CoStar, BBPC, 2008

DELIVERIES AND DEVELOPMENT UNDER CONSTRUCTION

Since 1982, Nashville's long term average delivery of new retail space has been 1.5 million square feet per year. Annual delivery peaked in 1988 (3 million square feet), 2000 (2.6 million square feet), and recently in 2007 (2 million square feet). Given the cyclical nature of the retail market, it is reasonable to expect the annual delivery of new space to oscillate over time, but the long-term annual average has been 1.5 million square feet.

Exhibit 3-28: Nashville Retail Market – Historical Deliveries 1998-2008 (in millions of SF)



Source: CoStar, BBPC, 2008

In the Tri-County Study Area, the Hendersonville-Gallatin retail submarket has experienced strong activity with large retail centers recently constructed or underway. Selected retail developments recently constructed or underway in the Tri-County Study Area include:

<u>Hendersonville-Gallatin</u>

- The Streets of Indian Lake (Phase I) – 150,000 square foot lifestyle center to be anchored by Regal Cinemas that is completely preleased
- Barnes and Noble – 40,000 square feet
- Hendersonville Marketplace – 25,000 square feet
- 1025 Nashville Pike – Phase II – 18,000 square feet
- September's – 7,500 square feet

<u>Mt Juliet-Lebanon</u>

- Mt. Juliet Commons – 5,500 square feet
- Mt. Juliet Shopping Center – 45,000 square feet

Exhibit 3-29: Recent Deliveries and Properties Under Construction – Tri-County Retail Submarket - First Quarter 2008

Building	Submarket	Rentable Building Area (Square Feet)	% Occupied/ Preleased
DELIVERIES			
Barnes & Noble	Hendersonville-Gallatin	40,594	100%
Hendersonville Marketplace	Hendersonville-Gallatin	25,000	0%
1025 Nashville Pike – Phase II	Hendersonville-Gallatin	17,552	0%
September's	Hendersonville-Gallatin	7,359	100%
Mt. Juliet Commons	Mt. Juliet-Lebanon	5,662	38%
Subtotal:		**96,167**	
UNDER CONSTRUCTION			
The Streets of Indian Lake – Phase I	Hendersonville/Gallatin	52,254	100%
Mt. Juliet Shopping Center	Mt. Juliet-Lebanon	44,660	37%
The Streets of Indian Lake – Phase I	Hendersonville/Gallatin	42,282	100%
The Streets of Indian Lake – Phase I	Hendersonville/Gallatin	38,393	100%
Two Rivers Ford	Mt. Juliet-Lebanon	34,700	100%
The Streets of Indian Lake – Phase I	Hendersonville/Gallatin	33,597	100%
Subtotal:		**245,886**	

Source: CoStar, BBPC, 2008

RETAIL SUMMARY – STRENGTHS, CONSTRAINTS AND OPPORTUNTIES

With a positive business climate and high quality of life, the Nashville region's steady employment and household expansion supports a healthy climate for retail growth. As Nashville has recruited major national corporations in the office and industrial sectors, retail developers have clamored to provide facilities for retail goods and services close to new corporations and spin-off housing developments.

Retail growth is occurring in outlying suburban counties, including the Tri-County Study Area. The Hendersonville-Gallatin and Mount Juliet-Lebanon retail submarkets have taken advantage of this expansion and attracted a critical mass of shopping center development that continues to take shape.

The following table summarizes key conclusions regarding the strengths, constraints, and opportunities related to the potential for new retail development in the Tri-County study area.

Strengths	Constraints	Opportunities
▪ Attraction of major employers continues to lead to spin-off demand for retail goods and services ▪ Low vacancy rates and strong developer interest in Tri-County Study Area indicates solid demand for new space	▪ Certain retail product types (e.g. traditional malls) have fallen out of favor	▪ Retain high quality of life with amenity-rich mixed-use retail, housing, and employment centers ▪ Build off critical mass of retail space present in Hendersonville-Gallatin and Mt Juliet-Lebanon ▪ Recruit retailers in advance of construction

3.4 residential market

RESIDENTIAL MARKET OVERVIEW

The consulting team analyzed the residential market at the Nashville MSA level and Tri-County Study Area level. The study area residential market included Robertson, Sumner and Wilson counties, the boundaries synonymous with county lines.

Assessing residential development activity in the Nashville region and Tri-County Study Area offers a benchmark with which to predict future demand for residential units in Robertson, Sumner, and Wilson Counties, which may be incorporated in the transportation and land use planning growth alternatives.

KEY FINDINGS

- Residential development in Tri-County Study Area is concentrated in Hendersonville-Gallatin and Mt. Juliet areas
- Home values range from $200,000 to over $450,000, revealing a variety of housing sizes and types that create appeal for many different markets
- Lakefront development and communities on golf courses are most valued amenities and tend to be highest priced properties.

Exhibit 3-30: Residential Market Profile – Tri-County Study Area and Nashville MSA 2007

	Robertson County	Sumner County	Wilson County	Total Study Area	Nashville MSA	Study Area as % of MSA
Total Housing Units	20.995	51,657	42,518	129,073	634,482	20.3%
Owner-Occupied Units	18,509	44,766	32,909	96,159	406,703	23.6%
Renter-occupied units	5,370	13,731	7,228	26,331	187,807	14.0%
Vacant Units	1,099	3,079	2,381	6,583	39,972	16.5%
Vacancy %	4.4%	5.0%	5.3%	5.1%	6.3%	81.0%
Median home value (owner-occupied)	$155,333	$175,380	$197,556	$177,582	$172,910	102.7%
Median rent*	$391	$502	$479	$472	$517	91.3%
Single-Family %*	77.5%	76.5%	79.5%	77.7%	68.2%	113.9%
Multi-Family %*	9.9%	15.4%	9.3%	12.4%	25.3%	49.0%
Other Home Types %*	12.6%	8.1%	11.2%	9.9%	6.5%	152.3%

** 2000 Census Data*

Source: ESRI, BBPC, 2008

TRI-COUNTY HOUSING STOCK CHARACTERISTICS

The Tri-County Study Area housing stock represents roughly one-fifth of the Nashville MSA's housing stock. Median home values for owner-occupied units in the study area were slightly higher than home values for the MSA, although study area rents were slightly lower than in the region as a whole. Additionally, the study area displayed the following characteristics:

- An estimated total of 129,073 housing units were located within the Study Area in 2007;
- Approximately 75% are owner-occupied, 20% are renter-occupied, with the remaining units vacant;
- The 2007 median and average value of owner occupied housing units are $177,582 and $211,632, respectively;
- The 2000 median and average monthly costs of owner occupied housing units are $1,033 and $1,127, respectively;
- The 2000 median and average gross rents with utilities are $472 and $579 per month, respectively;
- In 2000, 78% of the housing units in the Study Area are single-family units – 76% are single-family detached homes and 2% are single-family attached homes; 12% of the housing units are located in multi-unit buildings; the remaining 10% of housing units are mobile homes or other types; and
- The median age of housing units in the Study Area in 2000 was 19 years (built in 1981).

RESIDENTIAL CONSTRUCTION ACTIVITY

Exhibit 3-31 shows the number of building permits issued in the Tri-County Study Area and Nashville MSA between 1996 and 2008. This provides insight into the general amount of residential construction activity occurring within the study area and the region.

Exhibit 3-31: Residential Building Permits by Type – Tri-County Study Area and Nashville MSA 1996-2008

	Total	Avg. Annual	% Distribution
Robertson County			
Single-Family Units	6,353	578	94.2%
Multi-Family Units	390	35	5.8%
Subtotal	6,743	613	100.0%
Sumner County			
Single-Family Units	15,136	1,376	89.7%
Multi-Family Units	1,746	159	10.3%
Subtotal	16,882	1,535	100.0%
Wilson County			
Single-Family Units	12,202	1,109	90.3%
Multi-Family Units	1,304	119	9.7%
Subtotal	13,506	1,228	100.0%
Tri-County Study Area			
Single-Family Units	33,691	3,063	90.7%
Multi-Family Units	3,440	313	9.26%
Subtotal	37,131	3,376	100.00%
Nashville MSA			
Single-Family Units	121,524	11,048	83.2%
Multi-Family Units	24,591	2,236	16.8%
TOTAL	146,115	13,283	100.0%

Source: U.S Census Bureau, BBPC, 2008

Between 1996 and 2008, just over 37,00 residential building permits were issued in the Tri-County Study Area, representing 25% of the 146,000 building permits issued in the Nashville MSA over the same

period. Single-family permits represented 91% of the total in the study area, while they represented only 83% of residential permits in the MSA. This shows a trend for more suburban, single-family unit development in the study area as compared to the region.

The study area averaged roughly 3,400 permits per year, with almost half being issued in Sumner County (1,500 annually; 17,000 total from 1996 to 2008). Wilson was the next most active county for residential development, with about 1, permits issued on average per year and 14,000 being issued in total over the 12-year period. Robertson County had the most modest residential construction activity, representing under a fifth (18%) of issued permits in the study area (6,700 total), averaging only 600 residential permits per year.

RESIDENTIAL SUMMARY – STRENGTHS, CONSTRAINTS AND OPPORTUNTIES

The Tri-County Study Area is already capturing much of the Nashville' regions robust residential growth. Enhancement of amenities in the area (waterfront communities, golf courses, etc.) and increased retail development has created even greater demand in Sumner and Wilson counties, and to a lesser extent, Robertson County.

New residential growth is currently concentrated in the Hendersonville-Gallatin area in Sumner County and the Mt. Juliet area of Wilson County. Demand for further residential development exists, but the need for expanded infrastructure (roads, sewer, utilities, etc.) is a vital factor in facilitating increased future growth in the study area.

The following table summarizes key conclusions regarding the strengths, constraints, and opportunities related to the potential for new residential development in the Tri-County Study Area.

Strengths	Constraints	Opportunities
▪ Lakes and golf courses in Hendersonville/ Gallatin area provide appealing residential amenity ▪ Relatively short commute into Nashville from main cities and residential areas ▪ Range of home values provides variety of housing opportunities ▪ Substantial existing and new retail in study area to create greater demand for new residential development	▪ Infrastructure does not provide sufficient capacities for new residential in many high-growth areas ▪ Relatively less office space to support live-work environment within study area	▪ High-quality mixed-use development (residential/retail/office) could create even greater appeal for residential ▪ Anticipate infrastructure needs to maintain or reduce residential traffic ▪ Develop "aging in place" and senior communities to meet needs of aging population

4.0 FUTURE DEMAND ANALYSIS

The economic and demographic overview, as well as the overview of the office, industrial, retail and residential markets provides the foundation for conducting future development demand analysis. This first involves forecasting employment projections for the relevant development types (office, industrial, retail) and the number of households in the future (to determine the demand for residential development).

Next, the employment and household projections are used to determine the future potential demand for office, industrial, retail, industrial and residential development in terms of square footage. This provides a general idea of future development potential in the Tri-County Study Area that will provide a basis for alternative growth scenarios provided later in the *Tri-County Transportation & Land Use Study*.

4.1 employment and household growth projections

Using the data from the economics & demographics and industry & labor sections above and 2008-2035, employment and household growth projections were made from 2008 to 2035. These projections were broken into two time periods – 2008-2020 and 2020-2035 – to distinguish between near-term and longer-term employment and household growth.

Employment was broken into three categories: office, industrial and retail. The projections for these categories were computed by assigning percentages of employment from Woods & Poole's employment categories into office, industrial and retail classifications based on industry standards and assumptions.[9]

KEY FINDINGS

- Wilson County is projected to experience the most growth in office, industrial and retail employment in the Tri-County Study Area (both in terms of number of new jobs and percentage growth) from 2008 to 2035, making it the main potential generator for future employment growth in the study area.
- Sumner County is projected to experience the second highest growth rate in office and industrial employment in terms of both number of jobs and percentage growth.
- Robertson County is projected to experience the second highest growth rate in retail employment (1.9% annually), although Sumner County is projected to add more retail jobs overall (3,900) from 2008 to 2035.
- Sumner County is expected have the largest increase in households (30,000), but Wilson County is projected to have the highest household growth rate in (2.2% annually).

[9] The specific breakdown according to the Woods & Poole employment category is as follows: *Office Employment*: 20% Transportation, Communication & Public Utilities; 100% Financial, Insurance & Real Estate; 33% Services. *Industrial Employment*: 100% Construction; 100% Manufacturing; 80% Transportation, Communications & Public Utilities; 100% Wholesale Trade; 33% Services. *Retail Employment*: 100% Retail Trade.

- Growth trends in the study area and Nashville MSA are similar for all three employment categories and households, with greater growth occurring in the short-term (2008-2020) and then decreasing in the longer-term period (2020-2035).

OFFICE EMPLOYMENT

Office, industrial and retail employment was designated by breaking down the industry categories displayed in the industry & labor section into these three employment categories corresponding with the three development types. The categories were broken down based on industry and market standards used in prior studies. Projections were based on Woods & Poole employment projections from 2008 to 2035, broken into two time periods – 2008-2020 and 2020-2035.

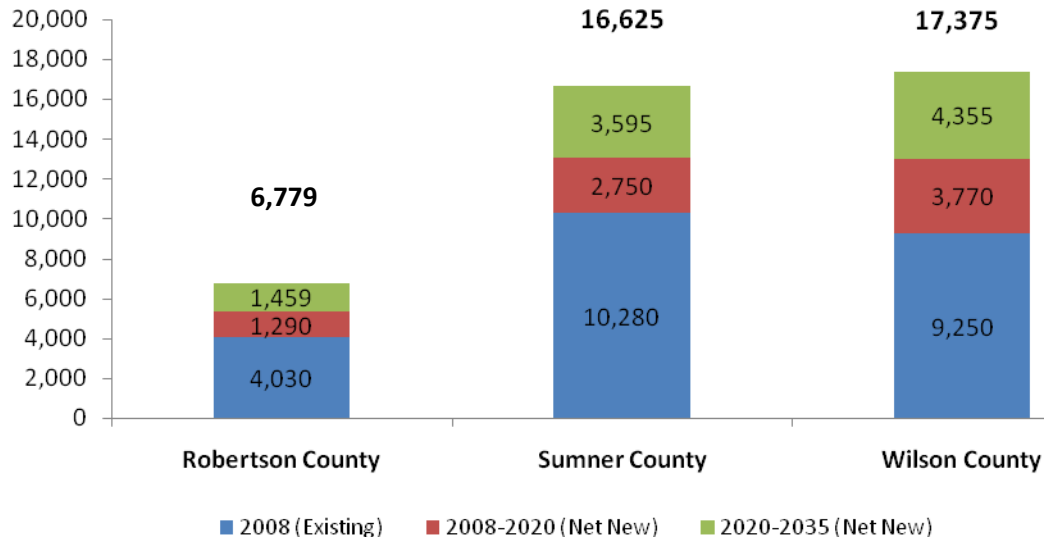
Exhibit 4-1: Projected Office Employment – Tri-Counties 2008 – 2035

County	Forecast			% Annual Growth (2008- 2020)	% Annual Growth (2020- 2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Robertson County	4,030	5,320	6,780	2.34%	1.63%	2,750	1.94%
Sumner County	10,280	13,030	16,630	2.00%	1.64%	6,350	1.80%
Wilson County	9,250	13,020	17,380	2.89%	1.94%	8,130	2.36%
Tri-County Study Area	23,560	31,370	40,780	2.41%	1.76%	17,220	2.05%
Nashville MSA	226,410	287,670	367,870	2.02%	1.65%	141,460	1.81%

Source: Woods and Poole, BBPC, 2008

Exhibit 4-1, 4-2 and 4-3 show the projected office employment for three counties of the Tri-County Study Area in comparison to the Nashville MSA from 2008-2035. The compound annual growth rate for office employment in the study area (2.05%) is projected to be higher than that of the MSA (1.81%), showing relatively strong potential for future office employment growth in the Tri-County area. Both the study area and MSA are projected to have higher annual growth in the near-term (2008-2020) than in the longer-term (2020-2035).

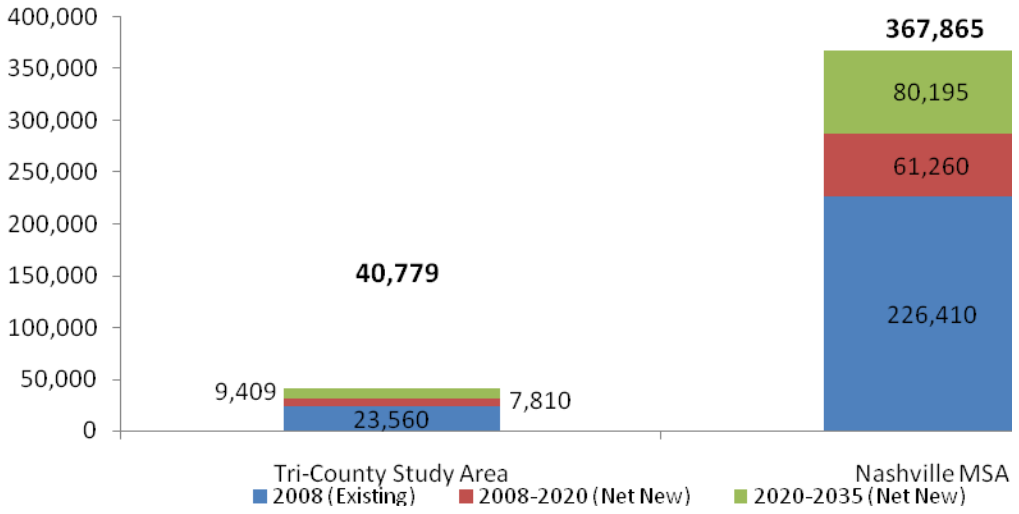
Exhibit 4-2: Projected Office Employment – Robertson, Sumner and Wilson Counties 2008 - 2035



Source: Woods and Poole, BBPC, 2008

The most growth within the Tri-County Study Area is expected in Wilson County (6,620 new office jobs) followed by Sumner County (5,170 new office jobs). Robertson County is expected to have relatively less growth over the 22-year period (2,240 new office jobs). More growth is expected to occur in the near term (2008-2020) in all counties, with the study area averaging 2.41% compound annual growth in the 2008-2020 period and 1.83% in the 2020-2035 period.

Exhibit 4-3: Projected Office Employment – Tri-County Study Area and Nashville MSA 2008 - 2035



Source: Woods and Poole, BBPC, 2008

INDUSTRIAL EMPLOYMENT

Exhibit 4-4 and 4-5 show the projected industrial employment for three counties of the Tri-County Study Area in comparison to the Nashville MSA from 2008-2035. The annual growth rate for industrial employment in the study area (1.7%) is projected to be higher than that of the MSA (1.4%), showing relatively strong potential for future industrial employment growth in the Tri-County area. Both the study area and MSA are projected to have higher annual industrial employment growth in the near-term (2008-2020) than in the longer-term (2020-2035).

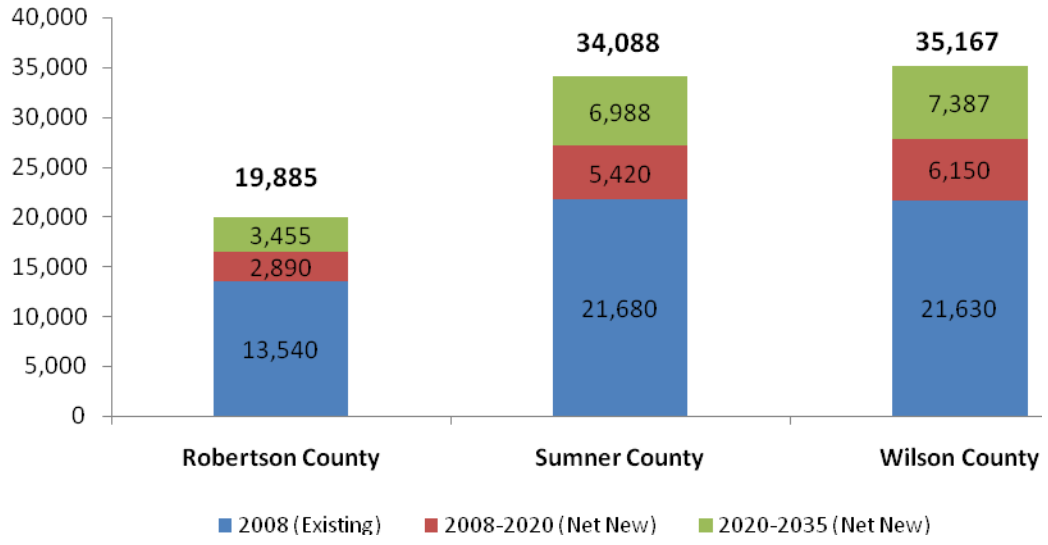
Exhibit 4-4: Projected Industrial Employment – Tri-Counties and Nashville MSA 2008 – 2035

County	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020- 2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Robertson County	13,540	16,430	19,890	1.63%	1.28%	6,350	1.43%
Sumner County	21,680	27,100	34,090	1.88%	1.54%	12,410	1.69%
Wilson County	21,630	27,780	35,170	2.11%	1.58%	13,540	1.82%
Tri-County Study Area	56,850	71,310	89,140	1.91%	1.50%	32,290	1.68%
Nashville MSA	377,090	450,790	546,050	1.50%	1.29%	168,960	1.38%

Source: Woods and Poole, BBPC, 2008

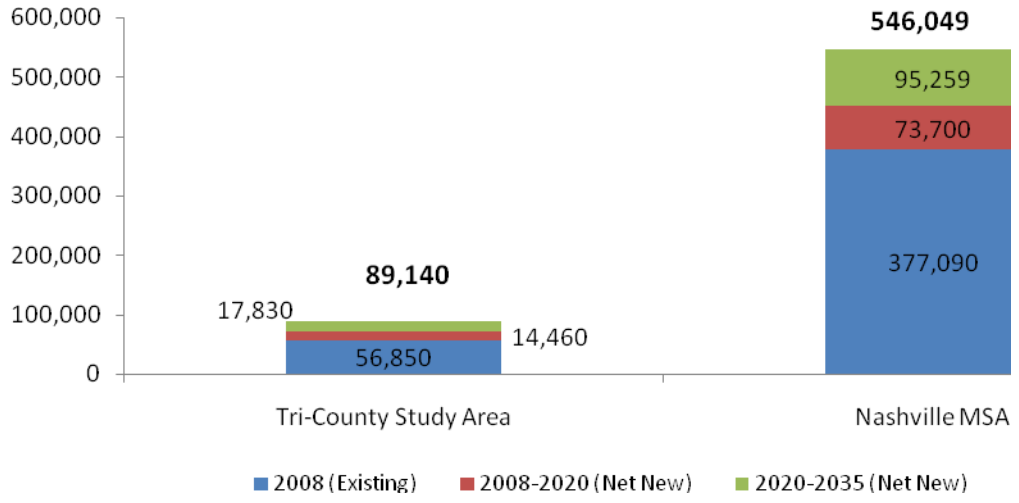
The most growth within the Tri-County Study Area is projected in Wilson County (13,540 new industrial jobs) followed by Sumner County (12,410 new industrial jobs). Robertson County is projected to have somewhat less growth over the 27-year period (6.350 new industrial jobs). More growth is expected to occur in the near term (2008-2020) in all counties, with the study area averaging 1.91% annual growth in the 2008-2020 period and 1.50% in the 2020-2035 period.

Exhibit 4-5: Projected Industrial Employment – Robertson, Sumner and Wilson Counties 2008 - 2035



Source: Woods and Poole, BBPC, 2008

Exhibit 4-6: Projected Industrial Employment – Tri-County Study Area and Nashville MSA 2008 - 2035



Source: Woods and Poole, BBPC, 2008

RETAIL EMPLOYMENT

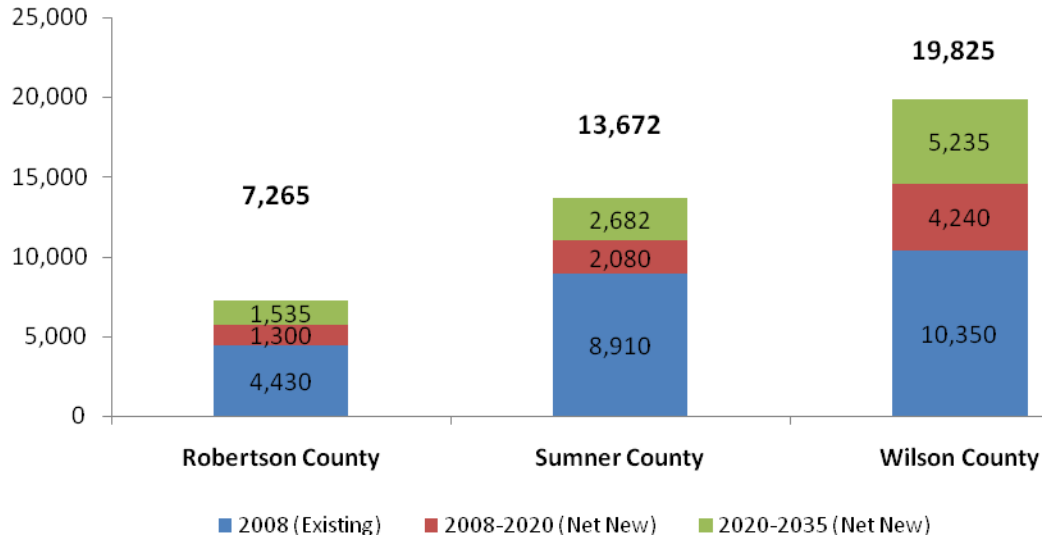
Exhibit 4-7 and 4-8 show the projected retail employment for three counties of the Tri-County Study Area in comparison to the Nashville MSA from 2008-2035. The compound annual growth rate for retail employment in the study area (2.0%) is projected to be higher than that of the MSA (1.5%), showing relatively strong potential for future retail employment growth in the Tri-County area. Both the study area and MSA are projected to have higher annual retail employment growth in the near-term (2008-2020) than in the longer-term (2020-2035).

Exhibit 4-7: Projected Retail Employment – Tri-Counties and Nashville MSA 2008 – 2035

County	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020- 2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Robertson County	4,430	5,730	7,270	2.17%	1.59%	2,840	1.85%
Sumner County	8,910	10,990	13,670	1.76%	1.47%	4,760	1.60%
Wilson County	10,350	14,590	19,830	2.90%	2.06%	9,480	2.44%
Tri-County Study Area	23,690	31,310	40,760	2.35%	1.77%	17,070	2.03%
Nashville MSA	173,450	211,270	260,190	1.66%	1.40%	86,740	1.51%

Source: Woods and Poole, BBPC, 2008

Exhibit 4-8: Projected Retail Employment – Robertson, Sumner and Wilson Counties 2008 - 2035

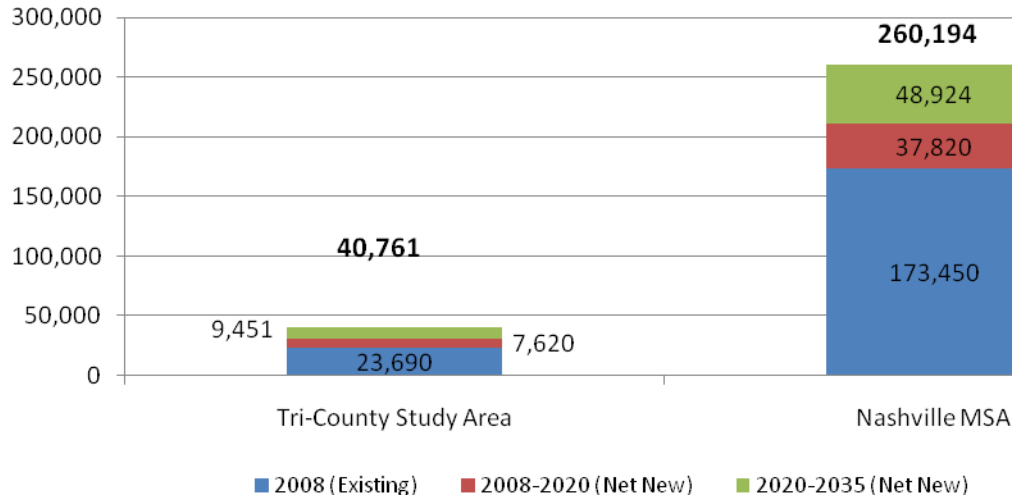


Source: Woods and Poole, BBPC, 2008

The most growth within the Tri-County Study Area is projected in Wilson County (9,480 new retail jobs) followed by Sumner County (4,760 new retail jobs). Robertson County is projected to have

somewhat less growth over the 27-year period (2,840 new retail jobs), but at a higher compound annual rate of growth than Sumner County (1.9% compared to 1.6%). More growth is expected to occur in the near term (2008-2020) in all counties, with the study area averaging 2.4% compound annual growth in the 2008-2020 period and 1.8% in the 2020-2035 period.

Exhibit 4-9: Projected Retail Employment – Tri-County Study Area and Nashville MSA 2008-2035



Source: Woods and Poole, BBPC, 2008

HOUSEHOLDS

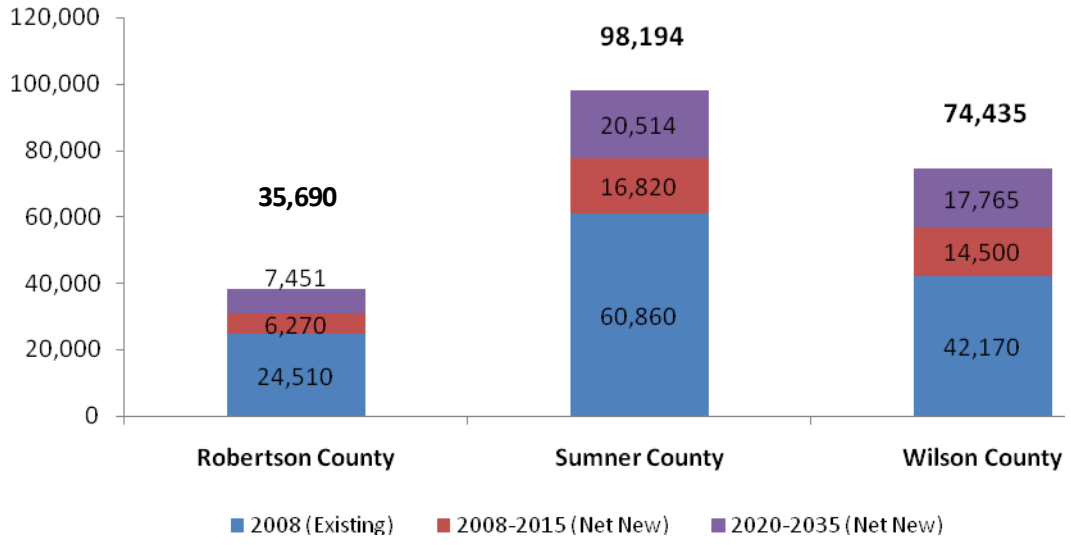
Future household growth projections were based on Woods & Poole household growth projections from 2008 to 2035. The projections were divided into two time periods – 2008-2020 and 2020-2035. Exhibits 4-10, 4-11 and 4-12 show projected household growth for the three counties of the Tri-County Study Area in comparison to the Nashville MSA from 2008-2035.

Exhibit 4-10: Projected Households – Tri-Counties 2008 – 2035

County	Forecast			% Annual Growth (2008-2020)	% Annual Growth (2020-2035)	Net Change (2008-2035)	% Annual Growth (2008- 2035)
	2008	2020	2035				
Robertson County	24,510	30,780	38,230	1.92%	1.46%	13,720	1.66%
Sumner County	60,860	77,680	98,190	2.05%	1.57%	37,330	1.79%
Wilson County	42,170	56,670	74,440	2.49%	1.83%	32,270	2.13%
Tri-County Study Area	127,540	165,130	210,860	2.18%	1.64%	83,320	1.88%
Nashville MSA	604,550	747,850	915,970	1.79%	1.36%	311,420	1.55%

Source: Woods and Poole, BBPC, 2008

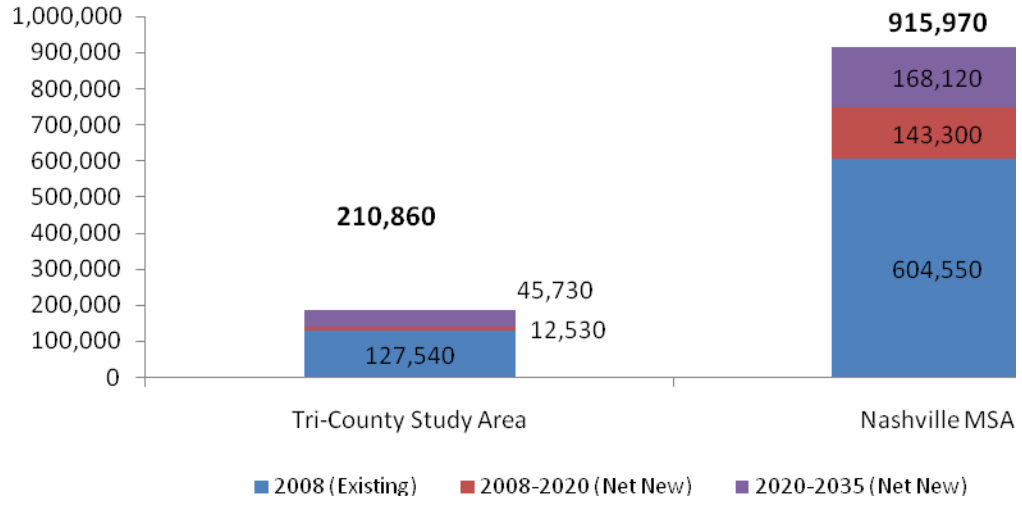
Exhibit 4-11: Projected Households – Robertson, Sumner and Wilson Counties 2008 - 2035



Source: Woods and Poole, BBPC, 2008

The compound annual growth rate for households in the study area (1.9%) is projected to be higher than that of the MSA (1.6%), showing relatively strong potential for future household growth in the Tri-County area. Both the study area and MSA are projected to have higher annual household growth in the near-term (2008-2020) than in the longer-term (2020-2035).

Exhibit 4-12: Projected Households – Tri-County Study Area and Nashville MSA 2008 - 2035



Source: Woods and Poole, BBPC, 2008

4.2 projected development demand

Based on the employment and household growth projections from Section 4.1, the consulting team calculated the projected demand for office, industrial, retail and residential development in the Tri-County Study Area and Nashville MSA from 2008-2035. Employment projections were converted into square footage of demand based on industry standards and assumptions of square footage require per employee.[10]

The projections were broken down into two time periods – 2008-2020 and 2020-3035. This was done to show the near-term demand for the different types of development and longer-term demand resulting after 2020. These projections will provide a basis for the alternative growth models presented later in the plan.

KEY FINDINGS

- Future demand for new office space in the Tri-County Study Area from 2008 to 2035 is moderate at 160,000 square feet per year (3.5 million square feet total), representing 12% of the total projected new office demand for the Nashville MSA.
- Wilson County is projected to have the most future demand for new office space in the study area, with the potential to add 75,000 square feet per year from 2008 to 2030 for a total of 1.7 million square feet of new demand over the 22-year period (49% of new office demand for the study area).
- Future demand for new industrial space in the study area is projected to be robust, with 9.2 million square feet of new demand from 2008 to 2030 (420,000 square feet per year), representing 19% of total future demand for new industrial space in the MSA.
- Wilson County is projected to have the most future demand for new industrial space from 2008 to 2030, with potential to add 175,000 square feet per year (3.9 million square feet total), followed by Sumner County, with the potential to add 160,000 square feet per year (3.5 million square feet total).
- Demand for new retail space in the study area is projected to strong, with opportunities for approximately 210,000 square feet per year from 2008 to 2030, representing 20% of the total projected demand for new retail in the Nashville MSA.
- The potential future demand for new residential development is very robust for the Tri-County Study Area; while the study area comprises about 21% of the MSA population, it is projected to represent 27% of the region's future demand for new residential units.
- Projected demand for new residential units is particularly strong in Sumner and Wilson counties, with the potential for 2.8 million new square feet per year and 2.4 million new square feet per year, respectively (potentially increasing both counties' housing stocks about 60% by 2030).

PROJECTED OFFICE DEVELOPMENT DEMAND 2008-2035

[10] *Office*: 250 square feet/employee; *Industrial*: 350 square feet/employee; *Retail*: 333 square feet/employee.

Trends for the overall 2008-2035 period generally followed those of the short-term and long-term periods, with Wilson County having the greatest projected demand for new office space (2.0 million square feet overall and 75,000 square feet annually, followed by Sumner County (1.6 million square feet overall and 59,000 square feet annually) and Robertson County (690,000 square feet overall and 25,000 square feet annually). Overall, the study area's projected demand for new office space (4.3 million square feet) represented 12% of the total MSA's projected new demand (35.5 million square feet).

Exhibit 4-13: New Office Space Demand Projections: 2008-2035

	Office Employment Growth Projection 2008-2035	Total Demand for Office Square 2008-2035	Annual Demand for Office Space (SF) 2008-2035
Robertson County	2,750	687,500	25,455
Sumner County	6,350	1,586,500	58,750
Wilson County	8,130	2,031,000	75,227
Tri-County Study Area	**17,220**	**4,300,000**	**159,432**
Nashville MSA	**141,460**	**35,500,000**	**1,309,773**

Source: Woods and Poole, BBPC, 2008

Overall projected demand for office space from 2008 to 2020 was 2 million square feet for the Tri-County Study Area and 15.3 million square feet for the Nashville MSA (Exhibit 4-14). This translated into 163,000 square feet of demand for the study area annually and 1.3 million square feet for the MSA. Within the study area, Wilson County was projected to have the most demand for office space over the 12-year period (over 940,000 overall and 79,000 square feet annually), followed by Sumner County (690,000 square feet overall and 57,000 square feet annually).

Exhibit 4-14: New Office Space Demand Projections: 2008-2020

	Office Employment Growth Projection 2008-2020	Total Demand for Office Space (SF) 2008-2020	Annual Demand for Office Space (SF) 2008-2020
Robertson County	1,290	322,500	26,880
Sumner County	2,750	687,500	57,290
Wilson County	3,770	942,500	78,540
Tri-County Study Area	**7,810**	**1,952,500**	**162,710**
Nashville MSA	**61,260**	**15,315,000**	**1,276,250**

Source: Woods and Poole, BBPC, 2008

From 2020 to 2035, the annual demand for office space was larger than the 2008-2020 period for the Nashville MSA, but slightly lower for the Tri-County Study Area, showing that office space demand may slightly taper off in the long term. Wilson County is projected to have the most demand for new office space over the 2020-2035 period as well (1,088,500 square feet overall and 72,580 square feet annually), followed by Sumner County (899,000 square feet overall and 59,920 square feet annually) and Robertson County (365,000 square feet overall and 24,320 square feet annually).

Exhibit 4-15: New Office Space Demand Projections: 2020-2035

	Office Employment Growth Projection 2020-2035	Total Demand for Office Square 2020-2035	Annual Demand for Office Space (SF) 2020-2035
Robertson County	1,460	365,000	24,320
Sumner County	3,600	899,000	59,920
Wilson County	4,360	1,088,500	72,580
Tri-County Study Area	**9,400**	**2,350,000**	**156,810**
Nashville MSA	**80,200**	**20,049,000**	**1,336,590**

Source: Woods and Poole, BBPC, 2008

PROJECTED INDUSTRIAL DEVELOPMENT DEMAND 2008-2035

Trends for the overall 2008-2035 period generally followed those of the short-term and long-term periods, with Wilson County having the greatest projected demand for new industrial space (4.7 million square feet overall and 175,000 square feet annually, followed by Sumner County (4.3 million square feet overall and 160,000 square feet annually) and Robertson County (2.2 million square feet overall and 82,000 square feet annually). Overall, the study area's projected demand for new industrial space represented 19% of the total MSA's projected new demand.

Exhibit 4-16: New Industrial Space Demand Projections: 2008-2035

	Industrial Employment Growth Projection 2008-2035	Total Demand for Industrial Space 2008-2035	Annual Demand for Industrial Space (SF) 2008-2035
Robertson County	6,350	2,221,000	82,250
Sumner County	12,400	4,343,000	160,840
Wilson County	13,540	4,738,000	175,480
Tri-County Study Area	**32,290**	**11,301,500**	**418,570**
Nashville MSA	**168,960**	**59,135,500**	**2,190,200**

Source: Woods and Poole, BBPC, 2008

Overall projected demand for industrial space from 2008 to 2020 was 5 million square feet for the Tri-County Study Area and 25.8 million square feet for the Nashville MSA (Exhibit 4-17). This translated into 420,000 square feet of demand for the study area annually and 2.1 million square feet for the MSA. Within the study area, Wilson County was projected to have the most demand for industrial space over the 12-year period (2.2 million square feet overall and 180,000 square feet annually), followed by Sumner County (1.9 million square feet overall and 160,000 square feet annually).

Exhibit4-17: New Industrial Space Demand Projections: 2008-2020

	Industrial Employment Growth Projection 2008-2020	Total Demand for Industrial Space (SF) 2008-2020	Annual Demand for Industrial Space (SF) 2008-2020
Robertson County	2,890	1,011,500	84,292
Sumner County	5,420	1,897,000	158,083
Wilson County	6,150	2,152,500	179,375
Tri-County Study Area	**14,460**	**5,061,000**	**421,750**
Nashville MSA	**73,700**	**25,795,000**	**2,149,583**

Source: Woods and Poole, BBPC, 2008

From 2020 to 2035, the annual demand for industrial space was lower than the 2008-2020 period for the Nashville MSA (33.3 million) and the Tri-County Study Area (6.2 million), showing that industrial space demand may slightly taper off in the long term. Wilson County is projected to have the most demand for new industrial space over the 2020-2035 period as well (2.6 million square feet overall and 172,000 square feet annually), followed closely by Sumner County (2.4 million square feet overall and 163,000 square feet annually) and Robertson County (1.2 million square feet overall and 80,000 square feet annually).

Exhibit 4-18: New Industrial Space Demand Projections: 2020-2035

	Industrial Employment Growth Projection 2020-2035	Total Demand for Industrial Space (SF) 2020-2035	Annual Demand for Industrial Space (SF) 2020-2035
Robertson County	3,460	1,209,500	80,620
Sumner County	6,990	2,446,000	163,050
Wilson County	7,390	2,585,500	172,360
Tri-County Study Area	**17,830**	**6,240,500**	**416,020**
Nashville MSA	**95,260**	**33,340,500**	**2,222,700**

Source: Woods and Poole, BBPC, 2008

PROJECTED RETAIL DEVELOPMENT DEMAND 2008-2035

Trends for the overall 2008-2035 period generally followed those of the short-term and long-term periods, with Wilson County having the greatest projected demand for new retail space (3.1 million square feet overall and 117,000 square feet annually, followed by Sumner County (1.6 million square feet overall and 59,000 square feet annually) and Robertson County (944,000 square feet overall and 35,000 square feet annually). Overall, the study area's projected demand for new retail space represented 20% of the total MSA's projected new demand.

Exhibit 4-19: New Retail Space Demand Projections: 2008-2035

	Retail Employment Growth Projection 2008-2035	Total Demand for Retail Space (SF) 2008-2035	Annual Demand for Retail Space (SF) 2008-2035
Robertson County	2,840	944,000	34,970
Sumner County	4,760	1,585,500	58,730
Wilson County	9,480	3,155,000	116,850
Tri-County Study Area	**17,070**	**5,685,000**	**210,550**
Nashville MSA	**86,740**	**28,885,500**	**1,069,840**

Source: Woods and Poole, BBPC, 2008

Overall projected demand for retail space from 2008 to 2020 was 2.5 million square feet for the Tri-County Study Area and 12.6 million square feet for the Nashville MSA (Exhibit 4-20). This translates into 210,000 square feet of demand for the study area annually and 1 million square feet for the MSA. Within the study area, Wilson County was projected to have the most demand for retail space over the 12-year period (1.4 million square feet overall and 110,000 square feet annually), followed by Sumner County (690,000 square feet overall and 60,000 square feet annually).

Exhibit 4-20: New Retail Space Demand Projections: 2008-2020

	Retail Employment Growth Projection 2008-2020	Total Demand for Retail Space (SF) 2008-2020	Annual Demand for Retail Space (SF) 2008-2020
Robertson County	1,300	432,900	36,075
Sumner County	2,080	692,640	57,720
Wilson County	4,240	1,411,920	117,660
Tri-County Study Area	**7,620**	**2,537,460**	**211,455**
Nashville MSA	**37,820**	**12,594,060**	**1,049,505**

Source: Woods and Poole, BBPC, 2008

From 2020 to 2035, the annual demand for retail space was lower than the 2008-2020 period for the Nashville MSA (16.3 million square feet) and the Tri-County Study Area (3.1 million square feet), showing that retail space demand may slightly taper off in the long term. Wilson County is projected to have the most demand for new retail space over the 2020-2035 period as well (1.7 million square feet overall and 116,000 square feet annually), followed by Sumner County (893,000 square feet overall and 60,000 square feet annually) and Robertson County (511,000 square feet overall and 34,000 square feet annually).

Exhibit 4-21: New Retail Space Demand Projections: 2020-2035

	Retail Employment Growth Projection 2020-2035	Total Demand for Retail Space (SF) 2020-2035	Annual Demand for Retail Space (SF) 2020-2035
Robertson County	1,540	511,000	34,080
Sumner County	2,680	893,000	59,540
Wilson County	5,240	1,743,000	116,210
Tri-County Study Area	**9,450**	**3,147,000**	**209,820**
Nashville MSA	**48,920**	**16,291,500**	**1,086,110**

Source: Woods and Poole, BBPC, 2008

PROJECTED RESIDENTIAL DEVELOPMENT DEMAND 2008-2035

Trends for the overall 2008-2035 period generally followed those of the short-term and long-term periods, with Sumner County having the greatest projected demand for new residential units (76.1 million square feet overall and 2.8 million square feet annually), followed by Wilson County (65.8 million square feet overall and 2.4 million square feet annually) and Robertson County (27.9 million square feet overall and 1 million square feet annually). Overall, the study area's projected demand for new residential units (169.9 million square feet) represents 27% of the total MSA's projected new demand (635.3 million square feet) from 2008 to 2035.

Exhibit 4-22: New Residential Unit Demand Projections in SF: 2008-2035

	Household Growth Projection 2008-2035	Total Demand for Residential Units (SF) 2008-2035	Annual Demand for Residential Units (SF) 2008-2035
Robertson County	13,720	27,990,500	1,036,690
Sumner County	37,330	76,160,500	2,820,760
Wilson County	32,270	65,820,500	2,437,800
Tri-County Study Area	**83,320**	**169,972,000**	**6,295,260**
Nashville MSA	**311,420**	**635,298,000**	**23,529,550**

Assumes 80 percent of new units are single-family detached with an average size of 2,300 SF, and 20 percent of new units are multi-family or attached units with an average size of 1,000 SF, based on national size standards provided by the National Association of Home Builders
Source: Woods and Poole, BBPC, 2008

Overall projected demand for new residential development from 2008 to 2020 was 76.7 million square feet for the Tri-County Study Area and 292 million square feet for the Nashville MSA (Exhibit 4-23). This translates into 6.4 million square feet for the study area annually and 24.4 million square feet for the MSA. Within the study area, Sumner County is projected to have the most demand for new housing over the 12-year period (34.3 million square feet overall and 2.9 million square feet annually), followed by Wilson County (29.6 million square feet overall and 2.5 million square feet annually).

Exhibit 4-23: New Residential Unit Demand Projections in SF: 2008-2020

	Household Growth Projection 2008-2020	Total Demand for Residential Development (SF) 2008-2020	Annual Demand for Residential Units (SF) 2008-2020
Robertson County	6,270	12,790,800	1,065,900
Sumner County	16,820	34,312,800	2,859,400
Wilson County	14,500	29,580,000	2,465,000
Tri-County Study Area	**37,590**	**76,683,600**	**6,390,300**
Nashville MSA	**143,300**	**292,332,000**	**24,361,000**

Assumes 80 percent of new units are single-family detached with an average size of 2,300 SF, and 20 percent of new units are multi-family or attached units with an average size of 1,000 SF, based on national size standards provided by the National Association of Home Builders
Source: Woods and Poole, BBPC, 2008

From 2020 to 2035, the annual demand for new residential units is projected to be lower than the 2008-2020 period for the Nashville MSA (22.8 million square feet) and the Tri-County Study Area (6.2 million square feet), showing that demand for new residential development may slightly taper off in the long term. Sumner County is also projected to have the most demand for new residential units over the 2020-2035 period (41.8 million square feet overall and 2.8 million square feet annually), followed by Wilson County (36.2 million square feet overall and 2.4 million square feet annually) and Robertson County (15.2 million square feet overall and 1 million square feet annually).

Exhibit 4-24: New Residential Unit Demand Projections in SF: 2020-2035

	Household Growth Projection 2020-2035	Total Demand for Residential Development (SF) 2020-2035	Annual Demand for Residential Units (SF) 2020-2035
Robertson County	7,450	15,200,000	1,013,320
Sumner County	20,510	41,848,000	2,789,860
Wilson County	17,770	36,240,500	2,416,040
Tri-County Study Area	**45,730**	**93,288,000**	**6,219,220**
Nashville MSA	**168,120**	**342,966,000**	**22,864,380**

Assumes 80 percent of new units are single-family detached with an average size of 2,300 SF, and 20 percent of new units are multi-family or attached units with an average size of 1,000 SF, based on national size standards provided by the National Association of Home Builders
Source: Woods and Poole, BBPC, 2008

APPENDIX C

Local Plans & Regulations Inventory

Tri-County Transportation and Land Use Study

Local Plans & Regulations Inventory

Local Plans & Regulations Inventory

	Future Land Use or Comprehensive Plan	Growth Management Plan (UGB)	Vision Plan, Statement	Downtown or Town Center Master Plan	Small Area, Corridor Plans/Study	Streetscape Plan	Major Thoroughfare Plan	Bike-Ped Plan and/or Greenway Plan	Design Standards	Zoning Ordinance	Subdivision Regulations	Historic Districts, Preservation Guidelines	Other
ROBERTSON COUNTY			●							●	●		Blueprint for America (AIA), Cost of Community Services Study
Adams													
Cedar Hill													
Coopertown										●	●		
Cross Plains													
Greenbrier													
Orlinda													
Ridgetop													
Springfield		●	●									●	Blueprint for America (AIA)
SUMNER COUNTY	●									●	●		
Gallatin	●	●		●	●		●	●		●	●	●	Transit Feasibility Study
Goodlettsville						●	●	●	●	●	●		Commercial Core Overlay Ordinance, Landscape Ordinance
Hendersonville	●	●	●	●			●	●	●	●	●		
Millersville										●	●		
Mitchellville													
Portland	●	●			●			●		●	●		
Westmoreland													
White House	●						●	●	●	●	●		
WILSON COUNTY	●	●						●		●	●		Public Facilities Ordinance, Cell Tower Policy, Flood Ordinance
Lebanon	●	●	●		●		●	●		●	●		School Program, Walkability/Bikabilitiy Survey (online)
Mt. Juliet	●	●		●						●	●		
Watertown		●						●		●	●	●	

Note: Unincorporated communities, such as Walnut Grove in Sumner County, and Census Designated Places, such as Rural Hill in Wilson County, are not included in this inventory.

APPENDIX D

Measures of Effectiveness Summary

Tri-County CV MOEs Summary Matrix

				Selection Fators for Tri-County Study			
Regional Goal	**Measure of Effectiveness**	**Description**	**Unit of Analysis**	**Data Available / Usable Format**	**Relevant to Measuring Performance of Goals**	**Allows Comparison Between Alternatives**	**In or Out for Tri-County Study**
Goal 2: Recongize and support the important role of agriculture in both the existing and future economy.	Amount of Agricultture Land Consumed	The amount of prime agricultural land lost to new urban or suburban development. Prime agricultural land is defined by the USDA Soil Survey.	Acres	Yes	Yes	Yes	In
Goal 3: Preserve areas intended to retain a rural character or way of life and reinforce preservation through plans, programs, and policies.	Rural Preservation	The percent of land area in the study area coded either rural or conservation. Statistics may be reported by defined geography.	Acres	Yes	Yes	Yes	In
	Urban Footprint	The total number of acres allocated with urban or suburban development (either residential or non-residential) for a specific planning horizon year. Urban and suburban development is represented by the following character areas: suburban, general urban, traditional town center, village center, employment center, activity center, and transit oriented development. Statistics may be reported by defined geography.	Acres	Yes	Yes	Yes	In
Goal 4: Enhance economic grwoth and opportunities in the study area to ensure a high quality-of-life remains for the population living in the study area.	Jobs / Housing Concentration	The percentage of employees and residents allocated within the influence area of an activity node compared to the rest of the study area. Activity nodes are represented by the following character areas: traditional town center, village center, activity center, and transit-oriented development. Statistics may be reported by land use category or defined geography.	Percentage	Yes	Yes	Yes	In
	Percent of Income Spent on Transportation	An estimate for the percentage of household income spent on transportation in the study area. Transportation expenditures are estimated using information published by the US Bureau of Labor Statistics, *Consumer Expenditures Survey (2007 Data)* . Expenditure information is published for three development patterns: central city, other urban, and rural. Development patterns will be represented by character areas as follows: central city (traditional town center, village center, activity center, and transit-oriented development), other urban (suburban, general urban, and employment center), and rural (conservation and rural). Statistics may be reported by defined geography.	Dollars	Yes	Yes	Yes	In
	Population Density	The number of people allocated per acre of land in the allocated area. Statistic may be reported by land use category or defined geography.	Residents per Acre	Yes	Yes	Yes	In
	Employment Density	The number of employees allocated per acre of land in the allocated area. Statistic may be reported by land use category or defined geography.	Employees per Acre	Yes	Yes	Yes	In
Goal 6: Identify and protect the most critical natural resources that exist in the study area.	Encroachment on Protected Open Space	The proximity of allocated development to protected land designed in the study area. Impacts are reported as the number of new acres of development within ____ feet of protected land (i.e., conservation character area).	Acres	Yes	Yes	Yes	In

Tri-County CV MOEs Summary Matrix

Goal 7: Provide for the efficient movement of persons, goods, and services while providing a wide range of transportation choices for the study area.	Congested Corridors	Congested corridors in the study area are represented by a volume to capacity ratio greater than 1.0. Roads included in the measurement for congested corridors will be those in the Nashville Area Regional Travel Demand Model. Statistics will be reported as the percent of roads in the study area over capacity compared to all of the roads in the study area.	Percentage	Yes	Yes	Yes	In
	Vehilce Miles Traveled per Capita	The number of vehicle miles traveled per capita reflects the reliance on the automobile for individuals' mobility within the study area. It reflects the number of vehicle trips and the length of those trips summed over the entire road network. VMT per capita is a good indicator of changes in travel demand associated with different development scenarios. Vehicle miles traveled per capita will be measured using the Nashville Area Regional Travel Demand Model and post processing of model results developed for each development scenario.	Vehiles Miles Traveled per Capita	Yes	Yes	Yes	In
	Average Trip Length	The average trip length (in miles or minutes) reported for each trip purpose included in the regional travel demand model. The overall average trip length for all trip purposes in the model will be reported for the study area.	Miles / Minutes	Yes (w/ KHA script)	Yes	Yes	Pending
	Action Required: KHA is willing to share with MPO staff a script for calculating average trip length in TransCAD. MPO staff will need to modify slightly the script to work with the local model (i.e., change file input names, etc.). KHA is avaialble to answer questions if MPO staff wants to modify the script for the local model.						
	Transit Rider Concentration to Bus Routes	The percentage of employees and residents allocated within one quarter mile of an existing or proposed bus corridor compared to the rest of the study area. Future transit corridors will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.	Percentage	Yes	Yes	Yes	In
	Transit Rider Concentration to Bus and Rail Stops	The percentage of employees and residents allocated within one quarter mile of an existing or proposed bus or rail stop compared to the rest of the study area. Future bus and rail stops will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.	Percentage	Yes	Yes	Yes	In
Goal 8: Ensure that future growth in the study area occurs in a coordinated manner with community infrastrucuture and services needed to adequately support growth and development.	Demand for Potable Water	Demand for potable water generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by utility service area.	Dwelling Units & Non-Residential Square Feet	No	Yes	Yes	Pending
	Action Required: Collect water utility service boundaries from local providers. Tag all parcels in the study area for water utility service area.						

Tri-County CV MOEs Summary Matrix

	Demand for Sanitary Sewer	Demand for sanitary sewer generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by utility service area.	Dwelling Units & Non-Residential Square Feet	No	Yes	Yes	Pending
	Action Required: Collect sewer utility service boundaries from local providers. Tag all parcels in the study area for sewer utility service area.						
	Demand for New Schools	Demand for new schools generated by development types, patterns, and intensities assumed for the study area. Information is reported in students. Statistics can be reported by school attendance boundary or other defined geography.	Students	No	Yes	Yes	Pending
	Action Required: Collect school district and school attendance boundaries from local school districts in the study area. Tag all parcels in the study area for school district and school attendance boundary. Collect generation rates for new students by school district.						
	Demand for Fire Protection	Demand for fire protection generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by fire station service area.	Dwelling Units & Non-Residential Square Feet	No	Yes	Yes	Pending
	Action Required: Collect fire service district boundaries from local fire departments. Tag all parcels in the study area for fire station service area. Coordinate with local fire chief(s) to ensure MOE is useful under NFPA Station 1710.						
	Demand for Police Protection	Demand for police protection generated by new population in the study area. Information is reported as the number of new sworn officers per 1,000 people needed to maintain the current service delivery standard. Statistics may be reported by a defined geography.	New Sworn Officers	No	Yes	Yes	Pending
	Action Required: Confirm partrol jurisdiction with police and sheriff departments in the study area. Tag all parcels in the study area for police or sheriff jurisdiction. Coordinate with local police and sheriff departments to develop current service delivery rates (i.e., number of sworn officers per 1,000 people).						
	Demand for New Park Land	Demand for new parkland generated by new population in the study area. Information is reported as the number of acres per 1,000 people needed to maintain the current service delivery standard. Statistics may be reported by a defined geography.	Acres	Yes	Yes	Yes	In
Goal 9: Provide a wide range of housing types and communities for a variety of household sizes and income ranges.	Housing Mix	Housing mix reflects the share of single family and multi-family dwelling units allocated within the study area for a specific planning horizon. Single family dwelling units are assumed in the following future land use categories: open space, agriculture, single family, residential, and mixed use (30%). Multi-family dwelling units are assumed in the following land use categories: multi-family, and mixed use (70%). Statistics may be reported by a defined geography.	Percentage	Yes	Yes	Yes	In
	Prevailing Residential Lot Size	The prevailing residential lot size reported throughout the study area. It represents the weighted average (using allocated dwelling units) of the minimum lot sizes (developed using density assumptions in the development lookup tables) for each combination of future land use category and character area type that received new development. Statistics may be reported by a defined georgraphy.	Lot Size (Acres)	Yes	Yes	Yes	In

Tri-County Transportation & Land Use Study

Measure of Effectiveness Summary

Background Calculations

INDICATOR: DWELLING UNITS

DEFINITION AND UNITS

The total number of dwelling units expected in the study area for a specific planning horizon year. Statistic may be reported by land use category, housing type, or defined geography.

FORMULA

$$DU_{ALLO} = \sum DU_{ALLO\ Base,}\ DU_{ALLO\ Base+x}$$

Where:

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

$DU_{ALLO\ Base}$ = Existing dwelling units assumed for the base year

$DU_{ALLO\ Base+x}$ = New dwelling units allocated for an interim planning horizon year

$$DU_{BO} = \sum DU_{FLU}$$

Where:

DU_{BO} = Total dwelling units anticipated at build-out of the future land use map

DU_{FLU} = Total dwelling units that might be built assuming development types, patterns, and intensities depicted on the future land use map

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU DUs, DUs ALLO)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

- Land use categories
- General development characteristics (e.g max density, minimum lot size, etc.)

ACTION REQUIRED

None

INDICATOR: POPULATION

DEFINITION AND UNITS

The total number of people expected in the study area for a specific planning horizon year. Statistic may be reported by land use category, housing type, or defined geography.

FORMULA

$$POP_{ALLO} = \sum DU_{ALLO} \times ppHH$$

Where:

POP_{ALLO}= Population allocated for a specific planning horizon year

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

ppHH= persons per household assumed for the study area

$$POP_{BO} = \sum DU_{BO} \times ppHH$$

Where:

POP_{BO} = Total population assumed at build-out of the future land use map

DU_{BO}= Total dwelling units anticipated at build-out of the land use map

ppHH= persons per household assumed in the study area

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU DUs, DUs ALLO)

NESTED INDICATORS

DU_{ALLO} = Dwelling units assumed for a specific planning horizon year

DU_{BO}= Total dwelling units anticipated at build-out of the future land use map

USER DEFINED PARAMETERS

Persons per household for the study area (ppHH)

ACTION REQUIRED

None

INDICATOR: NON-RESIDENTIAL SQUARE FOOTAGE

DEFINITION AND UNITS

The total amount of non-residential square footage expected in the study area for a specific planning horizon year. Statistic may be reported by land use category or defined geography.

FORMULA

$$NON\ RES\ SF_{ALLO} = \sum NON\ RES\ SF_{ALLO\ Base,}\ NON\ RES\ SF_{ALLO\ Base+x}$$

Where:

$NON\ RES\ SF_{ALLO}$ = Non-residential square footage allocated for a specific planning horizon year

$NON\ RES\ SF_{ALLO\ Base}$ = Existing non-residential square footage assumed for the base year

$NON\ RES\ SF_{ALLO\ Base+x}$ = New non-residential square footage allocated for an interim planning horizon year

$$NON\ RES\ SF_{BO} = \sum NON\ RES\ SF_{FLU}$$

Where:

$NON\ RES\ SF_{BO}$= Total non-residential square footage anticipated at build-out of the future land use map

$NON\ RES\ SF_{FLU}$ = Total non-residential square footage that might be built assuming development types, patterns, and intensities depicted on the future land use map

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU NON RES SF, NON RES SF ALLO)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

- Land use categories
- General development characteristics (e.g max density, minimum lot size, etc)

ACTION REQUIRED

None

INDICATOR: EMPLOYEES

DEFINITION AND UNITS

The total number of employees expected in the study area for a specific planning horizon year. Statistics may be reported by land use category, employee type, or defined geography.

FORMULA

$$EMP_{ALLO} = \sum NON\ RES\ SF_{ALLO} \times EpSF$$

Where:

EMP_{ALLO} = Employees allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a given horizon year

EpSF = Employees per square feet estimates (or employee space ratios)

$$EMP_{BO} = \sum NON\ RES\ SF_{BO} \times EpSF$$

Where:

EMP_{BO} = Employees anticipated at build-out of the future land use map

NON RES SF_{BO} = Total non-residential square footage that might be built assuming development types, patterns, and intensities depicted on the future land use map

EpSF = Employees per square feet estimates (or employee space ratios)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU NON RES SF, NON RES SF ALLO)

NESTED INDICATORS

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

NON RES SF_{BO}= Total non-residential square footage anticipated at build-out of the future land use map

USER DEFINED PARAMETERS

Employees per square feet estimates or employee space ratios (EpSF)

ACTION REQUIRED

None

Tri-County Transportation & Land Use Study

Measure of Effectiveness Summary

Candidate Variables

INDICATOR: AGRICULTURAL LAND CONSUMED (GOAL NO. 2)

DEFINITION AND UNITS

The amount of prime agricultural land lost to new urban or suburban development. Prime agricultural land is defined by the USDA Soil Survey.

FORMULA

$$Area_{ALC} = \sum Area\left(\bigcap_{Area_{PF}} Area_{DEV\ ALLO}\right)$$

Area $_{ALC}$ = Amount of prime agricultural land lost to suburban or urban development for a specific planning horizon year

Area $_{PF}$ = Area designated with prime agriculture soils

Area $_{DEV\ ALLO}$ = Area with allocated urban or suburban development

∩ = Intersection function (selects parcels with allocated urban or suburban development and prime agriculture soils)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (Pop ALLO, Emp ALLO)
Prime Agriculture Soils (YES)

NESTED INDICATORS

Area $_{PF}$ = Area designated with prime agriculture soils

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

All parcels in the study area with prime agriculture soils need to be tagged. Prime agriculture soils will be defined using USDA Soil Survey

INDICATOR: RURAL PRESERVATION (GOAL NO. 3)

DEFINITION AND UNITS

The percent of land area in the study area coded either rural or conservation. Statistics may be reported by defined geography.

FORMULA

$$Area_{RURAL} = \frac{\sum Area_{RLU}}{\sum Area}$$

Where:

Area $_{RURAL}$ = Percentage of land in the study area coded rural or conservation character areas for the development scenario

Area $_{RLU}$ = Area in acres coded as rural or conservation character areas

Area $_{EMP}$ = Area in acres for the entire study area

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, AREA)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

None

INDICATOR: URBAN FOOTPRINT (GOAL NO. 3)

DEFINITION AND UNITS

The total number of acres allocated with urban or suburban development (either residential or non-residential) for a specific planning horizon year. Urban and suburban development is represented by the following character areas: suburban, general urban, traditional town center, village center, employment center, activity center, and transit oriented development. Statistics may be reported by defined geography.

FORMULA

$$Area_{DEV\ ALLO} = \sum Area_{LU} \left(\bigcup_{Area_{EMP}} Area_{POP} \right)$$

Where:

Area $_{DEV\ ALLO}$ = Number of acres in urban or suburban character areas allocated with development

Area $_{LU}$ = Area in acres coded as urban or suburban character areas

Area $_{EMP}$ = Area in acres allocated with employees for a specific planning horizon year

Area $_{POP}$ = Area in acres allocated with population for a specific planning horizon year

U = Union function (avoids double counting for mixed-use parcels)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, AREA, Pop ALLO, Emp ALLO)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

None

INDICATOR: JOBS / HOUSING CONCENTRATION (GOAL NO. 4)

DEFINITION AND UNITS

The percentage of employees and residents allocated within the influence area of an activity node compared to the rest of the study area. Activity nodes are represented by the following character areas: traditional town center, village center, activity center, and transit-oriented development. Statistics may be reported by land use category or defined geography.

FORMULA

$$\text{JHC} = \frac{\sum EMP_{ALLO,} POP_{ALLO} \left(\cap_{Area_{BUFFR}} Area_{DEV\ ALLO} \right)}{\sum EMP_{ALLO} + POP_{ALLO}}$$

Where:

JHC = the percentage of employees and people allocated within the influence area of an activity node compared to the rest of the study area

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

Area $_{ALLO}$ = Area with allocated development

∩= Intersection function (selects parcels with allocated development that are within the buffers defined for various activity nodes)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (EMP ALLO, POP ALLO)
Activity Node Buffers

NESTED INDICATORS

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

Area $_{ALLO}$ = Area with allocated development

USER DEFINED PARAMETERS

Anticipated influence area surrounding activity nodes (i.e., buffer radius reported by activity node type)

ACTION REQUIRED

None

INDICATOR: PERCENT OF INCOME SPENT ON TRANSPORTATION (GOAL NO. 4)

DEFINITION AND UNITS

An estimate for the percentage of household income spent on transportation in the study area. Transportation expenditures are estimated using information published by the US Bureau of Labor Statistics, *Consumer Expenditures Survey (2007 Data)*. Expenditure information is published for three development patterns: central city, other urban, and rural. Development patterns will be represented by character areas as follows: central city (traditional town center, village center, activity center, and transit-oriented development), other urban (suburban, general urban, and employment center), and rural (conservation and rural). Statistics may be reported by defined geography.

FORMULA

$$INCOME_{TRANS} = \frac{\left[\left(\sum DU_{ALLO,CC}\ \mathbf{x}\ COST_{CC}\right) + \left(\sum DU_{ALLO,OU}\ \mathbf{x}\ COST_{OU}\right) + \left(\sum DU_{ALLO,RR}\ \mathbf{x}\ COST_{RR}\right)\right]}{\sum\left(DU_{ALLO}\ \mathbf{x}\ HH_{INCOME}\right)}$$

Where:

$INCOME_{TRANS}$ = The percentage of household income spent on transportation in the study area

$DU_{ALLO,CC}$ = Dwelling units assumed for a specific planning horizon year that meet the US Bureau of Labor Statistics definition of central city development

$COST_{CC}$ = Average annual expenditure for transportation in a central city

$DU_{ALLO,OU}$ = Dwelling units assumed for a specific planning horizon year that meet the US Bureau of Labor Statistics definition of other urban development

$COST_{OU}$ = Average annual expenditure for transportation in other urban areas

$DU_{ALLO,RR}$ = Dwelling units assumed for a specific planning horizon year that meet the US Bureau of Labor Statistics definition of rural development

$COST_{OU}$ = Average annual expenditure for transportation in rural areas

DU_{ALLO} = Total dwelling units assumed for a specific planning horizon year

HH_{INCOME} = Average household income reported for the study area (Woods and Poole data)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (Character Area, Land Use, DU ALLO)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

Group character areas into generalized development patterns (central city, other urban, and rural)

ACTION REQUIRED

Ensure that price of gasoline in the three "COST" estimates remains variable. Include an assumption in CommunityViz to account for fluctuation in gasoline prices.

INDICATOR: POPULATION DENSITY (GOAL NO. 4)

DEFINITION AND UNITS

The number of people allocated per acre of land in the allocated area. Statistic may be reported by land use category or defined geography.

FORMULA

$$POP_{DEN} = \frac{POP_{ALLO}}{\sum Area_{DEV\ ALLO}}$$

Where:

POP_{DEN} = Number of new people per acre of land in the allocated area

POP_{ALLO}= Population allocated for a specific planning horizon year

$Area_{DEV\ ALLO}$ = Acres allocated with new development for a specific planning horizon year

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (POP ALLO, DUs ALLO, AREA)

NESTED INDICATORS

POP_{ALLO} = Population allocated at a specific planning horizon year

$AREA_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

USER DEFINED PARAMETERS

None

ACTION REQUIRED

None

INDICATOR: EMPLOYEE DENSITY (GOAL NO. 4)

DEFINITION AND UNITS

The number of employees allocated per acre of land in the allocated area. Statistic may be reported by land use category or defined geography.

FORMULA

$$EMP_{DEN} = \frac{EMP_{ALLO}}{\sum Area_{DEV\ ALLO}}$$

Where:

EMP_{DEN} = Number of employees per acre of land in the allocated area

EMP_{ALLO}= Employees allocated for a specific planning horizon year

$Area_{DEV\ ALLO}$ = Acres allocated with new development for a specific planning horizon year

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (EMP ALLO, NON RES SF ALLO, AREA)

NESTED INDICATORS

EMP_{ALLO} = Employees allocated at a specific planning horizon year

$AREA_{DEV\ ALLO}$ = Acres allocated with new development for a specific planning horizon year

USER DEFINED PARAMETERS

None

ACTION REQUIRED

None

INDICATOR: ENCROACHMENT ON PROTECTED OPEN SPACE (GOAL NO. 6)

DEFINITION AND UNITS

The proximity of allocated development to protected land designed in the study area. Impacts are reported as the number of new acres of development within ____ feet of protected land (i.e., conservation character area).

FORMULA

$$Area_{PRO} = \sum Area\left(\bigcap_{Area_{BUFFER}} Area_{DEV\ ALLO}\right)$$

Area $_{PRO}$ = Amount of land developed in close proximity to protected land

Area $_{BUFFER}$ = Area designated within designed buffer from protected land (i.e., ____ feet)

Area $_{DEV\ ALLO}$ = Area with allocated urban or suburban development

$\cap$ = Intersection function (selects parcels with allocated development inside the buffer measured from protected land)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (Pop ALLO, Emp ALLO)
Development Scenario (Conservation)
Buffer from Protected Land (YES)

NESTED INDICATORS

Area $_{BUFFER}$ = Area designated within designed buffer from protected land (i.e., ____ feet)

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

Code the development scenarios with desired types and patterns of conservation areas.

INDICATOR: CONGESTED CORRIDORS (GOAL NO. 7)

DEFINITION AND UNITS

Congested corridors in the study area are represented by a volume to capacity ratio greater than 1.0. Roads included in the measurement for congested corridors will be those in the Nashville Area Regional Travel Demand Model. Statistics will be reported as the percent of roads in the study area over capacity compared to all of the roads in the study area.

FORMULA

$$\%\,CONG = \frac{\sum LINKS_{V/C > 1.0}}{\sum LINKS_{NETWORK}}$$

Where:

%CONG = The percentage of corridors in the study area with a volume to capacity ratio greater than 1.0

$LINKS_{V/C > 1.0}$ = The number of links in the travel demand model with a volume to capacity ratio greater than 1.0 in the study area

$LINKS_{NETWORK}$ = The total number of links in the travel demand model for the study area

SHAPEFILES (ATTRIBUTE FIELDS)

N/A

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

Run the regional travel demand model for each development scenario. In post-processing, identify links where the volume to capacity ratio is greater than 1.0. Sum the number of links identified over capacity and divide by the total number of links in the model.

INDICATOR: VEHICLE MILES TRAVELED PER CAPITA (GOAL NO. 7)

DEFINITION AND UNITS

The number of vehicle miles traveled per capita reflects the reliance on the automobile for individuals' mobility within the study area. It reflects the number of vehicle trips and the length of those trips summed over the entire road network. VMT per capita is a good indicator of changes in travel demand associated with different development scenarios.

Vehicle miles traveled per capita will be measured using the Nashville Area Regional Travel Demand Model and post processing of model results developed for each development scenario.

FORMULA

$$VMT_{PER\ CAPITA} = \frac{\sum\ (TVOL_{SEGMENT}\ x\ LENGTH_{SEGMENT})}{POP_{ALLO}}$$

Where:

VMT_{CAPITA} = The number of vehicle miles traveled per capita in the study area

$TVOL_{SEGMENT}$ = The number of vehicles on each road segment in the regional travel demand model for the study area

$LENGTH_{SEGMENT}$ = The length (in miles) of each road segment in the regional travel demand model for the study area

POP_{ALLO}= Population allocated for a specific planning horizon year

SHAPEFILES (ATTRIBUTE FIELDS)

N/A

NESTED INDICATORS

POP_{ALLO}= Population allocated for a specific planning horizon year

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

None

INDICATOR: TRANSIT RIDER CONCENTRATION TO BUS ROUTES (GOAL NO. 7)

DEFINITION AND UNITS

The percentage of employees and residents allocated within one quarter mile of an existing or proposed bus corridor compared to the rest of the study area. Future transit corridors will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.

FORMULA

$$TRC_{ROUTE} = \frac{\sum EMP_{ALLO,} POP_{ALLO} \left(\cap_{Area_{BUFFR}} Area_{DEV\ ALLO} \right)}{\sum EMP_{ALLO} + POP_{ALLO}}$$

Where:

TRC = the percentage of employees and people allocated within one quarter mile of an existing or proposed bus corridor compared to the rest of the study area

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

Area $_{ALLO}$ = Area with allocated development

∩= Intersection function (selects parcels with allocated development that are within one quarter mile of an existing or proposed bus corridor)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (EMP ALLO, POP ALLO)
Transit Routes (existing and proposed)
Buffer around bus routes

NESTED INDICATORS

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

Area $_{ALLO}$ = Area with allocated development

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

A file will need to be provided with each development scenario indicating new bus service.

INDICATOR: TRANSIT RIDER CONCENTRATION TO BUS/RAIL STOPS (GOAL NO. 7)

DEFINITION AND UNITS

The percentage of employees and residents allocated within one quarter mile of an existing or proposed bus or rail stop compared to the rest of the study area. Future bus and rail stops will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.

FORMULA

$$TRC_{STOP} = \frac{\sum EMP_{ALLO,} POP_{ALLO} \left(\cap_{Area_{BUFFR}} Area_{DEV\ ALLO} \right)}{\sum EMP_{ALLO} + POP_{ALLO}}$$

Where:

TRC_{STOP} = the percentage of employees and people allocated within one quarter mile of an existing or proposed bus or rail compared to the rest of the study area

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

$Area_{ALLO}$ = Area with allocated development

∩= Intersection function (selects parcels with allocated development that are within one quarter mile of an existing or proposed bus or rail stop)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (EMP ALLO, POP ALLO)
Bus and Rail Stops (existing and proposed)
Buffer around bus and rail stops

NESTED INDICATORS

EMP_{ALLO} = Employees allocated for a specific planning horizon year

POP_{ALLO}= Population allocated for a specific planning horizon year

$Area_{ALLO}$ = Area with allocated development

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

A file will need to be provided with each development scenario indicating new bus or rail stops.

INDICATOR: DEMAND FOR POTABLE WATER (GOAL NO. 8)

DEFINITION AND UNITS

Demand for potable water generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by utility service area.

FORMULA

$$Demand_{WATER} = \sum DU_{ALLO}\left(\bigcap_{Area_{WTR}} Area_{DEV\ ALLO}\right) + \sum NON\ RES\ SF_{ALLO}\left(\bigcap_{Area_{WTR}} Area_{DEV\ ALLO}\right)$$

Where:

$DEMAND_{WATER}$ = Number of new dwelling units or new non-residential square footage by utility service area

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

$AREA_{WTR}$ = Acres represented by utility service area

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

∩= Intersection function (selects parcels with allocated development that are inside a utility service area)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, DU ALLO, NON RES SF ALLO)
Utility Service Areas (Water)

NESTED INDICATORS

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

Tag all parcels in the study area for water utility service area.

INDICATOR: DEMAND FOR SANITARY SEWER (GOAL NO. 8)

DEFINITION AND UNITS

Demand for sanitary sewer generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by utility service area.

FORMULA

$$Demand_{SEWER} = \sum DU_{ALLO}\left(\bigcap_{Area_{SWR}} Area_{DEV\ ALLO}\right) + \sum NON\ RES\ SF_{ALLO}\left(\bigcap_{Area_{SWR}} Area_{DEV\ ALLO}\right)$$

Where:

$DEMAND_{SEWER}$ = Number of new dwelling units or new non-residential square footage by utility service area

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

$AREA_{SWR}$ = Acres represented by utility service area

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

∩= Intersection function (selects parcels with allocated development that are inside a utility service area)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, DU ALLO, NON RES SF ALLO)
Utility Service Areas (Sewer)

NESTED INDICATORS

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

Tag all parcels in the study area for sewer utility service area.

INDICATOR: DEMAND FOR NEW SCHOOLS (GOAL NO. 8)

DEFINITION AND UNITS

Demand for new schools generated by development types, patterns, and intensities assumed for the study area. Information is reported in students. Statistics can be reported by school attendance boundary or other defined geography.

FORMULA

$$NEW\ STUDENT\ DEMAND = \sum DU_{ALLO} \times spHH$$

Where:

NEW STUDENT DEMAND = Number of new students generated by allocated growth in the study area

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

spHH= number of new students estimated per household

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, DU ALLO)
School District Boundaries
School Attendance Boundaries

NESTED INDICATORS

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

USER DEFINED PARAMETERS

- Student generation rates by household (spHH)
- Existing demand at local schools

ACTION REQUIRED

Tag all parcels in the study area for school district and school attendance boundary. Assemble generation rates for new students by school district.

INDICATOR: DEMAND FOR FIRE PROTECTION (GOAL NO. 8)

DEFINITION AND UNITS

Demand for fire protection generated by new dwelling units or new non-residential square footage in the study area. Information is reported as new dwelling units or new non-residential square footage by fire station service area.

FORMULA

$$Demand_{FIRE} = \sum DU_{ALLO}\left(\bigcap_{Area_{FSD}} Area_{DEV\ ALLO}\right) + \sum NON\ RES\ SF_{ALLO}\left(\bigcap_{Area_{FSD}} Area_{DEV\ ALLO}\right)$$

Where:

$DEMAND_{FIRE}$ = Number of new dwelling units or new non-residential square footage by fire station service area

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

$AREA_{FSD}$ = Acres represented by fire station service area

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

∩ = Intersection function (selects parcels with allocated development that are inside a fire station service area)

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, DU ALLO, NON RES SF ALLO, AREA)
Fire Station Service Areas

NESTED INDICATORS

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

NON RES SF_{ALLO} = Non-residential square footage allocated for a specific planning horizon year

AREA $_{DEV\ ALLO}$= Acres allocated with new development for a specific planning horizon year

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

Tag all parcels in the study area for fire station service area. Coordinate with local fire chief(s) to ensure MOE is useful under NFPA Station 1710.

INDICATOR: DEMAND FOR POLICE PROTECTION (GOAL NO. 8)

DEFINITION AND UNITS

Demand for police protection generated by new population in the study area. Information is reported as the number of new sworn officers per 1,000 people needed to maintain the current service delivery standard. Statistics may be reported by a defined geography.

FORMULA

$$Demand_{POLICE} = \sum POP_{ALLO}/1000 \times SDR_{POLICE}$$

Where:

DEMAND $_{POLICE}$ = The number of new sworn officers needed to maintain current service delivery standards.

POP $_{ALLO}$= Population allocated for a specific planning horizon year

SDR $_{POLICE}$ = the current rates of sworn officers per 1,000 people

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, POP ALLO)
Police/Sheriff Department Jurisdictional Boundaries

NESTED INDICATORS

POP_{ALLO}= Population allocated for a specific planning horizon year

USER DEFINED PARAMETERS

SDR $_{POLICE}$ = the current rates of sworn officers per 1,000 people

ACTION REQUIRED

Tag all parcels in the study area for police or sheriff jurisdiction. Coordinate with local police and sheriff departments to develop current service delivery rates (i.e., number of sworn officers per 1,000 people).

INDICATOR: DEMAND FOR NEW PARK LAND (GOAL NO. 8)

DEFINITION AND UNITS

Demand for new parkland generated by new population in the study area. Information is reported as the number of acres per 1,000 people needed to maintain the current service delivery standard. Statistics may be reported by a defined geography.

FORMULA

$$Demand_{PARKS} = \sum POP_{ALLO}/1000 \times SDR_{PARKS}$$

Where:

$DEMAND_{PARKS}$ = The amount of new parkland needed to maintain current service delivery standards.

POP_{ALLO}= Population allocated for a specific planning horizon year

SDR_{PARKS} = the current rate of acres per 1,000 people

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, POP ALLO)
Existing Park Locations
Future Park Locations
Park District Boundaries

NESTED INDICATORS

POP_{ALLO}= Population allocated for a specific planning horizon year

USER DEFINED PARAMETERS

SDR_{PARKS} = the current rate of acres per 1,000 people

ACTION REQUIRED

Tag all parcels in the study area for park district (or political boundary). Coordinate with local park and recreation departments and/or planning departments to develop current service delivery rates (i.e., number of acres per 1,000 people).

INDICATOR: HOUSING MIX (GOAL NO. 9)

DEFINITION AND UNITS

Housing mix reflects the share of single family and multi-family dwelling units allocated within the study area for a specific planning horizon. Single family dwelling units are assumed in the following future land use categories: open space, agriculture, single family, residential, and mixed use (30%). Multi-family dwelling units are assumed in the following land use categories: multi-family, and mixed use (70%). Statistics may be reported by a defined geography.

FORMULA

$$\%DU_{SF} = \frac{\sum(DU_{ALLO,OS} + DU_{ALLO,AGR} + DU_{ALLO,SFR} + DU_{ALLO,RES} + DU_{ALLO,MU\ (30\%)})}{DU_{ALLO}}$$

Where:

$\%DU_{SF}$ = The percent of single family dwelling units assumed in the study area.

$DU_{ALLO,OS}$ = Dwelling units allocated to the open space land use category

$DU_{ALLO,AGR}$ = Dwelling units allocated to the agriculture land use category

$DU_{ALLO,SFR}$ = Dwelling units allocated to the single family residential land use category

$DU_{ALLO,RES}$ = Dwelling units allocated to the residential land use category

$DU_{ALLO,MU(30\%)}$ = Dwelling units allocated to the mixed use land use category. Assumes 30% of the dwelling units in the mixed use land use category will be single family units.

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

$$\%DU_{MF} = \frac{\sum(DU_{ALLO,MFR} + DU_{ALLO,MU\ (70\%)})}{DU_{ALLO}}$$

Where:

$\%DU_{MF}$ = The percent of multi-family dwelling units assumed in the study area.

$DU_{ALLO,OS}$ = Dwelling units allocated to the multi-family residential land use category

$DU_{ALLO,AGR}$ = Dwelling units allocated to the mixed use land use category. Assumes 70% of the dwelling units in the mixed use land use category will be multi-family units.

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, DU ALLO)

NESTED INDICATORS

DU_{ALLO} = Dwelling units allocated for a specific planning horizon year

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

None

INDICATOR: PREVAILING RESIDENTIAL LOT SIZE (GOAL NO. 9)

DEFINITION AND UNITS

The prevailing residential lot size reported throughout the study area. It represents the weighted average (using allocated dwelling units) of the minimum lot sizes (developed using density assumptions in the development lookup tables) for each combination of future land use category and character area type that received new development. Statistics may be reported by a defined georgraphy.

FORMULA

$$PLS = \frac{\dfrac{\sum \left[DU_{ALLO\ (FLU\ 1\ldots n, CA\ 1\ldots n)}\ x \left(\dfrac{43{,}560}{LOOKUP\ MAX\ DENSITY\ _{(FLU\ 1\ldots n, CA\ 1\ldots n)}} \right) \right]}{\sum\ DU_{ALLO\ (FLU\ 1\ldots n, CA\ 1\ldots n)}}}{43{,}560}$$

Where:

PLS = Prevailing lot size for allocated residential development in the study area

DU $_{\text{ALLO (FLU 1…n, CA 1…n)}}$ = The number of dwelling units allocated by future land use category and character area type. A statistic will be reported for each combination of future land use category and character area type allocated residential development in the scenario.

LOOKUP MAX DENSITY $_{\text{(FLU 1…n, CA 1…n)}}$ = Density assumed for each future land use category and character area type combination from the lookup table maintained for each county represented in the model.

SHAPEFILES (ATTRIBUTE FIELDS)

Parcels (FLU, CHAR, DU ALLO)
General Development Lookup Table (one for each county)

NESTED INDICATORS

N/A

USER DEFINED PARAMETERS

N/A

ACTION REQUIRED

None

APPENDIX E

Business-as-Usual Scenario Report

TRI-COUNTY TRANSPORTATION & LAND USE STUDY

Business As Usual Scenario

FINAL DRAFT

June 2009

LandDesign™ urban design planning civil engineering branding landscape architecture

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Section 1: Introduction

Project Overview

The Tri-County Transportation & Land Use Study is a first of its kind effort in the Nashville region to bring local governments, citizens, and businesses together across jurisdictional boundaries to talk about significant growth issues. The effort, kicked-off in late 2007, created a forum for local leaders in the counties of Robertson, Sumner, and Wilson to consider the growth plans of their neighboring communities in an effort to improve their own – all for the sake of regional mobility and prosperity.

The project employed a regional, GIS-based modeling approach using CommunityViz 3.3 modeling software. CommunityViz is decision support software that evaluates competing future land use scenarios under consideration by a community. This approach allowed the project team to visualize and compare the ability for alternative future land use scenarios to meet growth challenges faced, as expressed by a set of common goals identified for the entire region (see Section 6). These goals and the results of modeling were confirmed during the process thorough visioning workshops with the public and through participation with the Steering Committee.

This effort provides a guidance document usable by all, including local governments to update local land use and major thoroughfare plans. Results of this study will be incorporated into the MPO's 2035 Long Range Transportation Plan, scheduled for adoption in October 2009.

The Tri-County study area includes Wilson, Sumner, and Robertson Counties. These three counties are northeast of the Nashville metropolitan area. The MPO's planning boundary includes Wilson, Sumner and portions of Robertson County that include Springfield. For the purpose of this study, the entirety of Robertson County was included within the study area. The following Map A - Study Area identifies the general location of the study area. Additional information on local and regional partners involved in the Tri-County Transportation & Land Use Study is shown below.

Local & Regional Partners

City of Gallatin
City of Goodlettsville
City of Hendersonville
City of Millersville
City of Portland
City of White House
Sumner County
City of Springfield
Robertson County
City of Lebanon
City of Mt. Juliet
Wilson County
Greater Nashville Regional Council
Regional Transportation Authority
State & Federal Partners

Tennessee Department of Transportation
Federal Highway Administration
Federal Transit Administration

Project Management / Information Requests

Michael Skipper, Director, Nashville Area MPO

Organization of this Report

The remainder of this report includes the following sections as described below:

Section 2: Introduction of the Business-As-Usual (BAU) Scenario – provides a general description of the BAU Scenario including its purpose related to the Tri-County study.

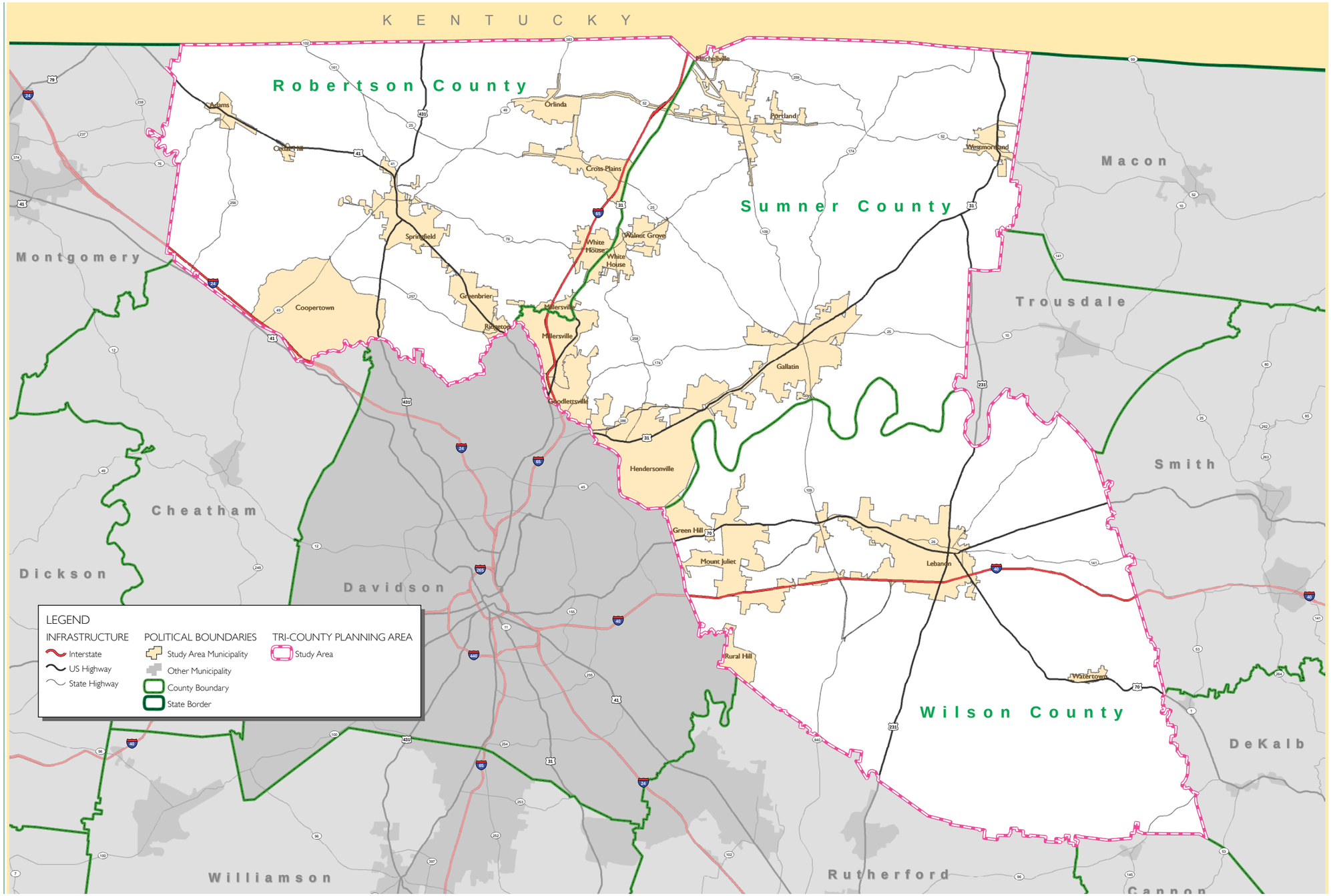
Section 3: Demand, Magnitude of Growth – provides an overview of projected growth for employment by sector (retail, industrial, office) and households, 2008-2035.

Section 4: Suitability & Drivers of Growth – provides a detailed description of suitability factors that collectively are represented as "suitability" in the model along with results of calculations in the form of maps of suitability for the study area and each of the three counties included.

Section 5: Location of Growth, 2035 – provides a description of how projected growth is allocated along with maps for assumed buildout (2035) for non-residential and residential growth. Additional maps representing potential intensities/densities are included.

Section 6: Evaluating the Business-as-Usual – overview of regional goals and measures of effectiveness (MOEs) and how each is used to evaluate the performance of the business-as-usual scenario.

Technical Appendix – Additional technical materials such as assumptions and calculations performed with modeling the business-as-usual scenario.



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MAP A
STUDY AREA

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

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Section 2: Introduction of the BAU Scenario

Definition of the BAU Scenario

The first step in evaluating future land use involves preparing a baseline scenario for future land use or the "business-as-usual (BAU)" scenario, described in detail in this narrative. The business-as-usual scenario serves the purpose of visually representing where the region is heading in terms of growth within the timeframe of the study, or 2035. It represents continuation of development "as usual" with plans, programs and adopted policy. In the absence of policy, adopted regulations now in place are used. The BAU reflects projected demand for population, employment, goods and services in this timeframe and existing characteristics of the study area.

The business-as-usual scenario was completed based on the following information:

- The BBPC *Tri-County Transportation/Land use Study: Economic & Market Analysis prepared by BBPC* ***(June 2008)***
- Woods & Poole population projections for 2035 **(June 2008)**
- Census population estimates **(March 2008)**
- Growth Management Plan for Wilson County **(January 2001)**
- Other available land use plans (by jurisdiction)
- Available zoning maps and ordinances (by jurisdiction)
- Tax assessor data by parcel (for existing land uses)
- Existing demand for public infrastructure (water, sewer, parks, fire, police, and public schools)
- Information from focus group meetings for socioeconomic update to the travel demand model conducted as part of a separate study **(July 2008)**
- Character types

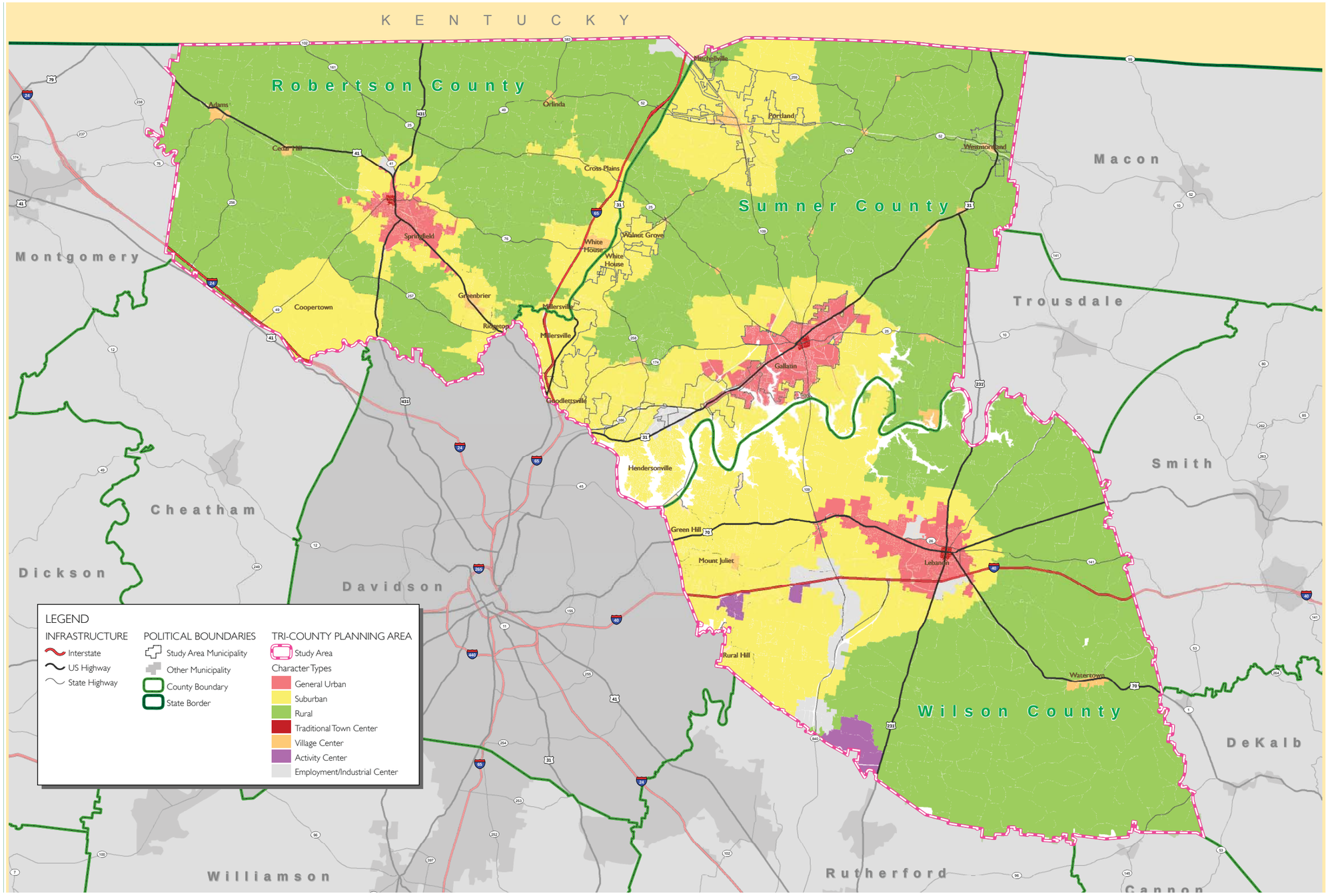
Character Types

Character types are a defined set of categories that comprise general, recognizable development patterns expected to occur across the landscape into the future. Land uses are depicted using "character types" that allows comparison of patterns across multiple jurisdictions. Map B - BAU Map and Character Types provides a visual representation of how each jurisdictions' adopted plans, programs and policies intend to direct future growth when plans are assembled together, like a patchwork quilt.

The project team gathered available documents and plans for the study area including 1) comprehensive plans/land use plans, 2) zoning ordinances and maps and 3) existing land use data. Initial efforts to assign parcels to character types using land use plan and zoning map categories were performed by the consultant team. Given the range of jurisdictions and the variety of plan approaches across jurisdictions, MPO staff established a generalized method to define the extent of character areas using county boundaries, Urban Growth Areas, Urban Services Districts, city limits, and local input from jurisdictions. These were presented to the Steering Committee for initial feedback. The resulting Map B - BAU Map and Character Types describes the result of the project team method to define the extent of character areas. Specific definitions and illustrations of character types are found in this section along with the map.

Character types allowed for an emphasis on form and design rather than solely focusing on land use. In general, character types are defined on a sliding scale from rural to urban, with residential densities and non-residential intensities ranging from least to highest. Special categories exist to recognize unique character types found in the study area. The range was developed with the "transect" in mind, a scale often used in applications of new urbanist principles, but finalized to recognize local conditions.

While character types are primarily meant to summarize a continuation of existing plans, programs and policies, they are also a means to foster discussion of potential new development patterns that may be desired in the future (if any). The intent was to allow character types and definitions to be refined during the Tri-County Transportation and Land Use Study, as goals for evaluating the business-as-usual scenario could lead to discussions about the merits of new development patterns that do not yet exist in the study area. One example is Transit-Oriented Development, a character type that has received some discussion as a potential new development pattern along the existing Music City Star East Corridor Commuter Rail. This character type was added to allow these discussions to continue as part of the study. Up to three alternative scenarios will be developed for consideration as a supplement to the business-as-usual scenario. These alternatives will then be evaluated based on a draft series of goals and measures of effectiveness (MOEs), with the purpose of selecting a preferred growth scenario.



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MAP B

BAU MAP AND CHARACTER TYPES

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

June 2009 | LD#1007293

1 inch = 9,000 feet

0 1 2 4 Miles

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Character Type	Definition	Existing vs. Proposed Character Type	Examples in Study Area	Examples Elsewhere	Residential Types / Density	Non-Residential Types / Density	Structure Heights	Block Pattern	Street Pattern, Spacing	Multi-Modal Accommodations	Parking Spaces (per 1000 sf)
Conservation	• Areas recognized for preservation of environmentally sensitive areas. • Includes state parks & large dedicated open spaces.	• Existing	• Old Hickory Reservoir • Cedars of Lebanon	n/a	• Predominately undeveloped, environmentally sensitive lands	• n/a	• n/a	• Not Present	• 2-lane roads with shoulder and ditch (no curb and gutter). • 1 mile for smaller (2-lane) collectors and arterials. • 1-3 miles for larger (4-lane) collectors and arterials.	• Limited Pedestrian Accommodations (typically a coordinated system of greenways and trails).	• n/a
Rural	• Areas recognized as those having significant value for continued agricultural purposes and rural way of life in the future.	• Existing	• Northern Robertson County • Eastern Wilson County	n/a	• Predominately rural, agricultural uses • Very low density residential	• Non-residential FAR ≤ 0. 10	• 1-2 Stories	• Not Present	• 2-lane roads with shoulder and ditch (no curb and gutter). • 1-3 miles for smaller (2-lane) collectors and arterials. • 3-5 miles for larger (4-lane) collectors and arterials.	• Limited Pedestrian Accommodations (typically a coordinated system of greenways and trails). • Very limited transit accommodations, predominantly demand-response services for medical trips. • Access to carpool or vanpool park-n-ride lots	• 3
Suburban	• Areas where a variety of land uses occur at low densities, generally separated across the landscape by specific use type. • Areas that extend beyond current city limits to Urban Growth Boundary • Automobile-oriented, includes highway commercial areas found along major roadway corridors.	• Existing	• Portland • Brentwood • Hendersonville	• Carlisle TN • Sterling Falls TN	• Predominately low-density, range of uses. • Low density residential 40,000 sf lot - 5 du / ac	• Non-residential FAR ≥ 0.20 retail.	• 2 Stories	• Not present • Curvilinear street system, cul-de-sacs present. • Limited connectivity	• 2-lane roads. collector streets and 4-lane divided roads are primary form of access, and curb and gutter is more widely used. • 1,500 feet for smaller (2-lane) collectors and arterials. • 3,000 – 6,000 feet for larger (4-lane) collectors and arterials.	• Typically sidewalks supplemented by multi-use trails. • Bicycle accommodations. • Some limited transit accommodations, predominantly express service on commuter (bus or rail) routes, low level of service on local bus routes where available with service typically running no more frequent than every 30 to 60 minutes. • Access to carpool or vanpool park-n-ride lots	• 5
General Urban	• Areas where a variety of land uses occur at medium to high densities, having a well-connected pattern within the landscape. • Areas generally within current city limits of county seats • Generally comprised of established residential neighborhoods found near historic core areas.	• Existing	• Franklin • Gallatin • Murfreesboro	• Savannah GA • Charleston SC	• Predominately small lot and attached residential, multi-family • Medium to high density residential > 5 du / ac	• Civic, parks and open space, limited retail and office uses. • Non-residential FAR ≥ 0.9	• 2-3 Stories	• Block pattern present. • Neighborhood general - desired length 250-600 ft.	• Connected street network in grid pattern. • On-street parking. • 750 feet for smaller (2-lane) collectors and arterials. • 3,000 – 6,000 feet for larger (4-lane) collectors and arterials.	• Typically sidewalks supplemented by multi-use trails. • Bicycle accommodations. • A moderate level of transit accommodations in larger cities with buses or trains running every 15 to 30 minutes. Smaller cities may have limited trolley or local circulator service with connections to an express bus or rail route to the central city. • Access to carpool or vanpool park-n-ride lots	• 3
Traditional Town Centers	• Areas with a variety of land uses, typically at the highest densities in region. • Generally found in historic established core areas such as the county seats. • Pedestrian oriented, due to these areas being planned prior to euclidean zoning (separates land uses) and automobile dominance in the landscape (typically pre-1940s).	• Existing	• Franklin • Murfreesboro • Gallatin • Springfield	• Savannah GA • Charleston SC	• Medium to high density residential > 5 du / ac • Civic focus	• Civic, parks and open space, retail and office uses. • Non-residential FAR ≥ 0.9	• 2-3+ Stories	• Block pattern present. • Neighborhood general - desired length 250-600 ft. • Civic / Centers - desired length 300-500 ft.	• Dense, connected street network in grid pattern. • On-street parking. • 750 feet for smaller (2-lane) collectors and arterials. • 3,000 – 6,000 feet for larger (4-lane) collectors and arterials.	• Wide sidewalks that can accommodate commerce activities. • Designated bicycle routes.	• 3
Village Centers	• Smaller Town, hamlet, or village centers in Rural or Suburban setting • Grid street system (not necessary) • Possible mixed-use neighborhoods • Commercial concentration	• Existing	• Eagleville • Fairview • Watertown • Portland	n/a	• Low to medium density residential	• Non-residential FAR ≥ 0.20	• 1-2 Stories	• Block pattern may be present	• 2-lane roads with shoulder and ditch (no curb and gutter). • 1-3 miles for smaller (2-lane) collectors and arterials. • 3-5 miles for larger (4-lane) collectors and arterials.	• Limited Pedestrian Accommodations (typically a coordinated system of greenways and trails).	• 3
Employment Centers	• High concentration of light industrial, back-office, or industrial employment	• Existing	• Nashville International Airport	• Southway Industrial Park, La Vergne TN	• n/a	• Industrial, Commercial (FAR ≥ 0.15)	• 1-2 Stories	• Not Present	• n/a	• n/a	• >5
Activity Centers	• Large-scale mix of office, retail and residential land uses	• Existing	• Providence Place • Indian Lake • Cool Springs	• North Carolina Research Campus, Kannapolis NC	• Med to high density residential (> 5 du / ac)	• Office, Retail (FAR ≥ 0.20)	• 1-3+ Stories	• Block pattern present. • Neighborhood general - desired length 250-600 ft.	• n/a	• Wide sidewalks that can accommodate commerce activities.	• >5
Transit Oriented Development	• District supporting a mix of land uses, at higher densities, located in close proximity to an existing or planned mass transit station.	• Proposed	• None	• South Corridor, Charlotte NC • Denver CO	• High density residential 12-25 du / ac	• Retail and employment. Within comfortable walking distance of mass transit station (2,000 feet), may be sited along feeder bus routes. • Non-residential FAR = 0.5 - 3.0	• 2-12 Stories	• Block pattern present. Desired length 300-500 ft.	• Dense, connected street network in a grid pattern. On-street and structured parking, reduced parking requirements. • 750 feet for smaller (2-lane) collectors and arterials • 1,500 to 3,000 feet for larger (4-lane) collectors and arterials.	• High level of walkability with frequent access to fixed-route, and in most cases, fixed-guideway service.	• 3

FIGURE 1
SUMMARY OF CHARACTER TYPES

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tngis.org

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The use of this information is cautioned to consider the provisional nature of the information before making decisions that concern monetary or operational consequences. Furthermore, LandDesign Inc. assumes no responsibility for the accuracy, completeness or misuse of this information. Conclusions or actions taken from this information are the sole responsibility of the user. Please contact original source about questions on data.

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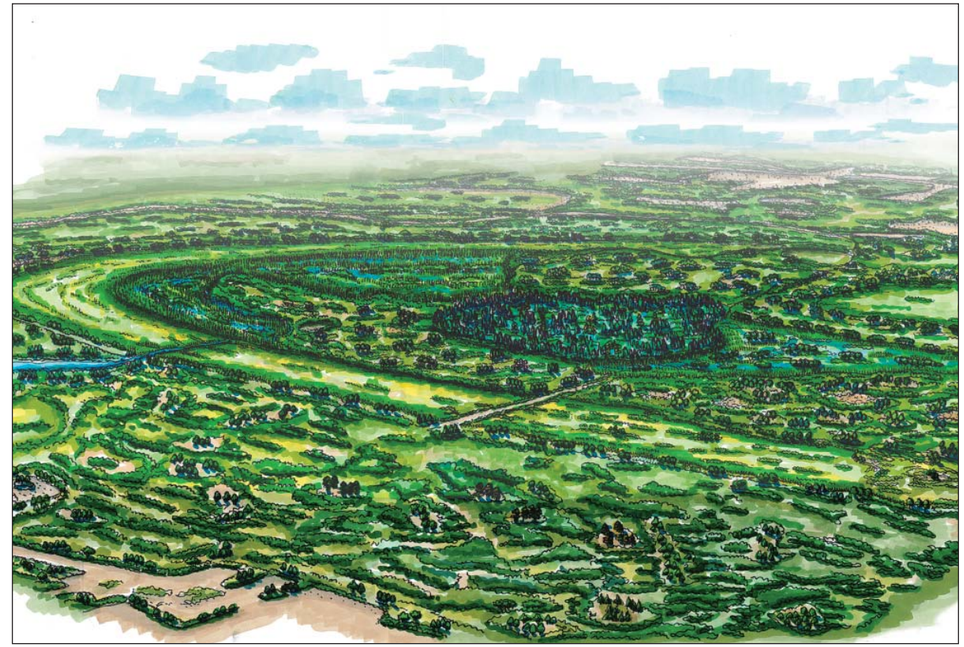
Conservation

- Definition
  - Areas recognized for preservation of environmentally sensitive areas
  - Includes state parks and large dedicated open space areas
- Local Examples
  - Old Hickory Reservoir
  - Cedars of Lebanon
- Uses/Intensity
  - Predominately undeveloped, environmentally sensitive lands
- Street Pattern (typical)
  - 2-lane roads with shoulder and ditch (no curb and gutter)
- Street Spacing
  - 1 mile for smaller (2-lane) collectors and arterials
  - 1-3 miles for larger (4-lane) collectors and arterials
- Block Pattern (typical)
  - Not present
- Multi-modal Accommodations
  - Limited Pedestrian Accomodations (typically a coordinated system of greenways and trails)



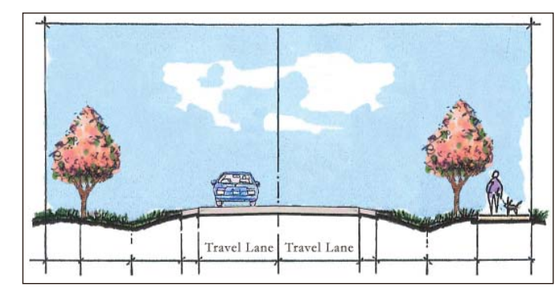


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FIGURE 2
CHARACTER TYPE - CONSERVATION
Tri-County Transportation and Land Use Study, Tennessee

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1 inch = 9,000 feet
0 1 2 4 Miles

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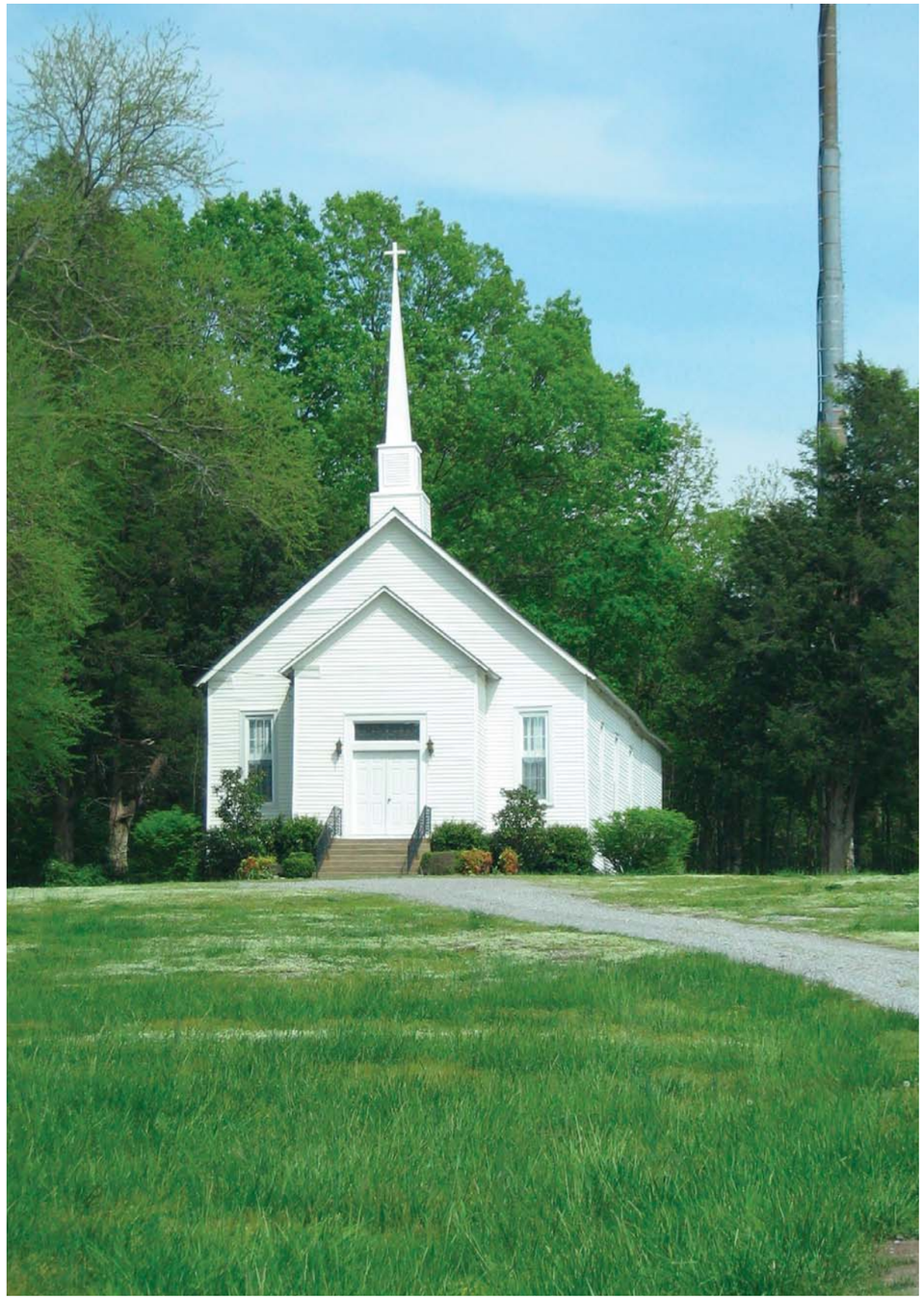

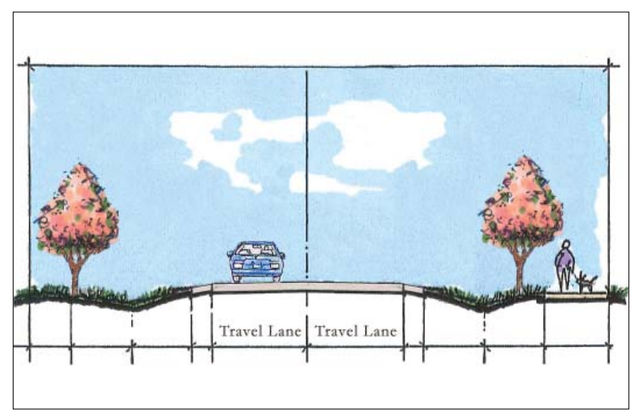

Rural

- Definition
  - Areas recognized as those having significant value for continued agricultural purposes and a rural way of life in the future
- Local Examples
  - Northern Robertson County
  - Eastern Wilson County
- Uses/Intensity
  - Predominately rural, agricultural uses
  - Very low density residential
  - Non-residential FAR ≤ 0.10
- Structure Heights
  - 1-2 stories
- Street Pattern (typical)
  - 2-lane roads with shoulder and ditch (no curb and gutter)
- Street Spacing
  - 1-3 miles for smaller (2-lane) collectors and arterials
  - 3-5 miles for larger (4-lane) collectors and arterials
- Block Pattern (typical)
  - Not present
- Multi-modal Accomodations
  - Limited Pedestrian Accommodations (typically a coordinated system of greenways and trails)
  - Very limited transit accommodations, predominantly demand-response services for medical trips
  - Access to carpool or vanpool park-n-ride lots

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FIGURE 3
CHARACTER TYPE - RURAL
Tri-County Transportation and Land Use Study, Tennessee

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1 inch = 9,000 feet
0 1 2 4 Miles

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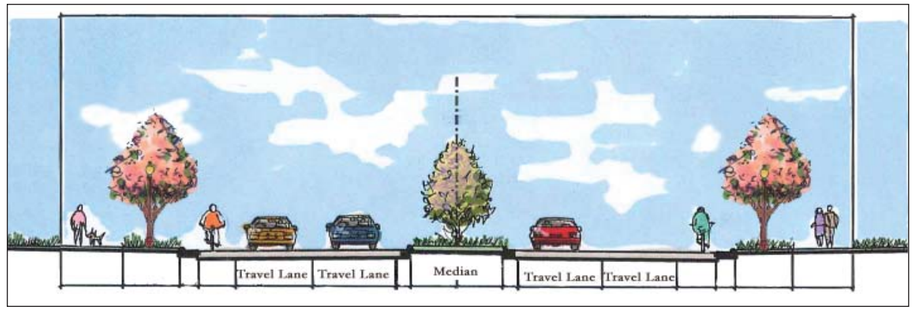
Suburban

- Definition
  - Areas where a variety of land uses occur at low densities, generally separated across the landscape by specific use type
  - Areas that extend beyond current city limits to Urban Growth Boundary
  - Automobile-oriented, includes highway commercial areas found along major roadway corridors
- Local Examples
  - Portland
  - Brentwood
  - Hendersonville
- Examples Elsewhere
  - Carlisle, TN
  - Sterling Falls, TN
- Uses/Intensity
  - Predominately low-density, range of uses
  - Low density residential 40,000 sf lot - 5 du / ac
  - Non-residential FAR ≤ 0.20 retail
- Structure Heights
  - 2 stories
- Street Pattern (typical)
  - 2-lane roads, collector streets and 4-lane divided roads are primary form of access, and curb and gutter is more widely used
- Street Spacing
  - 1,500 feet for smaller (2-lane) collectors and arterials
  - 3,000 – 6,000 feet for larger (4-lane) collectors and arterials
- Block Pattern (typical)
  - Not present
  - Curvilinear street system, cul-de-sacs present
  - Limited connectivity
- Multi-modal Accommodations
  - Typically sidewalks supplemented by multi-use trails
  - Bicycle accommodations
  - Some limited transit accommodations, predominantly express service on commuter (bus or rail) routes, low level of service on local bus routes where available with service typically running no more frequent than every 30 to 60 minutes
  - Access to carpool or vanpool park-n-ride lots



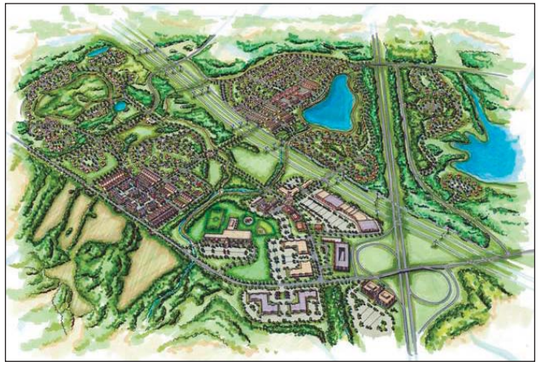


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FIGURE 4

CHARACTER TYPE - SUBURBAN

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

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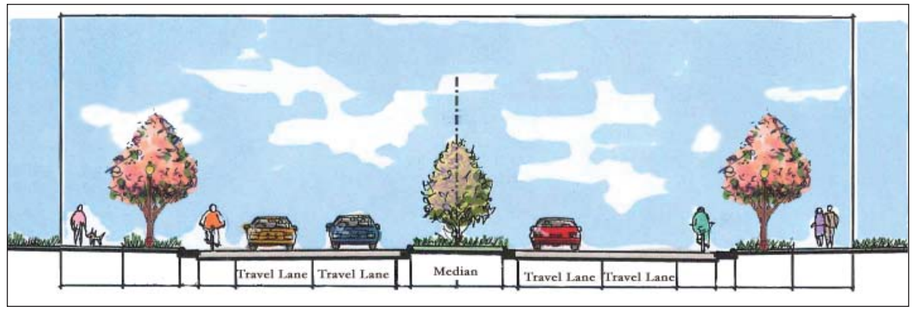
Suburban

- Definition
  - Areas where a variety of land uses occur at low densities, generally separated across the landscape by specific use type
  - Areas that extend beyond current city limits to Urban Growth Boundary
  - Automobile-oriented, includes highway commercial areas found along major roadway corridors
- Local Examples
  - Portland
  - Brentwood
  - Hendersonville
- Examples Elsewhere
  - Carlisle, TN
  - Sterling Falls, TN
- Uses/Intensity
  - Predominately low-density, range of uses
  - Low density residential 40,000 sf lot - 5 du / ac
  - Non-residential FAR ≤ 0.20 retail
- Structure Heights
  - 2 stories
- Street Pattern (typical)
  - 2-lane roads, collector streets and 4-lane divided roads are primary form of access, and curb and gutter is more widely used
- Street Spacing
  - 1,500 feet for smaller (2-lane) collectors and arterials
  - 3,000 – 6,000 feet for larger (4-lane) collectors and arterials
- Block Pattern (typical)
  - Not present
  - Curvilinear street system, cul-de-sacs present
  - Limited connectivity
- Multi-modal Accommodations
  - Typically sidewalks supplemented by multi-use trails
  - Bicycle accommodations
  - Some limited transit accommodations, predominantly express service on commuter (bus or rail) routes, low level of service on local bus routes where available with service typically running no more frequent than every 30 to 60 minutes
  - Access to carpool or vanpool park-n-ride lots



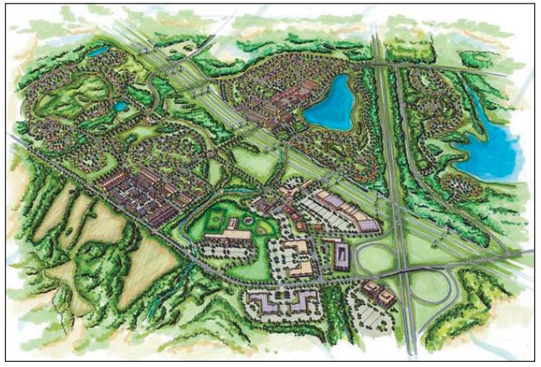


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FIGURE 4

CHARACTER TYPE - SUBURBAN

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

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General Urban

- Definition
  - Areas where a variety of land uses occur at medium to high densities, having a well-connected pattern within the landscape
  - Areas generally within current city limits of county seats
  - Generally comprised of established residential neighborhoods found near historic core areas
- Local Examples
  - Franklin
  - Gallatin
  - Murfreesboro
- Examples Elsewhere
  - Savannah GA
  - Charleston SC
- Uses/Intensity
  - Predominately small lot and attached residential, multi-family
  - Medium to high density residential > 5 du / ac
  - Civic, parks and open space, limited retail and office uses.
  - Non-residential FAR ≥ 0.9
- Structure Heights
  - 2-3 Stories
- Street Pattern (typical)
  - Connected street network in grid pattern
  - On-street parking
  - 750 feet for smaller (2-lane) collectors and arterials.
  - 3,000 – 6,000 feet for larger (4-lane) collectors and arterials
- Multi-modal Accommodations
  - Typically sidewalks supplemented by multi-use trails.
  - Bicycle accommodations
  - A moderate level of transit accommodations in larger cities with buses or trains running every 15 to 30 minutes. Smaller cities may have limited trolley or local circulator service with connections to an express bus or rail route to the central city
  - Access to carpool or vanpool park-n-ride lots

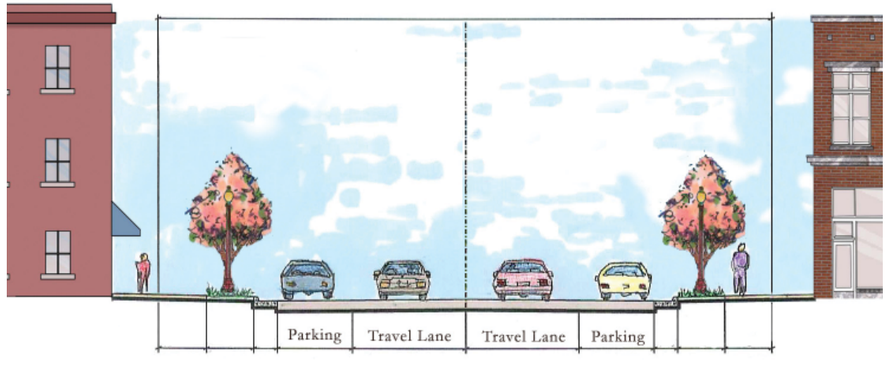

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FIGURE 5

CHARACTER TYPE - GENERAL URBAN

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tngis.org

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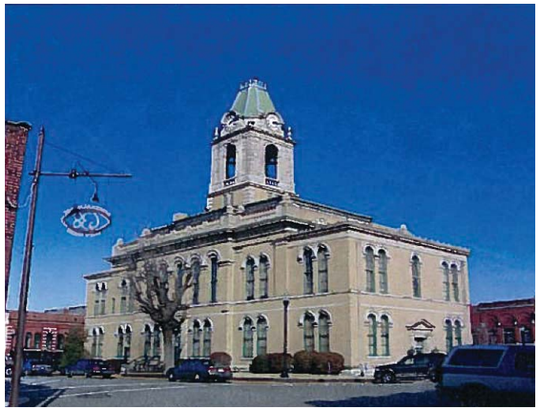
Traditional Town Centers

- Definition
  - Areas with a variety of land uses, typically at the highest densities in region
  - Generally found in historic established core areas such as the county seats
  - Pedestrian oriented, due to these areas being planned prior to euclidean zoning (separates land uses) and automobile dominance in the landscape (typically pre-1940s)
- Local Examples
  - Franklin
  - Murfreesboro
  - Gallatin
  - Springfield
- Examples Elsewhere
  - Savannah, GA
  - Charleston, SC
- Uses/Intensity
  - Civic, parks and open space, retail and office uses
  - Non-residential FAR ≥ 0.9
  - Medium to high density residential > 5 du / ac
  - Civic focus
- Structure Heights
  - 2-3+ Stories
- Street Pattern (typical)
  - Dense, connected street network in grid pattern
  - On-street parking
- Street Spacing
  - 750 feet for smaller (2-lane) collectors and arterials
  - 3,000 – 6,000 feet for larger (4-lane) collectors and arterials
- Block Pattern (typical)
  - Blocks present
  - Neighborhood general – length 250-600 ft
  - Civic / Centers - length 300-500 ft
- Multi-modal Accommodations
  - Wide sidewalk that can accommodate commerce activities
  - Designated bicycle routes



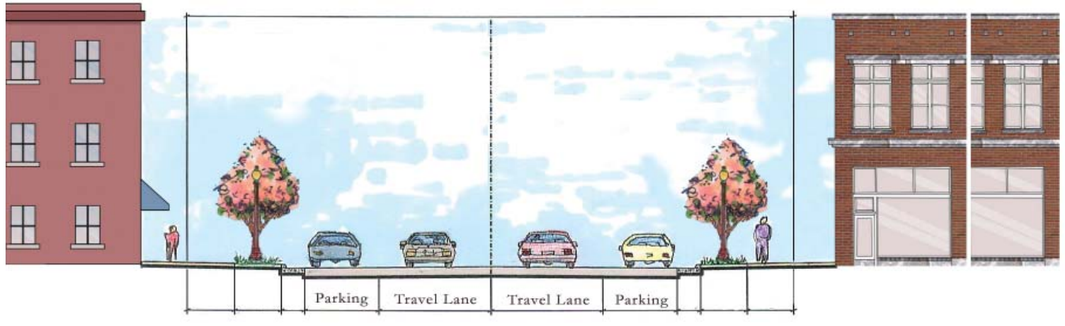


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FIGURE 6

CHARACTER TYPE - TRADITIONAL TOWN CENTERS

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

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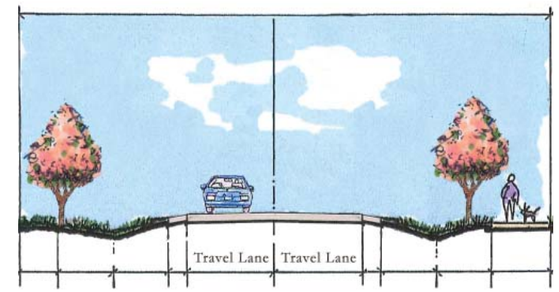
Village Centers

- Definition
  - Smaller Town, hamlet, or village centers in rural or suburban setting
  - Grid street system (not necessary)
  - Possible mixed-use neighborhoods
  - Commercial concentration
- Local Examples
  - Eagleville
  - Fairview
  - Watertown
  - Portland
- Uses/Intensity
  - Low to medium density residential
  - Non-residential FAR ≥ 0.20
- Structure Heights
  - 1-2 Stories
- Street Pattern (typical)
  - 2-lane roads with shoulder and ditch (no curb and gutter)
  - 1-3 miles for smaller (2-lane) collectors and arterials
  - 3-5 miles for larger (4-lane) collectors and arterials
- Multi-modal Accommodations
  - Limited Pedestrian Accommodations (typically a coordinated system of greenways and trails)



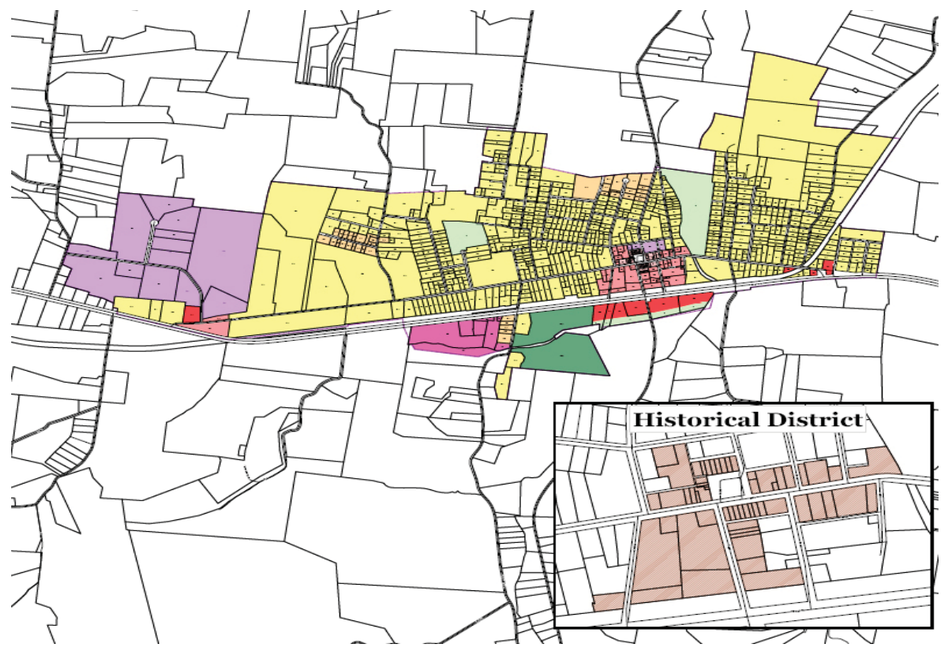


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FIGURE 7

CHARACTER TYPE - VILLAGE CENTERS

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

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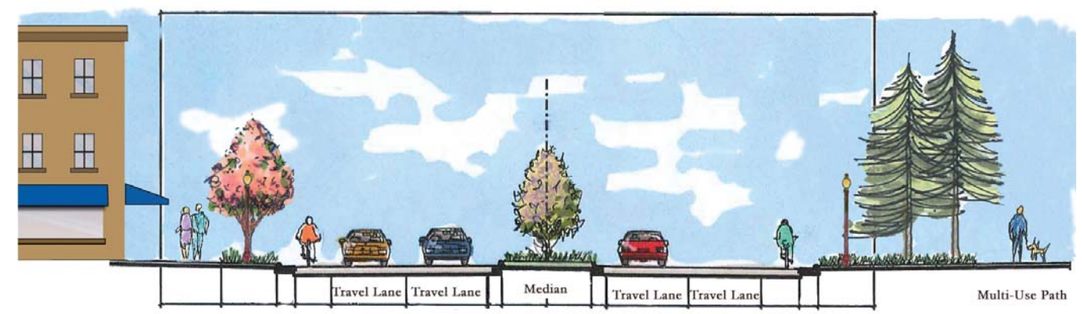
Employment Centers

- Definition
  - High concentration of light industrial, back-office, or industrial employment
- Local Examples
  - Nashville International Airport
- Examples Elsewhere
  - Southway Industrial Park, La Vergne TN
- Uses / Intensity
  - Industrial, Commercial (FAR ≥ 0.15)
- Structure Heights
  - 1-2 stories
- Block Pattern
  - Not Present



LandDesign
223 North Graham St. · Charlotte, NC 28202
Ph 704.333.0325 | Fx 704.332.3101
Ph 704.375.1777 | Fx 704.375.4726

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FIGURE 8

CHARACTER TYPE - EMPLOYMENT CENTERS

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tdnp.org

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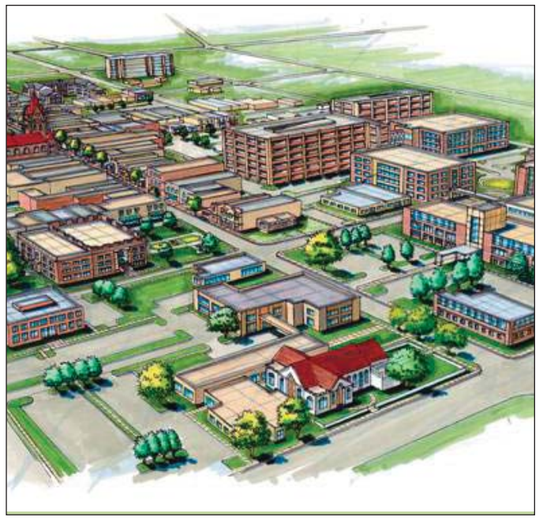
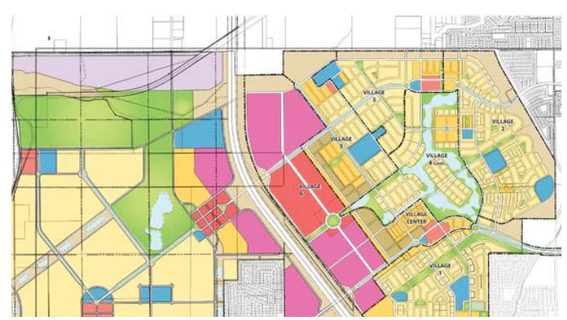


Activity Centers

- Definition
  - Large-scale mix of office, retail and residential land uses
- Local Examples
  - Providence Place
  - Indian Lake
  - Cool Springs
- Examples Elsewhere
  - North Carolina Research Campus, Kannapolis, NC
- Uses/Intensity
  - Med to high density residential (> 5 du / ac)
  - Office, Retail (FAR ≥ 0.20)
- Structure Heights
  - 1-3+ Stories
- Block Pattern (typical)
  - Blocks present
  - Neighborhood General – Length 250-600 ft
  - Civic / Centers - Length 300-500 ft
- Multi-modal Accommodations
  - Wide sidewalks that can accommodate commerce activities



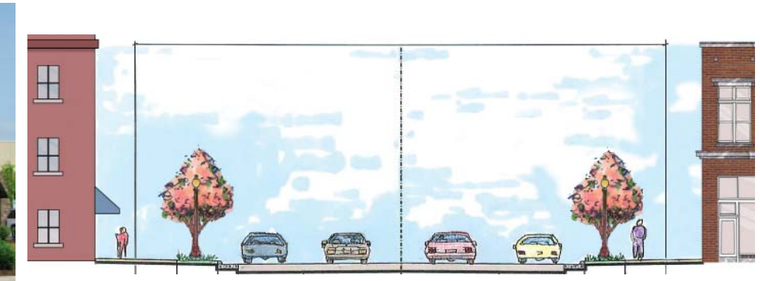


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FIGURE 9

CHARACTER TYPE - ACTIVITY CENTERS

Tri-County Transportation and Land Use Study, Tennessee

1 inch = 9,000 feet

0 1 2 4 Miles

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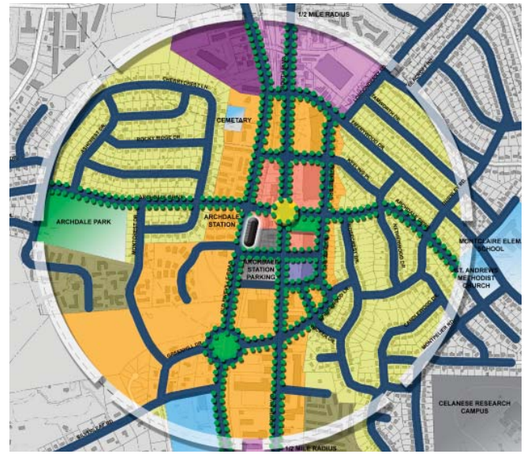
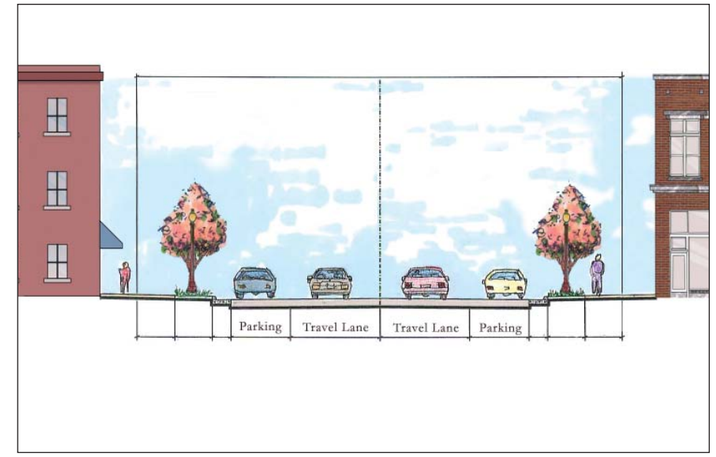




Transit Oriented Development

- Definition
  - District supporting a mix of land uses, at higher densities, located in close proximity to an existing or planned mass transit station
- Local Examples
  - None
- Examples Elsewhere
  - South Corridor, Charlotte, NC
  - Denver, CO
- Uses/Intensity
  - Retail and employment. Within comfortable walking distance of mass transit station (2,000 feet), may be sited along feeder bus routes.
  - Non-residential FAR = 0.5 - 3.0
  - High density residential 12-25 du / ac
- Structure Heights
  - 2 - 12 + stories
- Street Pattern (typical)
  - Dense, connected street network in grid pattern
  - On-street and structured parking, reduced parking requirements
- Street Spacing
  - 750 feet for smaller (2-lane) collectors and arterials
  - 1,500 to 3,000 feet for larger (4-lane) collectors and arterials
- Block Pattern
  - Block pattern present
  - Desired length 300-500 ft
- Multi-modal Accommodations
  - Combination of sidewalks and coordinated multi-use trails
  - Sidewalks wide enough to encourage commerce activities in TOD Core
  - High level of walkability with frequent access to fixed-route, and in most cases, fixed-guideway service
  - Designated routes and some bike lanes

The Model

The Tri-County Transportation & Land Use Study employed a regional, GIS-based modeling approach using CommunityViz 3.3 modeling software. CommunityViz is decision support software that evaluates competing future land use scenarios under consideration by a community. The model was prepared using data provided by county planning departments, representatives from public service agencies, and the MPO staff. Input gathered during stakeholder interviews and the community-at-large was also used to help refine the model.

Look Up Tables organize development characteristics for character types. Additional Look Up Tables are used in the model as discussed below in this section. The Technical Appendix contains further information on the model structure including how specific Look Up Tables are used in relation to the model.

Development Controls

The model uses available land use, environmental, and social data to generate build-out potential for remaining vacant land within each county and the municipalities within them. Build-out potential is calculated at the parcel level and requires thorough existing and future land use data, application of appropriate development controls derived using a combination of character types and generalized future land use (see list below), and accurate environmental and social data. Additional input from local jurisdictions was gathered to determine the appropriate development controls. In each micro-model prepared (one per each county), height, bulk, and density development controls were tailored to represent average calculations suitable for the local area. These values represent the available supply for future development on a given parcel. The estimated build-out potential for each micro model was report by the number of dwelling units, commercial gross square footage, office gross square footages, and industrial square footage supported by each of the parcels. These values were stored in Look Up Tables found in the Technical Appendix. The use of development controls in allocation is discussed further in this report (Section 5: Location of Growth, 2035).

Generalized Future Land Use

In order to develop accurate information for generalized future land use, MPO staff requested future land use map data from local governments (cities, counties) in the study area. Where GIS data was not available, MPO staff digitized and created shapefiles from current future land use maps or zoning maps. Where future land use map data was unavailable, the MPO staff used zoning information. If neither future land use or zoning information was available, tax assessor data or CASS codes (Aug 2007) were used to represent the use of a given parcel (e.g., parts of Robertson– Adams, Burns, Cross Plains, Orlinda– used separate category RES-Residential).

Information was coded for 10 separate categories. Areas were differentiated by use types and the code used defaulted to the more intensive use allowed in the category (e.g., future land use or zoning categories allowing single and/or multi-family uses were coded MFR-Multifamily Residential; categories allowing office and industrial uses were coded IND-Industrial).

Generalized future land use categories included:

- IND – Industrial
- O – Office
- GC – General Commercial
- IPF – Institutional/Public Facilities
- MU – Mixed Use
- MFR – Multifamily Residential
- SFR – Single family Residential
- RES – Residential
- AGR – Agriculture
- OS – Open Space

Supply, Suitability and Demand

Supply, suitability and demand (as defined below) are the critical factors used to generate the business-as-usual scenario that is explored in more detail in this report.

Supply

Supply is the amount of land available for development and the build-out potential for new future dwelling units and non-residential square footage based on existing development controls in adopted plans and ordinances for the cities and counties represented in the model and the presence of any areas that are highly constrained for development. Determining supply began with identifying land available through an assessment of developed versus vacant land, and further reducing the vacant area by identifying constraints to development (Map D - Development Constraints). The supply available is shown on Map E - Supply.

Existing Development vs Vacant Land

MPO staff ran a set of queries using available tax parcel data (CASS codes – August 2007) to determine the extent of developed versus vacant land. In general, parcels defined as "existing development" are assumed to have an existing structure or the parcel has been converted to a more intensive use. Public open spaces, cemeteries, and parks were also assumed as developed. Remaining parcels in the study area were assumed as "vacant" or undeveloped. MPO staff relied on aerial maps to verify the results of the methodology used. The methodology is described in the Technical Appendix. The results are shown on Map C - Existing Development.

Environmental Constraints

Areas that are environmentally constrained also factor into determining supply of available land. Physical and policy constraints must be considered to accurately estimate the build-out potential of an area. The carrying capacity analysis performed within each micro-model identifies areas deemed either "highly-constrained for development" or "areas of conflict for development." Variables used to determine these two classifications differed by county based on available data. The data inputs for the carrying capacity analysis include a parcel shape file and environmental features that

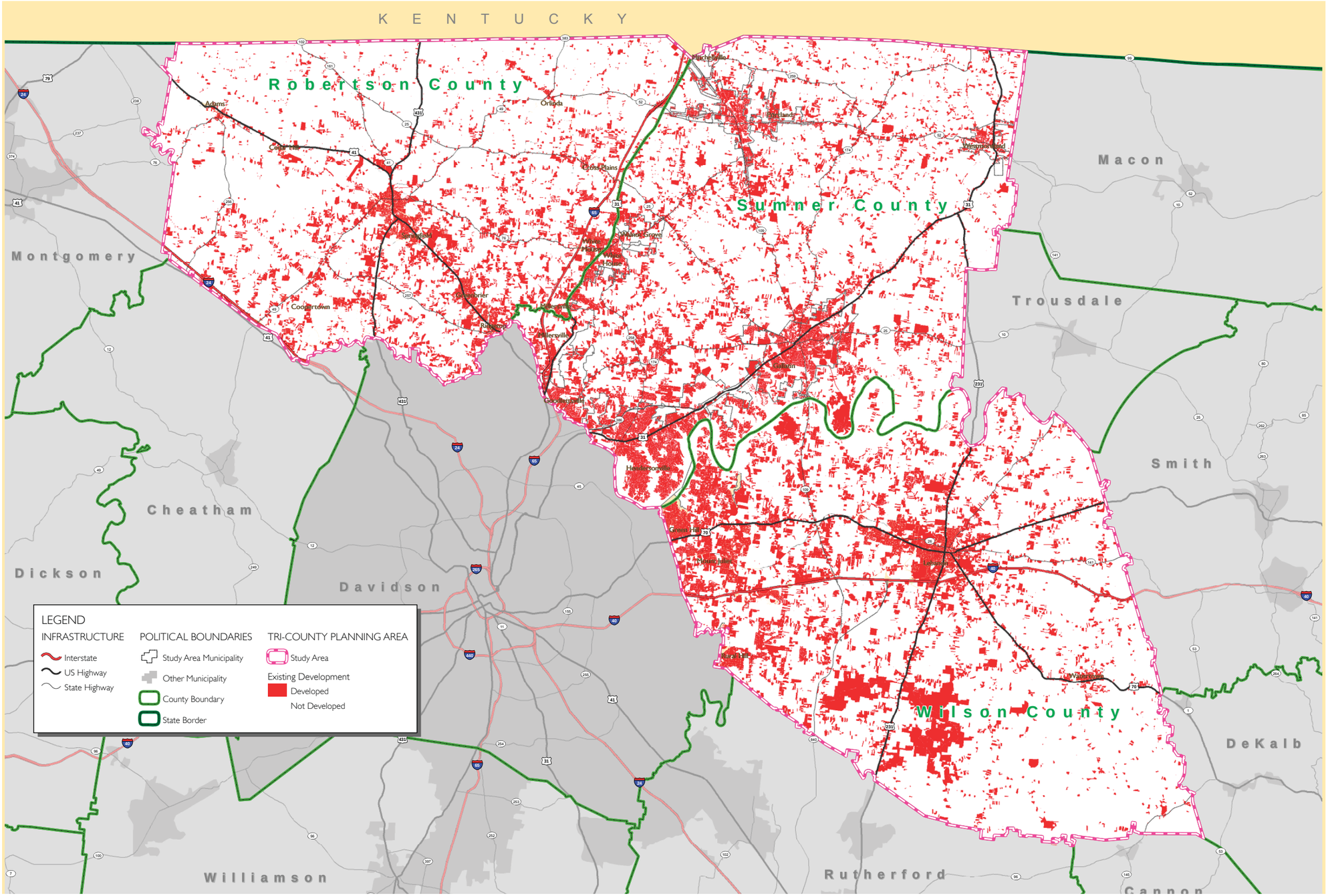
represent both areas “highly-constrained for development” or “in conflict for development” (see below for list of environmental layers). These designations can change over time as new data becomes available, policies change, or as MPO staff or member jurisdictions refine the models.

Collectively, areas having significant development constraints are removed by the model from the supply of available land, referred to as “stamping out.” Map D - Development Constraints identifies those areas removed by the model from supply including the following areas:

- Existing Development
- Floodways - Created from an overlap of the county’s DFIRM.
- Protected Lands
  - Conservation Areas, created from TDEC/TWRA files
  - Land Trust, created from Tennessee Land Trust files
- Parks
  - Created from regional parks file and local parks files
- State Natural Areas
  - Created from TDEC/TWRA files
- TWRA Lands
  - Created from TDEC/TWRA files
- Slopes
  - Created from DTM. Includes slopes over 25%
- Water Bodies
  - Created from State Water Bodies, local water bodies, and Davidson Flood buffer files.
- Wetlands
  - Created from NWI wetlands file excluding Uplands

Areas that were assumed vacant, and that were not environmentally constrained, represent the supply of available land eligible to receive future development based on Demand and Suitability. The supply of land eligible to receive future development does not assume potential redevelopment of developed areas. Map E - Supply shows those areas which comprise the supply of available land throughout the study area. Note the model does not assume each parcel within the supply can be entirely developed. The carrying capacity and build-out potential analyses make use of development controls (Section 5: Location of Growth, 2035 – also see above) that influence the amount of each parcel that may be eligible to receive certain types of development.

Importantly, land consumption that occurs within the supply of available land can be measured against this supply to assess impacts in the business-as-usual scenario. Also, alternative land consumption patterns can be compared to results of the business-as-usual scenario.



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MAP C

EXISTING DEVELOPMENT

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

June 2009 | LD#1007293

1 inch = 9,000 feet

0 1 2 4 Miles

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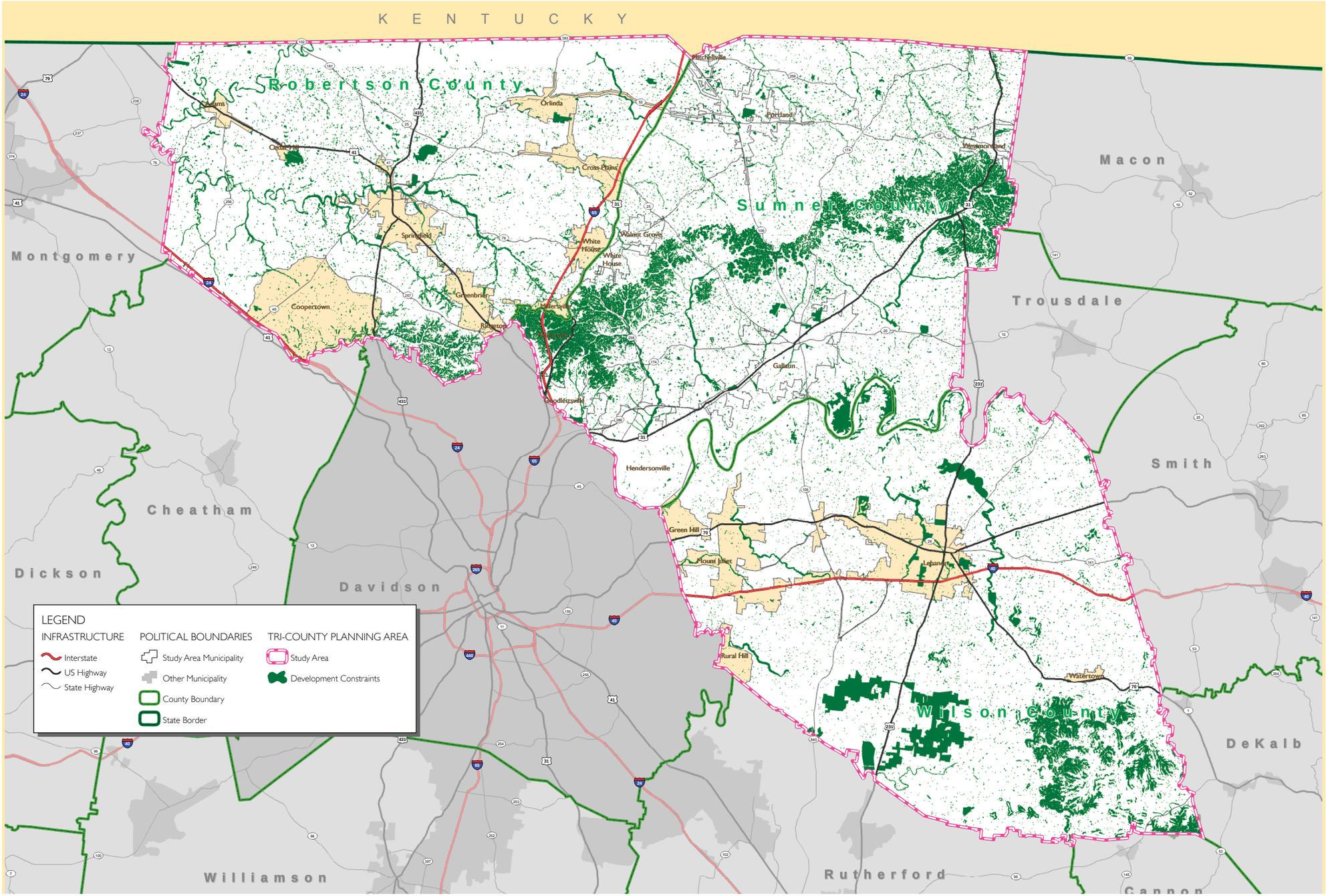

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MAP D

DEVELOPMENT CONSTRAINTS

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

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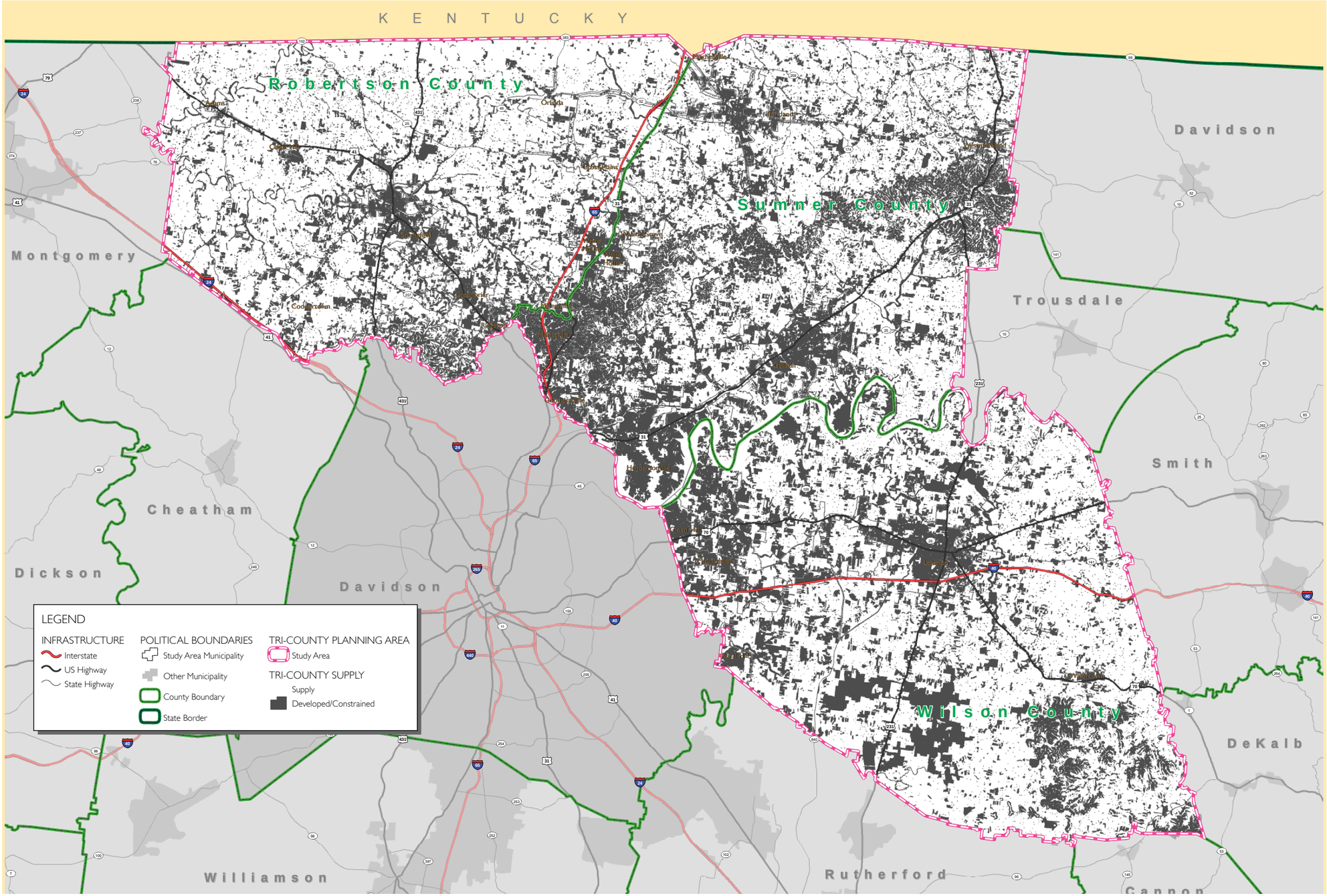

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MAP E
SUPPLY

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

June 2009 | LD#1007293

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tnsdi.org

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Demand

Demand is the amount of projected growth for the study area, including future employment by sector as well as residential population. Projections were analyzed for the study area in horizon years 2015, 2025 and 2035.

The Tri-County Transportation & Land Use Study Economic and Market Analysis, prepared for the study area, was used to identify demand. The source of employment and population forecasts is Woods & Poole, a source of data used by the MPO for the regional travel demand model. The last major update to regional control totals for socioeconomic data used in the regional travel demand model was completed in July 2008. The forecasting approach is a top-down procedure that starts with a national forecast, then describes future conditions in the Nashville region as a whole, then allocates the regional magnitudes to the seven individual counties considered in the regional travel demand model.

Employment and population projections for the study area (commonly referred to as "control totals") were used as direct inputs to the CommunityViz allocation model. Additional information on control totals used in the analysis is summarized in the Technical Appendix of this report. The results of the allocation model and maps are found in Section 5: Location of Growth, 2035 of this report.

Suitability

Suitability is the likelihood that one area will develop before another, based on its spatial relationship to a list of factors deemed positive and/or negative for attracting growth. The list of factors was determined in partnership with local developers, market analysts, policy-makers, and utility providers. A detailed description of each factor shown below is found in Section 4: Suitability & Drivers of Growth of this report.

- Water Availability – WATER
- Sewer Availability – SEWER
- Retail Density (Walking Neighborhood) – RETAIL_H
- Retail Density (Driving Neighborhood) – RETAIL_2
- Transit Service Area – BUS
- Distance to Nearest Transit Station – TRAN_STA
- Distance to Nearest Regional Road – LINK_DIST
- Distance to Nearest Major Intersection – MAJ_INT
- Distance to Nearest Park – PARKS
- Environmental Conflicts
    - Rare & Endangered Species – RARE
    - Floodplain – NOT_FLD
    - Suitable Soil – NOT_SOIL

It was determined after consideration and testing by MPO staff that factors would not be individually weighted. Options exist to weight factors and these options could be explored in the future.

Collectively, the above listed factor information is represented as “suitability” in the model. Suitability factors have a strong influence on the allocation of future growth and resulting land consumption with Demand.

Suitability is explained in more detail in Section 4: Suitability & Drivers of Growth. Additional maps showing suitability for each of the three counties is also found in Section 4: Suitability & Drivers of Growth of this report.

Section 3: Demand, Magnitude of Growth, 2008-2035

The market analysis prepared by BBPC for Tri-County provides both non-residential and residential projections through 2035. These numbers are based on information provided by Woods & Poole and were approved in June 2008 by the TCC and MPO staff. Regional employment is predicted to increase by approximately 2% annually between now and 2035. Residential growth (households) will occur at a similar rate.

Projected Retail Employment Growth—Tri-County Study Area, 2008-2035

County	2008	2020	2035	% Annual Growth
Robertson	4,430	5,730	7,265	1.85%
Sumner	8,910	10,990	13,672	1.60%
Wilson	10,350	27,780	19,825	2.44%
Total	**23,690**	**31,310**	**40,761**	**2.03%**

Projected Industrial Employment Growth—Tri-County Study Area, 2008-2035

County	2008	2020	2035	% Annual Growth
Robertson	13,540	16,430	19,885	1.43%
Sumner	21,680	27,100	34,088	1.69%
Wilson	21,630	27,780	35,167	1.82%
Total	**56,850**	**71,310**	**89,140**	**1.68%**

Projected Office Employment Growth—Tri-County Study Area, 2008-2035

County	2008	2020	2035	% Annual Growth
Robertson	4,030	5,320	6,779	1.94%
Sumner	10,280	13,030	16,625	1.80%
Wilson	9,250	13,020	17,375	2.36%
Total	**23,560**	**31,370**	**40,779**	**2.05%**

Projected Household Growth—Tri-County Study Area, 2008-2035

County	2008	2020	2035	% Annual Growth
Robertson	24,510	30,780	38,231	1.66%
Sumner	60,860	77,680	98,194	1.79%
Wilson	42,170	56,670	74,435	2.13%
Total	**127,540**	**165,130**	**210,860**	**1.88%**

(Source: Woods and Poole, BBPC, 2008)

Section 4: Suitability & Drivers of Growth

The market, and the factors that influence it, is the underlying phenomenon that the built environment reflects. Planners and policy makers attempt to guide the market and development through other mechanisms, but developers and the real estate industry also help design the future.

The demand for single family homes can give rise to increased demand for service and retail related uses. However, certain factors that make areas desirable are not constant across land uses. What makes an area attractive for retail use may not also translate into an attractive area for residential uses. These intricacies of attractiveness must be understood by a region's policy makers in order to guide growth and satisfy demand.

Focus group meetings were held in July 2008 with real estate developers, infrastructure providers, and policy makers to establish common factors that drive growth, and policies that affect the likely build-out of each county.

The information obtained from these meetings was used as an influencing factor for the study area model as well as the regional land use model being prepared for the socioeconomic update to the regional travel demand model. A list of factors that could be spatially represented and accounted for in GIS is included below. The list of factors was put together with input from all three focus groups. Additional factors were provided based on the expertise of the project team and given availability of data. This information is collectively represented as "suitability" in the land use model. Suitability factors have a strong influence on the allocation of future growth and resulting 2035 land consumption maps.

> *The existence of a market for any urban planning prescription is primary, for without it there is no reason to even consider action. The word "market" is not synonymous with population. It means a specific desire for something and willingness to pay for it in the face of available alternatives. Nor is market synonymous with "need." Too often what one person calls a need is really a preference for what other people ought to have. To be successful, an urban planning prescription must reflect both market demand and supply.*
>
> -Alex Garvin, *The American City*

Suitability Factors

- Water Availability – WATER
- Sewer Availability – SEWER

MPO staff used tax parcel data and service area shapefiles provided on a county by county basis to create a data set that covered the entire region. Information contained in this data set delineated where one of these three conditions existed: the presence of water and sewer infrastructure, the presence of only water infrastructure, and the presence of only sewer infrastructure. Areas not covered by the data set did not have public infrastructure for either

service. Using this information, the suitability of each parcel was determined, with highest scores going to those parcels that had water and sewer service (assigned "Y"), equal scores for either water or sewer if one was present and lowest scores assigned to parcels without either (assigned "N").

- Retail Density (Walking Neighborhood) – RETAIL_H
- Retail Density (Driving Neighborhood) – RETAIL_2

The MPO used Info USA data to create a point layer that represented existing retail uses. From this point file, using the spatial analyst extension in GIS, MetroGIS created two polygon files called "RETAIL_H" and "RETAIL_2" Within the boundaries of each grid, the density of retail points was determined and ranked. Grids were ranked from 1 to 5, with 5 being the grids which contained the highest density of retail uses. Overlap with the grids increased a parcel's suitability, and within the group of parcels that overlapped, overlap with a ½ mile grid ranked 5 was the most suitable, while overlap with a 2 mile grid ranked 1 was the least suitable. This two tiered system of retail ranking enabled the project team to account for proximity to retail uses on two scales. Overlap and ranking of the ½ mile grid was weighted more heavily than the similarly designed 2 mile grid.

- Transit Service Area – BUS

The Metropolitan Transit Authority provided a line file that represents existing bus routes in the region. The MPO used this file to create a 1/4 mile buffer of transit service. Those parcels that fell within the ¾ mile buffer area were assigned a "Y", while those parcels outside of the service area were given a value "N." Parcels with a "Y" value were ranked as more suitable than those assigned "N."

- Distance to Nearest Transit Station – TRAN_STA

The MPO created a transit stops shape file which inventories express bus and commuter rail stops. Proximity to these stops (measured in miles) makes a parcel more suitable. Currently, this file represents the most popular and widely available public transportation options.

- Distance to Nearest Regional Road – LINK_DIST

The MPO maintains a network file of major roadways for the regional travel demand model. The same network file is used in the land suitability analysis. Proximity to the network file is measured for each parcel: those parcels that are closer to the network have a higher suitability score than those that are further away. For horizon years 2015, 2025, and 2035, suitability is based on the proposed network file for that horizon year. A parcel's suitability score may change as the network expands, changes, or shrinks in certain areas. In order to assign distances to

parcels, the parcel layer was tagged in TransCAD with the name of the link closest to it. A MinDistance function with a "where" clause was run to calculate the distance from a parcel to its nearest link. As the regional network file is modified, the 2015 distance, 2025 distance, and 2035 distance should be calculated in the same way.

- Distance to Nearest Major Intersection – MAJ_INT

  The MPO created a major intersections and interchanges data set for the region. This data set inventories intersections of state routes and network roads described above. Proximity to a major intersection or interchange increases the suitability of a parcel for development.

- Distance to Nearest Park – PARKS

  State and national conservation areas, municipal parks, and recreation areas (both land and water based) were joined together by MPO staff to create a regional parks file. Proximity to parks increased the suitability of a parcel. Where local, municipal data was not available, proximity was measured to the closest state or national conserved open space areas and recreation areas.

- Environmental Conflicts
  - Rare & Endangered Species – RARE
  - Floodplain – NOT_FLD
  - Suitable Soil – NOT_SOIL

  While very few physical features preclude development completely, land where rare and endangered species, floodplain, unsuitable soil and other environmental challenges are absent or minimal is considered more attractive for development. Development on higher, well drained land incurs less cost and time than development on an otherwise similar parcel.

  The MPO staff created a layer for rare and endangered species using data from TDEC. A parcel's suitability score would change depending on the presence ("Y") or absence ("N") of rare and endangered species. Using an overlap of the county's DFIRM (A, AE) data set, another layer was created to represent the 100 year floodplain. The percentage of the parcel not covered by the 100 year floodplain was calculated. A higher percentage increases the suitability of a parcel for development. Another layer was generated by the MPO staff for suitable soils, created from an overlap of greater than 15% sloping and other locally identified soils from county soil maps and reports. The percentage of a parcel not covered by unsuitable soils was calculated. The greater the percentage, the more suitable the parcel was considered for development.

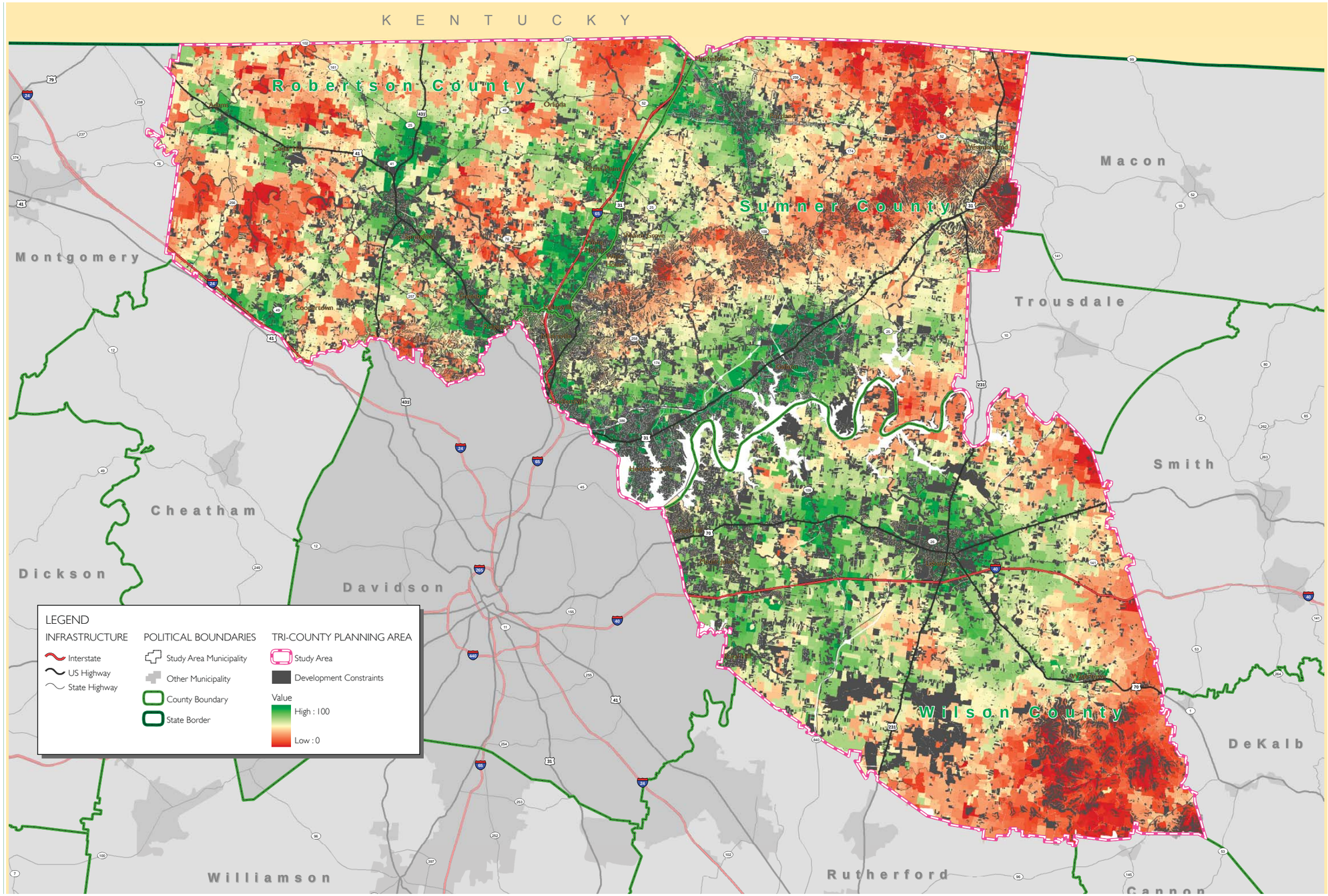
Suitability Results

Model updates were made during calibration to overcome existing limitations of the land suitability analysis. Limitations included: no initial weighting scale, inconsistent data across the region, and lack of up-to-data travel time information. It was determined after consideration and testing by MPO staff that factors would not be individually weighted. Options exist to weight factors and these options could be explored in the future. Suitability and allocation map results appeared favorable without weighting of factors. MPO staff requested additional data from local governments (cities, counties) in the study area. Where GIS data was not available, MPO staff digitized and created shapefiles.

The suitability factor was represented by an attribute in the parcel field which contained values for "per cent constrained." The closer a parcel's value was to 1, the less suitable for development it was. The closer the parcel's value was to 0, the more suitable it was. Areas shown in green are assumed to be more attractive based on the presence or absence of factors identified above. These areas would be assigned growth during allocation before areas deemed less attractive (areas colored in pink and red). Map F - Suitability shows the suitability map for the entire study area. The method for how the model allocates growth as relates to suitability is explained in more detail in the next section of the report.

MPO staff and the consultant team summarized available data for the study area, and MPO staff created regional level files for each of the factors. Regional files enabled micro area suitability to account for influence of factors beyond county boundaries.

Over time the land suitability analysis can be updated by the MPO in concert with member jurisdictions to reflect both new information and emerging trends.



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LandDesign
223 North Graham St. · Charlotte, NC 28202
Ph 704.333.0325 | Ex 704.332.3101
Ph 704.376.7777 | Ex 704.376.8405

Kimley-Horn and Associates, Inc.

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MAP F
SUITABILITY

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
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Section 5: Location of Growth

Taking a closer look at each of the counties in the study area enabled the project team to explore the Supply, Suitability and Demand components of each in order to prepare a more accurate regional business-as-usual scenario.

Non-residential and residential demand for each county remains equal to the BBPC growth forecasts shown previously in Section 3: Demand, Magnitude of Growth, 2008-2035. Knowing that such growth is projected to occur, the region must attempt to understand where and at what intensities new jobs and homes will locate. Influencing factors to locational allocation include such factors as: development constraints, currently adopted jurisdictional development controls, land availability and market forces.

Suitability has been calculated through the land suitability map in Section 4: Suitability & Drivers of Growth.

Method of Allocating Growth

Two methods exist for performing allocation: strict-order (standard) and probability-based (random).

Strict-order allocation places development in the most desirable location with available capacity. When demand is allocated to resources using strict order, the most desirable parcels are filled and the least desirable parcels remain empty. Partially filled parcels occur when demand exhausts itself before capacity. Demand is spread evenly between parcels or areas that share the same desirability score.

Probability-based allocation results in slightly different outcomes. Probability-based allocation operates on the premise that a parcel's capacity is used proportional to the relative desirability score of that parcel. In this method, if a parcel's desirability is 100, its relative desirability is the percentage identified when that score is added to all other scores and divided by the total. A parcel may be identified as the most desirable with a score of 100, but when relative desirability is identified, that parcel could have a relative desirability of only 33.3%. Allocator places 33.3% of the demand (e.g., residential dwelling units) in that parcel. When that parcel is completely filled to capacity, relative desirability scores are rescaled among the remaining parcels with capacity. Typically this results in a more random development pattern that changes between allocation runs. Probability based allocation has been found to more closely mirror development patterns. For this reason, probability based allocation has been used in both the macro and micro models. Specific equations are found in the Technical Appendix.

Model Allocation Process

Future year allocation was completed for horizon years 2015, 2025, and 2035. The "allocation tool wizard" in CommunityViz software uses supply, suitability, and demand to allocate project new population and/or employment by parcel. For this process, the allocation wizard uses build-out potential as the "supply", population and employment forecasts as the "demand", and the results of the land suitability analysis as the "desirability score."

Information generated in the micro process is aggregated up to the TAZ-level for use in the macro area model. After normalizing suitability scores across the region, allocation is run using supply information

(build-out potential), desirability scores (raw suitability scores by parcel averages and normalized for the region), and demand (regional population and employment control totals). After macro allocation, the county-wide totals can be updated to reflect the output of the regional allocation process. However, county control totals remain as an option for future allocation at the micro level is necessary.

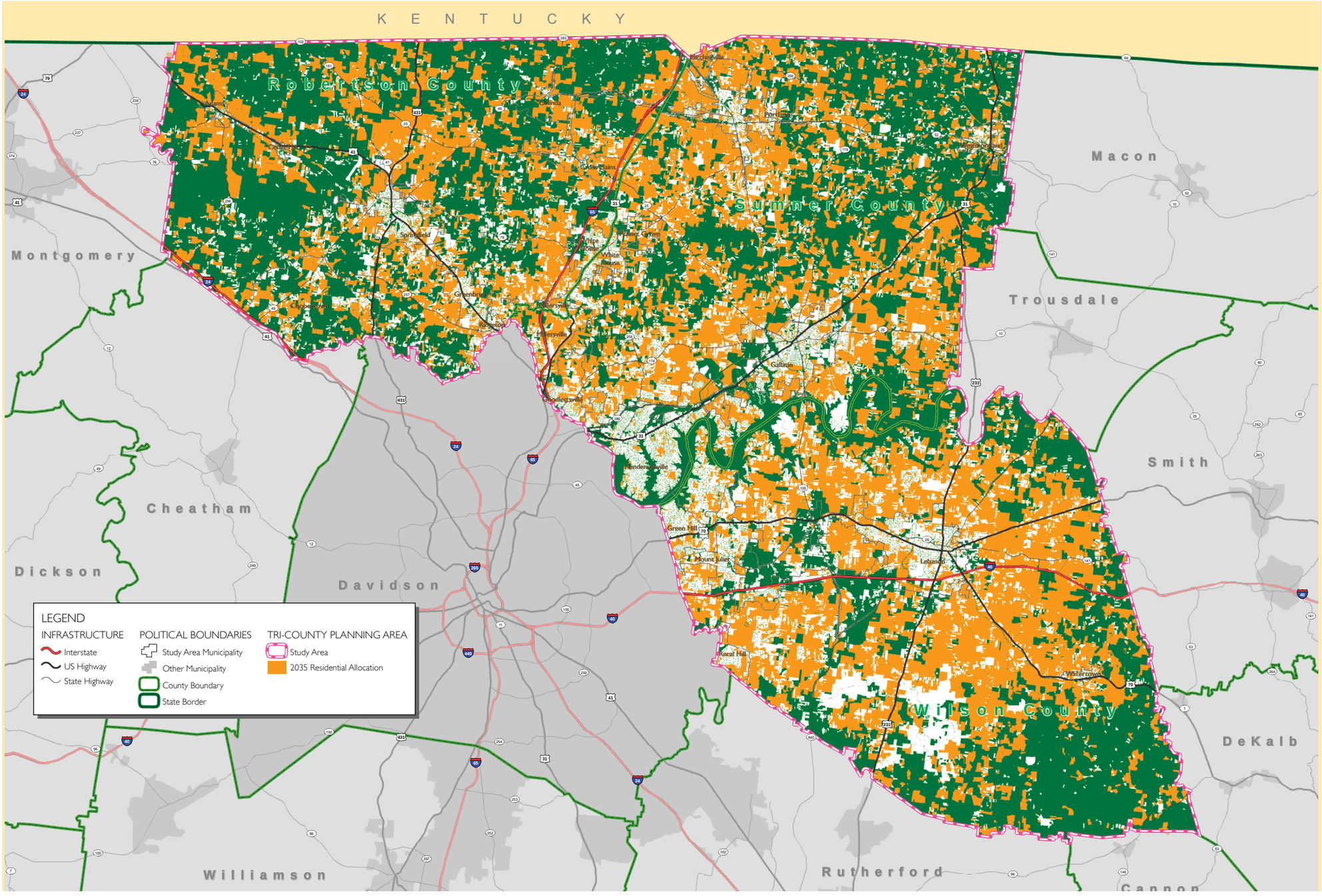
Population and employment growth was allocated for the horizon years. The supply remaining for each subsequent horizon year was updated automatically based on how growth was allocated in the previous horizon year. This method ensures that no parcel is assigned more growth than it can accommodate, and that development patterns can be illustrated individually for each horizon year. As mentioned, allocation within the software was performed using probability rules in CommunityViz software.

The following pages contain the results of 2035 land consumption including the following maps. The 2035 land consumption maps provide a visual representation of the results of the allocation process. The allocation process only distributes new growth (or the change between base and horizon years). The population forecasts have been converted to new expected household growth. The numbers representing the change between base and horizon years were used in the allocation process. Because the micro model generates build-out potential in square feet by land use, employment forecasts were converted to demand for square feet by land use using employee space ratios with input from MPO staff. These space ratios were based on the Tri-County Transportation/Land use Study: Economic & Market Analysis prepared by BBPC.

Additional maps representing potential densities/intensities are included to better understand what locations within the study area theoretically have the highest densities/intensities of growth as anticipated by the model.

Map G - 2035 Residential Allocation
Map H - 2035 Residential Allocation Units by Acre
Map I - 2035 Non-Residential Allocation
Map J - 2035 Non-Residential Allocation Units by Acre

Additional information including equations and model structure diagrams is included in the Technical Appendix.



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MAP G

2035 RESIDENTIAL ALLOCATION

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tnsdi.org

Disclaimer:
The user of this information is cautioned to consider the provisional nature of the information before making decisions that concern monetary or operational consequences. Furthermore, LandDesign Inc. assumes no responsibility for the accuracy, completeness or misuse of this information. Conclusions or actions taken from this information are the sole responsibility of the user. Please contact original source about questions on data.

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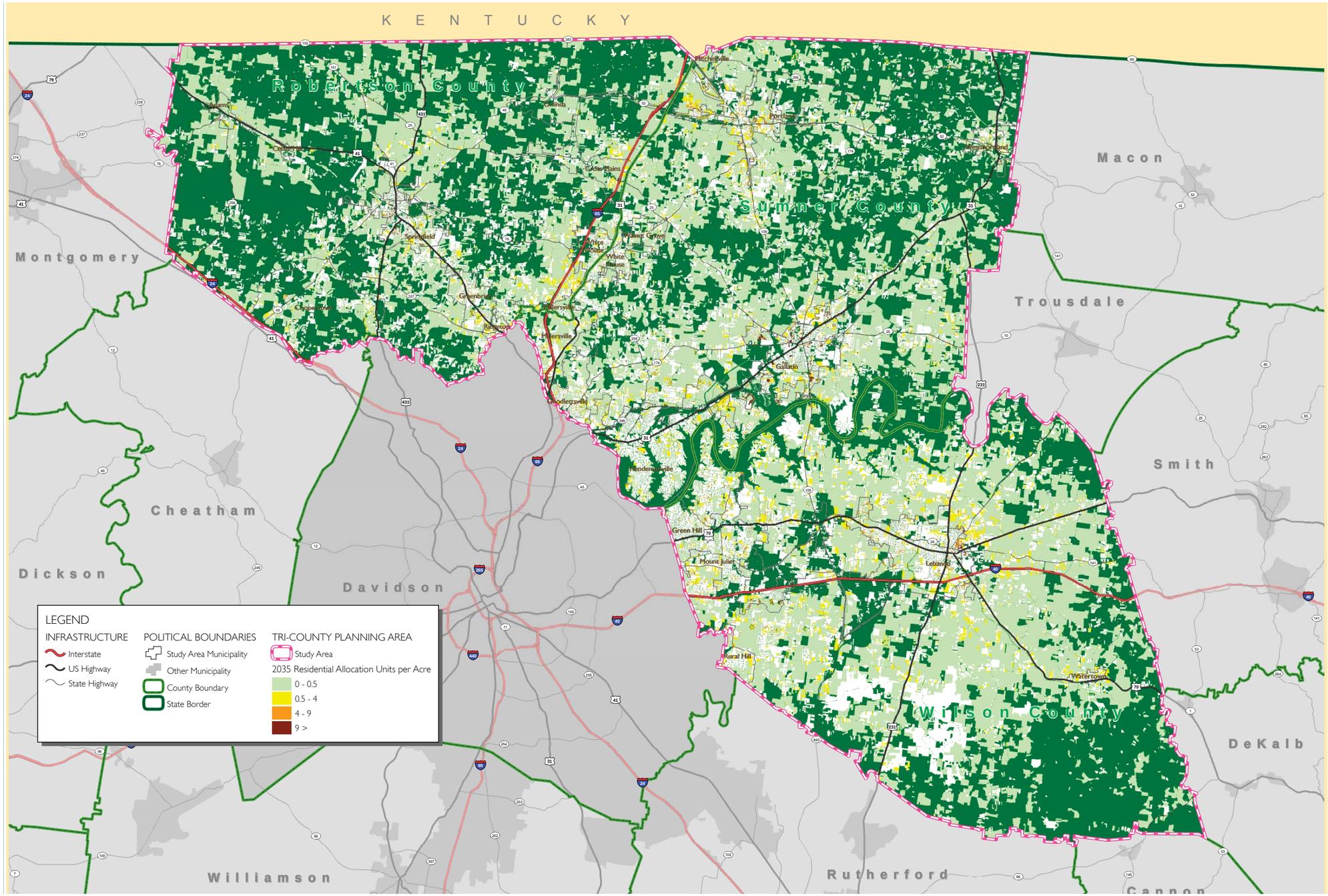

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LandDesign

Kimley-Horn and Associates, Inc.

bbpc ASSOCIATES

Sterling COMMUNICATIONS

MAP H

2035 RESIDENTIAL ALLOCATION UNITS BY ACRE

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

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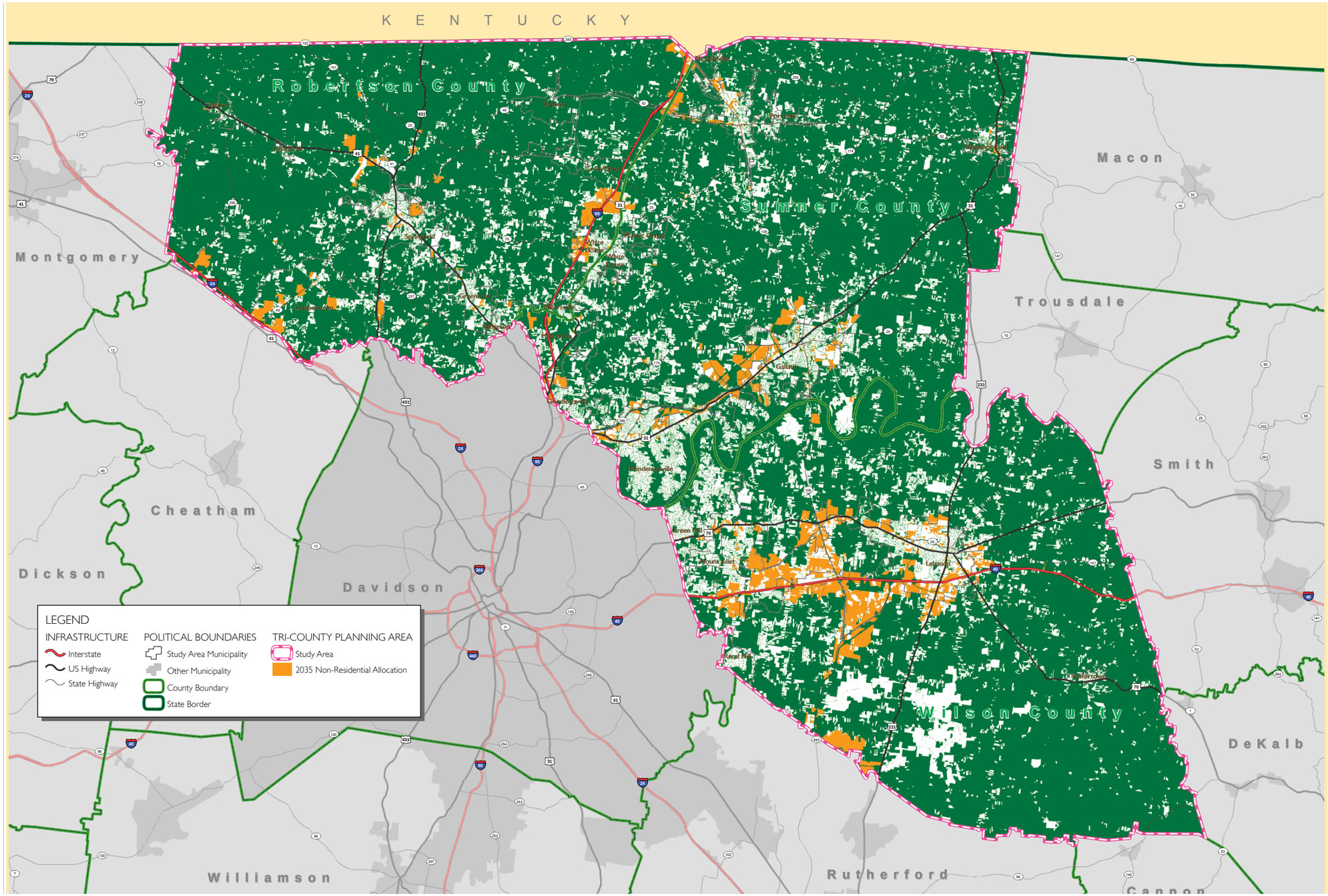

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MAP 1

2035 NON-RESIDENTIAL ALLOCATION

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tnsdi.org

Disclaimer:
The user of this information is cautioned to consider the provisional nature of the information before making decisions that concern monetary or operational consequences. Furthermore, LandDesign Inc. assumes no responsibility for the accuracy, completeness or misuse of this information. Conclusions or actions taken from this information are the sole responsibility of the user. Please contact original source about questions on data.

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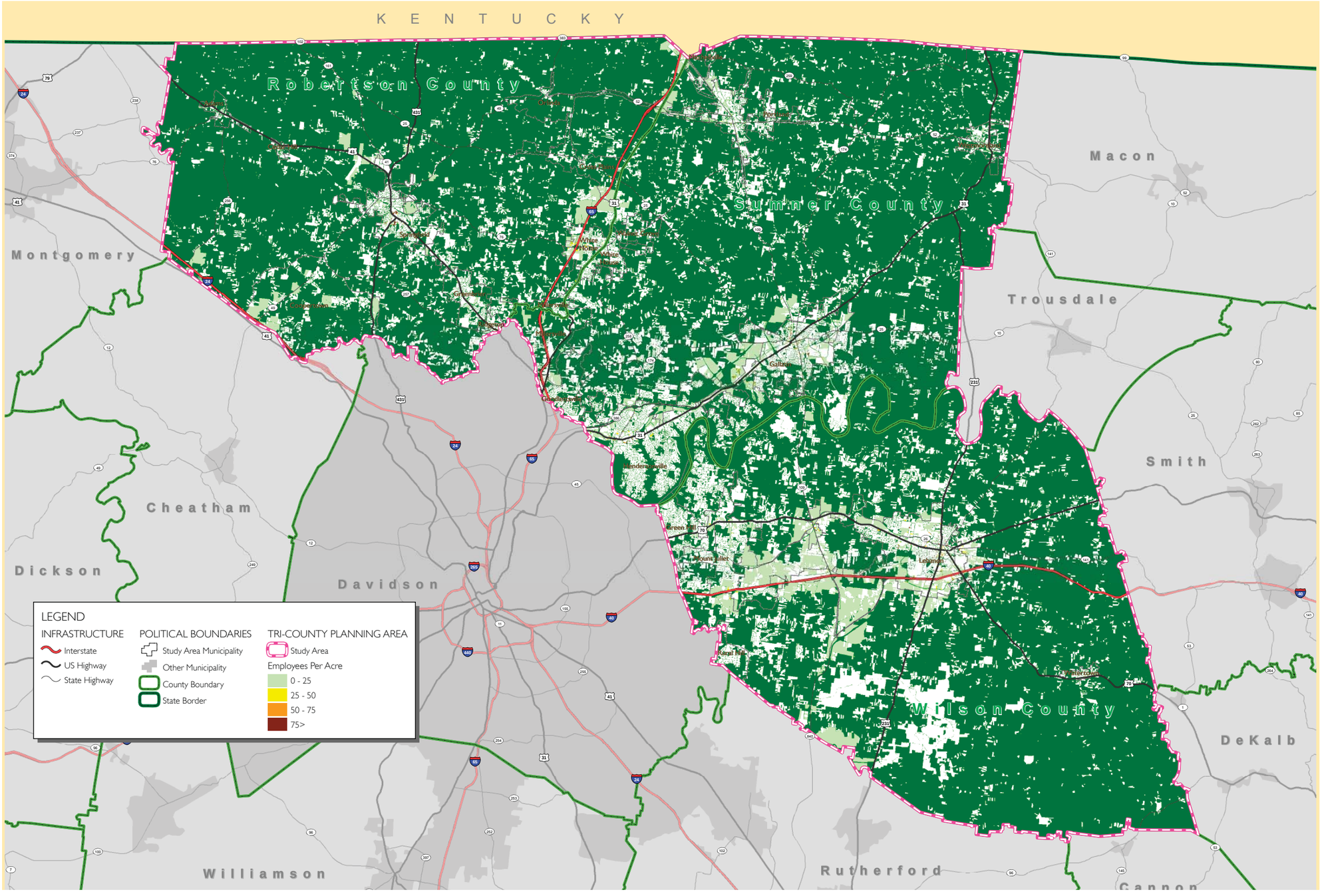

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MAP J

2035 NON-RESIDENTIAL ALLOCATION UNITS BY ACRE

Tri-County Transportation and Land Use Study, Tennessee

Robertson Co. - Sumner Co. - Wilson Co.

1 inch = 9,000 feet

0 1 2 4 Miles

Sources:
Tennessee Spatial Data Server http://www.tnsdi.org

Disclaimer:
The user of this information is cautioned to consider the provisional nature of the information before making decisions that concern monetary or operational consequences. Furthermore, LandDesign Inc. assumes no responsibility for the accuracy, completeness or misuse of this information. Conclusions or actions taken from this information are the sole responsibility of the user. Please contact original source about questions on data.

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Section 6: Evaluating the Business-as-Usual

Regional Goals and Regional Report Card

In order to evaluate the business-as-usual scenario, a draft series of regional goals were prepared along with measures of effectiveness. Regional goals were prepared based upon review of adopted plans, programs and policies in the study area. Review of preliminary model results and these regional goals were the focus of the Steering Committee meeting in August 2008 and workshops with the community-at-large held in late September and early October, 2008. During the workshops, participants were asked to assign scores for how preliminary model BAU results for the region were doing toward achieving regional goals using a "regional report card." A total of 37 report cards were completed by participants during a group exercise. The report card and tabulated results of the workshops is shown below.

The series of regional goals, like MOEs, will allow alternative development scenarios to be evaluated on the basis of whether they better achieve identified goals. Regional goals, since expanded to reflect community feedback, are shown below.

GOAL 1: Promote conservation of historic and cultural resources and support efforts in the study area related to these areas through plans, programs and policies.

GOAL 2: Recognize and support the important role of agriculture in both the existing and future economy.

GOAL 3: Preserve areas intended to retain a rural character or way of life and reinforce preservation through plans, programs, and policies.

GOAL 4: Enhance economic growth and opportunities in the study area to ensure that a high quality of life remains for population in the study area.

GOAL 5: Strengthen and enhance existing urban centers through plans, programs and policies.

GOAL 6: Identify and protect the most critical natural resources that exist.

GOAL 7: Provide for the efficient movement of persons, goods and services while providing a wide range of transportation choices for the study area.

GOAL 8: Ensure that future growth in the study area occurs in a coordinated manner with community infrastructure and services needed to adequately support growth and development.

GOAL 9: Provide a wide range of housing types and communities for a variety of household sizes and income ranges.

GOAL 10: Allow new types of development while recognizing the importance of retaining the established character and existing development types unique to the study area.

Regional Report Card

Age: Zip Code: # Years Resident: Date:

Explanation of Evaluation System

A: BAU does an excellent job meeting the goal
B: BAU does a good job meeting the goal
C: BAU does a average job meeting the goal
D: BAU does a poor job meeting the goal
F: BAU fails to meet the goal

Goal	Grade
1) Historic Conservation and Enhancement	
2) Viable Agriculture	
3) Rural Preservation	
4) Economic Enrichment while Safeguarding Existing Public and Private Development	
5) Preserve Urban Centers	
6) Protection of Natural Resources	
7) Efficient Transportation System	
8) Ensure Availability of Services	
9) Provide Housing Options	
10) Maintain Sense of Community and Sense of Place	

You may also list any additional goals and their respective scores below.

Regional Report Card – Results of Workshops

Goals	Grade
1) Historic Conservation and Enhancement	B-
2) Viable Agriculture	B
3) Rural Preservation	C+
4) Economic Enrichment while Safeguarding Existing Public and Private Development	B-
5) Preserve Urban Centers	B
6) Protection of Natural Resources	B-
7) Efficient Transportation System	C
8) Ensure Availability of Services	B
9) Provide Housing Options	C+
10) Maintain Sense of Community and Sense of Place	B-

Measures of Effectiveness (MOEs)

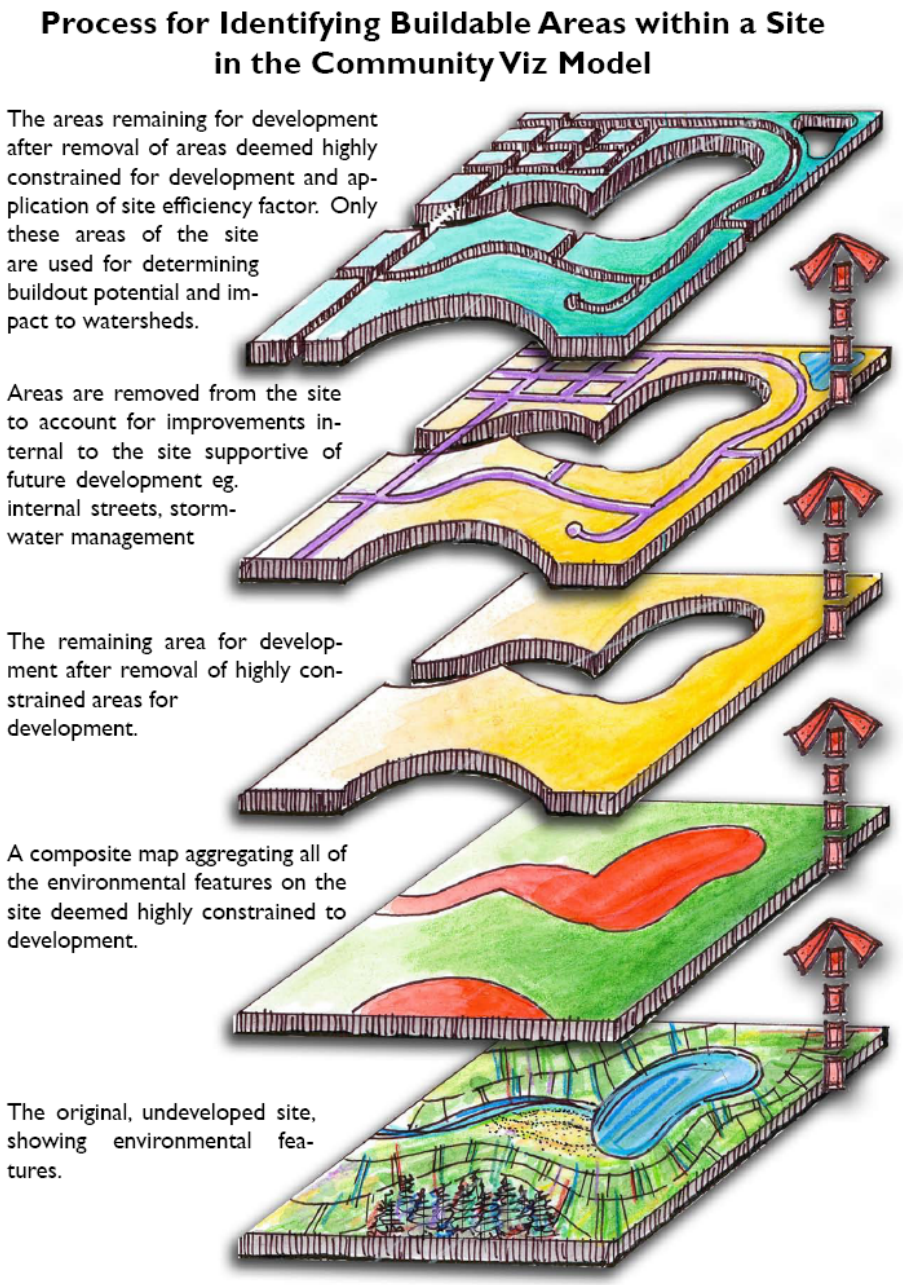
In order to evaluate the BAU and provide a more detailed evaluation of impacts associated with growth, a set of indicators was developed. These indicators, termed as "measures of effectiveness (MOEs)" include the following:

Goal Addressed	Measure	Unit of Analysis	Measurement
	Socio-Economic Impacts		
	Population Density	Persons/Acre	Allocated Population / Acres Developed
	Employment Density	Employees/Acre	Allocated Employment / Acres Developed
No. 9	Housing Type Mix	Dus	% Single-Family / % Multifamily Dus
	Environmental Impacts		
No. 3	Urban Footprint	Acres	No. of acres coded urban/suburban vs. BAU scenario
No. 2	Agricultural Land Consumed	Acres	No. of acres coded urban/suburban w/ prime AG soils
	Potential Revenue Generation		
No. 4	Property Tax Generation	Dollars	Land Value x Millage Rate
	Impacts to Community Facilities and Services		
No. 7	Congestion on Major Corridors	Minutes	Summary Statistic -- Average Delay
No. 7	Average Trip Length	Minutes	Summary Statistic -- Average Trip Length
No. 8	Demand for Potable Water (Inside Service Areas)	MGD	New Dus & Non-Res. S.F. x GPD Generation Rates
No. 8	Demand for Potable Water (Outside Service Areas)	MGD	New Dus & Non-Res. S.F. x GPD Generation Rates
No. 8	Demand for Sanitary Sewer (Inside Service Areas)	MGD	New Dus & Non-Res. S.F. x GPD Generation Rates
No. 8	Demand for Sanitary Sewer (Outside Service Areas)	MGD	New Dus & Non-Res. S.F. x GPD Generation Rates
No. 8	Demand for New Schools	Students	New Dus & Non-Res. S.F. x Student Generation Rates
No. 8	Demand for Parkland	Acres	New Dus & Non-Res. S.F. x Current Service Delivery Rate

Technical Appendix

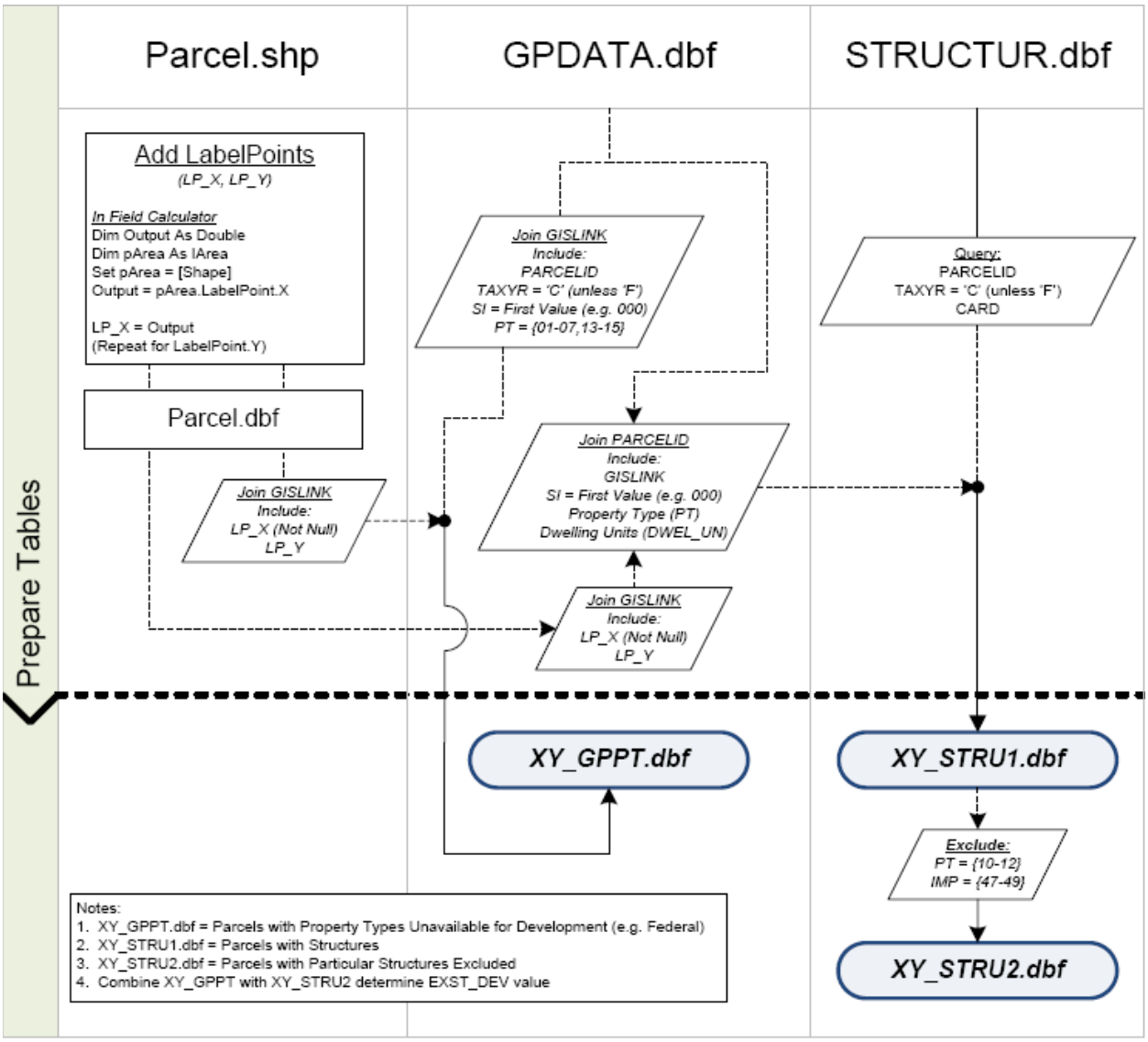
The process of identifying buildable land within the study area and generating county-wide supply numbers is detailed in the graphic below. Pertinent information essential to model development, assumptions, and methodology has previously been approved by MPO staff and focus group members.

Identifying Buildable Areas

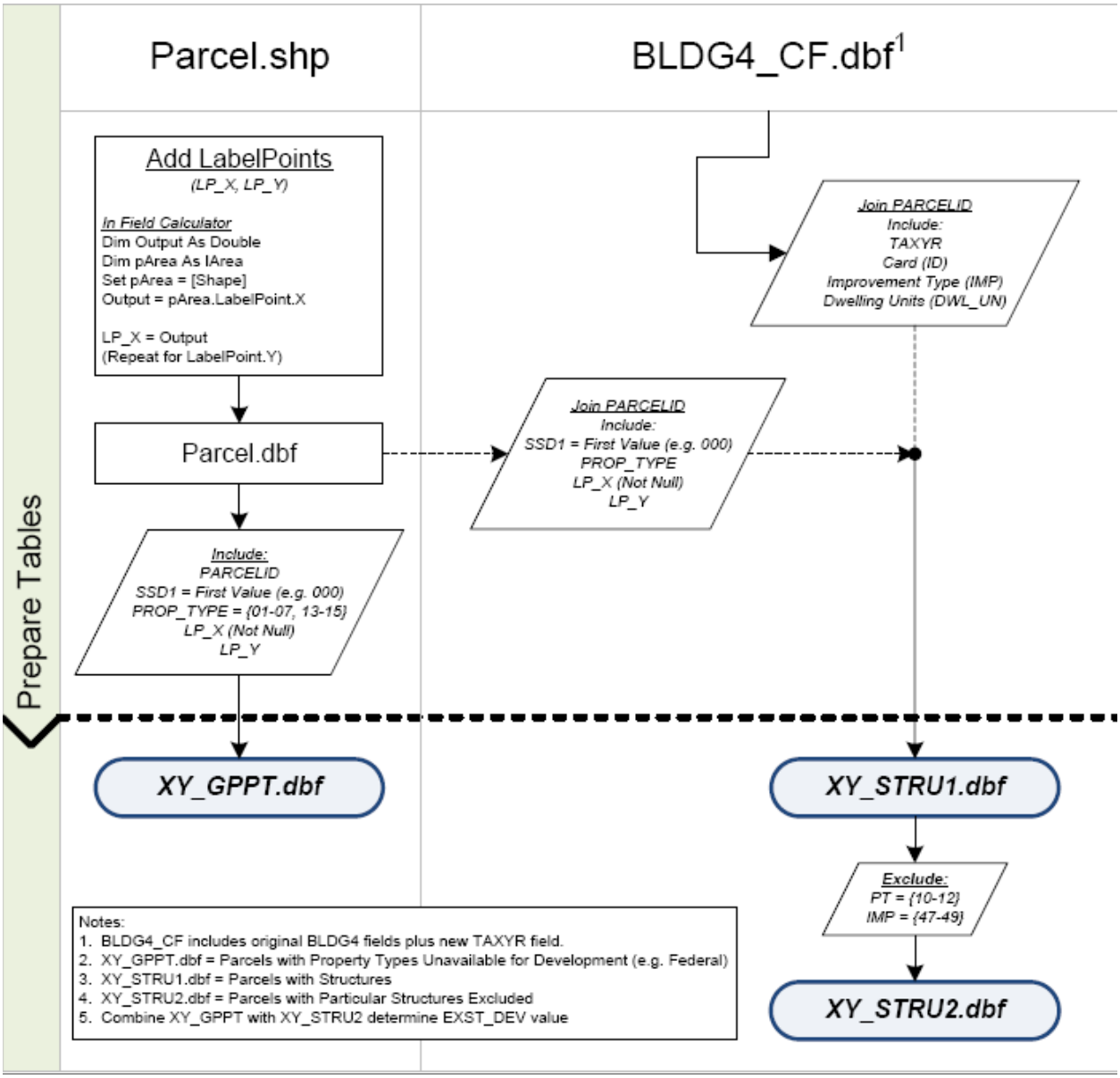


Vacant vs. Developed Coding Queries (updated 11-24-2008)

Sumner, Wilson Counties



Robertson County



Finally, in order to allocate growth as projected by the BBPC report, residential supply of dwelling units and non residential supply of square footage were converted to supply of persons using the below space ratios.

Employee and Residential Space Ratios

Type	Wilson	Sumner	Robertson
Persons per household*	2.70	2.58	2.71
Commercial/Office**	3.50	3.50	3.50
Industrial***	3.00	3.00	3.00

**Source: American Community Survey, US Census Bureau, 2006 except for Robertson for which 2006 ACS data is not available and 2000 Decennial census information was used.*
***BBPC Report, 2008, Average of Commercial and Office employee ratio.*
****BBPC Report, 2008.*
Note: Non residential employee space ratios are employees per 1,000 s.f.

Equations and Model Structure Diagrams

Contact Information

If you have any questions on the information contained herein or the Tri-County Land Use & Transportation Study, please contact:

Michael Skipper
Nashville Area MPO
skipper@nashvillempo.org
(615) 862-7204

APPENDIX F

Alternatives Modeling

Tri-County Transportation and Land Use Study

Alternatives Modeling

Alternatives Modeling

The following CommunityViz model results indicate the Tri-County region's likely performance relative to several factors. These factors were selected based on the goals defined early in the process for the Tri-County Land Use and Transportation Study. The Business-As-Usual (BAU) results (or the results we can expect if development continues under current policies and regulations) provided a baseline against which the two alternative scenarios could be evaluated. The results for the two alternatives, therefore, are also provided.

Preceding the model results are a list of the factors, or Measures of Effectiveness (MOEs), and the definitions of each. With an understanding of the factors, measures and the model results, study participants from around the region examined the two alternative scenarios to determine the desired features of a preferred alternative. Not all factors were considered in the selection of features that comprise the Preferred Alternative Scenario; however, ten were presented at the community meetings during which the two alternatives were evaluated, which contributed to more informed discussions to determine the features to be included in the preferred alternative.

The complete reports showing the results for each county are presented at the end of this section. Four summary tables (one for the Tri-County area and one each for the three counties) that present results for the ten factors considered precede the more detailed reports. Note that the results for the two alternatives are relative to the BAU result. For example, the amount of prime agricultural land "lost" to development in the BAU scenario for the entire Tri-County area is equal to 17,755 acres. The results for the two alternatives indicate a reduction in the total amount to be lost if future policies and regulations are modified. So, development in accordance with the "Centers and Corridors" alternative would result in 12,644 acres of prime agricultural land lost to development while development in accordance with the "Centers" alternative would result in only 11,684 acres lost.

Definitions

Amount of Agricultural Land Consumed (AG)
The amount of prime agricultural land lost to new development. Prime agricultural land is defined by the USDA Soil Survey. The acres of prime agricultural land consumed were calculated by multiplying the allocated acreage by the percentage of prime agricultural land to total acreage of each parcel.

Transit Rider Concentration to Bus Routes (BUS)
The percentage of employees and residents allocated within one quarter mile of an existing or proposed bus corridor compared to the rest of the study area. Future transit corridors will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.

Employment Density (EMP_D)
The number of employees allocated per acre of allocated land. Statistic may be reported by land use category or defined geography.

Encroachment on Protected Open Space (ENV)
The proximity of allocated development to protected land designed in the study area. Impacts are reported as the number of new acres of development within _50_ feet of protected land (i.e., environmentally constrained).

Demand for Fire Protection (FIRE)
Demand for fire protection generated by new dwelling units or new non-residential square footage in the study area. Information is reported as number of additional firefighters needed to maintain the current service delivery standard (1 firefighter per 1000 people).

Housing Mix (MFR%)
Housing mix reflects the percentage of multi-family households allocated within the study area for a specific planning horizon. Single family dwelling units are assumed in the following future land use categories: open space, agriculture, single family, residential, and mixed use (30%). Multi-family dwelling units are assumed in the following land use categories: multi-family, and mixed use (70%). Statistics may be reported by a defined geography.

Jobs / Housing Concentration (HEMIX)
The percentage of employees and residents allocated within the influence (Preferred Growth) area of an activity node compared to the rest of the study area. Activity nodes are represented by the following character areas: traditional town center, village center, activity center, and transit-oriented development. Statistics may be reported by land use category or defined geography.

Demand for New Park Land (PARK)
Demand for new parkland generated by new population in the study area. Information is reported as the number of acres needed to maintain the current service delivery standard (25 acres per 1000 residents). Statistics may be reported by a defined geography.

Demand for Police Protection (POLICE)

Demand for police protection generated by new dwelling units or new non-residential square footage in the study area. Information is reported as number of additional sworn officers needed to maintain the current service delivery standard (2.5 police officers per 1000 people).

Population Density (POP_D)
The number of residents allocated per acre of land in the allocated area. Statistic may be reported by land use category or defined geography.

Demand for New Schools (SCHOOL)-Not Used
Demand for new schools generated by development types, patterns, and intensities assumed for the study area. Information is reported in residential population (measure is not developed yet). Statistics can be reported by school attendance boundary or other defined geography.

Transit Rider Concentration to Bus and Rail Stops (RAIL_BUS)
The percentage of employees and residents allocated within 0.25 miles of an existing or proposed bus corridor compared to the rest of the study area. Future transit corridors will be designated (as appropriate) for each development scenario. Statistics may be reported by defined geography.

Demand for Sanitary Sewer (SEWER)
Demand for sanitary sewer generated by new households or new non-residential square footage of different land uses in the study area. Information is reported as additional 1000 gallons per day to maintain the current service delivery standard.

Urban Footprint (FTPRNT)
The total number of acres allocated with urban or rural development (either residential or non-residential). Urban development is represented by the following character areas: suburban, general urban, traditional town center, employment center, activity center, and transit oriented development. Statistics may be reported by defined geography.

Demand for Potable Water (WATER)
Demand for water generated by new dwelling units or new non-residential square footage of different land uses in the study area. Information is reported as additional 1000 gallons per day to maintain the current service delivery standard.

Vehicle Miles Traveled (VMT)
The number of vehicle miles traveled on an average day reflects the reliance on the automobile for individuals' mobility within the study area. It is calculated by the number of vehicle trips and the length of those trips summed over the entire road network. VMT is a good indicator of changes in travel demand associated with different development scenarios. Vehicle miles traveled will be measured using the Nashville Area Regional Travel Demand Model and post processing of model results developed for each development scenario.

Vehicle Hours Traveled (VHT)
The number of vehicle hours travelled on an average day reflects the amount of time spent in a vehicle. It is calculated by the product of vehicle travel times by the number of vehicles on the system. In most cases, a larger number indicates higher congestion levels. Vehicle hours traveled will be measured using

the Nashville Area Regional Travel Demand Model and post processing of model results developed for each development scenario.

Percent of Income Spent on Transportation (FUEL2.5)
An estimate for the percentage of household income spent on transportation in the study area. Transportation expenditures are estimated using information published in the *Consumer Expenditure Survey*, by the BLS, with an assumption of $2.50/gallon of gasoline.

Percent of Income Spent on Transportation (FUEL5.0)
An estimate for the percentage of household income spent on transportation in the study area. Transportation expenditures are estimated using information published in the *Consumer Expenditure Survey*, by the BLS, with an assumption of $5.00/gallon of gasoline.

Congested Corridors
Not used

Prevailing Residential Lot Size (LOT)
The prevailing residential lot size reported throughout the study area. It represents the average (using allocated households) of the minimum lot sizes (developed using density assumptions in the development lookup tables) for each combination of future land use category and character area type that received new development. Statistics may be reported by a defined geography.

Rural Preservation
Not used

Tri-County Summary

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	WLS	5008	-1151	-1223
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	WLS	0.00%	0.00%	0.00%
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	WLS	7120	-2529	-2373
MFR%	% of Households Allocated as Multi-Family	WLS	6.96%	4.63%	4.70%
		GRN	4.3%	-3.3%	-2.9%
		LEB	22.3%	0.0%	0.8%
		LEBUGB	0.9%	0.9%	-0.4%
		MTJ	3.3%	2.7%	3.1%
		MTJUGB	6.2%	2.3%	4.8%
		RHL	0.0%	0.0%	0.0%
		WLS	1.4%	2.8%	0.3%
		WTN	1.3%	4.0%	7.9%
		WTNUGB	34.4%	31.4%	34.2%
POP_D	# Allocated Residential Population/ Acre within each of the Geographies	WLS	0.575713672	0.799190935	0.938590729
		GRN	2.27	0.49	1.82
		LEB	1.52	0.81	0.81
		LEBUGB	0.81	0.50	0.75
		MTJ	1.47	1.21	2.49
		MTJUGB	1.33	0.61	1.09
		RHL	1.64	-0.91	-0.96
		WLS	0.34	-0.07	-0.10
		WTN	1.51	-0.32	-0.01
		WTNUGB	0.79	0.42	0.99
LOT	Average Residential Lot Size (Acres) for each of the Geographies	WLS	0.248858745	-0.029414684	-0.032819704
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	WLS	0.9%	0.0%	0.2%
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	9354	-5931	-6171
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	5582	596	655
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	3.67%	-0.20%	-0.21%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	7.34%	-0.39%	-0.42%

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	All	5646	-1480	-2245
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	All	0.00%	0.00%	0.00%
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	ALL	4156	-1238	-1519
MFR%	% of Households Allocated as Multi-Family				
		ADM	0.0%	0.0%	0.0%
		CHL	0.0%	0.0%	0.0%
		CPR	0.0%	0.0%	0.0%
		CSP	0.0%	0.0%	0.0%
		CSPUGB	0.0%	0.0%	0.0%
		GRB	16.3%	1.3%	-0.4%
		GRBUGB	0.0%	0.0%	0.0%
		MLR	0.0%	0.0%	0.0%
		MLRUGB	0.0%	0.0%	0.0%
		ORL	0.0%	0.0%	0.0%
		ORLUGB	0.0%	0.0%	0.0%
		ROB	0.0%	0.0%	0.0%
		RTPUGB	0.0%	0.0%	0.0%
		SPF	44.7%	-4.4%	-9.7%
		SPFUGB	10.9%	-1.0%	-4.2%
		WHH	0.0%	0.0%	0.0%
		WHHUGB	4.1%	5.4%	0.6%
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		ADM	0.25	0.09	0.35
		CHL	0.34	0.65	1.13
		CPR	0.45	0.12	-0.07
		CSP	0.31	0.01	-0.19
		CSPUGB	0.64	-0.21	-0.40
		GRB	1.31	0.46	0.58
		GRBUGB	0.43	0.01	0.43
		MLR	0.91	-0.09	-0.43
		MLRUGB	0.87	-0.31	-0.52
		ORL	0.17	0.02	0.03
		ORLUGB	0.21	0.06	-0.05
		ROB	0.18	0.00	-0.02
		RTPUGB	1.06	0.64	0.21
		SPF	1.84	0.66	1.26
		SPFUGB	0.53	0.25	0.50
		WHH	1.78	0.12	0.28
		WHHUGB	0.94	-0.28	-0.60
LOT	Average Residential Lot Size (Acres) for each of the Geographies				
		ADM	0.54	-0.04	-0.07
		CHL	0.57	-0.05	-0.06
		CPR	0.34	-0.01	-0.02
		CSP	0.54	-0.03	-0.03
		CSPUGB	1.00	0.00	0.00
		GRB	0.26	-0.02	-0.03
		GRBUGB	0.44	-0.02	-0.03
		MLR	0.45	-0.04	-0.01
		MLRUGB	0.50	0.00	0.00
		ORL	0.89	-0.11	-0.14
		ORLUGB	1.00	0.00	0.00
		ROB	1.00	0.00	0.00
		RTPUGB	0.51	0.00	0.00
		SPF	0.11	0.00	0.00
		SPFUGB	0.21	0.00	0.00
		WHH	0.21	0.00	0.00
		WHHUGB	0.25	-0.01	0.01

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.0%	2.5%	3.3%
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	5598	-2231	-3128
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	2666	114	-14
WATER	Additional 1000 Gallons per Day Consumed by Allocation				
		ADM	44001	12800	38000
		CHL	22001	19600	41401
		CPR	227412	-31801	-162206
		CPRUGB	0	0	0
		CSP	120607	-54002	-96804
		CSPUGB	55203	-30201	-46002
		GRB	260013	55401	67202
		GRBUGB	23400	-4600	3800
		MLR	74603	-20800	-54001
		MLRUGB	4800	-3200	-4000
		ORL	28604	-5401	-2202
		ORLUGB	44000	-13200	-33200
		PLVUGB	0	0	0
		ROB	881639	-374813	-529223
		RTPUGB	72604	-11600	-39801
		SPF	764703	456834	784056
		SPFUGB	160805	120803	224204
		WHH	178265	-5818	-12422
		WHHUGB	233603	-109601	-178402
VMT	Vehicle Miles Travelled per Day	ALL	4,203,397.0	(119,794.00)	(128,279.00)
VHT	Vehicle Hours Travelled per Day	ALL	102,299.7	107,196.64	105,396.85
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	6.89%	-0.20%	-0.21%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	13.78%	-0.39%	-0.42%

Sumner County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	All	7101	-2480	-2602
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	All	0.00%	0.00%	0.00%
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	ALL	10667	-5866	-5329
MFR%	% of Households Allocated as Multi-Family				
		GDV	3.9%	5.3%	1.5%
		GDVUGB	0.0%	0.0%	0.0%
		GLT	0.4%	1.2%	1.3%
		GLTUGB	0.0%	6.0%	12.0%
		HVL	11.4%	4.9%	4.8%
		HVLUGB	11.9%	5.3%	5.6%
		MLR	1.3%	7.5%	4.0%
		MLRUGB	0.0%	0.0%	0.0%
		MTV	0.0%	0.0%	0.0%
		PRT	7.9%	-1.3%	4.4%
		PRTUGB	0.0%	0.0%	0.0%
		SMN	0.0%	0.0%	0.0%
		WHH	0.0%	0.0%	0.0%
		WHHUGB	0.0%	0.0%	0.0%
		WLG	0.0%	0.0%	0.0%
		WST	0.0%	0.0%	0.0%
		WSTUGB	0.0%	0.0%	0.0%
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		GDV	0.72	0.77	0.10
		GDVUGB	0.24	0.21	-0.13
		GLT	2.19	2.95	5.75
		GLTUGB	0.39	0.41	1.24
		HVL	1.10	0.38	0.32
		HVLUGB	0.76	-0.19	-0.19
		MLR	0.46	0.47	-0.15
		MLRUGB	0.59	0.47	-0.08
		MTV	0.26	-0.16	-0.07
		PRT	0.79	1.44	1.09
		PRTUGB	0.32	0.25	-0.08
		SMN	0.22	0.03	0.19
		WHH	0.94	0.81	1.18
		WHHUGB	0.49	0.22	-0.23
		WLG	0.48	0.03	0.76
		WST	0.74	0.40	0.88
		WSTUGB	0.23	-0.05	-0.09
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.3%	3.0%	5.6%
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	12726	-9404	-9241
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	5147	829	390
WATER	Additional 1000 Gallons per Day Consumed by Allocation				
		GDV	123210	-5802	-64008
		GDVUGB	26200	-22400	-24000
		GLT	1225505	1340635	2053149
		GLTUGB	501427	89594	496609
		HVL	584364	76392	-135304
		HVLUGB	230813	-102996	-131606
		MLR	186812	92397	-145410
		MLRUGB	33600	-20600	-31600
		MTV	12600	-9800	-11000
		PRT	567651	634586	204980
		PRTUGB	515403	-158802	-406603
		SMN	2344805	-1673802	-1553003
		WHH	161801	-5000	-45000
		WHHUGB	57601	-28801	-49001
		WLG	72800	-44200	-12400
		WST	138204	-66401	-58203
		WSTUGB	103000	-94400	-87000
VMT	Vehicle Miles Travelled per Day	ALL	5,939,148.0	5,511,159.00	5,530,424.00
VHT	Vehicle Hours Travelled per Day	ALL	164,033.9	151,063.24	148,243.00
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	3.00%	-0.29%	-0.33%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	6.00%	-0.57%	-0.67%

Wilson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	All	5008	-1151	-1223
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	All	0.00%	0.00%	0.00%
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	ALL	7120	-2529	-2373
MFR%	% of Households Allocated as Multi-Family				
		GRN	4.3%	-3.3%	-2.9%
		LEB	22.3%	0.0%	0.8%
		LEBUGB	0.9%	0.9%	-0.4%
		MTJ	3.3%	2.7%	3.1%
		MTJUGB	6.2%	2.3%	4.8%
		RHL	0.0%	0.0%	0.0%
		WLS	1.4%	2.8%	0.3%
		WTN	1.3%	4.0%	7.9%
		WTNUGB	34.4%	31.4%	34.2%
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		GRN	2.27	0.49	1.82
		LEB	1.52	0.81	0.81
		LEBUGB	0.81	0.50	0.75
		MTJ	1.47	1.21	2.49
		MTJUGB	1.33	0.61	1.09
		RHL	1.64	-0.91	-0.96
		WLS	0.34	-0.07	-0.10
		WTN	1.51	-0.32	-0.01
		WTNUGB	0.79	0.42	0.99
LOT	Average Residential Lot Size (Acres) for each of the Geographies				
		GRN	0.20	0.00	0.00
		LEB	0.11	0.00	0.00
		LEBUGB	0.19	0.00	0.00
		MTJ	0.20	0.00	0.00
		MTJUGB	0.20	0.00	0.00
		RHL	0.21	0.00	0.00
		WLS	0.45	-0.02	-0.03
		WTN	0.78	-0.06	-0.07
		WTNUGB	0.46	0.01	0.00
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.9%	0.0%	0.2%
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	9354	-5931	-6171
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	5582	596	655
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	3.67%	-0.20%	-0.21%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	7.34%	-0.39%	-0.42%

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	**# Acres within Prime Ag Consumed by Allocation**	All	5646	-1480	-2245
BUS	**% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)**	All	0.00%	0.00%	0.00%
EMP_D	**# Allocated Employees/ Acre within each of the Geographies**				
	Adams	ADM	2.75	1.07	1.22
	Cedar Hill	CHL	7.08	1.94	8.44
	Coopertown	CPR	0.41	-0.06	-0.22
	Cross Plains	CSP	0.69	-0.20	-0.40
	Cross Plains UGB	CSPUGB	1.24	-0.58	-0.75
	Greenbrier	GRB	5.12	0.31	0.80
	Millersville	MLR	5.68	-0.27	-1.41
	Orlinda	ORL	3.11	-1.36	-2.09
	Orlinda UGB	ORLUGB	0.16	-0.08	-0.12
	Robertson	ROB	0.64	-0.11	-0.36
	Ridgetop UGB	RTPUGB	19.21	-1.14	-3.03
	Springfield	SPF	11.20	2.38	4.60
	Springfield UGB	SPFUGB	0.89	0.39	0.44
	White House	WHH	5.52	-1.21	-1.47
	White House UGB	WHHUGB	1.75	-0.47	-1.08
ENV	**# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation**	ALL	4156	-1238	-1519
FIRE	**# New Fire Fighters Required to Keep LOS as Identifed by**				
		ADM	0.60	0.24	0.55
		CHL	0.31	0.30	0.64
		CPR	3.40	-0.31	-2.24
		CPRUGB	0.00	0.00	0.00
		CSP	1.97	-0.70	-1.42
		CSPUGB	0.75	-0.39	-0.60
		GRB	3.70	0.96	1.17
	Greenbrier UGB	GRBUGB	0.23	0.01	0.11
		MLR	1.21	-0.25	-0.73
	Millersville UGB	MLRUGB	0.05	-0.03	-0.04
		ORL	0.57	-0.15	-0.17
		ORLUGB	0.53	-0.14	-0.39
	Pleasant View UGB	PLVUGB	0.00	0.00	0.00
		ROB	11.64	-4.01	-6.56
		RTPUGB	1.19	-0.08	-0.47
		SPF	15.89	7.90	13.38
		SPFUGB	2.21	1.73	3.04
		WHH	6.24	-0.84	-1.12
		WHHUGB	3.12	-1.40	-2.34
MFR%	**% of Households Allocated as Multi-Family**				
		ADM	0.0%	0.0%	0.0%
		CHL	0.0%	0.0%	0.0%
		CPR	0.0%	0.0%	0.0%
		CSP	0.0%	0.0%	0.0%
		CSPUGB	0.0%	0.0%	0.0%
		GRB	16.3%	1.3%	-0.4%
		GRBUGB	0.0%	0.0%	0.0%
		MLR	0.0%	0.0%	0.0%
		MLRUGB	0.0%	0.0%	0.0%
		ORL	0.0%	0.0%	0.0%
		ORLUGB	0.0%	0.0%	0.0%
		ROB	0.0%	0.0%	0.0%
		RTPUGB	0.0%	0.0%	0.0%
		SPF	44.7%	-4.4%	-9.7%
		SPFUGB	10.9%	-1.0%	-4.2%
		WHH	0.0%	0.0%	0.0%
		WHHUGB	4.1%	5.4%	0.6%

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
HEMIX	% of People (Pop & Emp) Allocated within Preferred Growth	All	41.4%	17.7%	38.6%
PARK	Additional Park Land (Acres) Required to Keep LOS as				
		ADM	13.5	4.2	12.1
		CHL	6.4	6.5	13.3
		CPR	70.7	-9.7	-50.3
		CPRUGB	0.0	0.0	0.0
		CSP	36.4	-15.7	-29.0
		CSPUGB	17.5	-9.7	-14.6
		GRB	80.7	18.1	21.7
		GRBUGB	6.0	-0.1	2.5
		MLR	24.3	-7.5	-17.9
		MLRUGB	1.4	-0.9	-1.1
		ORL	9.3	-2.1	-1.1
		ORLUGB	13.6	-4.0	-10.3
		PLVUGB	0.0	0.0	0.0
		ROB	267.0	-108.8	-157.0
		RTPUGB	22.1	-3.0	-11.8
		SPF	242.8	139.4	241.6
		SPFUGB	50.6	37.2	69.3
		WHH	60.3	-6.4	-8.5
		WHHUGB	76.1	-37.4	-58.9
POLICE	# New Police Officers Required to Keep LOS as Identifed by				
		ADM	1.1	1.0	1.8
		CHL	0.6	1.0	1.8
		CPR	6.1	1.6	-3.2
		CPRUGB	0.0	0.0	0.0
		CSP	3.5	-0.4	-2.1
		CSPUGB	1.3	-0.4	-1.0
		GRB	6.6	5.0	5.6
		GRBUGB	0.4	0.2	0.4
		MLR	2.2	0.2	-1.0
		MLRUGB	0.1	0.0	-0.1
		ORL	1.0	0.0	0.0
		ORLUGB	0.9	0.0	-0.6
		PLVUGB	0.0	0.0	0.0
		ROB	20.8	-1.8	-8.1
		RTPUGB	2.1	0.6	-0.3
		SPF	28.4	31.1	44.7
		SPFUGB	3.9	5.9	9.2
		WHH	11.2	2.3	1.6
		WHHUGB	5.6	-1.3	-3.6
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		ADM	0.25	0.09	0.35
		CHL	0.34	0.65	1.13
		CPR	0.45	0.12	-0.07
		CSP	0.31	0.01	-0.19
		CSPUGB	0.64	-0.21	-0.40
		GRB	1.31	0.46	0.58
		GRBUGB	0.43	0.01	0.43
		MLR	0.91	-0.09	-0.43
		MLRUGB	0.87	-0.31	-0.52
		ORL	0.17	0.02	0.03
		ORLUGB	0.21	0.06	-0.05
		ROB	0.18	0.00	-0.02
		RTPUGB	1.06	0.64	0.21
		SPF	1.84	0.66	1.26
		SPFUGB	0.53	0.25	0.50
		WHH	1.78	0.12	0.28
		WHHUGB	0.94	-0.28	-0.60

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
SCHOOL	# of Residential Population within each of the Geographies				
		ADM	549	160	473
		CHL	274	244	516
		CPR	2839	-399	-2024
		CPRUGB	0	0	0
		CSP	1505	-675	-1208
		CSPUGB	688	-376	-573
		GRB	3261	690	835
		GRBUGB	292	-58	47
		MLR	932	-260	-674
		MLRUGB	60	-40	-50
		ORL	357	-67	-28
		ORLUGB	550	-166	-415
		PLVUGB	0	0	0
		ROB	10997	-4668	-6596
		RTPUGB	911	-146	-499
		SPF	9583	5707	9796
		SPFUGB	2008	1504	2791
		WHH	2230	-75	-158
		WHHUGB	2917	-1370	-2228
LOT	Average Residential Lot Size (Acres) for each of the Geographies				
		ADM	0.54	-0.04	-0.07
		CHL	0.57	-0.05	-0.06
		CPR	0.34	-0.01	-0.02
		CSP	0.54	-0.03	-0.03
		CSPUGB	1.00	0.00	0.00
		GRB	0.26	-0.02	-0.03
		GRBUGB	0.44	-0.02	-0.03
		MLR	0.45	-0.04	-0.01
		MLRUGB	0.50	0.00	0.00
		ORL	0.89	-0.11	-0.14
		ORLUGB	1.00	0.00	0.00
		ROB	1.00	0.00	0.00
		RTPUGB	0.51	0.00	0.00
		SPF	0.11	0.00	0.00
		SPFUGB	0.21	0.00	0.00
		WHH	0.21	0.00	0.00
		WHHUGB	0.25	-0.01	0.01

Robertson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.0%	2.5%	3.3%
SEWER	Additional 1000 Gallons per Day Generated by Allocation				
		ADM	55001	16000	47500
		CHL	27501	24500	51751
		CPR	284262	-39751	-202756
		CPRUGB	0	0	0
		CSP	150757	-67502	-121004
		CSPUGB	69003	-37751	-57502
		GRB	325012	69251	84002
		GRBUGB	29250	-5750	4750
		MLR	93253	-26000	-67501
		MLRUGB	6000	-4000	-5000
		ORL	35754	-6751	-2752
		ORLUGB	55000	-16500	-41500
		PLVUGB	0	0	0
		ROB	1102038	-468513	-661523
		RTPUGB	90753	-14500	-49751
		SPF	955846	571033	980053
		SPFUGB	201005	151003	280254
		WHH	222811	-7267	-15521
		WHHUGB	292003	-137001	-223002
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	5598	-2231	-3128
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	2666	114	-14
WATER	Additional 1000 Gallons per Day Consumed by Allocation				
		ADM	44001	12800	38000
		CHL	22001	19600	41401
		CPR	227412	-31801	-162206
		CPRUGB	0	0	0
		CSP	120607	-54002	-96804
		CSPUGB	55203	-30201	-46002
		GRB	260013	55401	67202
		GRBUGB	23400	-4600	3800
		MLR	74603	-20800	-54001
		MLRUGB	4800	-3200	-4000
		ORL	28604	-5401	-2202
		ORLUGB	44000	-13200	-33200
		PLVUGB	0	0	0
		ROB	881639	-374813	-529223
		RTPUGB	72604	-11600	-39801
		SPF	764703	456834	784056
		SPFUGB	160805	120803	224204
		WHH	178265	-5818	-12422
		WHHUGB	233603	-109601	-178402
VMT	Vehicle Miles Travelled per Day	ALL	4,203,397.0	(119,794.00)	(128,279.00)
VHT	Vehicle Hours Travelled per Day	ALL	102,299.7	107,196.64	105,396.85
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	6.89%	-0.20%	-0.21%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	13.78%	-0.39%	-0.42%

Sumner County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	All	7101	-2480	-2602
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	All	0.00%	0.00%	0.00%
EMP_D	# Allocated Employees/ Acre within each of the Geographies				
	Goodlettsville	GDV	2.31	-0.28	-1.68
	Gallatin	GLT	1.24	0.71	2.20
	Gallatin UGB	GLTUGB	0.75	-0.10	0.29
	Hendersonville	HVL	4.40	-0.97	-3.06
	Hendersonville UGB	HVLUGB	1.76	0.88	-0.97
	Millersville	MLR	1.02	-0.21	-0.78
	Millersville UGB	MLRUGB	3.01	-1.99	-2.65
	Mitchellville	MTV	16.65	-6.00	-14.58
	Portland	PRT	2.03	-0.27	-0.18
	Portland UGB	PRTUGB	1.60	-0.77	-1.31
	Sumner	SMN	1.52	-0.62	-0.89
	White House	WHH	5.86	-2.75	2.04
	White House UGB	WHHUGB	0.51	-0.36	-0.47
	Walnut Grove	WLG	11.88	-9.66	-4.94
	Westmoreland	WST	1.82	-0.63	-1.01
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	ALL	10667	-5866	-5329
FIRE	# New Fire Fighters Required to Keep LOS as Identifed by KHA Analysis				
		GDV	1.79	-0.03	-0.97
	Goodlettsville UGB	GDVUGB	0.29	-0.25	-0.27
		GLT	19.25	20.34	35.70
		GLTUGB	6.59	1.25	6.53
		HVL	18.45	-0.85	-9.32
		HVLUGB	3.36	-0.64	-1.83
		MLR	2.71	1.08	-2.07
		MLRUGB	0.39	-0.23	-0.37
		MTV	0.15	-0.11	-0.13
		PRT	8.73	7.59	2.66
		PRTUGB	5.94	-1.66	-4.63
		SMN	26.51	-18.51	-17.14
		WHH	1.86	0.01	-0.42
		WHHUGB	0.74	-0.37	-0.63
		WLG	0.82	-0.48	-0.11
		WST	1.78	-0.78	-0.73
	Westmoreland UGB	WSTUGB	1.16	-1.06	-0.97
MFR%	% of Households Allocated as Multi-Family				
		GDV	3.9%	5.3%	1.5%
		GDVUGB	0.0%	0.0%	0.0%
		GLT	0.4%	1.2%	1.3%
		GLTUGB	0.0%	6.0%	12.0%
		HVL	11.4%	4.9%	4.8%
		HVLUGB	11.9%	5.3%	5.6%
		MLR	1.3%	7.5%	4.0%
		MLRUGB	0.0%	0.0%	0.0%
		MTV	0.0%	0.0%	0.0%
		PRT	7.9%	-1.3%	4.4%
		PRTUGB	0.0%	0.0%	0.0%
		SMN	0.0%	0.0%	0.0%
		WHH	0.0%	0.0%	0.0%
		WHHUGB	0.0%	0.0%	0.0%
		WLG	0.0%	0.0%	0.0%
		WST	0.0%	0.0%	0.0%
		WSTUGB	0.0%	0.0%	0.0%
HEMIX	% of People (Pop & Emp) Allocated within Preferred Growth Area Centers	All	20.1%	26.0%	59.9%
PARK	Additional Park Land (Acres) Required to Keep LOS as Identified by KHA Anlaysis				
		GDV	36.5	-1.8	-18.9
		GDVUGB	7.7	-6.6	-7.1
		GLT	362.9	400.1	611.6
		GLTUGB	148.2	25.8	144.9
		HVL	173.8	23.1	-40.3
		HVLUGB	68.4	-30.6	-39.1
		MLR	55.3	26.8	-43.0
		MLRUGB	9.9	-6.1	-9.3
		MTV	3.7	-2.9	-3.3
		PRT	168.0	186.4	60.4
		PRTUGB	152.2	-47.4	-120.2
		SMN	693.1	-495.9	-460.8
		WHH	47.8	-1.6	-13.4
		WHHUGB	17.0	-8.5	-14.4
		WLG	21.5	-13.1	-3.8
		WST	41.0	-19.8	-17.3
		WSTUGB	30.4	-27.9	-25.8
POLICE	# New Police Officers Required to Keep LOS as Identifed by KHA Analysis				
		GDV	3.2	1.2	-1.2
		GDVUGB	0.5	-0.4	-0.5
		GLT	34.5	64.5	102.9
		GLTUGB	11.8	7.8	21.0
		HVL	33.0	11.0	-10.2
		HVLUGB	6.0	0.8	-2.2
		MLR	4.9	4.6	-3.3
		MLRUGB	0.7	-0.3	-0.6
		MTV	0.3	-0.2	-0.2
		PRT	15.6	25.2	12.9
		PRTUGB	10.6	0.1	-7.3
		SMN	47.4	-27.4	-24.0
		WHH	3.3	1.4	0.3
		WHHUGB	1.3	-0.4	-1.0
		WLG	1.5	-0.6	0.3
		WST	3.2	-0.7	-0.6
		WSTUGB	2.1	-1.8	-1.6

Sumner County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		GDV	0.72	0.77	0.10
		GDVUGB	0.24	0.21	-0.13
		GLT	2.19	2.95	5.75
		GLTUGB	0.39	0.41	1.24
		HVL	1.10	0.38	0.32
		HVLUGB	0.76	-0.19	-0.19
		MLR	0.46	0.47	-0.15
		MLRUGB	0.59	0.47	-0.08
		MTV	0.26	-0.16	-0.07
		PRT	0.79	1.44	1.09
		PRTUGB	0.32	0.25	-0.08
		SMN	0.22	0.03	0.19
		WHH	0.94	0.81	1.18
		WHHUGB	0.49	0.22	-0.23
		WLG	0.48	0.03	0.76
		WST	0.74	0.40	0.88
		WSTUGB	0.23	-0.05	-0.09
SCHOOL	# of Residential Population within each of the Geographies (no school measure yet)				
		GDV	1458	-71	-757
		GDVUGB	310	-265	-283
		GLT	14517	16006	24464
		GLTUGB	5927	1031	5796
		HVL	6953	926	-1612
		HVLUGB	2734	-1223	-1564
		MLR	2210	1071	-1722
		MLRUGB	397	-243	-374
		MTV	149	-116	-130
		PRT	6719	7456	2416
		PRTUGB	6087	-1897	-4807
		SMN	27725	-19834	-18432
		WHH	1913	-62	-537
		WHHUGB	679	-340	-577
		WLG	860	-524	-151
		WST	1640	-791	-692
		WSTUGB	1218	-1117	-1030
LOT	Average Residential Lot Size (Acres) for each of the Geographies				
		GDV	0.20	0.00	0.00
		GDVUGB	0.20	0.00	0.00
		GLT	0.10	0.00	0.00
		GLTUGB	0.29	-0.05	-0.05
		HVL	0.23	0.00	-0.01
		HVLUGB	0.19	-0.02	-0.04
		MLR	0.20	0.00	0.00
		MLRUGB	0.23	0.01	0.01
		MTV	1.00	0.00	0.00
		PRT	0.20	0.00	0.00
		PRTUGB	0.29	-0.03	-0.03
		SMN	0.94	-0.11	-0.18
		WHH	0.20	0.00	0.00
		WHHUGB	0.21	0.00	0.00
		WLG	0.23	0.02	0.01
		WST	0.75	-0.13	-0.18
		WSTUGB	0.99	-0.15	-0.13
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.3%	3.0%	5.6%
SEWER	Additional 1000 Gallons per Day Generated by Allocation				
		GDV	154010	-7252	-80008
		GDVUGB	32750	-28000	-30000
		GLT	1531849	1675781	2566388
		GLTUGB	626777	111994	620758
		HVL	730400	95496	-169094
		HVLUGB	288513	-128747	-164505
		MLR	233512	115497	-181760
		MLRUGB	42000	-25750	-39500
		MTV	15750	-12250	-13750
		PRT	709549	793236	256229
		PRTUGB	644253	-198502	-508252
		SMN	2931005	-2092251	-1941253
		WHH	202250	-6250	-56250
		WHHUGB	72001	-36001	-61251
		WLG	91000	-55250	-15500
		WST	172754	-83001	-72753
		WSTUGB	128750	-118000	-108750
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	12726	-9404	-9241
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	5147	829	390
WATER	Additional 1000 Gallons per Day Consumed by Allocation				
		GDV	123210	-5802	-64008
		GDVUGB	26200	-22400	-24000
		GLT	1225505	1340635	2053149
		GLTUGB	501427	89594	496609
		HVL	584364	76392	-135304
		HVLUGB	230813	-102996	-131606
		MLR	186812	92397	-145410
		MLRUGB	33600	-20600	-31600
		MTV	12600	-9800	-11000
		PRT	567651	634586	204980
		PRTUGB	515403	-158802	-406603
		SMN	2344805	-1673802	-1553003
		WHH	161801	-5000	-45000
		WHHUGB	57601	-28801	-49001
		WLG	72800	-44200	-12400
		WST	138204	-66401	-58203
		WSTUGB	103000	-94400	-87000
VMT	Vehicle Miles Travelled per Day	ALL	5,939,148.0	5,511,159.00	5,530,424.00
VHT	Vehicle Hours Travelled per Day	ALL	164,033.9	151,063.24	148,243.00
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	3.00%	-0.29%	-0.33%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	6.00%	-0.57%	-0.67%

Wilson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
AG	# Acres within Prime Ag Consumed by Allocation	All	5008	-1151	-1223
BUS	% of People (Pop & Emp) within Transit Service Area (1/4 mile buffer of bus routes)	All	0.00%	0.00%	0.00%
EMP_D	# Allocated Employees/ Acre within each of the Geographies				
	Green Hill	GRN	6.23	-0.82	-0.19
	Lebanon	LEB	2.79	-0.15	0.04
	Lebanon UGB	LEBUGB	0.87	0.21	-0.09
	Mount Juliet	MTJ	1.03	-0.05	0.02
	Mount Juliet UGB	MTJUGB	0.87	-0.04	0.01
	Wilson	WLS	0.17	0.28	-0.03
	Watertown	WTN	5.07	-0.65	0.09
ENV	# Acres within (X) buffer of Environmentally Constrained Areas Consumed by Allocation	ALL	7120	-2529	-2373
FIRE	# New Fire Fighters Required to Keep LOS as Identifed by KHA Analysis				
		GRN	1.12	0.14	0.43
	Green Hill UGB	GRNUGB	0.00	0.00	0.00
		LEB	43.15	10.85	9.96
		LEBUGB	12.32	4.11	3.50
		MTJ	10.38	6.07	11.44
		MTJUGB	8.35	3.96	4.35
	Rural Hill	RHL	1.76	-1.14	-1.11
		WLS	36.84	-18.49	-23.70
		WTN	0.89	0.11	0.24
	Watertown UGB	WTNUGB	0.54	0.47	0.96
MFR%	% of Households Allocated as Multi-Family				
		GRN	4.3%	-3.3%	-2.9%
		LEB	22.3%	0.0%	0.8%
		LEBUGB	0.9%	0.9%	-0.4%
		MTJ	3.3%	2.7%	3.1%
		MTJUGB	6.2%	2.3%	4.8%
		RHL	0.0%	0.0%	0.0%
		WLS	1.4%	2.8%	0.3%
		WTN	1.3%	4.0%	7.9%
		WTNUGB	34.4%	31.4%	34.2%
HEMIX	% of People (Pop & Emp) Allocated within Preferred Growth Area Centers	All	43.5%	17.0%	36.5%
PARK	Additional Park Land (Acres) Required to Keep LOS as Identified by KHA Anlaysis				
		GRN	22.2	3.1	9.4
		GRNUGB	0.0	0.0	0.0
		LEB	489.7	248.1	181.7
		LEBUGB	223.2	62.0	81.9
		MTJ	189.9	141.9	271.0
		MTJUGB	183.1	89.6	97.5
		RHL	46.4	-30.7	-29.9
		WLS	959.8	-526.6	-639.7
		WTN	21.1	1.9	4.9
		WTNUGB	14.2	11.0	23.4
POLICE	# New Police Officers Required to Keep LOS as Identifed by KHA Analysis				
		GRN	2.0	1.2	1.9
		GRNUGB	0.0	0.0	0.0
		LEB	77.2	57.8	55.5
		LEBUGB	22.0	19.0	17.5
		MTJ	18.6	22.5	36.0
		MTJUGB	14.9	15.8	16.8
		RHL	3.2	-1.6	-1.5
		WLS	65.9	-20.0	-33.1
		WTN	1.6	0.9	1.2
		WTNUGB	1.0	1.6	2.8
POP_D	# Allocated Residential Population/ Acre within each of the Geographies				
		GRN	2.27	0.49	1.82
		LEB	1.52	0.81	0.81
		LEBUGB	0.81	0.50	0.75
		MTJ	1.47	1.21	2.49
		MTJUGB	1.33	0.61	1.09
		RHL	1.64	-0.91	-0.96
		WLS	0.34	-0.07	-0.10
		WTN	1.51	-0.32	-0.01
		WTNUGB	0.79	0.42	0.99
SCHOOL	# of Residential Population within each of the Geographies (no school measure yet)				
		GRN	905	107	361
		GRNUGB	0	0	0
		LEB	19906	9606	6952
		LEBUGB	8726	2683	3477
		MTJ	7591	5679	10844
		MTJUGB	7358	3548	3865
		RHL	1950	-1325	-1294
		WLS	38017	-20689	-25214
		WTN	950	-30	90
		WTNUGB	579	429	926

Wilson County

MOE	UNIT OF MEASURE	UTILITY/ GEOGRAPHY	BAU VALUES	BAU - ALT1a "CTR & CORR"	BAU - ALT2a "CENTERS"
LOT	Average Residential Lot Size (Acres) for each of the Geographies				
		GRN	0.20	0.00	0.00
		LEB	0.11	0.00	0.00
		LEBUGB	0.19	0.00	0.00
		MTJ	0.20	0.00	0.00
		MTJUGB	0.20	0.00	0.00
		RHL	0.21	0.00	0.00
		WLS	0.45	-0.02	-0.03
		WTN	0.78	-0.06	-0.07
		WTNUGB	0.46	0.01	0.00
RAIL_BUS	% of People (Pop & Emp) within 1/4 Mile of Transit Stations (Rail Stations & Express Bus Stops)	All	0.9%	0.0%	0.2%
SEWER	Additional 1000 Gallons per Day Generated by Allocation				
		GRN	94003	11250	37750
		GRNUGB	0	0	0
		LEB	2053887	996731	719506
		LEBUGB	906800	280516	363743
		MTJ	785286	591998	1130002
		MTJUGB	764515	369749	402500
		RHL	202750	-137750	-134500
		WLS	3953504	-2153244	-2623751
		WTN	98001	-3500	8750
		WTNUGB	60250	45000	96750
FTPRNT	# Acres Allocated to Rural Areas (as Defined by Rural & Village Center Character Areas)	R	9354	-5931	-6171
	# Acres Allocated to Urban Areas (as Defined by All Other Character Areas)	U	5582	596	655
WATER	Additional 1000 Gallons per Day Consumed by Allocation				
		GRN	75200	9003	30203
		GRNUGB	0	0	0
		LEB	1643129	797466	575692
		LEBUGB	725414	224457	291033
		MTJ	628216	473623	904026
		MTJUGB	611605	295811	322012
		RHL	162200	-110200	-107600
		WLS	3162800	-1722589	-2098996
		WTN	78400	-2799	7001
		WTNUGB	48200	36000	77400
VMT	Vehicle Miles Travelled per Day	ALL	5,429,926.0	5,139,830.00	5,122,255.00
VHT	Vehicle Hours Travelled per Day	ALL	124,432.0	114,999.00	113,764.00
FUEL2.5	% of income spent on transportation fuel @ $2.50 per Gallon	ALL	3.67%	-0.20%	-0.21%
FUEL5.0	% of income spent on transportation fuel @ $5.00 per Gallon	ALL	7.34%	-0.39%	-0.42%

APPENDIX G

Transportation Planning Best Practices

Tri-County Transportation and Land Use Study

Transportation Planning Best Practices

Section G.1: Street Design Priorities

This section further communicates best practices associated with the creation of strategic corridors. Best practices pertaining to street design priorities, collector street planning, complete streets and access management, however, may be applied at the local level also. The inherent relationship between transportation, land use, and urban form is highlighted in each of these sections.

The creation of a future sustainable transportation system for the Tri-County area will include consideration and accommodations for all travel modes including cars, freight, bikes, pedestrians, and public transit. Transportation represents the conduit through which people will be connected to places within the region. While these statements are definitive they don't come without a recognition of the competing interest associated with safety, congestion management, access management, walkability, and complete streets (as well as many other transportation considerations). Adding to the complexities of the overlap between these interests is the competition for transportation resources. Simply stated, detailed planning is required to ensure that appropriate responses to defined transportation and land use issues occurs prior to designing and implementing transportation solutions.

One way that regional and local planning initiatives can respond to the question, "What's the street of the future need to include and what will it look like?" is to look beyond the systems level planning (which is the initial step) and begin to define the local land use context for each corridor, identify growth and safety concerns, and work collaboratively with local governments on the identification of corridor visions. This work is most important for the Strategic Corridors of local communities and corridors significant to the larger region (e.g., the Strategic Corridors analyzed in Part 5 of this study). This can be accomplished by using existing forecast, locally adopted plans, and field observations to communicate likely capacity needs, document safety concerns, and highlight planned improvements (funded and unfunded) to the multimodal network (sidewalks, paths, bike routes and facilities, existing and future transit service as well as freight routes). This exercise can result in a useful tool for elected official, developers, planners, designers, engineers, and local citizens as it provides a level of expectation one step beyond traditional systems level planning (Regional Transportation Plans). This exercise is not intended as a substitute for more detailed planning and engineering studies but nonetheless can be a useful tool to bring together agencies and communities to communicate a shared expectation for the roadway.

Only through the identification of context can informed decisions be made about the design of future transportation improvements (especially design criteria such as, design speed, travel lane widths, edge treatments, curb radii and parking). Once the primary purpose of a given street is defined, planners and engineers can begin to prioritize the elements of the street based on its purpose and context. Ideally, local governments, the MPO, and TDOT can collaborate on a mechanism to communicate the context based prioritization of street design elements and strategies and use the results as guidance when compromises are required as a result of natural and built environmental constraints. One example of this type of exercise is the creation of a street design priority matrix. The following illustrative matrix would be organized around defined context areas (or transects) and would define the priority elements for the travel realm (area for automobiles) and pedestrian realm (where parking, walking and bicycling occurs). High priority elements would not be eligible for compromise when constraints are encountered, while low priority elements may be considered for modification. The result is mechanism that allows planners, engineers, and local officials the ability to memorialize how future decisions will be made when and if compromises to the ultimate cross-section are required.

Sample Street Design Priority Matrix:

The following matrix is intended to describe the relative priority for design elements and considerations for street design. The matrix is organized around the principle of each street having a discrete set of realms including travel realm, pedestrian realm and the general context realm. The matrix is intended to provide designers a general framework for dealing with the compromise between competing interest for space on a given street.

	Primary Conservation	Secondary Conservation	Rural	General Urban	Suburban	Traditional Town Center	Activity Center	Employment Center	TOD Center
TRAVEL REALM									
Number and Width of Travel Lanes									
Intersection Vehicular Capacity									
Design for Large Vehicles									
Medians									
Access Management									
Bicycle Lanes									
Multimodal Intersection Design									
PEDESTRIAN REALM									
Wide Sidewalks with Amenities									
Standard Sidewalks with Verge									
Multi-use Paths									
Urban Design Features									
OTHER ELEMENTS									
Interconnected Street System									
On-street Parking									
Curb and Gutter									
Ditch Swale Section									
RELATIVE STREET SPACING (FT)									

High Priority
Medium Priority
Low Priority
N/A

Section G.2: Collector Street Planning

The role of a collector street in a balanced transportation system is to collect traffic from neighborhood and local streets and distribute it to the network of arterials. As such, these streets provide relatively less mobility but higher overall accessibility compared to higher level streets. The lower design speeds and multi-modal amenities make these streets attractive for bicyclists and pedestrians. Proper design and spacing of collector streets is critical to ensuring a balanced transportation network.

Policy Considerations

The design of a collector street network must respect present and future conditions, the public's vision for the future, and how the network can best balance the natural environment, connectivity, access, mobility, and safety.

Natural Environment

Local geography creates a network of lakes, creeks, and floodplains that impact land use and transportation decisions. These features affect how the community develops, where streets can be constructed and maintained, and where connections between streets can be made. Collector streets, as part of the development process, must respect the natural environment.

Street Spacing and Access

Local officials also must consider street spacing guidelines to promote the efficient development of an expanding transportation system. Ultimately, these street spacing guidelines could be used as "rules of thumb" during the development review process. Different spacing standards are necessary for different development types and intensities. The figure below and the table on the following page show the desired collector street spacing for different intensities.

Street Spacing: 3,000' to 6,000'

Very Low-Intensity Land Use

Street Spacing: 1,500' to 3,000'

Low-Intensity Land Use

Street Spacing: 750' to 1,500'

High-Intensity Land Use

Land Use/Type of Collector Street	Intensity (dwelling units per acre)	Access Function	Approximate Street Spacing
Very Low Intensity Residential	Less than 2	High	3,000 to 6,000 ft
Low Intensity Residential	2 to 4	High	1,500 to 3,000 ft
Medium and High Intensity Residential	More than 4	High	750 to 1,500 ft
Activity Center	Mixed-use	Medium	750 to 1,500 ft

In addition, individual driveway access to collector streets should be limited to local streets when possible.

Design Elements

As most communities' largest collection of public space, streets need to reflect the values of the community and reinforce a unique 'sense of place' to be enjoyed by citizens – whether in urban, suburban, or rural contexts. This is especially true for a collector street system that serves as the backbone for local mobility, property access, and non-vehicular transportation modes.

Recently, municipalities across the country have started implementing "Complete Streets" as one way to transform their transportation corridors from vehicle-dominated roadways into community-oriented streets that safely and efficiently accommodate all modes of travel – not just motor vehicles. The Complete Street movement as described later in this chapter does not advocate for one size fits all — a Complete Street in an urban area may look quite different from a Complete Street in a more rural area. However, both facilities are designed to balance mobility, safety, and aesthetics for everyone using the travel corridor. Furthermore, design considerations supportive of Complete Streets include elements in both the traditional travel corridor (i.e., the public realm) as well as adjacent land uses (i.e., the private realm) for reinforcing the desired 'sense of place.'

Section G.3: Complete Streets

"Complete Streets" is a term used nationally to describe the transformation of vehicle-dominated thoroughfares in urban and suburban areas into community-oriented streets that safely and conveniently accommodate all modes of travel, not just motorists. This section describes the process and components of a Complete Street, setting the stage for the plan's transportation and land use recommendations.

Implementing Complete Streets

Transforming major arterials into Complete Streets is complicated, requiring a diverse range of skill sets and broad support from the community. Fortunately, other metropolitan areas have demonstrated success stories that have been translated into guiding documents. The most detailed guidance comes from a joint effort of the Institute of Transportation Engineers and Congress for the New Urbanism. With funding from the U.S. Department of Transportation and the U.S. Environmental Protection Agency, best practices have been published as "Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities."

Successful Complete Street transformations require community support and leadership, as well as coordination between various disciplines. In particular, support must include economic revitalization, business retention and expansion, property owner involvement, urban planning, urban design, landscape architecture, roadway design, utility coordination, traffic engineering, transportation planning, transit planners, architects, graphic artists, and developers.

Guiding Principles

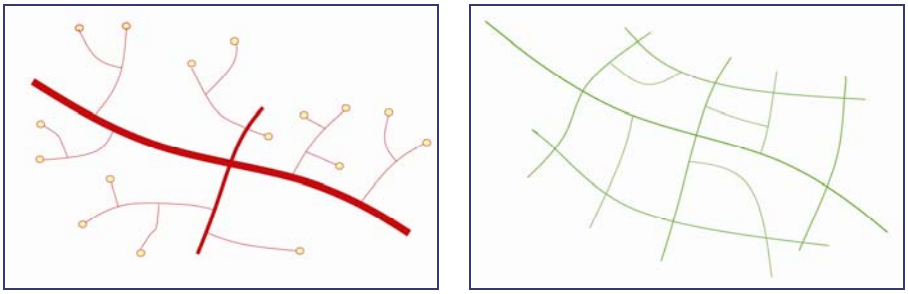
The following principles embody the most important aspects of a successful Complete Streets program:

- Achieve community objectives.
- Blend street design with the character of the area served.
- Capitalize on a public investment by working diligently with property owners, developers, economic development experts, and others to spur private investment in the area. A minimum return-on-investment of $3 private for every $1 of public investment should be expected. Often in more densely populated areas, the ratio is 10:1 or more.
- Design in balance so that traffic demands do not overshadow the need to walk, bicycle, and ride transit safely, efficiently, and comfortably. The design should encourage people to walk.
- Empower citizens to create their own sense of ownership in the success of the street and its myriad characters.

Caveats

Street transformations, however, require a tremendous effort by many stakeholders. Several factors contribute to the successful implementation of a Complete Street transformation, including:

- *An interconnected network of major and minor streets* with some redundancy in traffic capacity on parallel major streets. Concern over a "loss" of traffic capacity can be tempered with "surplus" capacity elsewhere.



Limited connectivity resulting in heavy reliance on arterial system (left) versus well-connected system of streets (right).

- *A demonstrated and well-defined problem that can be addressed with a Complete Street transformation.* The community should agree that the problem demands a solution and enough citizens feel compelled to "show up, stand up, and speak up in support." It will never be possible to get everyone to agree with every detail of the new design, but near universal agreement on the problem definition is critical.
- *A non-profit group to create an agenda for change. During the early phases of the t*ransformation project, a non-profit group can help facilitate change and participate in design meetings to make sure that designers continue to pursue solutions and decisions that will ultimately achieve the community objective.

Policy Support

Complete Street policies and enabling legislation should be reflected in important policy documents including:

- City or County Comprehensive Plans
- City or County Comprehensive Transportation Plans
- Area Plans (for the applicable area served by the Complete Street)
- Park Master Plans (if adjacent to the corridor)
- Economic Revitalization/Development Strategies

Street Realms

As described below, Complete Streets can be viewed in terms of four basic zones or realms: the context realm, pedestrian realm, travelway realm, and intersection realm. Together these street designs ensure the needs of all users are accommodated.

Context Realm

The context realm of a Complete Street is defined by the buildings that frame the major roadway. Identifying distinct qualities of the context realm requires focusing on four areas: building form and massing, architectural elements, transit integration, and site design.

Building Form and Massing

To enhance an already high-quality street design and help create a Complete Street, buildings should be located close enough to the street that they are able to frame the public space enjoyed by pedestrians.

In more urban areas, these buildings should be located directly behind the sidewalk. Buildings with stairs, stoops, or awnings may even encroach into the pedestrian realm to provide visual interest and access to the public space. Suburban environments that must incorporate setbacks for adjacent buildings should limit this distance to 20 feet or less and avoid off-street parking between buildings and the pedestrian realm.

Larger setbacks in these suburban areas will diminish the sense of enclosure afforded to the pedestrian and move access to the buildings farther away from the street. In both environments, building heights should measure at least 25% of the corridor width. For example, a 100-foot wide roadway right-of-way should be framed by buildings that are at least 25 feet high (a typical two-story building) on both sides with facades that are at most 20 feet from the edge of right-of-way.

Architectural Elements

Careful placement and design of buildings adjacent to the major roadway offer opportunities for meaningful interaction between those traveling along the corridor and those using the corridor for other purposes. These opportunities are greatly enhanced when restaurants, small shops and boutiques, residential units, and offices are located adjacent to the street. Building scale and design details incorporated into individual buildings foster a comfortable, engaging environment focused on the pedestrian. Common building design treatments generally favored in a pedestrian environment include awnings, porches, balconies, stairs, stoops, windows, appropriate lighting, promenades, and opaque windows.

Transit Integration

Areas that are targeted for high-quality transit service must be supported through land use and zoning policies that support transit-oriented development and reflect the benefits of increased access to alternative modes of travel. Policy examples include appropriate densities and intensities for supporting transit use, parking ratios that reflect reduced reliance on the automobile, and setback and design guidelines that result in pedestrian-supportive urban design. In addition, potential transit service identified for transportation corridors within the community should take into consideration the land use, density/intensity, and urban design characteristics of the surrounding environment before selecting proposed technologies or finalizing service plans.

Site Design

The Complete Street truly is integrated into the surrounding environment when the interface between the site and the street is complementary to the pedestrian environment created along the entire corridor. Access to the site should be controlled through a comprehensive access management program to minimize excessive driveways that create undesirable conflicts for traveling pedestrians. (See Section 5.3.4: Access Management.) Building orientation, further defined by landscape and architectural elements incorporated into the site should reinforce the public space protected between the buildings. Public paths through sites should be provided to shorten blocks longer than 600 feet.

Pedestrian Realm

The pedestrian realm of a Complete Street extends between the outside edge of sidewalk and the face-of-curb located along the street. Safety and mobility for pedestrians within this realm is predicated upon the presence of continuous sidewalks along both sides of the street built to a sufficient width for

accommodating the street's needs as defined by the environment. For example, suburban settings will require different widths than downtown settings. The quality of the pedestrian realm also is greatly enhanced by the presence of high-quality buffers between pedestrians and moving traffic, safe and convenient opportunities to cross the street, and consideration for shade and lighting needs.

The pedestrian realm may consist of up to four distinct functional zones: frontage zone, throughway zone, furnishing zone, and edge zone. The frontage zone is located near the back of the sidewalk and varies in width to accommodate potential window shoppers, stairs, stoops, planters, marquees, outdoor displays, awnings, or café tables. The throughway zone provides clear space for pedestrians to move between destinations and varies between 5 and 16 feet wide, based on the anticipated demand for unimpeded walking area. The furnishing zone provides a key buffering between pedestrians and moving traffic. It generally measures at least 4 to 6 feet wide to accommodate street trees, planting strips, street furniture, utility poles, sign poles, signal and electrical cabinets, phone booths, fire hydrants, bicycle racks, or retail kiosks targeted for the pedestrian realm. The edge zone is incorporated into the pedestrian realm concurrent with the presence of on-street parking to allow sufficient room for opening car doors.

Incorporation of one or more of these function zones in the pedestrian realm of a street generally is based upon the context of the surrounding built environment. For example, a more urban, downtown environment will include all four zones in the pedestrian realm and could measure up to 24 feet wide. An equally important link to the pedestrian network that is located in a more suburban setting may omit one or more of the function zones listed above, resulting in an overall minimum width of 11 feet.

Recommended design elements for promoting a healthy pedestrian realm generally focus on one of four areas of concentration: pedestrian mobility, quality buffers, vertical elements, and public open space. Together, these best practices can be implemented in both urban and suburban environments, to varying degrees, for promoting healthy pedestrian environments.

Pedestrian Mobility

The presence of a comprehensive, continuous pedestrian network serves as the foundation for fostering a walkable community that supports active transportation and mode choice. Sidewalks generally provide clear zones of 6 to 8 feet wide to accommodate pedestrian travel. In more urban environments, amenities in the frontage zone and furniture zone will greatly increase the overall width of the corridor when compared with more suburban settings. Mid-block pedestrian crosswalks should be incorporated into the urban fabric as needed to make sure that convenient crossing opportunities are provided approximately every 300 feet for maximizing efficiency and safety within the pedestrian system. As a general rule, mid-block crossings should be considered on two-lane streets when the block length is greater than 500 feet and the posted speed limit for the travel lanes does not exceed 40 miles per hour.

Quality Buffers

Providing separation between pedestrians and moving traffic greatly enhances the character of the pedestrian realm. The amount of separation incorporated into the pedestrian realm may vary between corridors based on the context of the surrounding built environment or on streets with different travel speed and/or traffic volume characteristics. In downtown areas, parallel or angled on-street parking provides sufficient distance (8 to 18 feet) for separating pedestrian and vehicle traffic. Likewise, landscape planting areas (typically 6 feet wide) incorporated into either urban or suburban

environments provide adequate lateral separation for pedestrians. In urban areas, street trees may be placed in tree wells within an overall hardscaping surface instead of using suburban-style grass areas.

Vertical Elements

Vertical elements traditionally incorporated into the pedestrian realm include street trees, pedestrian-scale street lighting, and utilities. Street trees provide necessary shade to pedestrians and soften the character of the surrounding built environment. They should be spaced between 15 and 30 feet apart, be adapted to the local environment, and fit the scale and character of the surrounding area. Pedestrian-scale street lighting incorporated into the pedestrian realm should use metal halide fixtures mounted between 12 and 20 feet high. Utilities should not interfere with pedestrian circulation or block entrances to buildings, curb cuts, or interfere with sight distance triangles. In some cases, burying utilities underground avoids conflicts and clutter caused by utility poles and overhead wires. Relocation of overhead utilities to tall poles on just one side of the roadway, however, can be a cost-effective aesthetic alternative to burial of utilities in a duct bank under the road.

Public Open Space

The pedestrian realm serves a dual purpose within the built environment, acting as both a transportation corridor and a public open space accessible to the entire community. As a result, specific design elements incorporated into the pedestrian environment should reinforce this area as a public space. Properly planned, these design elements could provide opportunities for visitors to enjoy the unique character of the corridor in both formal and informal seating areas. Public art and/or specialized surfaces and materials introduced into the pedestrian realm are appreciated by slower moving pedestrians. In more urban areas, street furniture and/or outdoor cafes provide opportunities that foster community ownership in the pedestrian realm, such as “people watching.” Furthermore, building encroachments in downtown areas, such as stairs and stoops, provide for interesting points of access to the pedestrian realm. Lastly, awnings and canopy trees provide shade which is helpful in the temperate climate of the region.

Travelway Realm

The travelway realm of a street is defined by the edge of pavement or curb line (in more urban areas) that traditionally accommodates the travel or parking lanes needed to provide mobility for bicycles, transit, and automobiles sharing the transportation corridor. This area also separates the pedestrian and context realms and may provide carefully-designed crossing opportunities between intersections. Recommended design elements incorporated into the travelway realm serve to achieve greater balance between travel modes sharing the corridor and favor design solutions that promote human scale for the street and minimize pedestrian crossing distance. Recommendations for the travelway realm in a Complete Street focus on two areas of consideration: modes of travel and medians.

Multi-modal Corridors

Balance between travel modes within the same transportation corridor fosters an environment of choice for mobility that could lead to reduced congestion on major roadways and a healthier citizenry. On a Complete Street, safe and convenient access to the transportation network for bicycles, transit, and automobiles is afforded within the travelway realm. Travel lanes for automobiles and transit vehicles should measure between 10 and 11 feet wide, depending on the target speed, to manage travel speeds and reinforce the intended character of the street. Parking lanes incorporated into the travelway

realm should not exceed 8 feet in width (including the gutter pan) and may be protected by bulb-outs evenly spaced throughout the corridor.

Bus stops located along the corridor should be well-designed to include shelters, as well as benches that comfort patrons while waiting for transit service. On-street bicycle lanes (typically 4 to 6 feet wide) should be considered when vehicle speeds range from 30 to 40 miles per hour. Wide outside lanes may be preferred on streets with higher speeds. To avoid situations where citizens with only basic bicycle skills may be attracted to a corridor, designated bicycle routes on parallel corridors may be the best option when speeds on the major street exceed 40 mph. According to state law, bicyclists are considered vehicles and are permitted on all corridors except freeways and access-controlled highways.

Median Treatments

Medians often are incorporated into the travelway realm to provide dedicated left-turn lanes, landscaping, and pedestrian refuge at crossings. They generally vary between 7 and 18 feet wide, depending on their intended application and the limitations of the surrounding built environment. Medians also reinforce other access management solutions provided within the travelway to reduce the number of conflict points and maintain the human scale intended for the Complete Street.

In addition to center medians, other access management solutions incorporated into the travelway realm should limit the number of individual driveways along the corridor and avoid the use of right-turn deceleration lanes. Together, these improvements will reduce the overall pedestrian crossing distance for the travelway and maximize the safety for pedestrians traveling inside the pedestrian realm.

Intersection Realm

Evaluating potential changes for the intersection realm of a street requires careful consideration for the concerns of multiple travel modes that could meet at major intersections within the transportation system. Recommendations for improving the multi-modal environment in and around these major intersections focus on two areas of the facility: operations and geometric design.

Geometric Design

Geometric design of an intersection should reinforce the operational characteristics of a traffic signal or roundabout. With traffic signals, this includes the introduction of curb extensions, or bulb-outs, to shorten pedestrian crossing distance and protect on-street parking near the intersection. Curb return radii designed for signalized intersections should be 15 to 30 feet to control turning speed around corners. At roundabouts, special consideration should be given to entry and exit speeds, pedestrian refuge in the splitter islands, and assigning predictability to the intersection for pedestrians, bicycles, and vehicles. Both intersection treatments may consider special pavement markings to distinguish pedestrian areas or bicycle lanes, although these surfaces need to be stable, firm, and slip resistant. Additional consideration should be given to maintaining adequate sight triangles in the intersection, addressing the treatment of bicycle lanes through the intersection, and compliance with federal requirements per the American with Disabilities Act for crosswalk and curb ramp design.

Operations

In terms of operations, traffic signals or roundabouts are the two most appropriate applications for traffic control devices that also could maintain the pedestrian scale of the street reinforced in the

context, pedestrian, and travelway realms. The merits of a traffic signal rather than a roundabout for intersection control should be determined on a case-by-case basis after taking into consideration key issues such as desired traffic speed, availability of right-of-way, anticipated traffic patterns, and the context of the built environment surrounding the intersection.

Section G.4: Access Management

Access management allows local decision-makers to do more with less. As the city and region's most traveled corridors continue to attract commercial development, protecting the through capacity becomes essential for the efficiency of the transportation system and continued economic growth. Access management balances the needs of motorists using a roadway with the needs of adjacent property owners dependent upon access to the roadway. In an environment with limited funds for transportation projects and competing agendas, access management is not just good policy but crucial to the health of the entire transportation network.

The Federal Highway Administration (FHWA) defines access management as "the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed." According to the Access Management Manual, access management results from a cooperative effort between state and local agencies and private land owners to systematically control the "location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway."[1] Access management requires cooperation between government agencies and private land owners.

The following sections provide access management policy measures and guidelines that should be integrated into the design review process for pending and future development along the study corridors.

Symptoms and Benefits of Access Management

Poor access management directly affects the livability and economic vitality of commercial corridors, ultimately discouraging potential customers from entering the area. A corridor with poor access management lengthens commute times, creates unsafe conditions, lowers fuel efficiency, and increases vehicle emissions. Signs of a corridor with poor access management include:

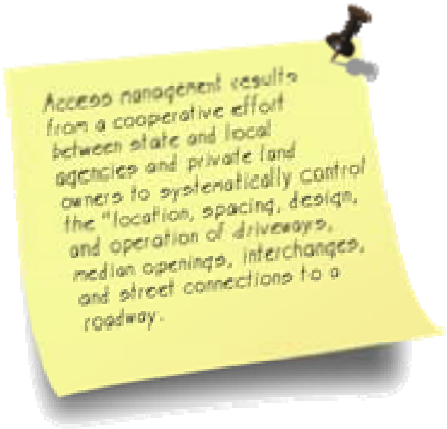
- Increased crashes between motorists, pedestrians, and cyclists
- Worsening efficiency of the roadway
- Congestion outpacing growth in traffic
- Spillover cut-through traffic on adjacent residential streets
- Limited sustainability of commercial development

Without access management, the function and character of major roadway corridors can deteriorate rapidly and adjacent properties can suffer from declining property values and high turnover. Access management has wide-ranging benefits to a variety of users as shown in the table below**.**

[1] *Access Management Manual, Transportation Research Board, National Academy of Sciences, Washington DC, 2003*

Benefits of Corridor Access Management	
User	**Benefit**
Motorists	• Fewer delays and reduced travel times • Safer traveling conditions
Bicydists	• Safer traveling conditions
	• More predictable motorist movements
	• More options in a connected street network
Pedestrians	• Fewer access points and more median refuges increases safety • More pleasant walking environment
Transit Users	• Fewer delays and reduced travel times
	• Safer, more convenient trips to and from transit stops in a connected street and sidewalk network
Freight	• Fewer delays and reduced travel times lower cost of delivering goods and services
Business Owners	• More efficient roadway system serves local and regional customers
	• More pleasant roadway corridor attracts customers
	• Improved corridor aesthetics
	• Stable property values
Government Agencies	• Lower costs to achieve transportation goals and objectives • Protection of long-term investment in transportation infrastructure
Communities	• More attractive, efficient roadways without the need for constant road widening

Access Management Strategy Toolkit



Access management is not a "one size fits all" solution to corridor congestion. Successful strategies differ throughout a region and even along the same road. The Access Management Strategy Toolkit provides a general overview of the various strategies available to mitigate congestion and its effects. A comprehensive access management program includes evaluation methods and supports the efficient and safe use of the corridors for all transportation modes. The purpose of the toolkit is to provide local engineering and planning officials with access management strategies as well as an overview of their application, use, and, in some cases, unit cost. The policies and guidelines found in the Access Management toolkit should be integrated into the design review process for pending and future development.

Site Access Treatments

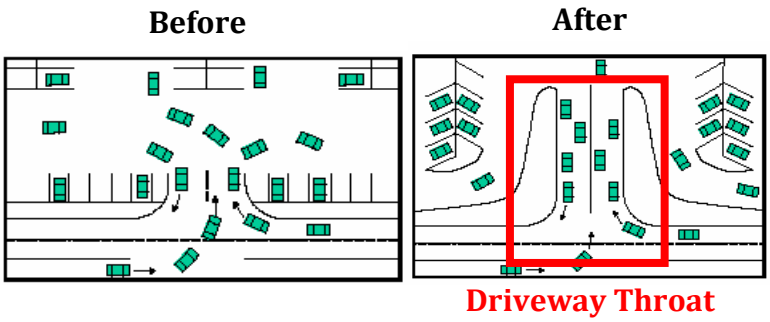
Improvements that reduce the total number of vehicle conflicts should be a key consideration during the approval of redeveloped sites along corridors identified for access management programs. Site Access Treatments include the following:

- Improved on-site traffic circulation,
- Number of driveways;
- Driveway placement/relocation; and

- Cross access.

Improved On-Site Traffic Circulation

One way to reduce traffic congestion is to promote on-site traffic circulation. Pushing back the throat of an entrance, as shown in the figures below, helps avoid spillback onto the arterial. This action improves both the safety and efficiency of the roadway. A minimum separation of 100 feet should be provided to prevent internal site operations from affecting an adjacent public street, ultimately causing spillback problems. Approximate construction cost varies and usually is the responsibility of private development.



Number of Driveways

Only the minimum number of connections necessary to provide reasonable access should be permitted. For those situations where outparcels are under separate ownership, easements for shared access can be used to reduce the number of necessary connections. Reducing the number of access points also decreases the number of conflict points, making the arterial safer and more efficient. Approximate construction cost varies and usually is the responsibility of private development.

Driveway Placement/Relocation

Driveways located close to intersections create and contribute to operational and safety issues. These issues include intersection and driveway blockages, increased points of conflict, frequent/unexpected stops in the through travel lanes, and driver confusion as to where vehicles are turning. Driveways close to intersections should be relocated or closed, as appropriate. As a best planning practice, no driveway should be allowed within 100 feet of the nearest intersection.

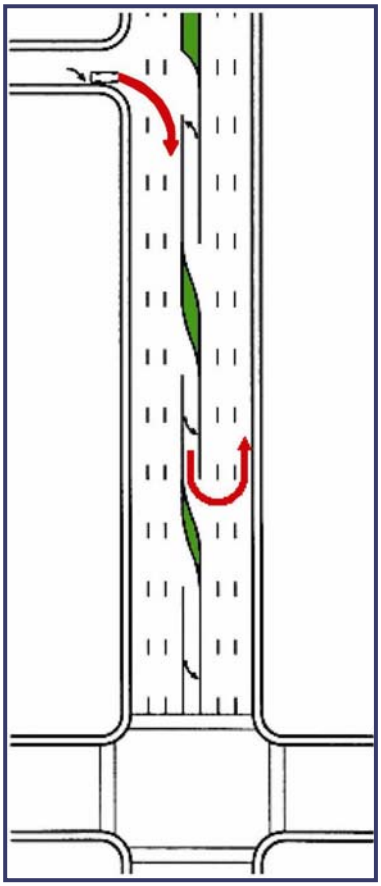
Cross Access

Cross access is a service drive or secondary roadway that provides vehicular access between two or more continuous properties. Such access prevents the driver from having to enter the public street system to travel between adjacent uses. Cross access can be a function of good internal traffic circulation at large developments with substantial frontage along a major roadway. Similarly, backdoor access occurs when a parcel has access to a parallel street behind buildings and away from the main line. When combined with a median treatment, cross access and backdoor access ensure that all parcels have access to a median opening or traffic signal for left-turn movements.

Median Treatments

Segments of a corridor with sufficient cross access, backdoor access, and on-site circulation may be candidates for median treatments. A median-divided roadway improves traffic flow, reduces congestion, and increases traffic safety — all important goals of access management. While medians restrict some left-turn movements, overall traffic delays are reduced by removing conflicting vehicles from the mainline. Landscaping and gateway features incorporated into median treatments improve the aesthetics of the corridor, in turn encouraging investment in the area. Median Treatments include the following:

- Non-Traversable Median
- Median U-Turn Treatment
- Directional Cross (Left-Over Crossing)
- Left-Turn Storage Bays
- Offset Left-Turn Treatment



Median U-Turn Movement

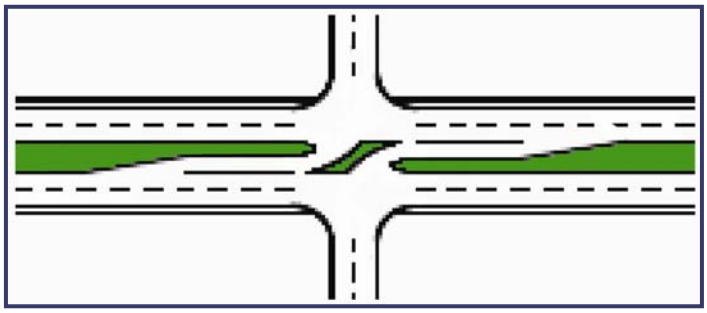
Non-Traversable Median

These features are raised or depressed barriers that physically separate opposing traffic flows. Inclusion in a new cross-section or retrofit of an existing cross-section should be considered for multi-lane roadways with high pedestrian volumes or collision rates as well as in locations where aesthetics are a priority. A non-traversable median requires sufficient cross and backdoor access. As these treatments are considered, sufficient spacing and locations for U- and left-turn bays must be identified.

The advantage of non-traversable medians includes increased safety and capacity by separating opposing vehicle flows, providing space for pedestrians to find refuge, and restricting turning movements to locations with appropriate turn lanes. Disadvantages include increased emergency vehicle response time (indirect routes to some destinations), inconvenience, increased travel distance for some movements, and potential opposition from the general public and affected property owners. To overcome some of these disadvantages, sufficient spacing and location of U- and left-turn bays must be identified. Approximate construction cost varies.

Directional Crossover (Left-Over Crossing)

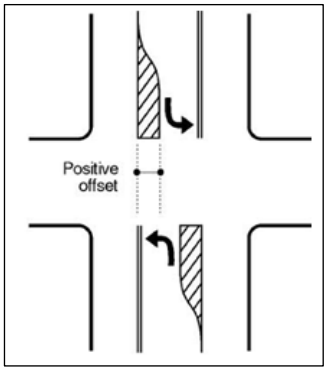
When a median exists on a corridor, special attention must be given to locations where left turns are necessary. A left-over is a type of directional crossover that prohibits drivers on the cross road (side street) from proceeding straight through the intersection with the main road, but allows vehicles on the mainline to turn left onto the cross road. Such



designs are appropriate in areas with high traffic volumes on the major road and lower volumes of through traffic on the cross road, particularly where traffic needs to make left turns from the main line onto the minor street. A properly implemented left-over crossing reduces delay for through-traffic and diverts some left-turn maneuvers from intersections. By reducing the number of conflict points for vehicles along the corridor, these treatments improve safety.

Left-Turn Storage Bays

Where necessary, exclusive left-turn lanes/bays should be constructed to provide adequate storage space exclusive of through traffic for turning vehicles. The provision of these bays reduces vehicle delay related to waiting for vehicles to turn and also may decrease the frequency of collisions attributable to lane blockages. In some cases, turn lanes/bays can be constructed within an existing median. Where additional right-of-way is required, construction may be more costly.



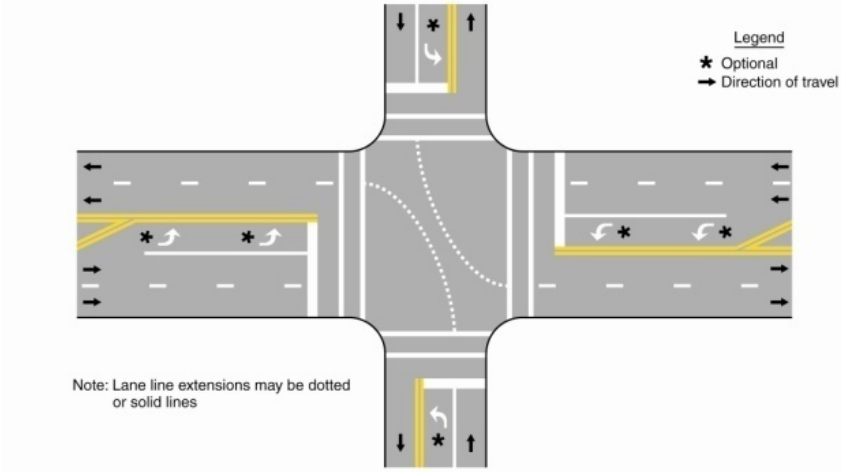
Offset Left-Turn Treatment

Exclusive left-turn lanes at intersections generally are configured to the right of one another, which causes opposing left-turning vehicles to block one another's forward visibility. An offset left-turn treatment shifts the left-turn lanes to the left, adjacent to the innermost lane of oncoming through traffic. In cases where permissive left-turn phasing is used, this treatment can improve efficiency by reducing crossing and exposure time and distance for left-turning vehicles. In addition, the positive offset improves sight distance and may improve gap recognition. In locations with sufficient median width, this treatment can be easily retrofitted. Where insufficient right-of-way width exists, the construction of this treatment can be difficult and costly. As a result, approximate construction costs vary.

Intersection and Minor Street Treatments

The operation of signalized intersections can be improved by reducing driver confusion, establishing proper curb radii, and ensuring adequate laneage of minor street approaches. Intersection and Minor Street Treatments include the following:

- Skip Marks (Dotted Line Markings)
- Intersection and Driveway Curb Radii
- Minor Street Approach Improvements



Skip Marks (Dotted Line Markings)

These pavement markings can reduce driver confusion and increase safety by guiding drivers through complex intersections. Intersections that benefit from these lane markings include

offset, skewed, or multi-legged intersections. Skip marks are also useful at intersections with multiple turn lanes. The dotted line markings extend the line markings of approaching roadways through the intersection. The markings should be designed to avoid confusing drivers in adjacent or opposing lanes.

Intersection and Driveway Curb Radii

Locations with inadequate curb radii may cause turning vehicles to use opposing travel lanes to complete their turning movement. Inadequate curb radii may cause vehicles to "mount the curb" as they turn a corner and cause damage to the curb and gutter, sidewalk, and any fixed objects located on the corner. This maneuver also can endanger pedestrians standing on the corner. Curb radii should be adequately sized for area context and likely vehicular usage.

Minor Street Approach Improvements

At signalized intersections, minor street vehicular volumes and associated delays may require that a disproportionate amount of green time be allocated to the minor street, contributing to higher-than-desired main street delay. With laneage improvements to the minor street approaches, such as an additional left-turn lane or right-turn lane, signal timing often can be re-allocated and optimized.

Intelligent Transportation System

Intelligent Transportation Systems (ITS) have many potential benefits when implemented in concert with an overall transportation management strategy. ITS solutions use communications and computer technology to manage traffic flow in an effort to reduce crashes, mitigate environmental impacts such as fuel consumption and emissions, and reduce congestion from normal and unexpected delays. Successful systems include a variety of solutions that provide surveillance capabilities, remote control of signal systems components, seamless sharing of traveler information with the public, and even allow emergency vehicles to have priority to proceed safely through signalized intersections.

Signalization

The volume of traffic attracted to some side streets or site driveways is more than can be accommodated acceptably under an unsignalized condition. Delays for minor street movements as well as left-turn movements on the main street may create or contribute to undue delays on the major roadway and numerous safety issues. The installation of a traffic signal at appropriate locations can mitigate these types of issues without adversely affecting the operation of the major roadway provided they are spaced appropriately. Approximate construction cost is $50,000 to $60,000 per signal.

Progressive-Controlled Signal System

A progressive-controlled signal system coordinates the traffic signals along a corridor to allow vehicles to move through multiple signals without stopping. Traffic signals are spaced appropriately and synchronized so when a vehicle is released from one intersection the signal at the next intersection will be green by the time the vehicle reaches it.

Likewise, adaptive signal control involves continuously collecting automated intersection traffic volumes and using the volumes to alter signal timing and phasing to best accommodate actual—real-time—traffic volumes. Adaptive signal control can increase isolated intersection capacity as well as improve overall corridor mobility by up to 20% during off-peak periods and 10% during peak periods.

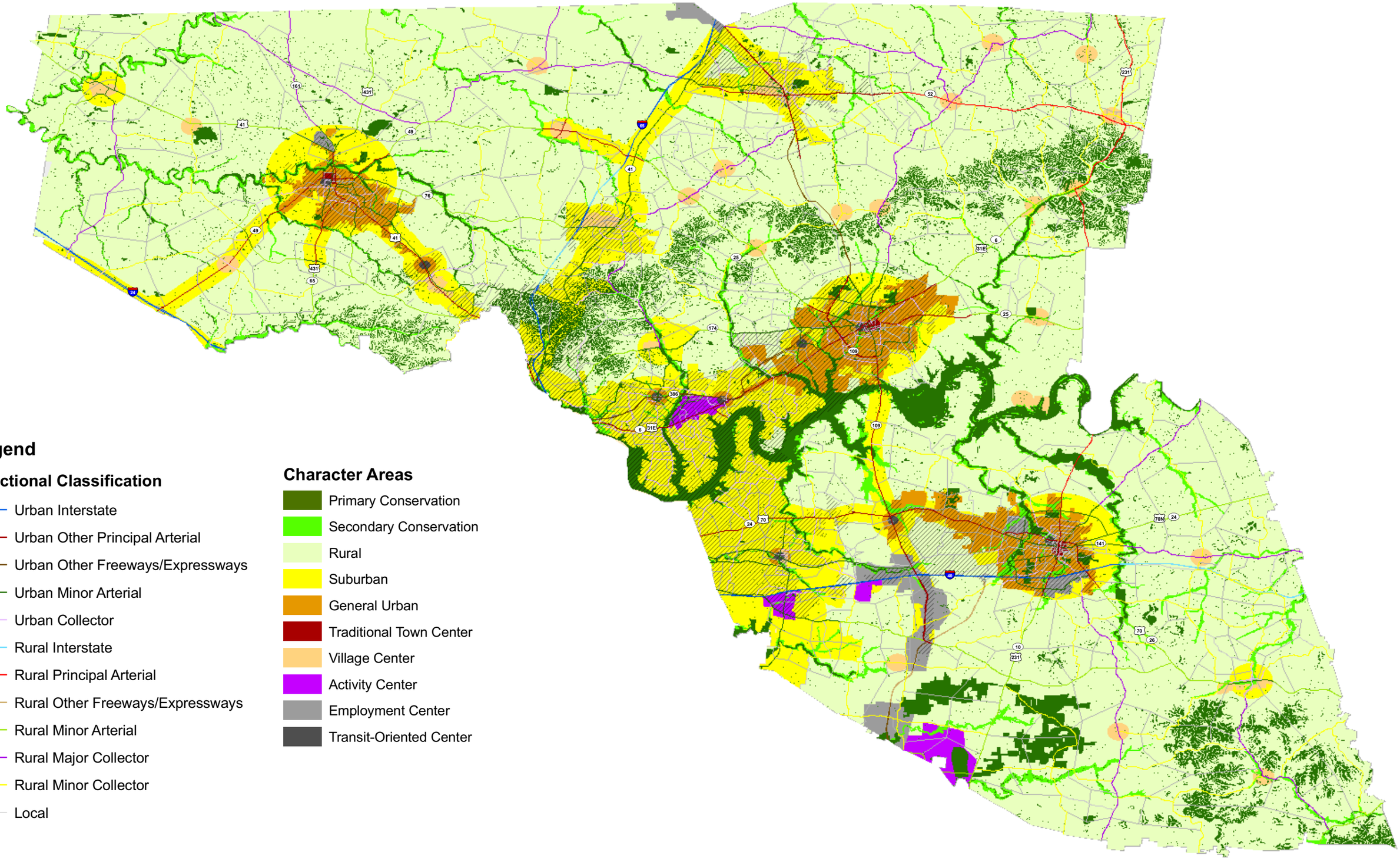
Approximate construction cost is $250,000 per system and $10,000 per intersection in addition to 25% of capital costs in training, etc.

Emergency Vehicle Preemption

This strategy involves an oncoming emergency or other suitably equipped vehicle changing the indication of a traffic signal to green to favor the direction of desired travel. Preemption improves emergency vehicle response time, reduces vehicular lane and roadway blockages, and improves the safety of the responders by stopping conflicting movements. Approximate construction cost is $5,000-$7,000 per intersection plus $2,000 per equipped vehicle.

APPENDIX H

Conceptual Road Transportation Plan



Legend

Functional Classification

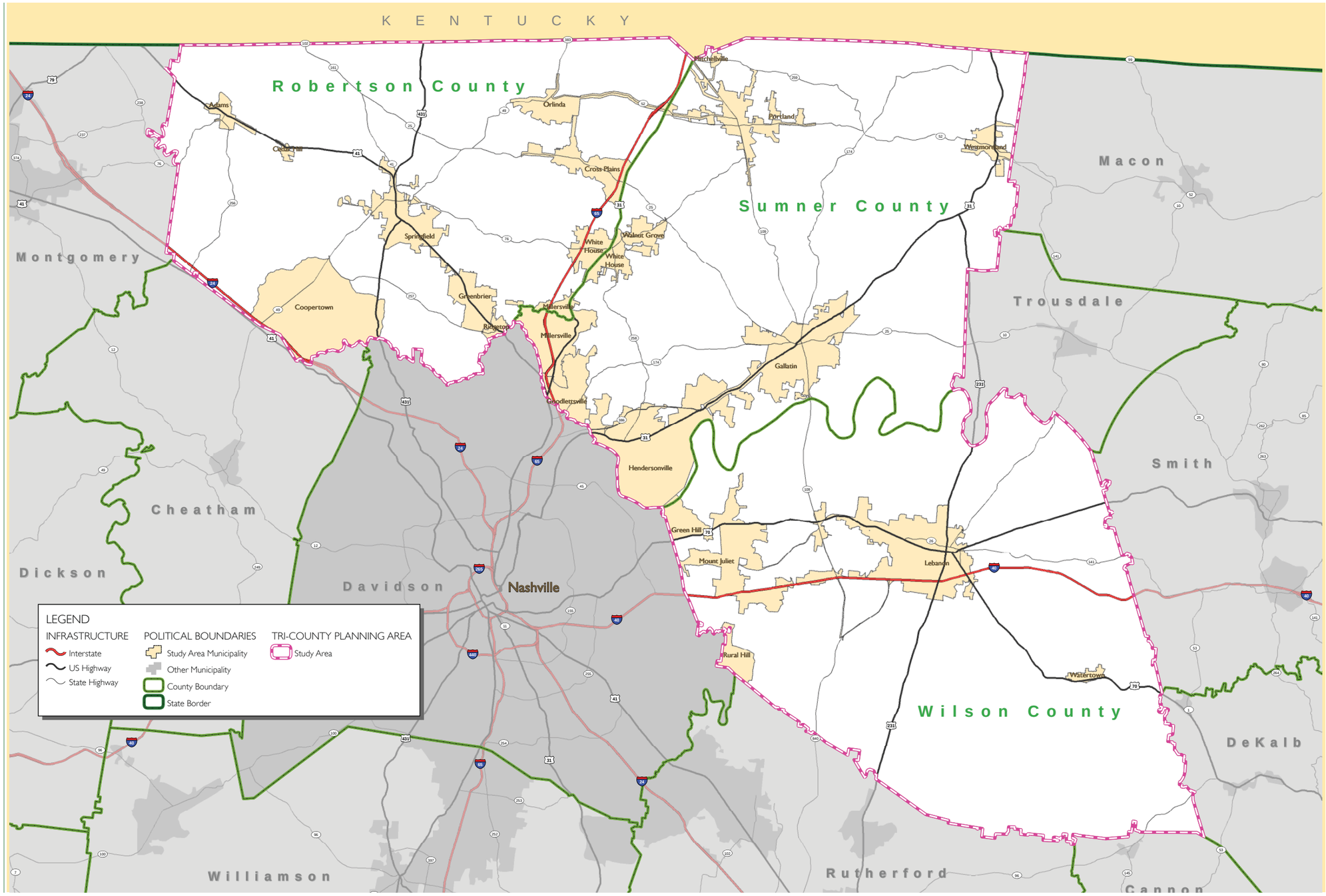
- Urban Interstate
- Urban Other Principal Arterial
- Urban Other Freeways/Expressways
- Urban Minor Arterial
- Urban Collector
- Rural Interstate
- Rural Principal Arterial
- Rural Other Freeways/Expressways
- Rural Minor Arterial
- Rural Major Collector
- Rural Minor Collector
- Local

Character Areas

- Primary Conservation
- Secondary Conservation
- Rural
- Suburban
- General Urban
- Traditional Town Center
- Village Center
- Activity Center
- Employment Center
- Transit-Oriented Center

APPENDIX I

Exhibits



NOT TO SCALE

EXHIBIT 1.1: CONTEXT MAP

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

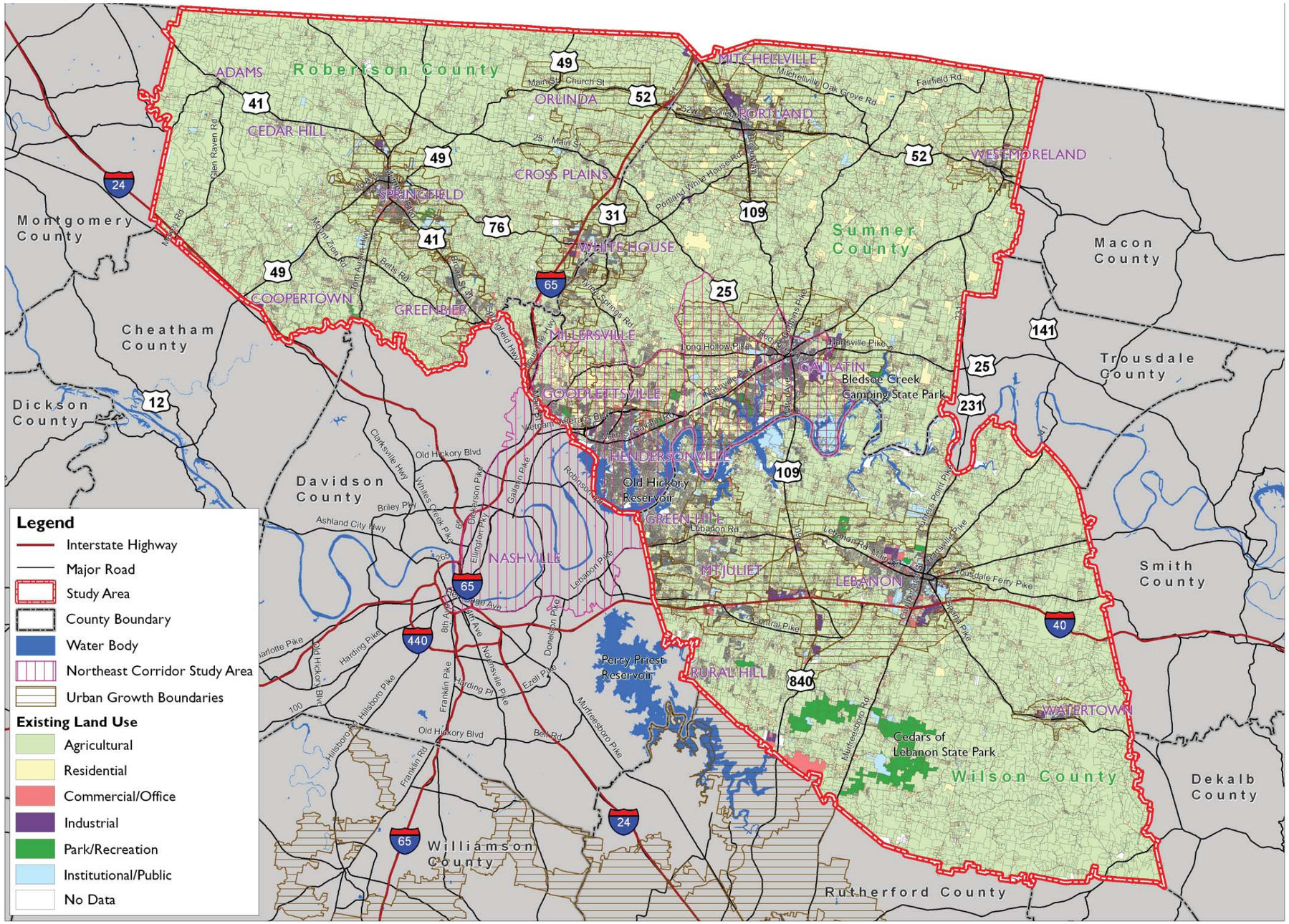


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EXHIBIT 2.1: EXISTING LAND USE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

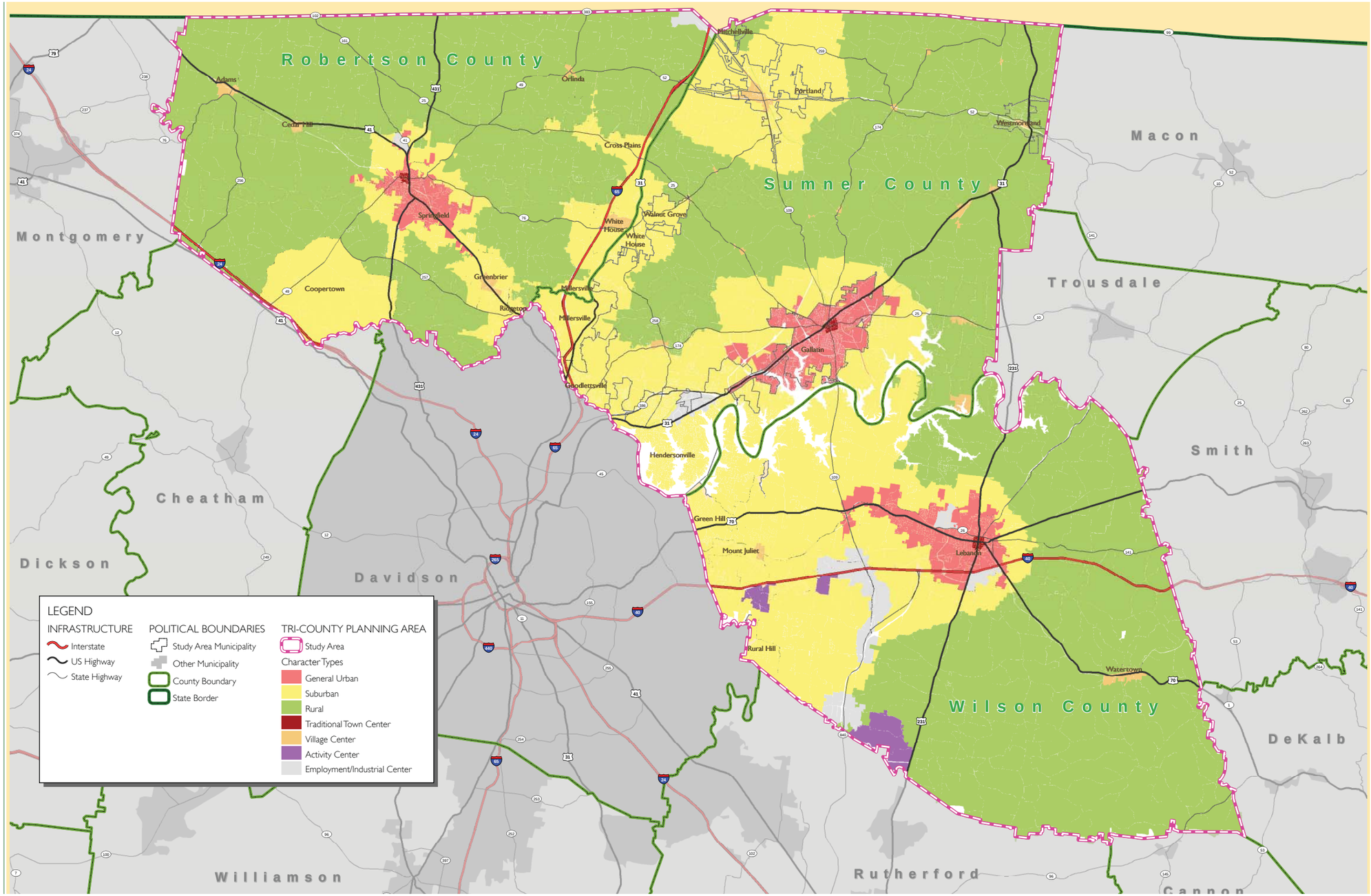

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EXHIBIT 3.1: BAU SCENARIO

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

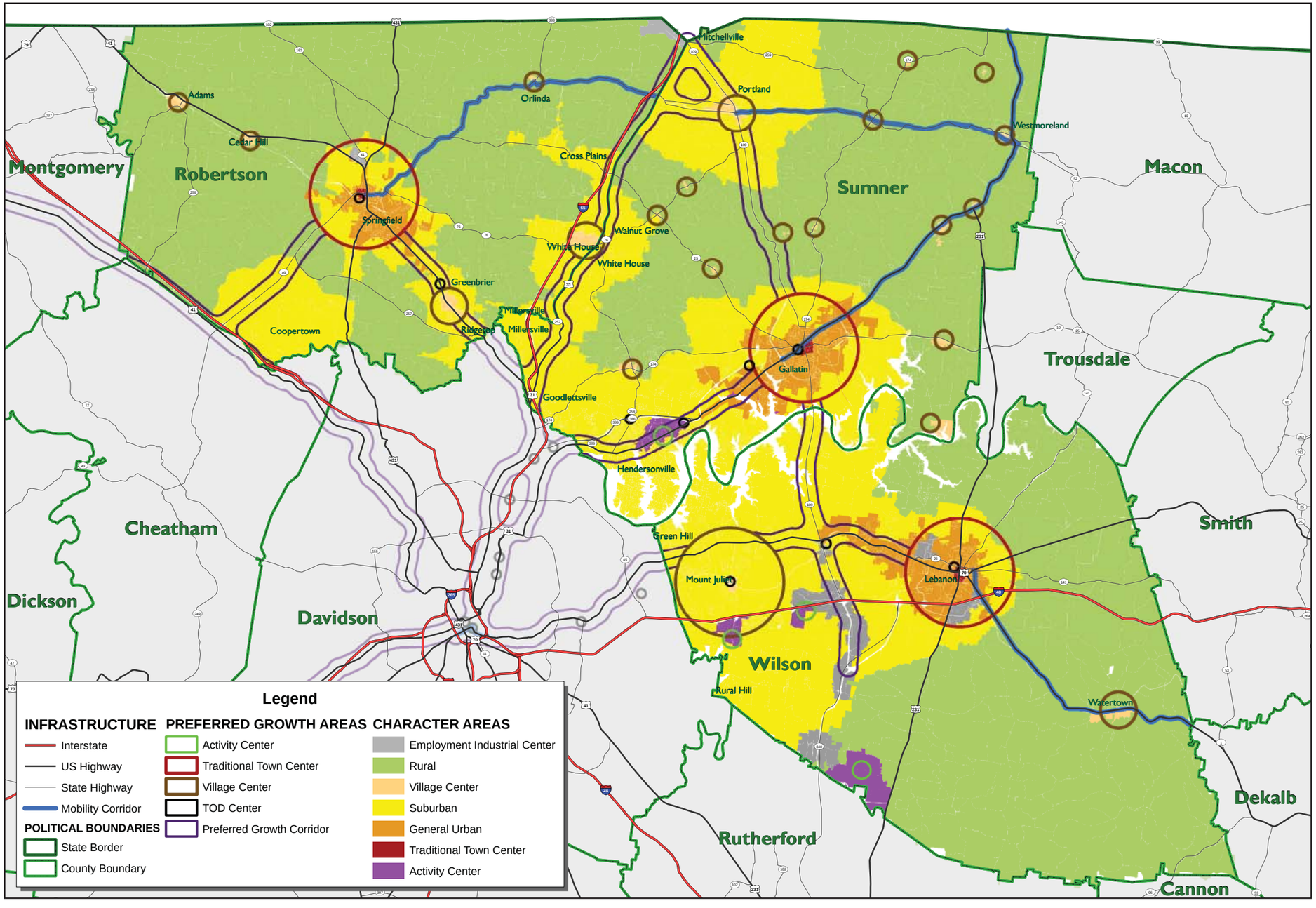

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EXHIBIT 3.2: ALTERNATIVE SCENARIO 1: CENTERS & CORRIDORS

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

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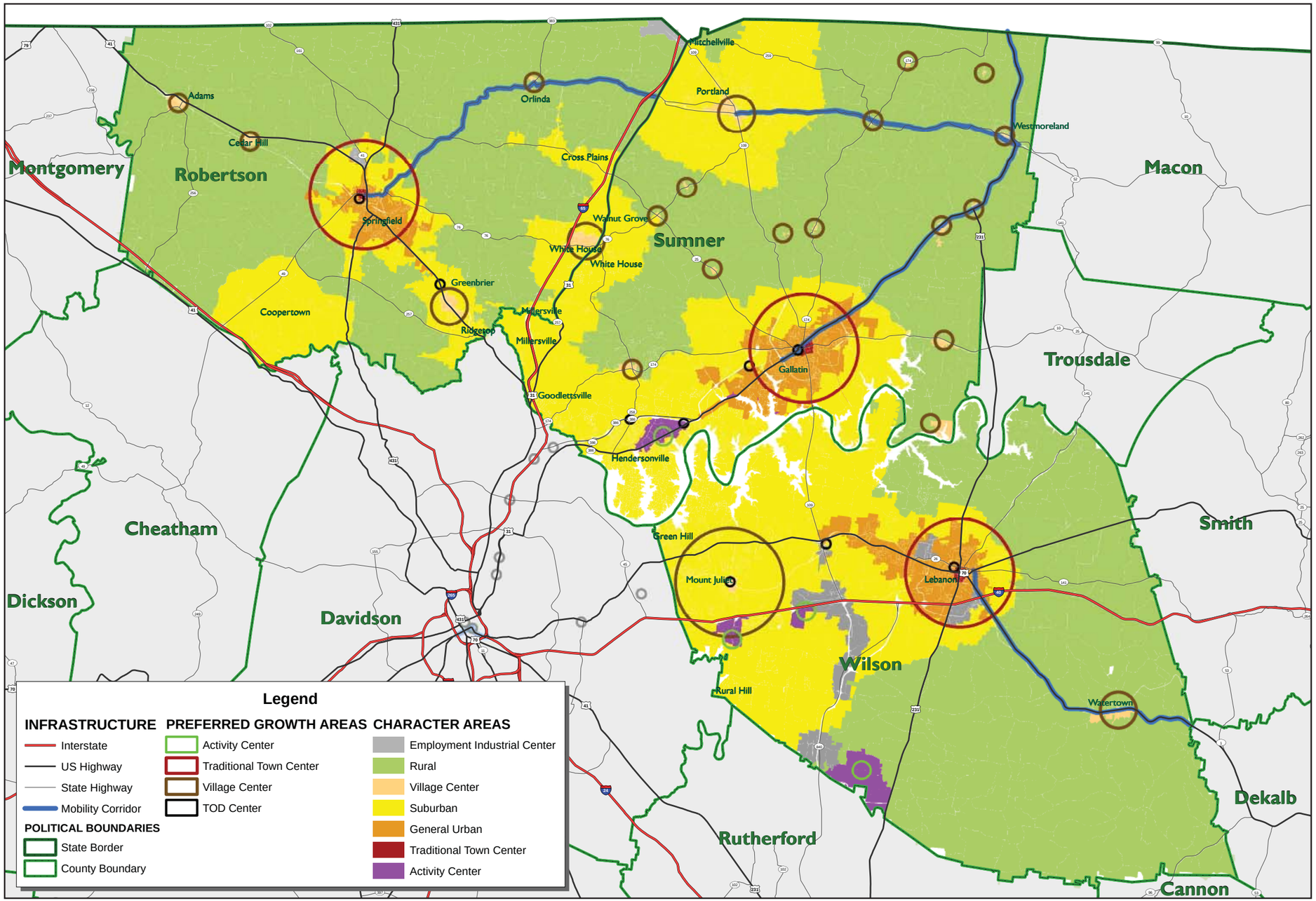

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EXHIBIT 3.3: ALTERNATIVE SCENARIO 2: CENTERS

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

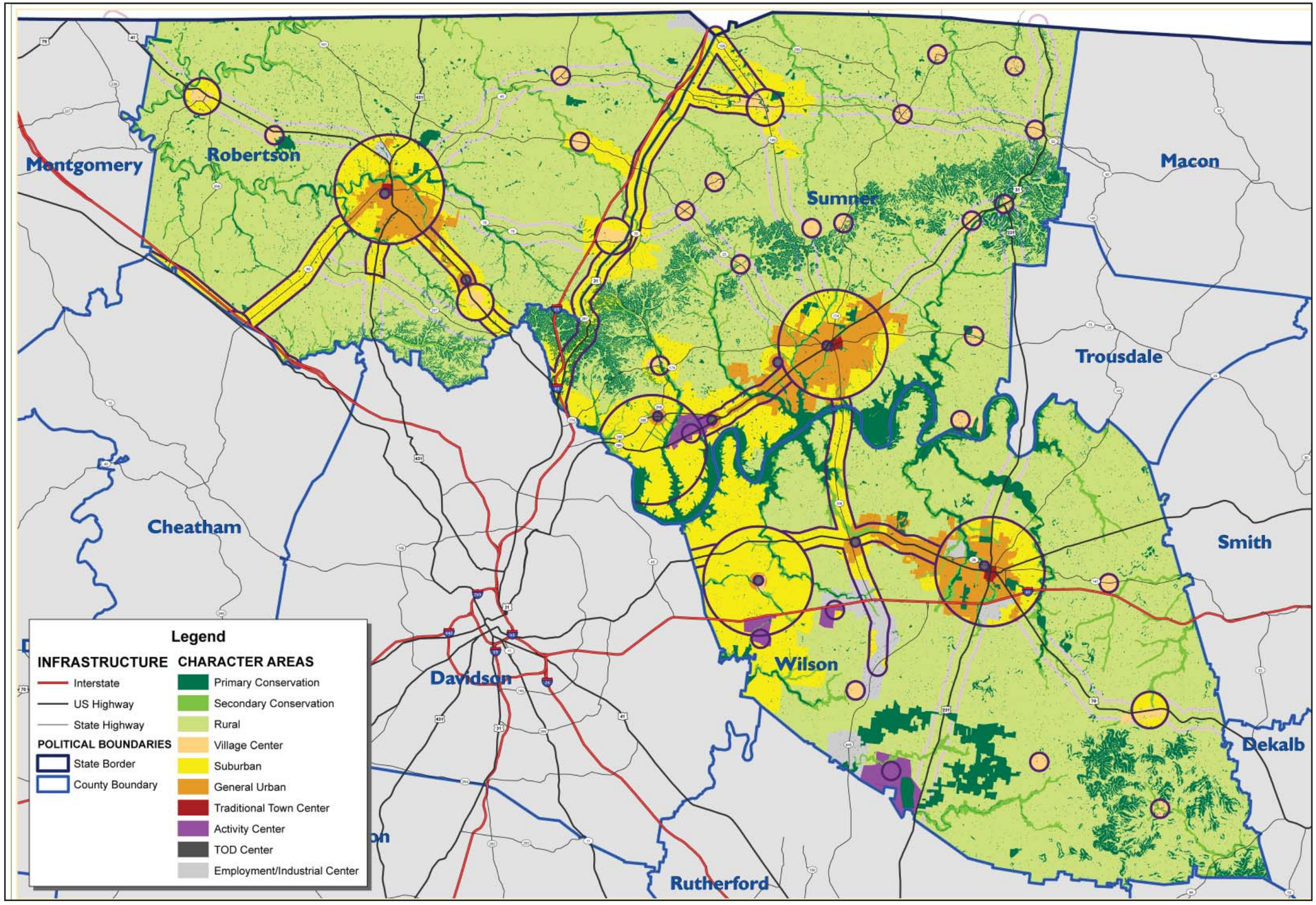

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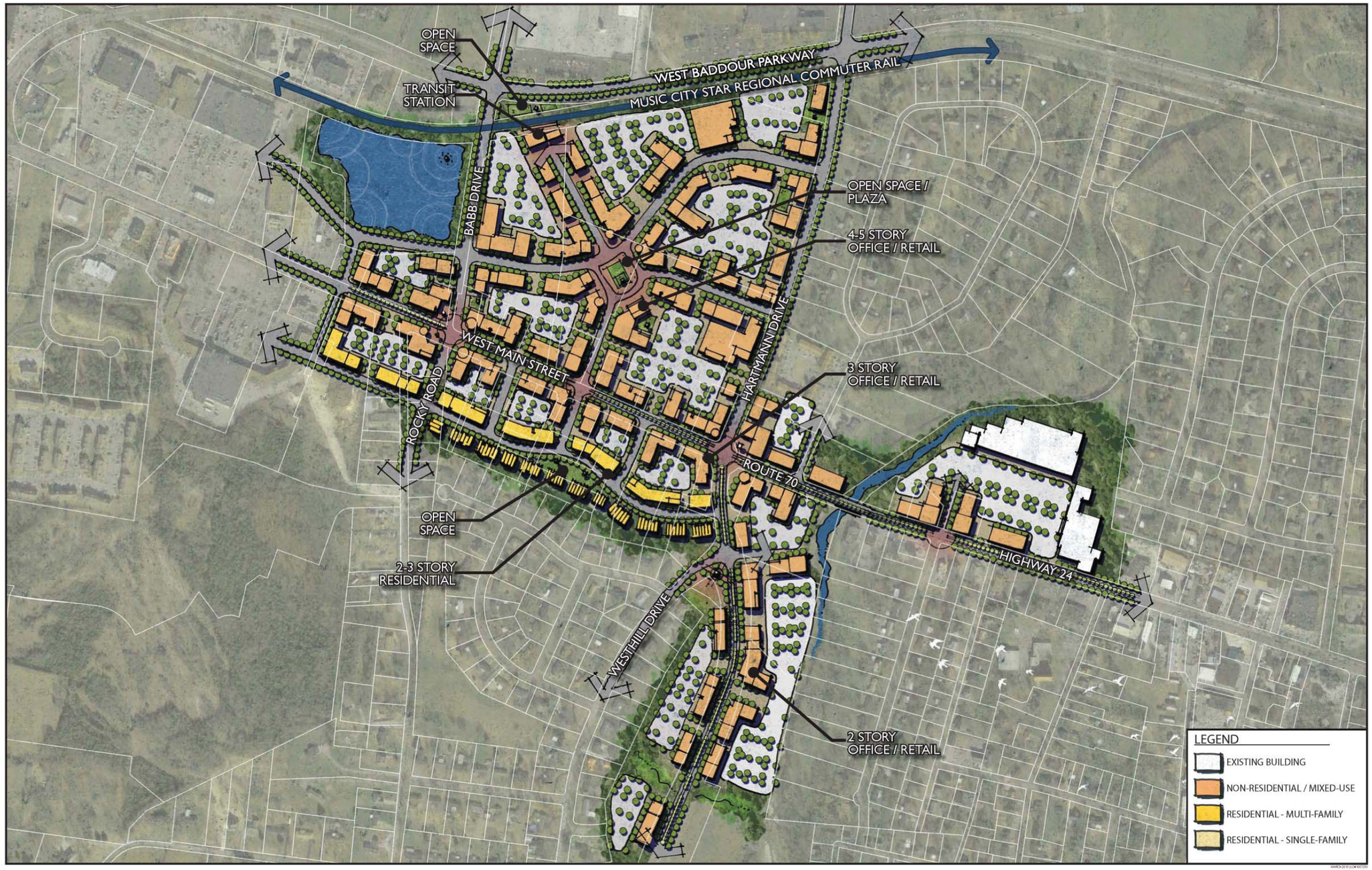
EXHIBIT 4.1: PREFERRED GROWTH STRATEGY

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc



NOT TO SCALE

EXHIBIT 6.11A: FOCUS AREA LEBANON AT HARTMANN DRIVE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

NASHVILLE AREA
Metropolitan Planning Organization

EXHIBIT 6.11B: FOCUS AREA LEBANON AT HARTMANN DRIVE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

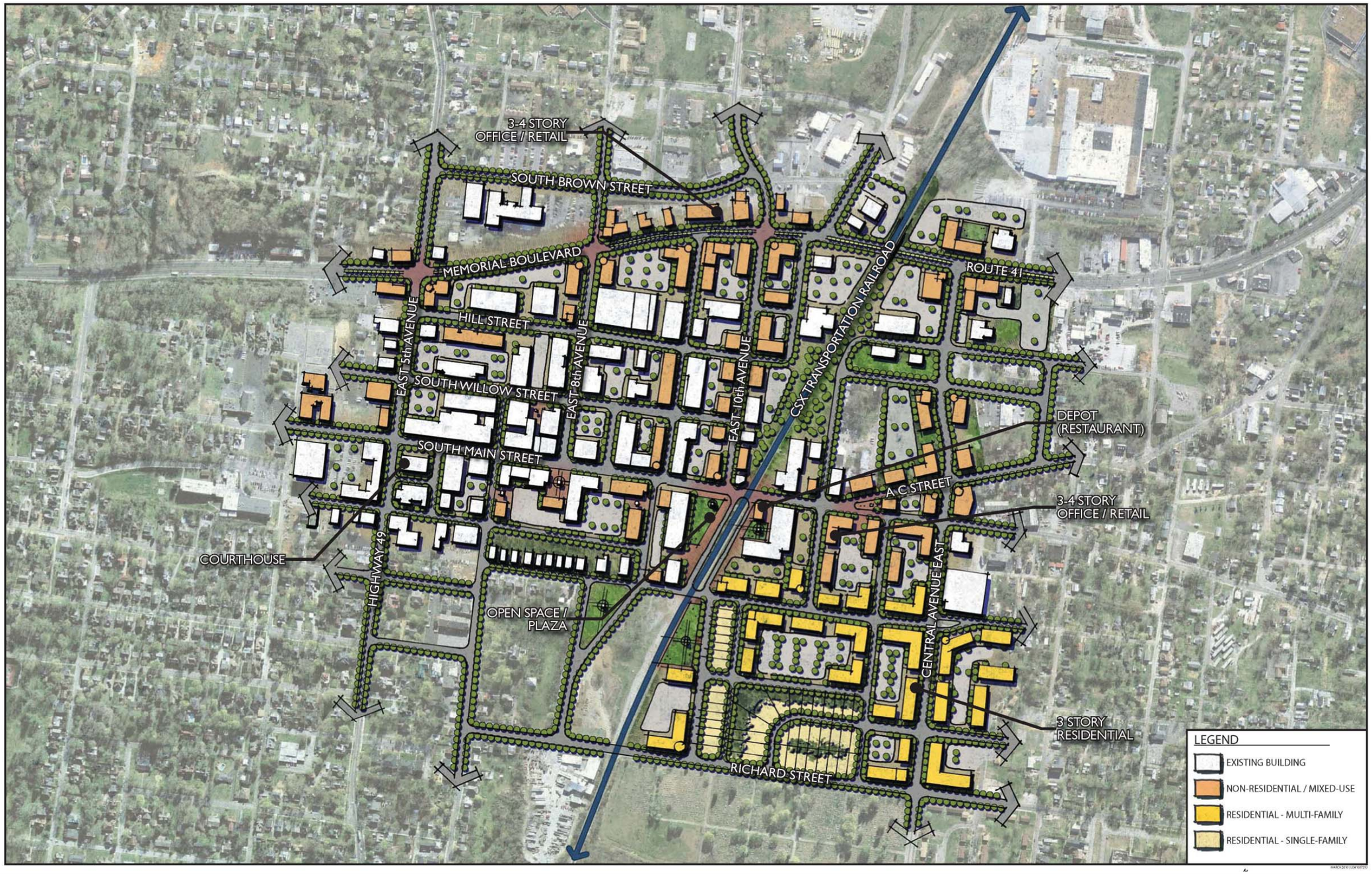
EXHIBIT 6.11C: FOCUS AREA LEBANON AT HARTMANN DRIVE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES



NOT TO SCALE

EXHIBIT 6.12A: FOCUS AREA SPRINGFIELD AT MEMORIAL BLVD.

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

NASHVILLE AREA
Metropolitan Planning Organization

EXHIBIT 6.12B: FOCUS AREA SPRINGFIELD AT MEMORIAL BLVD.

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

NOT TO SCALE

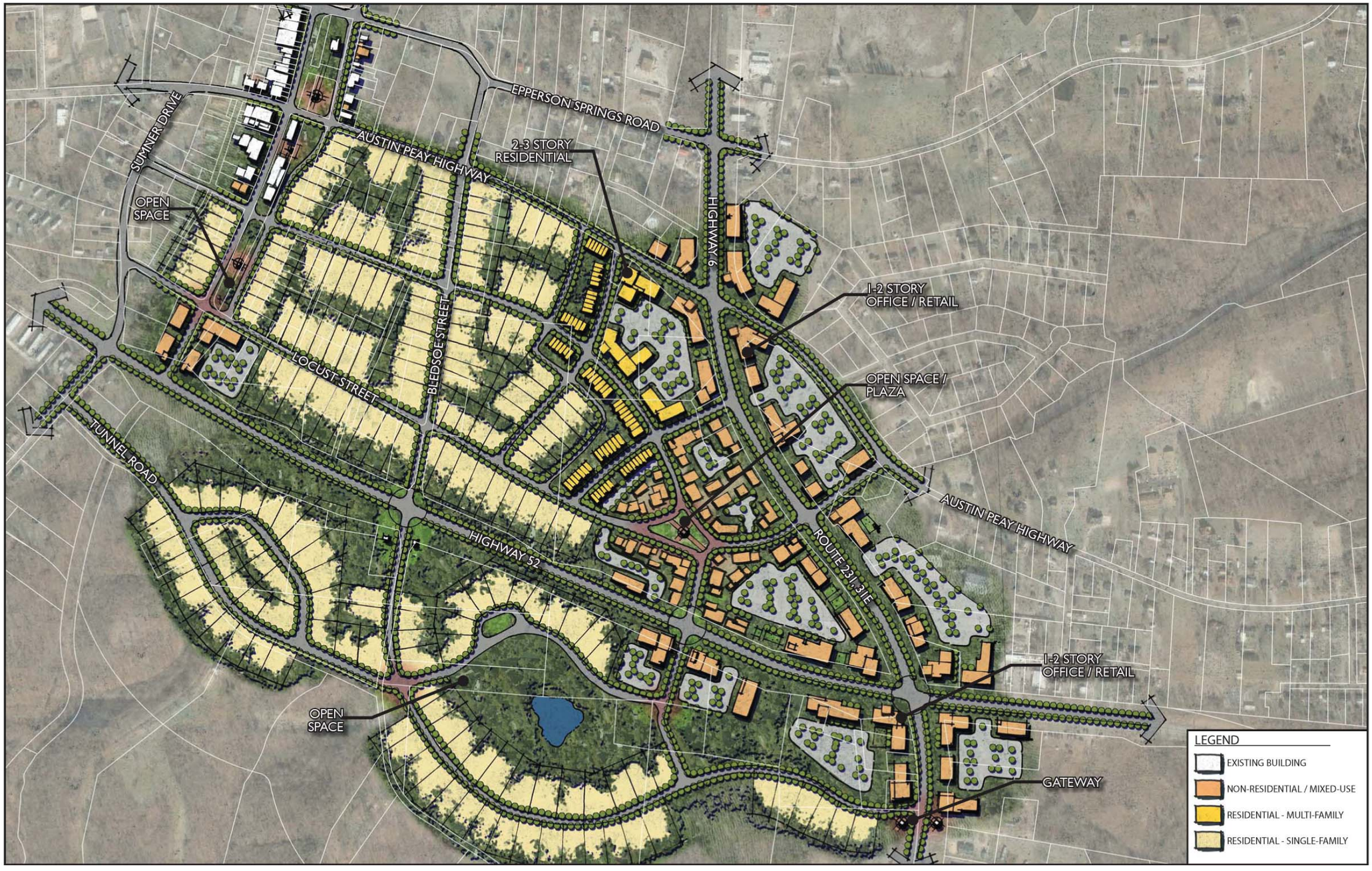
NASHVILLE AREA Metropolitan Planning Organization

EXHIBIT 6.12C: FOCUS AREA SPRINGFIELD AT MEMORIAL BLVD.

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates



NOT TO SCALE

EXHIBIT 6.13A: FOCUS AREA WESTMORELAND AT US 31E

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

EXHIBIT 6.13B: FOCUS AREA WESTMORELAND AT US 31E

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

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NOT TO SCALE

EXHIBIT 6.13C: FOCUS AREA WESTMORELAND AT US 31E

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

EXHIBIT 6.14A: FOCUS AREA SUMNER COUNTY AT LONG HOLLOW PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

NOT TO SCALE

EXHIBIT 6.14B: FOCUS AREA SUMNER COUNTY AT LONG HOLLOW PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

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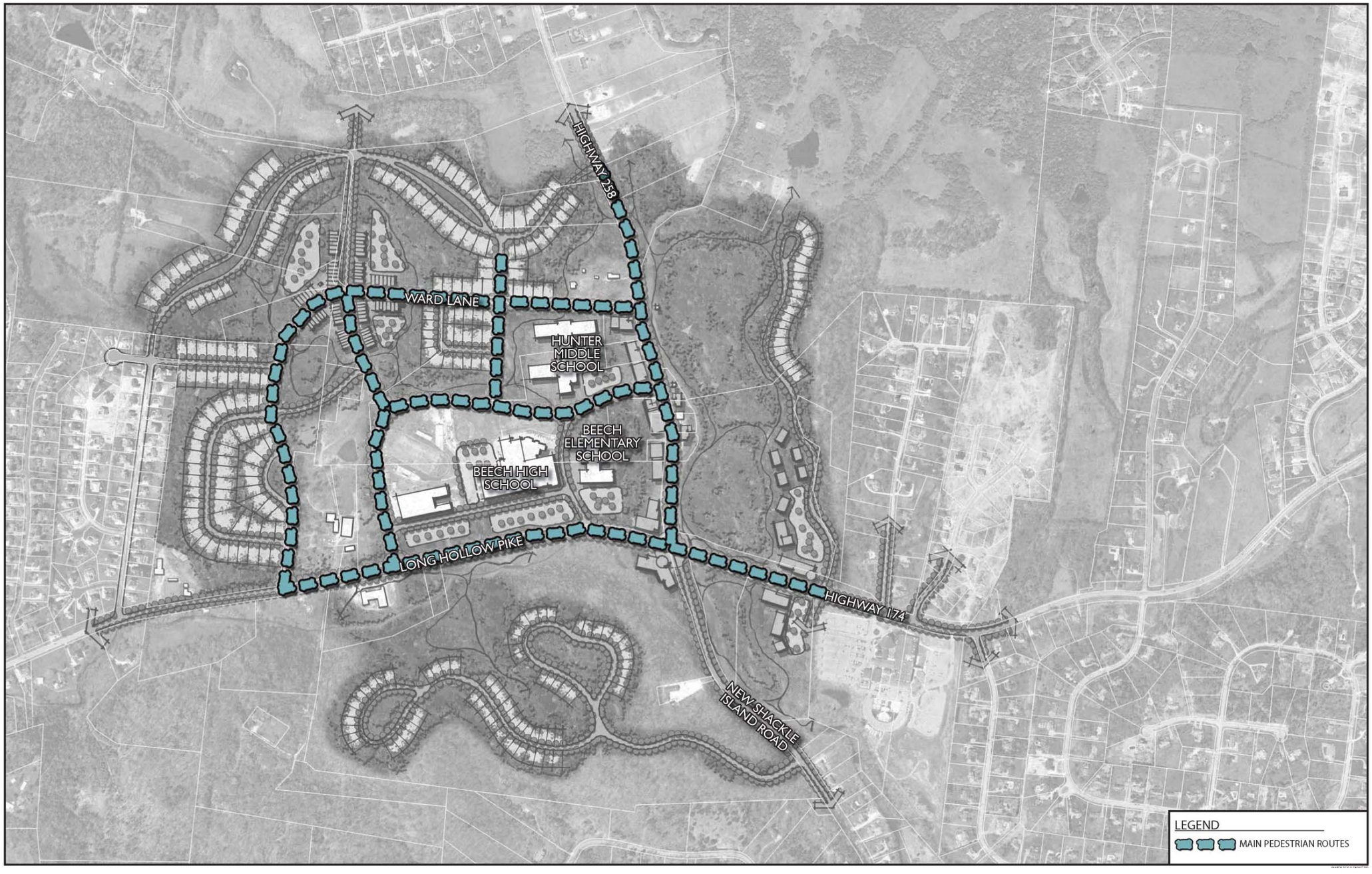
LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES



NOT TO SCALE

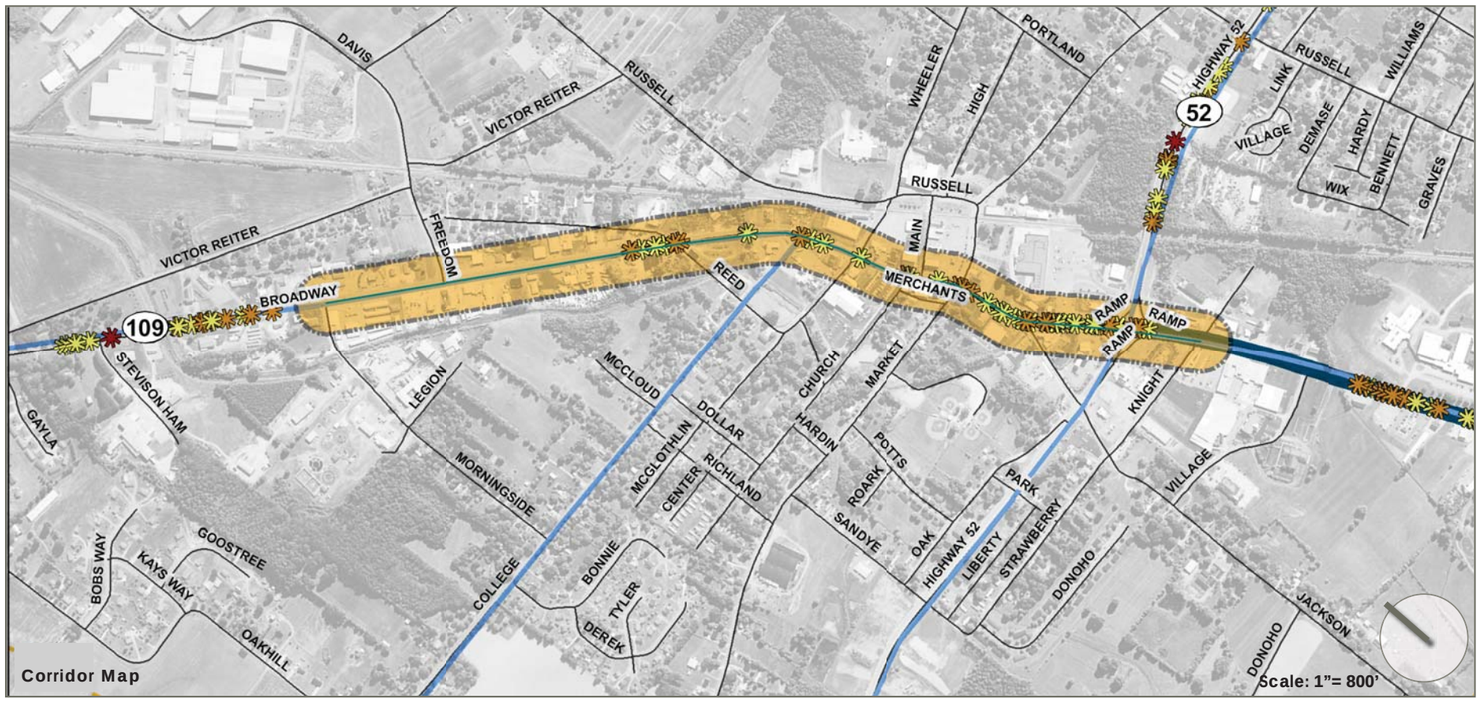
EXHIBIT 6.14C: FOCUS AREA SUMNER COUNTY AT LONG HOLLOW PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES



Tri-County Transportation & Land Use Study

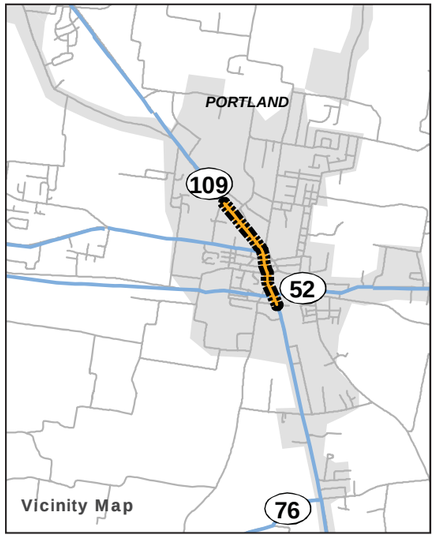
1

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Morningside Drive west to Knight street, covering a distance of 1.12 miles. The corridor is a 5-lane segment from West Knight Street to Jackson Road and a 4-lane segment from Jackson Road to Morningside Drive. The average annual daily traffic (AADT) was 13,665 vehicles per day (vpd) in 2008. Other characteristics of the corridor include heavy truck traffic, poorly defined driveways, and a lack of turn lanes at intersections. All of these characteristics lead to a high number of crashes throughout the corridor.

SR 109

Morningside Drive to W. Knight Street - *Wilson County, TN*

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.1A: SR 109 (MORNINGSIDE DRIVE TO W. KNIGHT STREET)

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

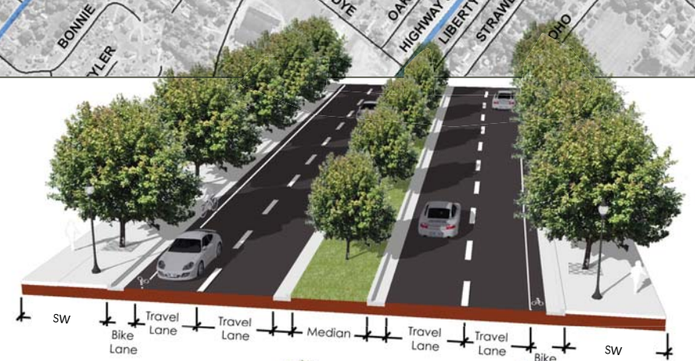
LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

Tri-County Transportation & Land Use Study

1

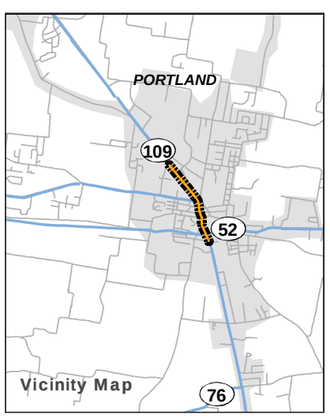
Legend

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Market Street to McGlothlin Street
Section 1

Knight St. to Market St.& McGlothlin St to Morningside Dr.
Section 2



Corridor Vision

The projected travel demand for this corridor in 2035 is 21,846 vehicles per day (vpd). In order to accomodate this increased traffic, a 4-lane divided roadway is proposed.

Other strategies are also recommended along the corridor to improve traffic flow and safety, including:

- installation of a raised (planted) median to reduce the frequency and types of crashes
- installation of sidewalks throughout the corridor
- creation of strategic right and left turn lanes throughout the corridor
- addition of bike lanes to accomodate cyclists

The section of road located between Market Street and McGlothlin Street is a part of Downtown Portland. For this reason, the proposed cross-section is slightly different than the remainder of the corridor and includes a generous sidewalk width, pedestrian scale lighting, and the potential for narrower travel lane widths. In addition, the center median may be narrower than the remainder of the corridor. These design queues will contribute to a sense of arrival as drivers approach the downtown, while still accommodating a mix of traffic including trucks. Posted speed limits in this section should not exceed 35 mph. Careful attention to multi-modal intersection designs are encouraged in this segment with special considerations for bicyclist and pedestrians. This segment of road is represented by Section 1 and the remainder of the corridor by Section 2.

SR 109

Morningside Drive to W. Knight Street - *Wilson County, TN*

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

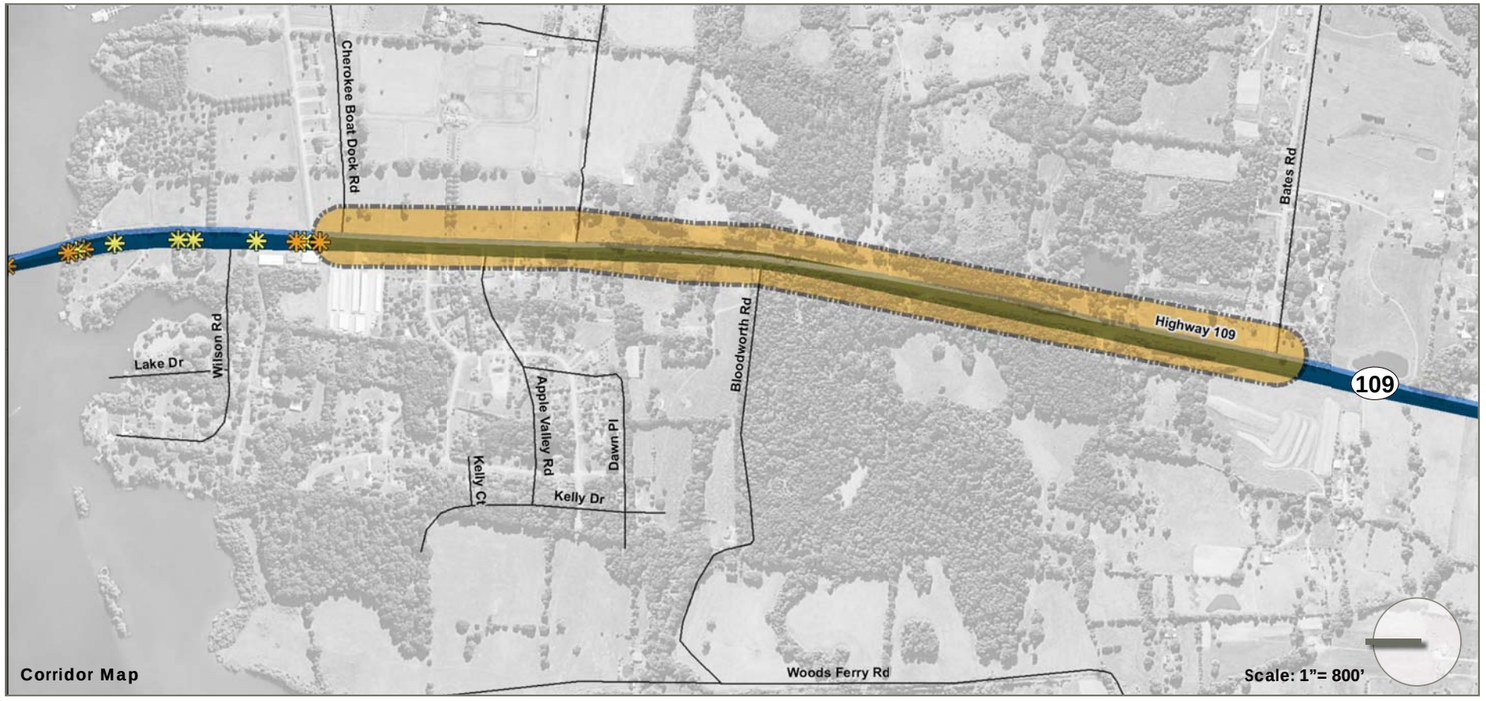
EXHIBIT 6.1B: FUTURE SR 109 (MORNINGSIDE DRIVE TO W. KNIGHT STREET)

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES



Tri-County Transportation & Land Use Study

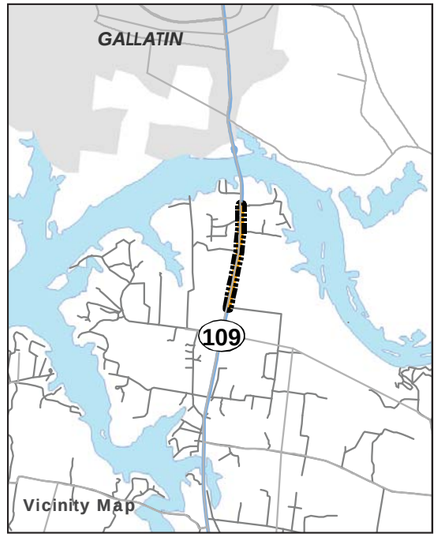
2

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Cherokee Dock Road to Bates Road, covering a distance of 1.22 miles. The corridor is a 2-lane section with a 2008 average annual daily traffic (AADT) of 16,700 vehicles per day (vpd). Other characteristics of the corridor include:

- 45 mph speed limit
- rolling topography
- passing zones throughout the corridor
- straight roadway leading to higher than posted speeds
- no turn lanes at intersections
- heavy truck traffic
- high frequency of crashes, north of this segment

SR 109

Cherokee Dock Road to Bates Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.2A: SR 109 (CHEROKEE DOCK ROAD TO BATES ROAD)

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

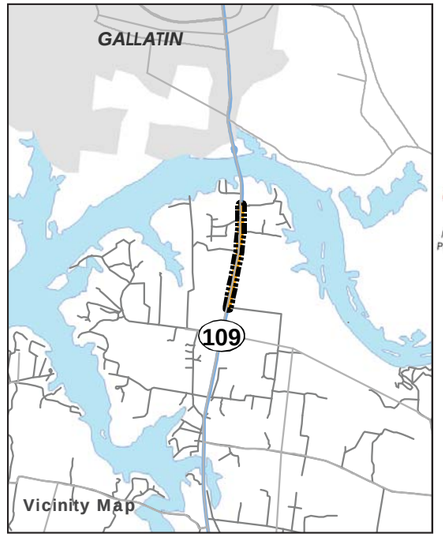
LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

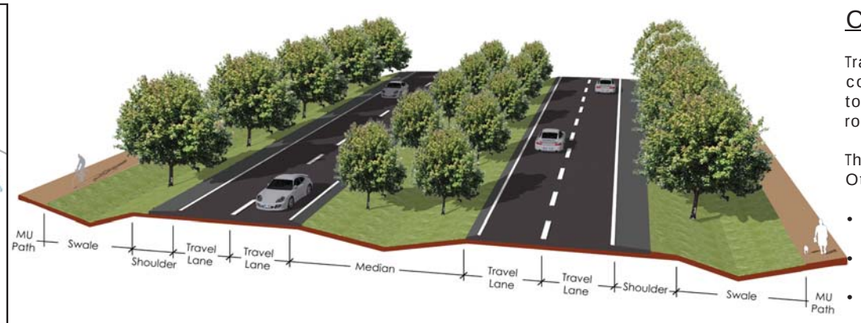
Tri-County Transportation
& Land Use Study

2

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

Traffic is projected to increase to 38,000 vehicles per day (vpd) in 2035. The vision for the corridor is to preserve the rural and residential character that currently exists. In response to the established vision, the proposed roadway section is a 4-lane median divided roadway.

The proposed section will widen the road to accomodate projected travel demand. Other recommendations include:

- providing a multi-use path along both sides of the road to accomodate pedestrians and cyclists at all skill levels
- maintain ditch and swale approach for stormwater collection to reduce the peak flows and improve water quality
- installation of trees or other vegetation where feasible

SR 109

Cherokee Dock Road to Bates Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

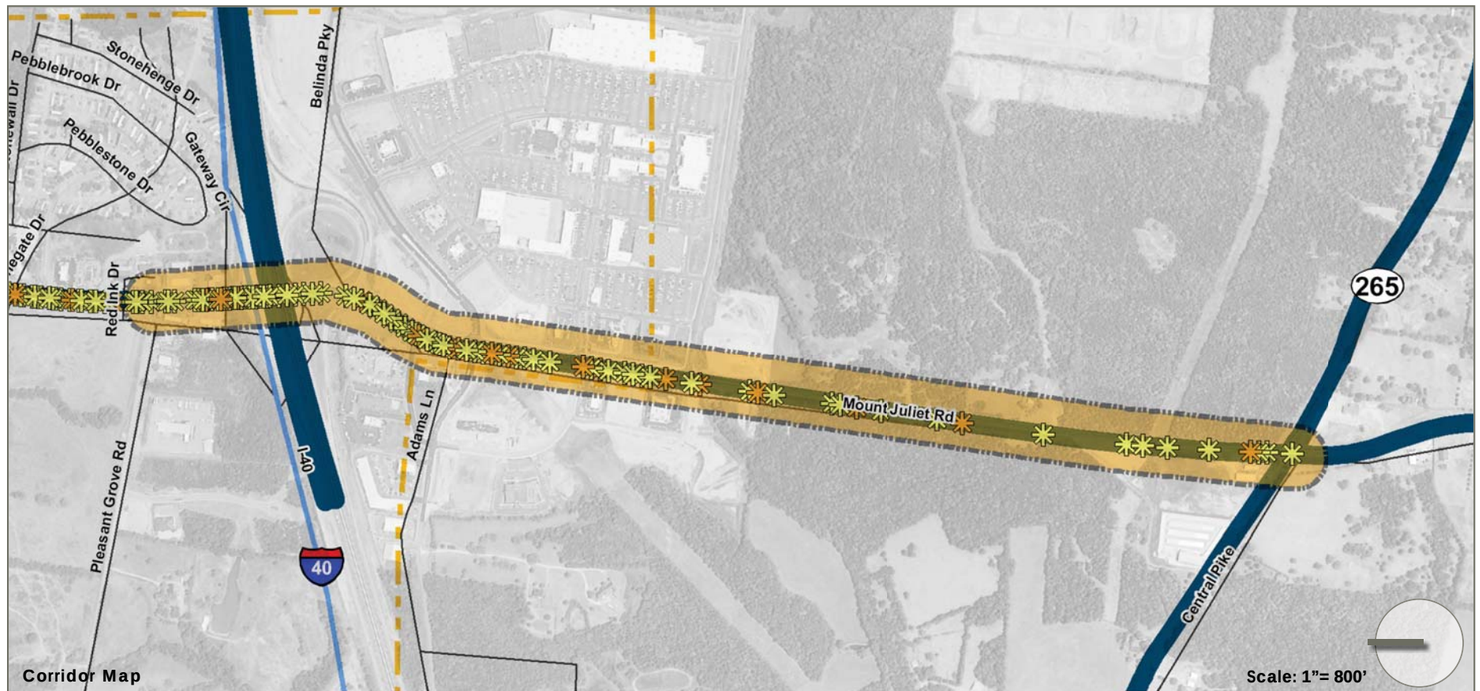
EXHIBIT 6.2B: FUTURE SR 109 (CHEROKEE DOCK ROAD TO BATES ROAD)

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates



Tri-County Transportation & Land Use Study

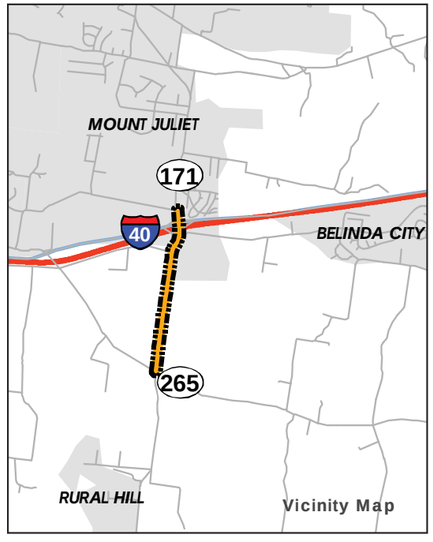
3

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Central Pike to Pleasant Grove Road and covers a length of 1.38 miles. The corridor has a 2-lane shoulder with swale section from Central Pike to Providence Parkway and a 5-lane section (with curb and gutter) from Providence Parkway to Pleasant Grove Road. The corridor carried 14,900 vehicles per day (vpd) in 2008. Other roadway characteristics include:

- 45 speed limit
- modified diamond interchange with I-40
- rolling topography
- vertical and horizontal curvature leading to and from the interchange with I-40
- coordinated signals throughout corridor
- high property damage crash volume
- traffic congestion due to lack of turn lanes on Central Pike
- serves as a major gateway into Mount Juliet

Mt. Juliet Road

Central Pike to Pleasant Grove Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

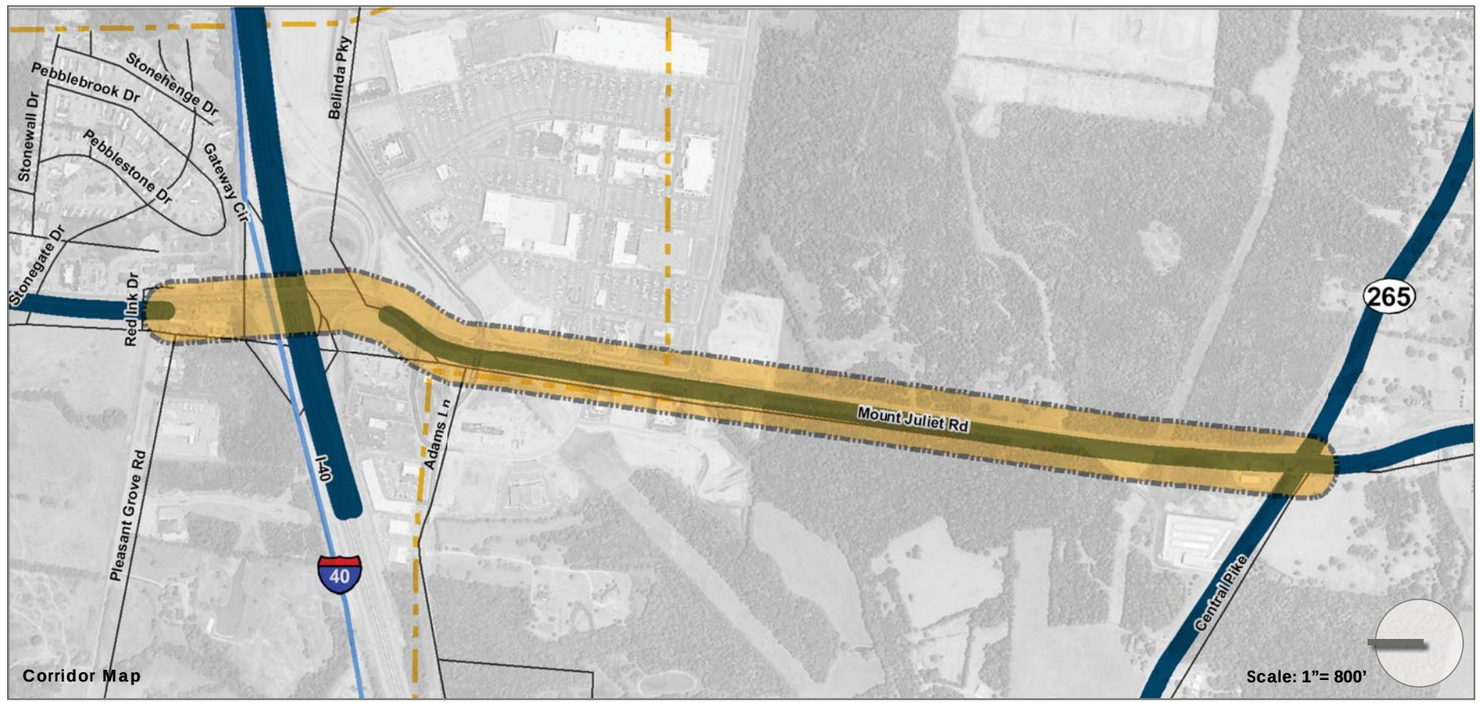
EXHIBIT 6.3A: CENTRAL PIKE TO PLEASANT GROVE ROAD

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

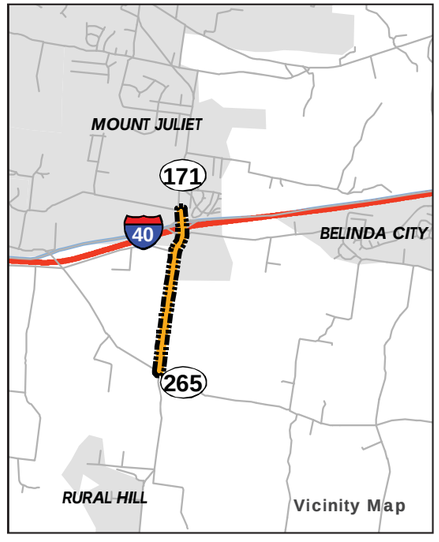


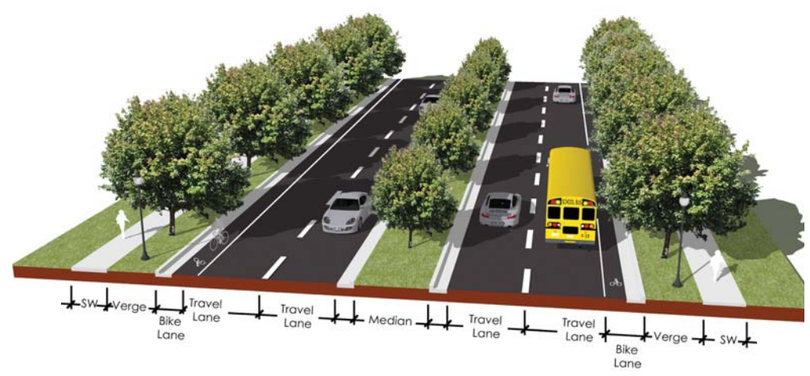
Tri-County Transportation
& Land Use Study

3

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

Traffic along the corridor is projected to increase to 19,200 vehicles per day (vpd) by 2035. In order to acommodate the projected traffic volumes and ensure that the roadway continues to serve as a primary gateway, the following recommendations are suggested:

- widen roadway to a 4-lane median divided section
- increase gateway features leading into downtown
- provide sidewalks to enhance pedestrian access to commercial development
- limit future and existing driveway access to Mt. Juliet Road
- consolidate driveways where possible
- provide strategic right and left turn lanes throughout the corridor
- include dedicated bike lanes to accomodate cyclists

Mt. Juliet Road

Central Pike to Pleasant Grove Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

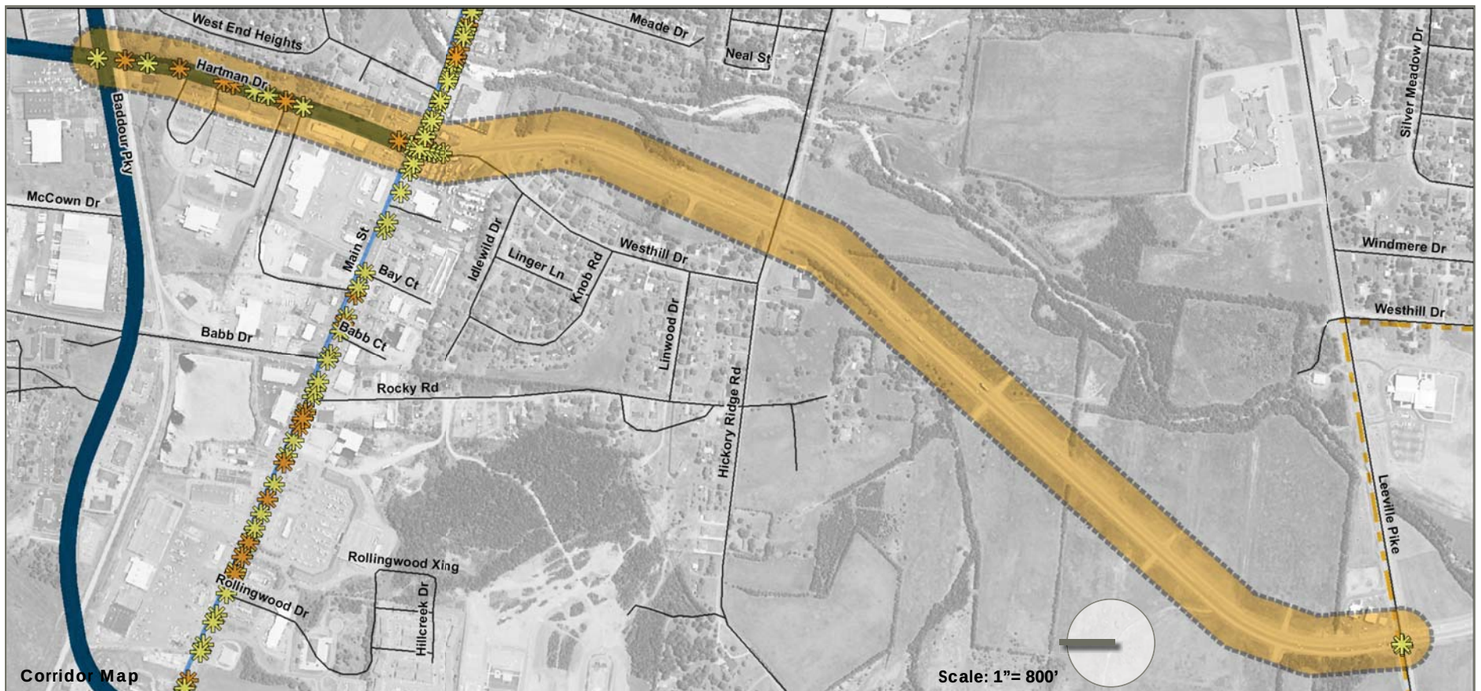
NASHVILLE AREA
Metropolitan Planning Organization

EXHIBIT 6.3B: FUTURE CENTRAL PIKE TO PLEASANT GROVE ROAD

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates



Tri-County Transportation & Land Use Study

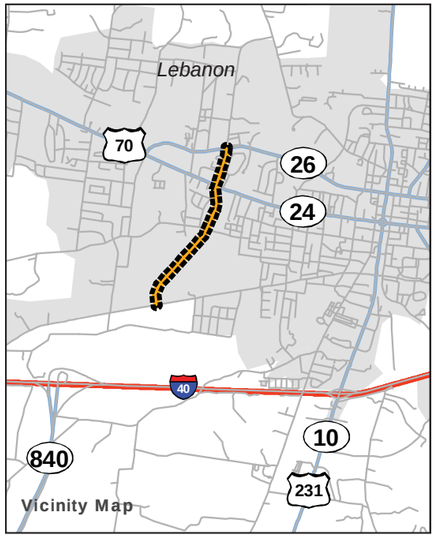
4

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from West Baddour Parkway to Leeville Pike, covering 1.86 miles. It is a 2-lane roadway section with paved shoulders and ditch swales from West Baddour Parkway to just south of US 70, a 5-lane section with shoulder and swale from Westhill Drive to Hickory Ridge Road and a 4-lane median divided shoulder and swale section from Hickory Ridge Road to Leeville Pike. The segment carried 16,700 vehicles per day (vpd) in 2008. The corridor between Baddour Parkway and US 70 experiences a high volume of crashes, likely resulting from a lack of adequate auxiliary turn lanes.

Hartmann Drive

W. Baddour Parkway to Leeville Pike- *Wilson County, TN*

NOT TO SCALE

EXHIBIT 6.4A: HARTMANN DRIVE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

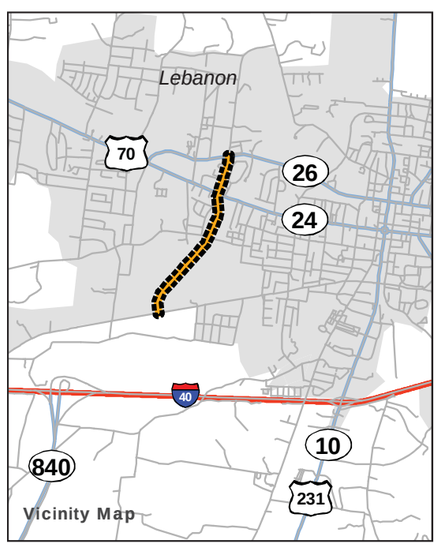
NASHVILLE AREA Metropolitan Planning Organization

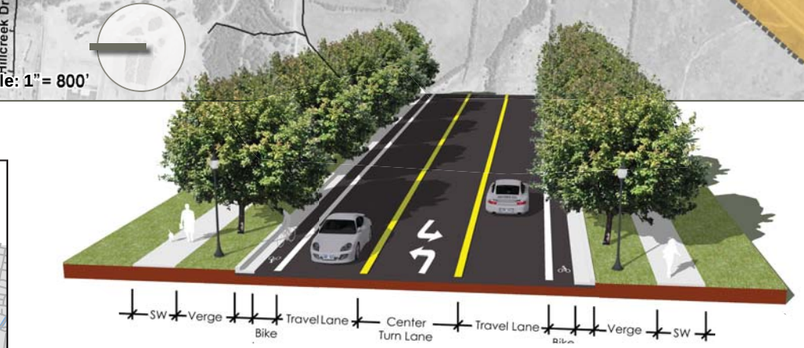
Tri-County Transportation & Land Use Study

4

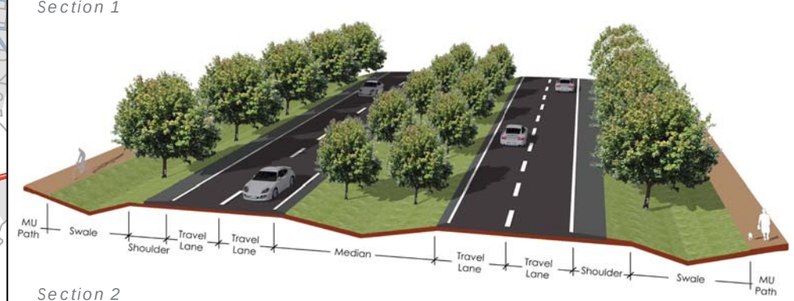
Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Section 1



Section 2

Corridor Vision

North of US 70:
A 3-lane curb and gutter section with sidewalks and bike lanes on both sides is recommended. This segment of the road should promote walkability and complete streets design characteristics and should compliment future redevelopment of the northwest quadrant of the intersection with Main Street including potential transit oriented development (as envisioned in the Lebanon focus area).

South of US 70:
The existing 4-lane divided section should be maintained. The wide shoulder will offer an enhanced environment for experienced cyclists and the addition of a multi-use path on both sides of the road will offer accommodations for pedestrian and bicycle riders of all skill levels. Access management practices that limit the number of driveways and encourages coordination between median breaks and signalization is encouraged to enhance safety and traffic operations.

Main Street Intersection Considerations:
A high quality multi-modal intersection design will be required at the intersection with Main Street. The mix of vehicle types will require accommodations for larger vehicles. Careful attention to the design of the pedestrian and bicycle realm will be required at this location and may include: pedestrian refuge areas in the median, high visibility crosswalks, appropriate signage and pavement markings, and pedestrian signals.

Hartmann Drive

W. Baddour Parkway to Leeville Pike - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.4B: FUTURE HARTMANN DRIVE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

Tri-County Transportation
& Land Use Study

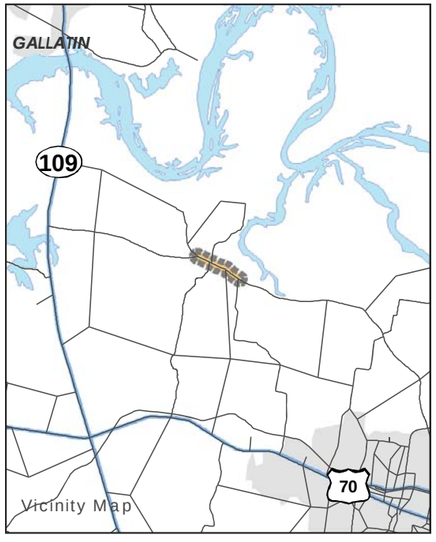
5

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Academy Road to Horn Springs Road and covers a distance of 0.9 of a mile. It is a 2-lane section with minimal shoulders and swale. Other roadway characteristics include:

- rolling topography
- sight distance concerns throughout the corridor because of topography and landscaping
- heavy school traffic
- two fatal crashes between Cairo Bend Road and Horn Springs Road

Coles Ferry Pike

Academy Road to Horn Springs Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.5A: COLES FERRY PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

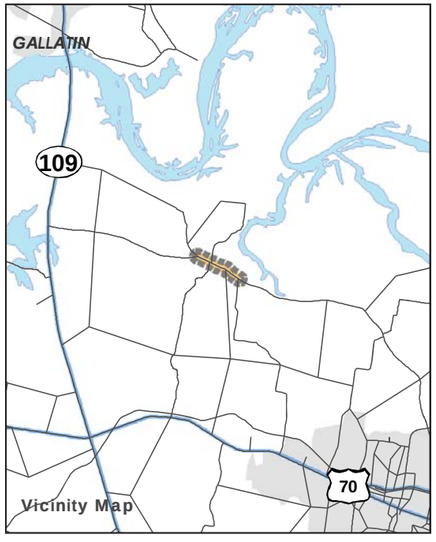
LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

Tri-County Transportation
& Land Use Study

5

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits



Corridor Vision

Traffic is projected to increase to 9,800 vehicles per day by 2035 along this segment of the corridor. Two travel lanes are sufficient to accommodate projected traffic volumes. This area is anticipated to remain residential in character; therefore, the following recommendations are proposed:

- provide sidewalks in the vicinity of Friendship Christian School
- provide uniform sight distance/ visibility throughout the corridor with increased signage, landscape maintenance, and proper driveway placement
- increase awareness of visibility concerns through the use of rumble strips
- provide strategic right and left-turn lanes throughout the corridor

Coles Ferry Pike

Academy Road to Horn Springs Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

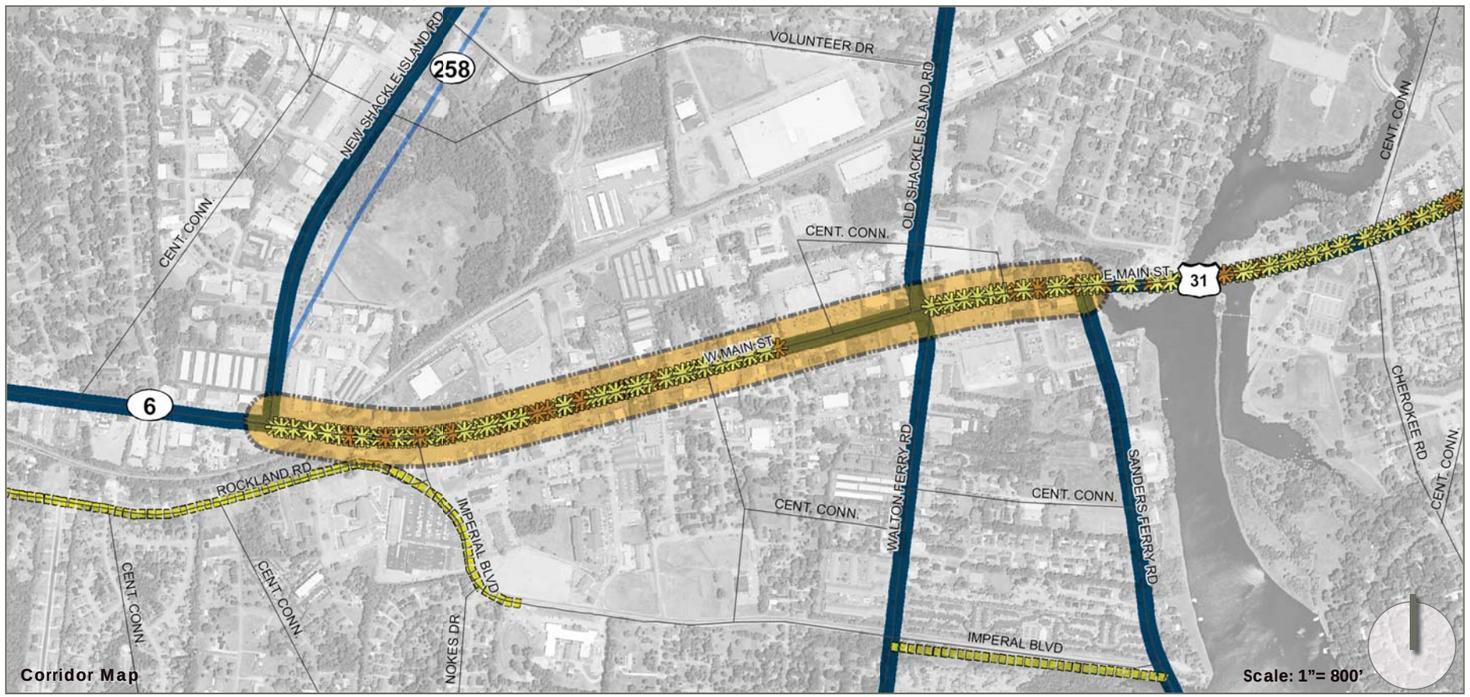
EXHIBIT 6.5B: FUTURE COLES FERRY PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates



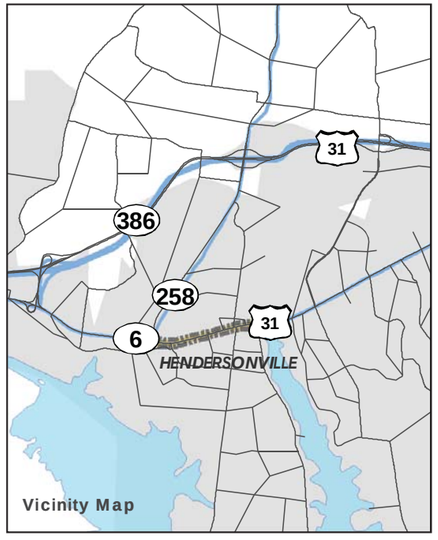
Strategic Corridors

Tri-County Transportation & Land Use Study

6

Legend

- Fatal
- Injury
- Property Damage Over $400
- Streets
- Major Roadways
- Railroads
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from New Shackle Island Road to Sanders Ferry Road, and covers a length 0.9 miles. It is a 5-lane section from New Shackle Island Road to Imperial Boulevard, a 6-lane section from Imperial Boulevard to Sanders Ferry Road with 2 westbound lanes, 3 eastbound lanes and a two-way left turn lane. There are five foot sidewalks on both sides of the corridor from Executive Park Drive to Imperial Drive. There is also a bridge over the railroad at New Shackle Island Road. This section does not have a sidewalk but does have wide shoulders. The segment carries 37,704 vehicles per day (AADT) and has a speed limit of 45 and 40 mph. Other characteristics include acceleration and deceleration lanes with wide shoulders for bikes and numerous driveway cuts. The corridor has a high crash frequency which is likely a result of the center turn lane and driveway frequency.

Gallatin Pike/West Main Street

New Shackle Island Rd to Sanders Ferry Rd - *Sumner County, TN*

Kimley-Horn and Associates, Inc. URBAN RESOURCE GROUP

NOT TO SCALE

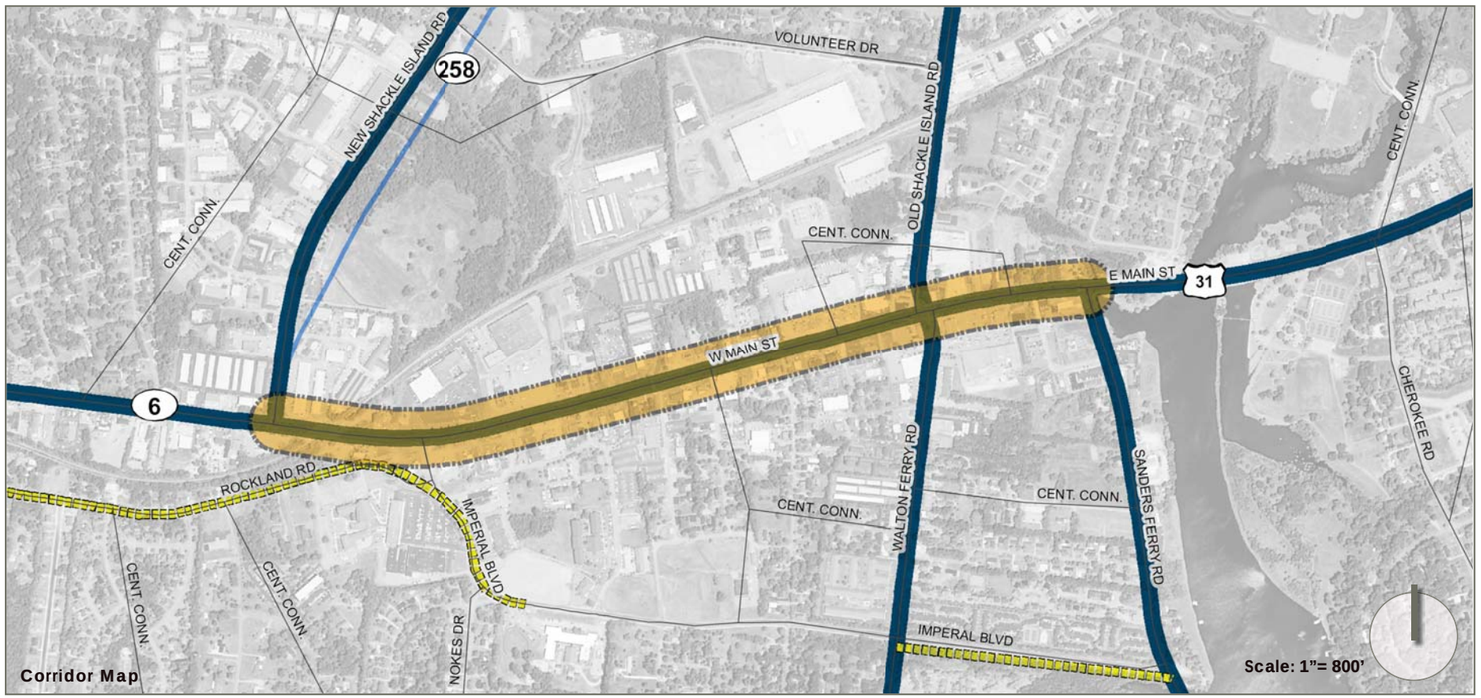
EXHIBIT 6.6A: GALLATIN PIKE/WEST MAIN STREET

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

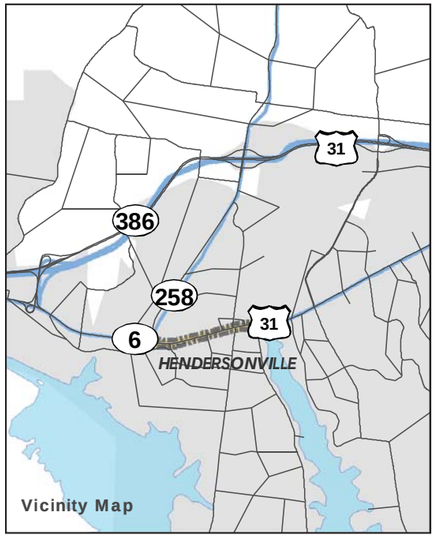


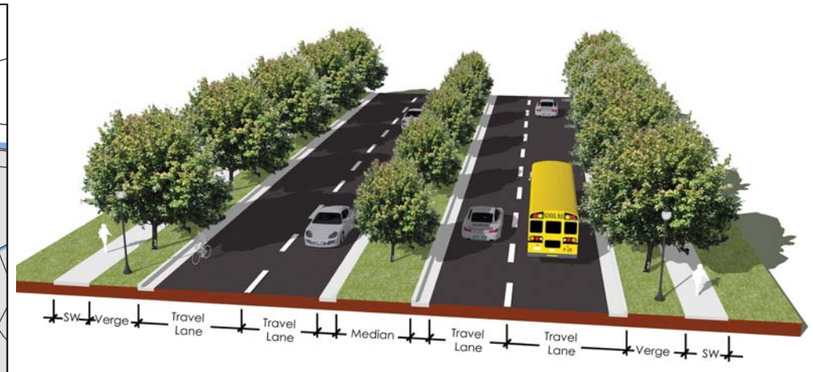
Tri-County Transportation & Land Use Study

6

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits
- New Roadway





Corridor Vision

Traffic along the corridor is projected to increase to 43,900 vehicles per day by 2035. In order to accommodate this traffic, a 4-lane median divided roadway section is proposed. The installation of a raised median will likely reduce the crash frequency and type that is present in the corridor today. A complete streets approach to this corridor is envisioned and is intended to accommodate the integrated movement of all modes through the corridor. In addition, the following recommendations are also proposed:

- providing sidewalks throughout the entirety of the corridor to access commercial development and the river park
- providing pedestrian signals and high visibility crosswalks at all signalized intersections
- consolidating existing driveways and minimizing future driveways
- increasing gateway features of the corridor into downtown through the installation of a median
- improving the roadway to a 4-lane median divided roadway to accommodate future traffic volumes
- providing median breaks and dedicated turn lanes where warranted
- including wide outside lanes to accommodate skilled bike riders and public transportation

Gallatin Pike/West Main Street

New Shackle Island Rd to Sanders Ferry Rd - *Sumner County, TN*

NOT TO SCALE

EXHIBIT 6.6B: FUTURE GALLATIN PIKE/WEST MAIN STREET

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

Tri-County Transportation
& Land Use Study

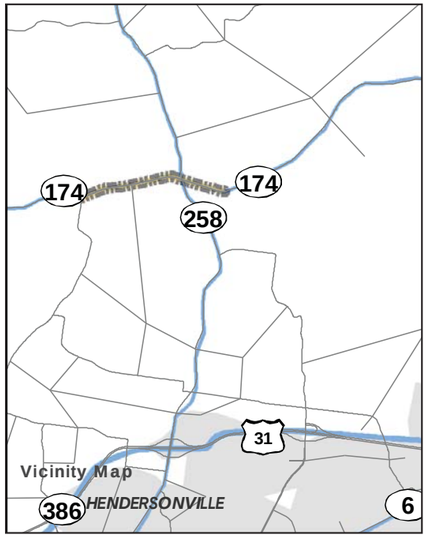
7

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Center Point Road to Buchanan Circle, covering a distance of 1.54 miles. It is a 3-lane section with a paved shoulder and swale from Buchanan Circle to School Drive and a 2-lane section with shoulder and swale from School Drive to Center Point Road. The corridor carries 10,800 vehicles per day (according to the 2008 AADT volumes). In addition, there is heavy school bus traffic. Other characteristics of the corridor include:

- offset intersection at Center Point Road/Happy Hollow Road
- crosswalks at Shackle Island Road and Long Hollow but no sidewalks
- blind shoulders/driveways with limited visibility
- speed limit posted at 50 mph, 15 mph during school hours
- travel speeds higher than posted speeds
- high crash frequency east of New Shackle Island Road

Long Hollow Pike

Center Point Road to Buchanan Circle - *Sumner County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

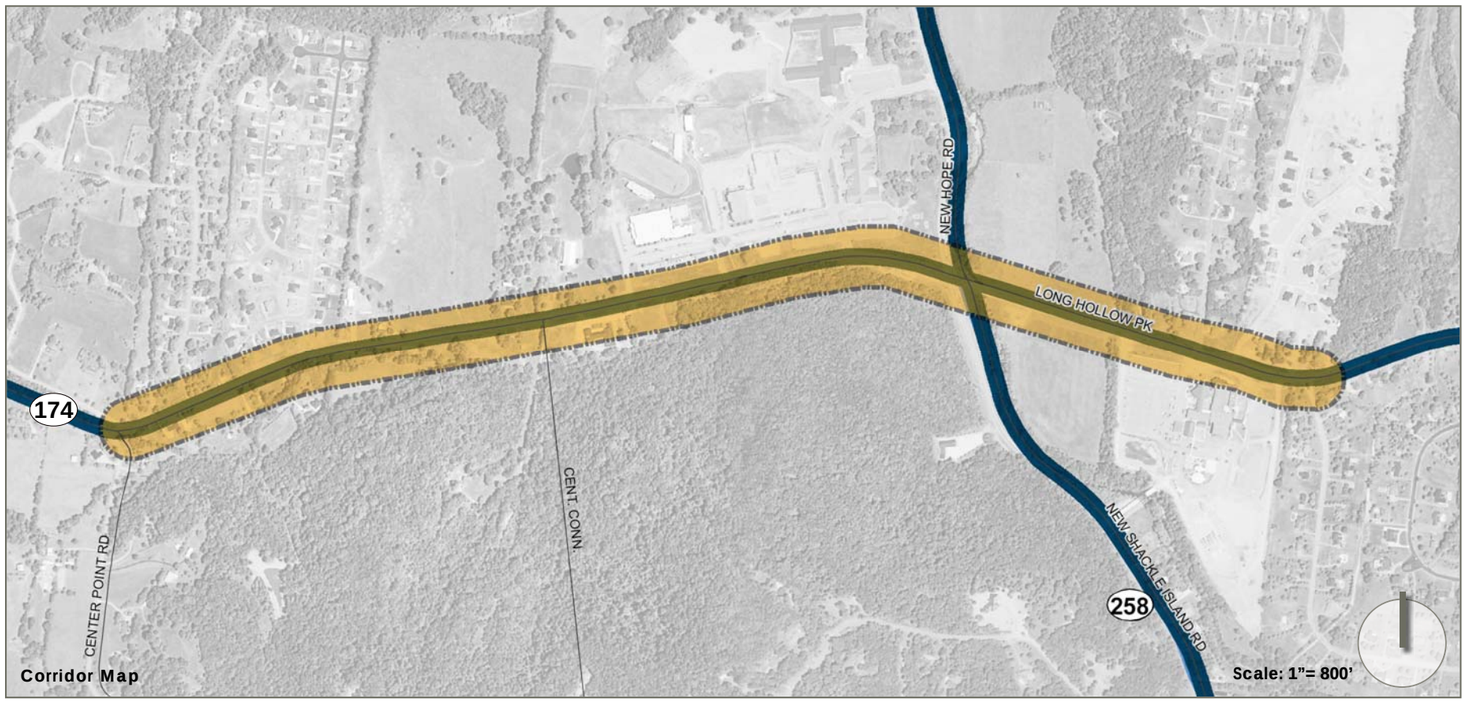
EXHIBIT 6.7A: LONG HOLLOW PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

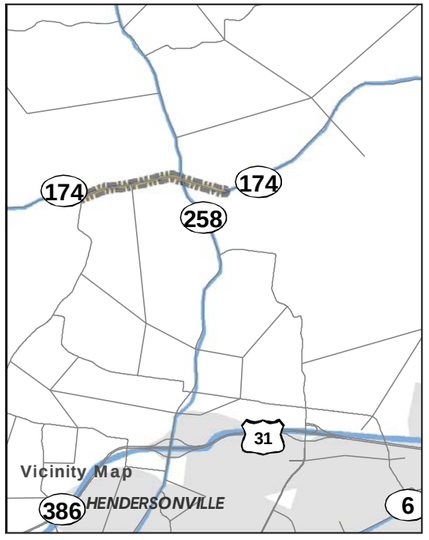


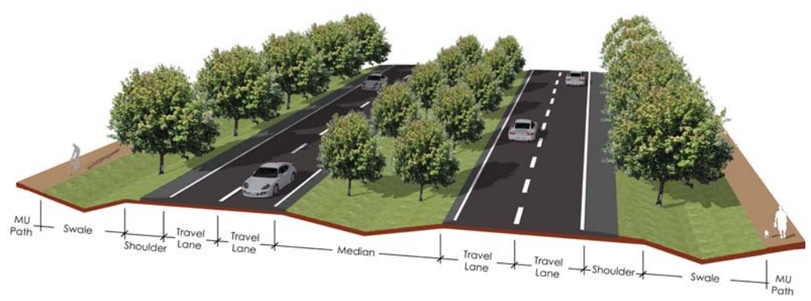
Tri-County Transportation
& Land Use Study

7

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

The corridor is adjacent to the Shackle Island focus area located at the northwest quadrant of the intersection of Long Hollow Pike and New Hope Road. The projected traffic volume in 2035 along the corridor is 13,420 vehicles per day. In response to the projected traffic, widening the roadway to create a 4-lane divided median with paved shoulder and swale is recommended. Other recommendations include:

- providing for a multi-use path in the vicinity of the elementary, middle, and high schools on both sides of the road
- providing for a multi-use parth along the creek parallel to New Hope Road
- reconstructing the intersection of Center Point Road and Happy Hollow Road to alleviate approach offset and sight distance concerns
- providing high visibility crosswalks and pedestrian heads at signalized intersections
- minimizing the flow rate of stormwater and contributing to improved water quality through the use of shoulder and swale sections and a depressed median

Long Hollow Pike

Center Point Road to Buchanan Circle - *Sumner County, TN*

Kimley-Horn and Associates, Inc
URBAN RESOURCE GROUP

NOT TO SCALE

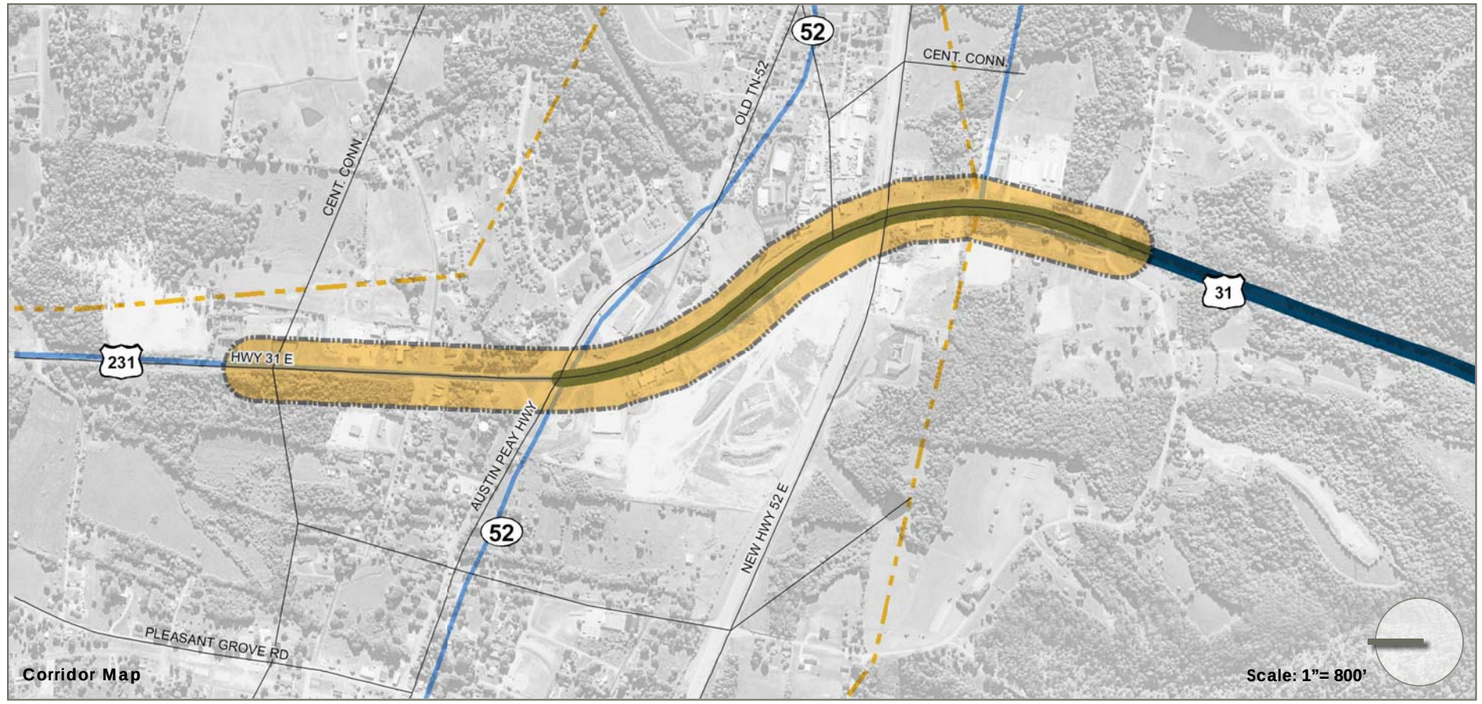
EXHIBIT 6.7B: FUTURE LONG HOLLOW PIKE

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA
Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates



Tri-County Transportation & Land Use Study

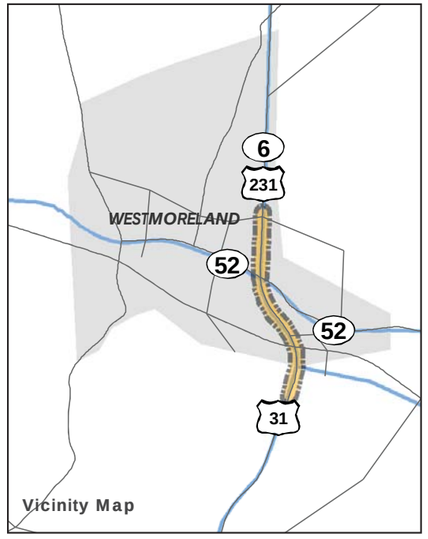
8

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Epperson Springs Road to Clyde Wix Road and covers a distance of one mile. The corridor has a 2-lane section with paved shoulder and swale from Clyde Wix Road to just south of Austin Peay Road, a 4-lane section with shoulder and swale through the intersection with Austin Peay Road, and a 2-lane section with shoulder and swale north of Austin Peay Road to Epperson Springs Road. The corridor carries 6,200 - 10,300 vehicles per day (vpd), according to the 2008 AADT. Other characteristics include:

- some blind shoulders/driveways with limited visibility
- multiple driveway cuts along corridor
- confusing intersection at Highway 23/intersection with Austin Peay Highway with large right-turn radii

US 31 E (Westmoreland)

Epperson Springs Road to Clyde Wix Road - Sumner County, TN

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

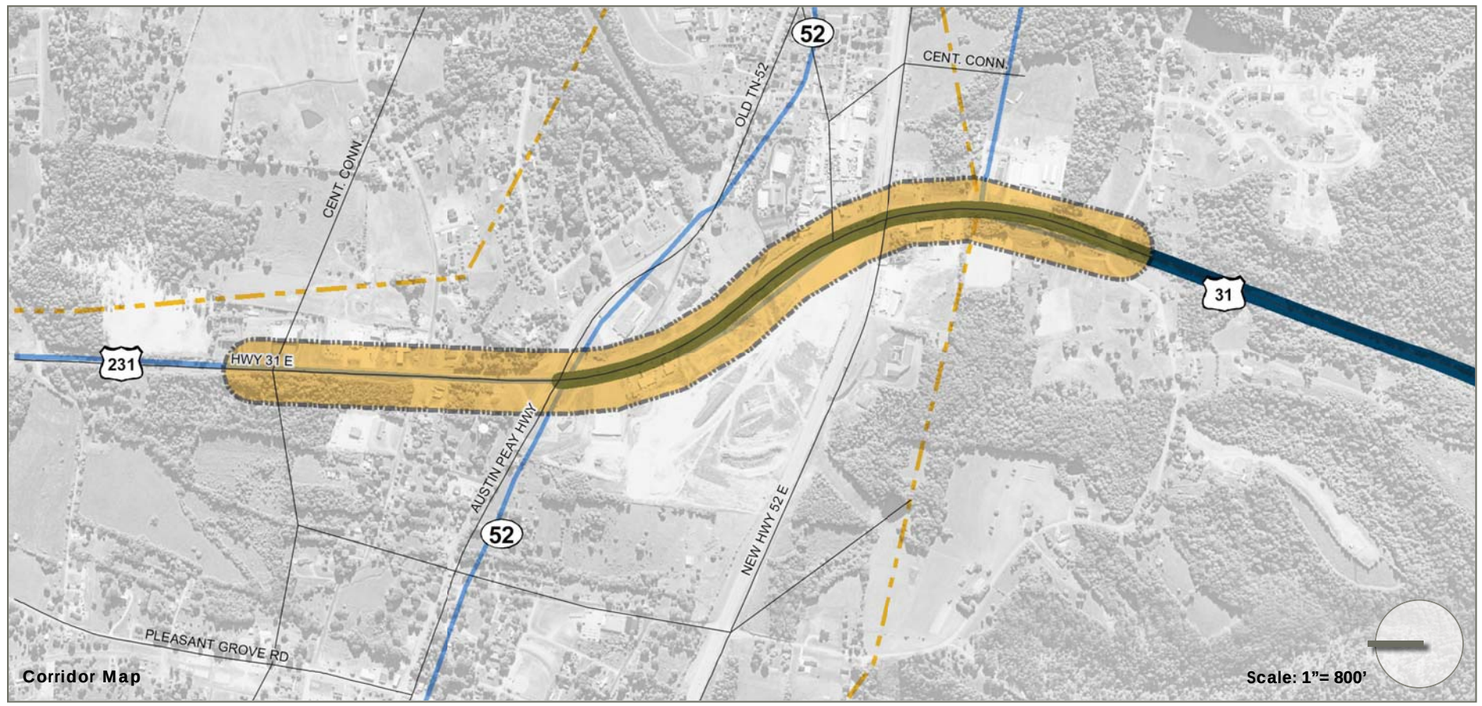
EXHIBIT 6.8A: US 31 EAST

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

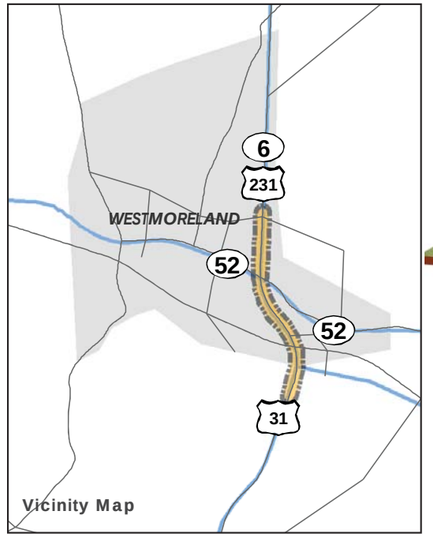


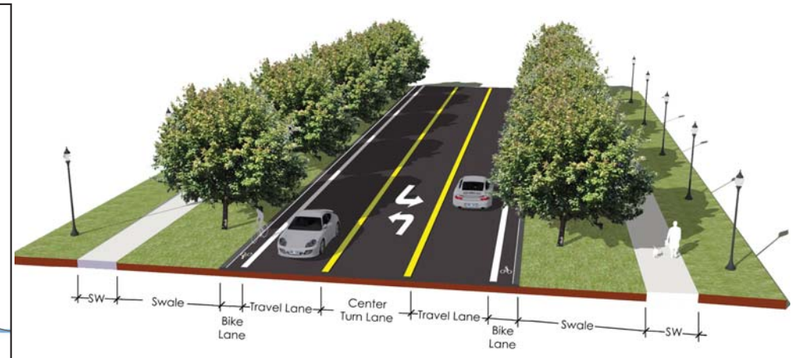
Tri-County Transportation & Land Use Study

8

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

The overall corridor is located in a relatively rural area, but the strategic corridor segment falls within a focus area representing a potential village center at the Hwy 52 intersection. The projected 2035 volumes vary greatly along the corridor between 5,900 and 19,000 vehicles per day (vpd). Within the village center, a 3-lane cross section is recommended. In an effort to create a sense of arrival and corresponding change in driver behavior, a number of design elements are proposed including: the addition of sidewalks, pedestrian scale lighting, and bike lanes and street trees. In addition, a posted speed limit that doesn't exceed 35 mph through any future village center is recommended. Additional roadway capacity may be required in locations where greater travel demand is anticipated (major intersections and segment of roadways with higher traffic volumes). Other recommendations include:

- providing a center turn-lane to improve access to adjacent properties
- removing the right-turn slip lanes at the Austin Peay Highway intersection at West 31E
- signalizing intersection of US 31E at Austin Peay Highway upon meeting signal warrants
- providing pedestrian signal heads and high visibility crosswalks at signalized intersections

US 31 E (Westmoreland)

Epperson Springs Road to Clyde Wix Road - Sumner County, TN

Kimley-Horn and Associates, Inc. URBAN RESOURCE GROUP

NOT TO SCALE

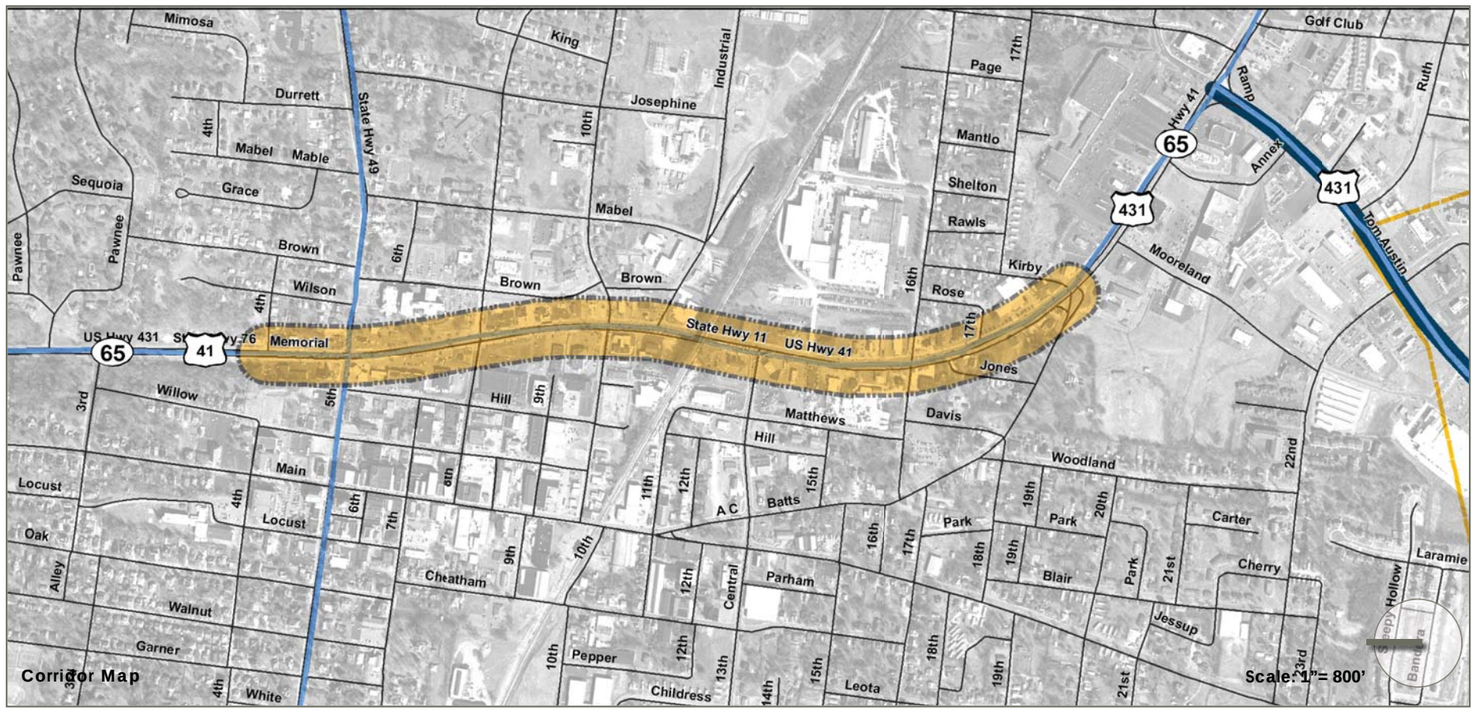
EXHIBIT 6.8B: US 31 EAST

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES



Tri-County Transportation & Land Use Study

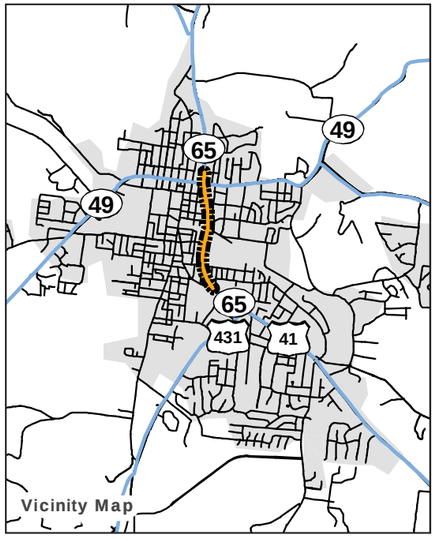
9

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from East 4th Avenue to Batts Boulevard and covers a length of one mile. The existing section is a 5-lane curb and gutter that carried 28,580 vehicles per day (vpd) in 2008. Other characteristics include:

- directionally split intersection at Memorial Boulevard and Batts Boulevard
- numerous driveway cuts
- wide outside shoulders
- sidewalks are present on both sides of Memorial Boulevard

Memorial Boulevard

East 4th Avenue to Batts Boulevard - *Robertson County, TN*

Kimley-Horn and Associates, Inc. URBAN RESOURCE GROUP

NOT TO SCALE

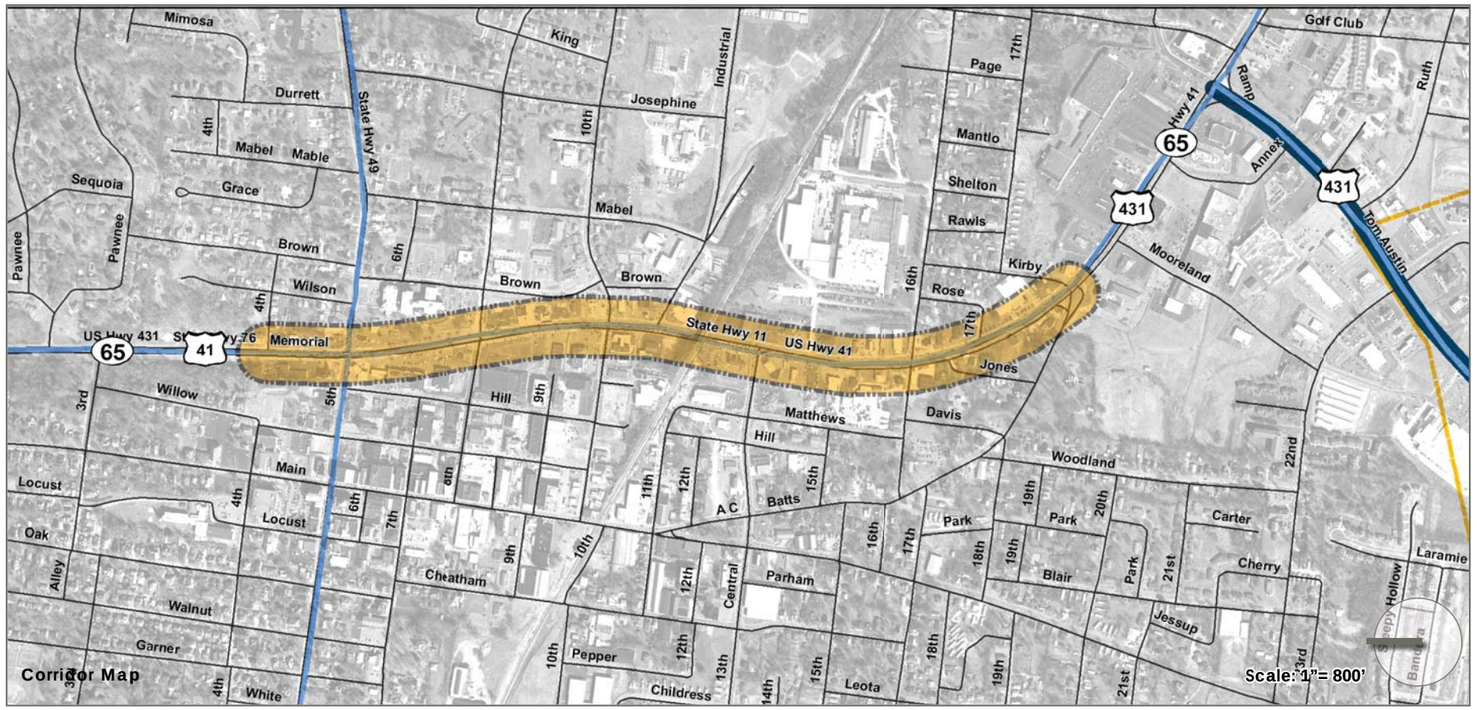
EXHIBIT 6.9A: MEMORIAL BOULEVARD

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc Associates

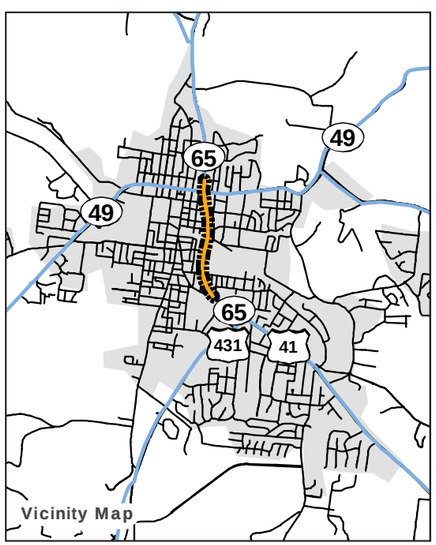


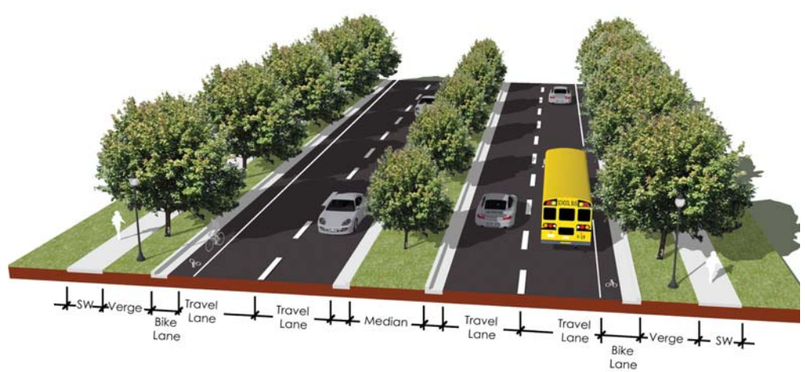
Tri-County Transportation & Land Use Study

9

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

This corridor is located in a traditional town center character area and is also within a designated focus area that communicates potential infill and redevelopment opportunities in the vicinity of the Springfield downtown. The projected 2035 traffic volume is 25,860 vehicles per day (vpd). The roadway is effectively the eastern boundary of the downtown and should be designed with this context in mind. In addition, this segment of roadway may play a role in providing an alternate north-south route for trucks through the downtown (in conjunction with Central Avenue) as opposed to using 5th Avenue. When considering the context of the area, proximity of downtown, and potential for future infill and redevelopment, the following improvements are proposed:

- install a median along Memorial Blvd to provide access management and to enhance gateway features into downtown
- sign Memorial Blvd as a truck route from the intersection around 5th Avenue to Central Avenue
- restrict truck access except by permit along West 5th Ave. between Memorial Blvd. and Central Ave. West
- reconstruct the Batts Blvd approach to Memorial Blvd by removing the channelizing islands
- provide median breaks and turn lanes where warranted
- include bike lanes and sidewalks

Memorial Boulevard

East 4th Avenue to Batts Boulevard - *Robertson County, TN*

Kimley-Horn and Associates, Inc. URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.9B: FUTURE MEMORIAL BOULEVARD

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling Communication bbpc

Tri-County Transportation & Land Use Study

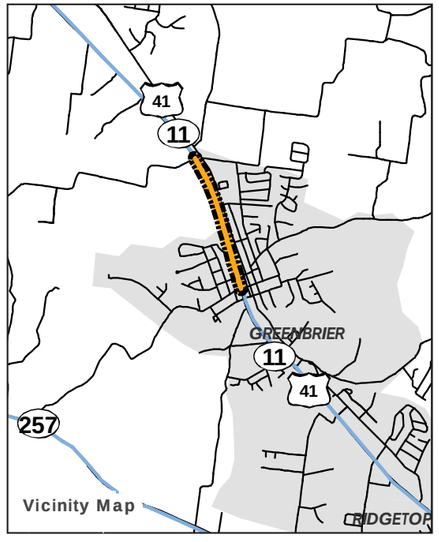
10

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits



Corridor Description and Issues Identified

The corridor runs from Lights Chapel Road to East College Street covering a distance of one mile. The existing section is 5-lanes with curb and gutter. In 2008 the corridor had an average annual daily traffic (AADT) volume of 17,800 vehicles per day. Other corridor characteristics include:

- open driveway cuts
- wide outside shoulders

US 41

Lights Chapel Road to East College Street - *Robertson County, TN*

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.10A: US 41

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

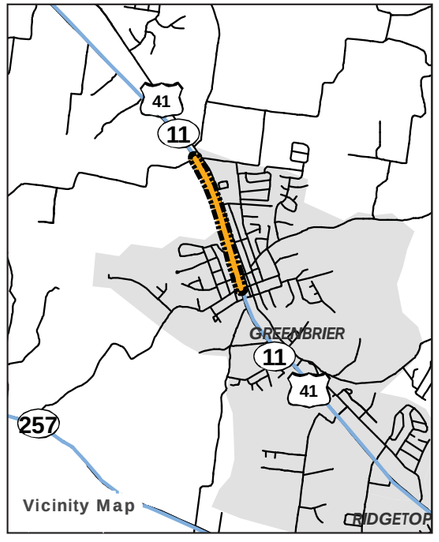
LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

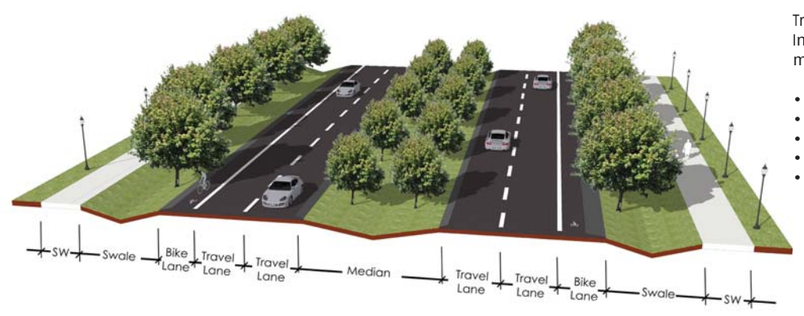
Tri-County Transportation & Land Use Study

10

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits





Corridor Vision

Traffic along the corridor is projected to increase to 26,500 vehicles per day (vpd) by 2035. In order to accomodate increased traffic while promoting better access management and multi-modal accomodations, the following recommendations are proposed:

- creating a 4-lane median divided section with sidewalk on both sides of US 41
- providing median breaks and turn lanes where warranted
- providing bike lanes for experienced cyclists
- increasing signage and visibility of the crosswalk adjacent to the school
- increasing gateway features approaching downtown

US 41

Lights Chapel Road to East College Street - *Robertson County, TN*

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.10B: FUTURE US 41

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES