

WARNER ROBINS AREA TRANSPORTATION STUDY (WRATS)

2035 Long Range Transportation Plan

Prepared by :



10/26/2010

Warner Robins Area Transportation Study (WRATS) the Metropolitan Planning Organization for the Warner Robins, Georgia region – Long Range Transportation Plan (LRTP) as required by SAFETEA-LU and USDOT FHWA under 23 CFR Parts 450 and 500 and FTA under CFR Part 613

Table of Contents

Technical Coordinating Committee Members.....	ii
Policy Committee Members.....	iii
Citizens Advisory Committee Members.....	iv
1 Introduction	1-1
1.1 History of WRATS	1-1
1.2 WRATS Study Area.....	1-1
1.3 Planning Process	1-1
1.4 WRATS Transportation Public Involvement Process (TPIP)	1-4
1.4.1 Process Design	1-6
1.4.2 Process Initiation	1-6
1.4.3 Process Implementation.....	1-6
1.4.4 Process Conclusion.....	1-7
1.4.5 Process Review.....	1-7
1.4.6 Committees	1-8
2 Goals and Objectives.....	2-1
2.1 Goal 1 – Economic Vitality	2-1
2.2 Goal 2 – Safety and Security	2-2
2.3 Goal 3 – Accessibility, Mobility and Connectivity	2-2
2.4 Goal 4 – Environment and Quality of Life	2-3
2.5 Goal 5 – Management and Preservation of the Existing System	2-3
3 Socioeconomic Data.....	3-1
3.1 Base Year.....	3-1
3.1.1 Occupied Units and Population.....	3-1
3.1.2 Employment	3-1
3.1.3 School Enrollment	3-1
3.2 Area Wide Projections.....	3-2
3.3 Growth Allocations	3-3
3.4 Motor Vehicle Registrations	3-4
3.5 Commuting Patterns.....	3-5
3.5.1 Houston County.....	3-5
3.5.2 Peach County.....	3-6
3.6 Environmental Justice	3-7
4 Land Use.....	4-1
4.1 Existing.....	4-1
4.1.1 Existing Land Use Definitions	4-1
4.1.2 Total Study Area Perspective.....	4-2

4.1.3	Corridor Area Perspective	4-9
4.2	Future Land Use Plan	4-16
4.2.1	Future Land Use Definitions.....	4-17
4.2.2	Total Study Area Perspective.....	4-24
4.2.3	Corridor Area Perspective	4-27
4.3	Future Land Use Policies	4-34
4.3.1	Land Use Development and Natural/Historic Resources.....	4-34
4.3.2	Land Use Development and Water/Sewer Infrastructure	4-35
4.3.3	Land Use Development and Transportation Infrastructure	4-35
4.3.4	Land Development Coordination.....	4-35
4.3.5	General Land Development Issues.....	4-36
5	Transportation Needs	5-1
5.1	Roads and Bridges.....	5-1
5.1.1	Existing Conditions.....	5-1
5.1.2	Needs Analysis.....	5-1
5.2	Public Transportation	5-1
5.3	Bicycle and Pedestrian.....	5-8
5.3.1	Existing Conditions.....	5-8
5.3.2	Needs Analysis.....	5-11
5.4	Other Modes.....	5-13
5.5	Freight and Goods Movement.....	5-13
5.5.1	Existing Conditions.....	5-13
5.5.2	Needs Analysis.....	5-13
5.6	Operations and Maintenance	5-13
5.6.1	Existing Conditions.....	5-13
5.6.2	Needs Analysis.....	5-14
6	Transportation Plan Funding	6-1
6.1	Estimated Costs	6-1
6.2	Available Funding.....	6-3
6.3	Financial Constraint.....	6-4
7	Plan Recommendations	7-1
7.1	Short Range Projects	7-1
7.2	Mid Range Projects	7-3
7.3	Long Range Projects.....	7-5
7.4	Illustrative Projects	7-7
7.5	SPLOST/Locally Funded and Intelligent Transportation System/Transportation Systems Management/Travel Demand Management (ITS/TSM/TDM) and Intersection Projects.....	7-10

Appendices

Section	Page
A Model Development Methodology	A-1
B Public Involvement Information	B-1
Advertisements Placed for Public Meetings	B-1
Form used to Solicit Public Comments for Goals and Objectives	B-7
Public Comments from Goals and Objectives Public Meetings	B-9
Form used to Solicit Public Comments on the Draft LRTP	B-11
Public Comments on Plan Recommendations	B-13
C WRATS Socioeconomic Data	C-1
Base Year Socioeconomic Data	C-1
Future Year Socioeconomic Data	C-6
D GDOT Socioeconomic Data Development Methodology	D-1
E Financial Summaries and Support	E-1
F SHSP Coordination and Environmental Mitigation.....	F-1

List of Figures

<i>Figure</i>	<i>Page</i>
Figure 1.1 Current WRATS Study Area	1-2
Figure 1.2 WRATS Traffic Analysis Zone Boundaries.....	1-3
Figure 1.3 The Long Range Transportation Plan Development Process	1-5
Figure 3.1 Environmental Justice Locations by Census Block Group	3-8
Figure 4.1 Existing Land Use	4-4
Figure 4.2 High Growth Corridors	4-10
Figure 4.3 Future Development Map	4-23
Figure 5.1 Existing Level of Service (2006)	5-2
Figure 5.2 Future Level of Service with no Improvements (2035).....	5-3
Figure 5.3 Existing Lanes per Direction (2006).....	5-4
Figure 5.4 All 2035 Planned Road and Bridge Improvements	5-5
Figure 5.5 Future Level of Service with Improvements (2035)	5-6
Figure 5.6 Future Lanes per Direction (2035).....	5-7
Figure 5.7 Bicycle and Pedestrian Facilities Plan.....	5-12
Figure 7.1 Short-Term Road and Bridge Improvements (2011 – 2015).....	7-2
Figure 7.2 Mid-Term Road and Bridge Improvements (2016 – 2025)	7-4
Figure 7.3 Long-Term Road and Bridge Improvements (2026 – 2035).....	7-6
Figure 7.4 Illustrative Road and Bridge Improvements.....	7-9
Figure 7.5 SPLOST/Locally Funded Road and Bridge Improvements and ITS/TSM/TDM and Intersection Projects	7-12

List of Tables

<i>Table</i>	<i>Page</i>
Table 3.1 Future Year Socioeconomic Data Control Totals	3-2
Table 3.2 Future Year Socioeconomic Data Population Totals	3-3
Table 3.3 Future Year Socioeconomic Data Employment Totals	3-3
Table 3.4 Number of Registered Vehicles by County by Vehicle Type.....	3-5
Table 3.5 Place of Employment for Residents of Houston County	3-5
Table 3.6 Place of Residence for Employees Working in Houston County.....	3-6
Table 3.7 Place of Employment for Residents of peach County	3-6
Table 3.8 Place of Residence for Employees Working in Peach County	3-7
Table 4.1 Total Acreage by Land Use Category in the WRATS Study Area	4-2
Table 5.1 Bicycle Crash Data for Houston and Peach Counties 2002-2006	5-9
Table 5.2 Pedestrian Crash Data for Houston and Peach Counties 2002-2006	5-11
Table 5.3 Annual Operations and Maintenance Spending by Jurisdiction	5-14
Table 6.1 Estimated Cost of Transportation Needs in the WRATS Study Area	6-1
Table 6.2 Financially Constrained LRTP Road and Bridge Projects.....	6-1
Table 6.3 Estimated Transportation Funding Available to WRATS over the 2035 LRTP Planning Horizon	6-1
Table 6.4 Estimated Transportation Funding by Year	6-1
Table7.1 Total Cost of Road and Bridge Improvement Projects by Short-, Mid- or Long Range.....	7-1

**Warner Robins Area Transportation Study
(WRATS)
Technical Coordinating Committee Members**

VOTING MEMBERS:

1. Mr. Robert Sisa
MPO Director
2. Mr. Mike Brumfield
Utility Superintendent, City of Centerville
3. Mr. Jacob Cox
Community Planner, Houston County
4. Mr. Tom Queen
District Planning & Program Engr.,
GDOT
5. Mr. Billie Segars
Director of Public Works, Peach County
6. Ms. Kelly Gwin
Urban Planning Engineer
GDOT Office of Planning
7. Mr. Bob Rychel
Planning Programs Manager
Middle Georgia RC
8. Mr. Johnny Brooks
Traffic Engineer, Houston County
9. Mr. W. Walter Gray, III
Warner Robins City Engineer
10. Mr. Mark Huntington
Traffic Engineer, City of Warner Robins
11. Mr. Charles Beauchea
Warner Robins Asst. City Engineer
12. Ms. Jessica L. Bird
MPO Transportation Planner
13. Mr. Tim Andrews
Houston County Planning & Zoning
Board
14. Mr. Mike Beecham
Community Development Director
City of Perry
15. Ms. Nancy Smith
Executive Director
Middle Georgia Community Action
Agency
16. Ms. Becky Cox
Warner Robins Asst. City Engr
17. Mr. Bill Rountree
District Preconstruction Engineer,
GDOT
18. Mr. Bill McDaniel
Public Works Director, City of Byron
19. Mr. Dave Noel
Traffic Engineer, Robins AFB

NON-VOTING MEMBERS:

20. Ms. Ann-Marie Day
Transportation Planner
Federal Highway Administration
21. Mr. David McMahan
Director of Facilities
Houston County Board of Education
22. Mr. Eddie Sutton
Trainmaster
Norfolk Southern Railway Company
23. Ms. Karen Quarles
Transit Planner
GDOT Office of Intermodal Programs
24. Mr. Paul W. Roberts
Field Engineering Supervisor, Flint E.M.C.
25. Ms. Adrienne Wood
Regional Representative
Department of Community Affairs
26. Mr. Morgan Law
Executive Director
Houston County Development Authority
27. Ms. Cindy Van Dyke
Assistant State Planning Administrator
GDOT Office of Planning
28. Mr. Radney Simpson
Central GA Planning Branch Chief
GDOT Office of Planning
29. Mr. Larry Warnock
WR Chamber Representative

**Warner Robins Area Transportation Study
(WRATS)
Policy Committee Members**

VOTING MEMBERS:

1. Mr. Charles K. Shaheen III, Mayor
City of Warner Robins
2. Mr. John R. Harley, Mayor
City of Centerville
3. (VACANT)
Robins AFB
4. Mr. Vance C. Smith, Jr., Commissioner
Georgia Department of Transportation
5. Mr. Ned Sanders, Chairman
Houston County Commissioners
6. Mr. Martin Moseley, Chairman
Peach County Commissioners
7. Mr. William Douglas
Chairman of CAC
8. Mr. Jimmy Faircloth, Mayor
City of Perry
9. Mr. Mark Waters, Councilman
City of Byron

NON-VOTING MEMBERS:

10. Ms. Ann-Marie Day, Transportation
Planner
Federal Highway Administration
11. Ms. Kelly Gwin, Transportation
Engineer
GDOT Office of Planning
12. Mr. Bill Rountree,
District Preconstruction Engineer
GDOT
13. Mr. Tom Queen
District Planning & Program Engineer
GDOT
14. Mr. Radney Simpson
Central GA Planning Branch Chief
GDOT Office of Planning
15. Mr. Roy Lewis, Commissioner
Peach County Commissioners

**Warner Robins Area Transportation Study
(WRATS)
Citizens Advisory Committee Members**

VOTING MEMBERS:

1. (VACANT)
Houston County
2. Ms. Nancy Newell
Houston County
3. Mr. Van Herrington
Houston County
4. Mr. Arthur Head
City of Warner Robins
5. Mr. William W. Douglas
Chairman of CAC
City of Warner Robins
6. Mr. Gerald H. Pounds
City of Warner Robins
7. Mr. Guerry E. Smith
City of Centerville
8. Mr. Alman Tew
City of Centerville
9. Mr. Olen B. Reid
Peach County
10. Mr. Calvin Middlebrooks
City of Perry
11. Ms. Rosella Cooper
City of Perry
12. (VACANT)
City of Byron

1 Introduction

1.1 History of WRATS

The purpose of the Warner Robins Area Transportation Study (WRATS) is to ensure that federal-aid transportation projects are planned in a continuous, coordinated and comprehensive manner. The WRATS, the designated Metropolitan Planning Organization (MPO), study area includes the existing urbanized area for the Cities of Warner Robins, Perry, Byron, Centerville, Robins Air Force Base, the remaining portion of Houston County and the eastern portion of Peach County along Interstate 75. This area covers the urbanized area as well as the area that is expected to become urbanized over the next 20 years.

The WRATS planning process was mandated by the 1962 Highway Act which requires that a transportation planning process be established in all metropolitan areas with a population greater than 50,000. With the completion of the 1980 US Census, Warner Robins was officially designated as an urbanized area. Before federal funds can be expended on a project in the WRATS study area, the project must be included in the WRATS planning process. The WRATS MPO is composed of elected, appointed, and advisory officials from the federal, state and local levels.

1.2 WRATS Study Area

The WRATS was formed in 1983 with the initial participation of the cities of Centerville and Warner Robins, Houston and Peach Counties, the Georgia Department of Transportation, and Robins Air Force Base. The study area encompassed approximately 81,662 acres, or 127.6 square miles.

The 2000 Census revealed a significant expansion of the urbanized area boundary due to the substantial growth that took place during the 1990s. This, coupled with the expectation that the Warner Robins urbanized area will continue to expand both south and west over the next 20 years (2020), the WRATS Policy Committee approved a new study area boundary that includes the cities of Perry and Byron, the remainder of unincorporated Houston County to the county line, and additional unincorporated areas in Peach County near Byron. The revised Study Area now totals approximately 266,624 acres, or 417 square miles. Figure 1.1 illustrates the current Study Area boundary as used in this plan.

For purposes of transportation planning and for displaying the existing and projected socio-economic characteristics, the Study Area was divided into traffic analysis zones (TAZs). The original Study Area encompassed a total of 127 TAZs. Using Census geography and a methodology established by the Georgia Department of Transportation (GDOT), TAZs were added and the WRATS study area incorporated a total of 248 TAZs for the 2030 LRTP. The TAZs have been further refined for developing the 2035 LRTP so that there are now 329 TAZs. Figure 1.2 shows the current TAZ boundaries as used in this plan.

1.3 Planning Process

The metropolitan transportation planning process in an urban area such as Warner Robins is fairly standardized. The process involves the coordination of the improvements for all modes of transportation including highways, bridges, transit, bicycles, pedestrians, airports, highway and rail freight movement, Intelligent Transportation Systems, and transportation system enhancements. Transportation planning in an MPO area is required by the Federal Highway

Figure 1.1
Current WRATS Study Area

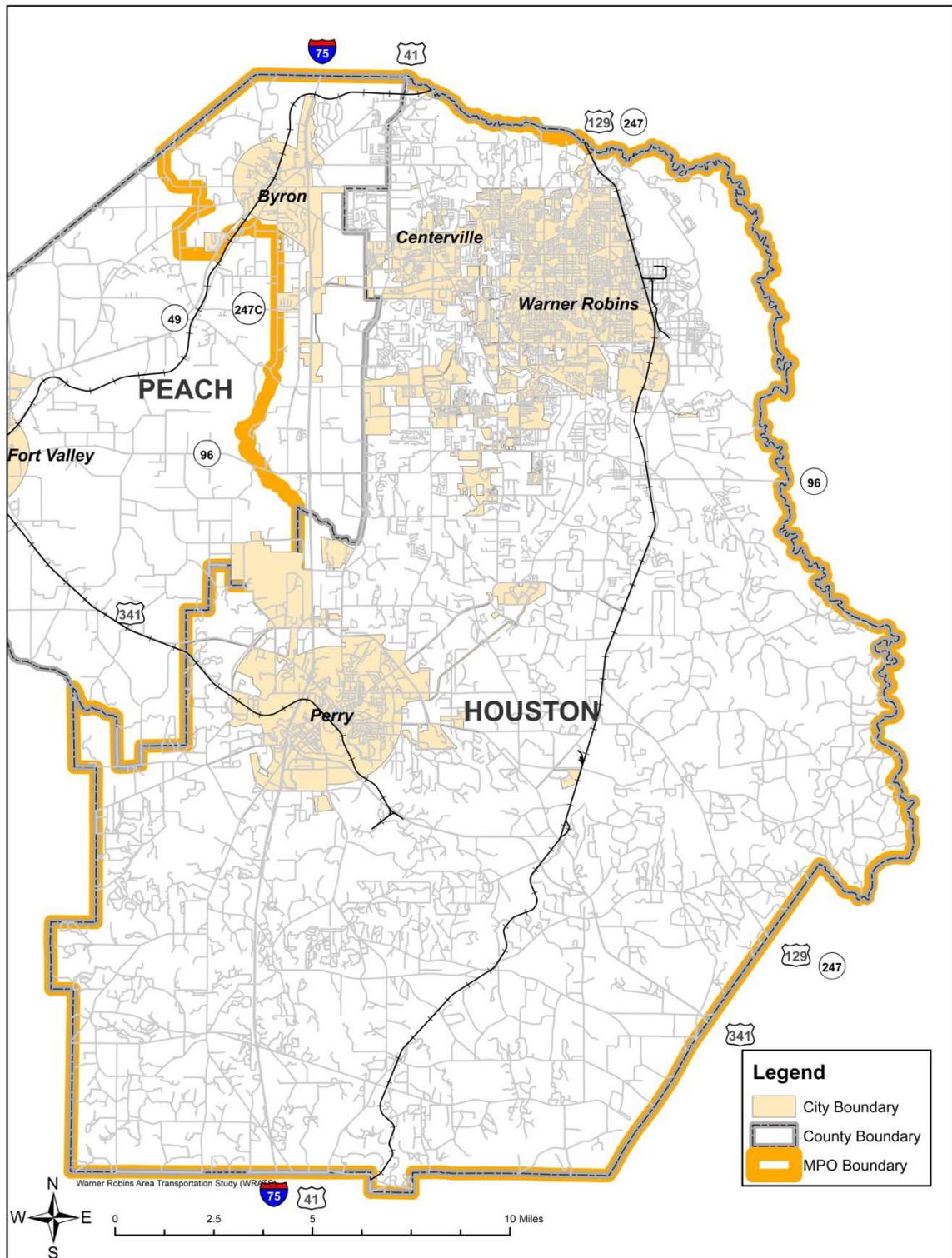
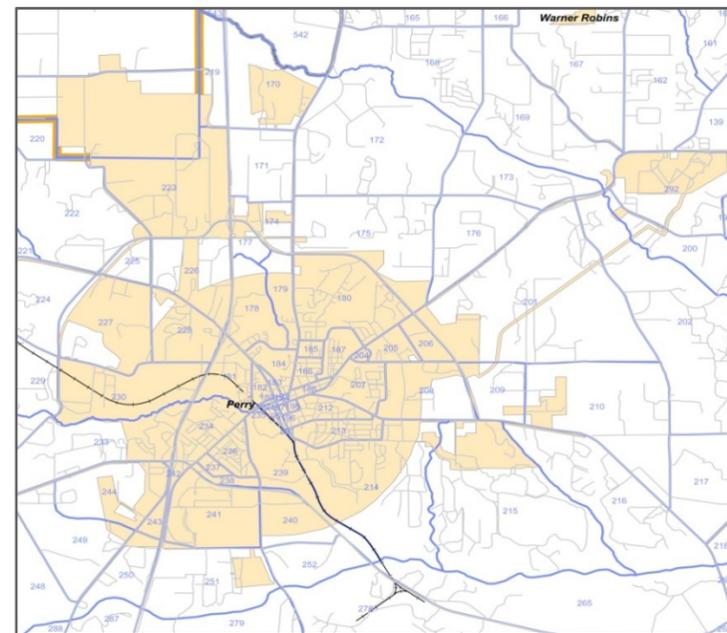
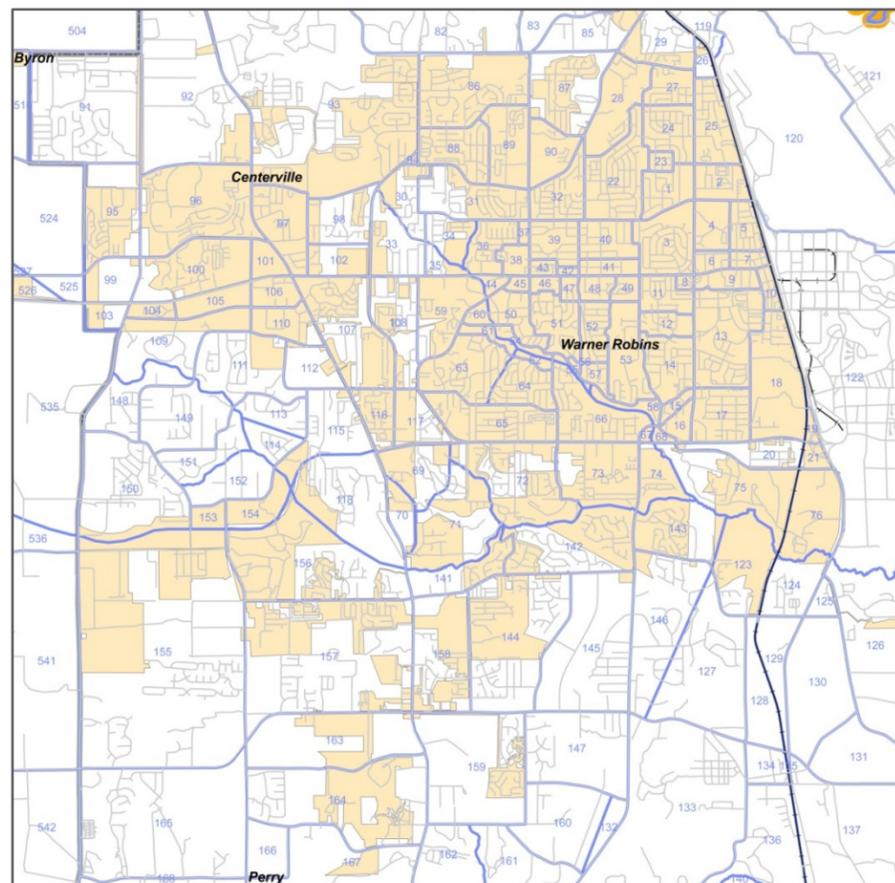


Figure 1.2
WRATS Traffic Analysis Zone Boundaries



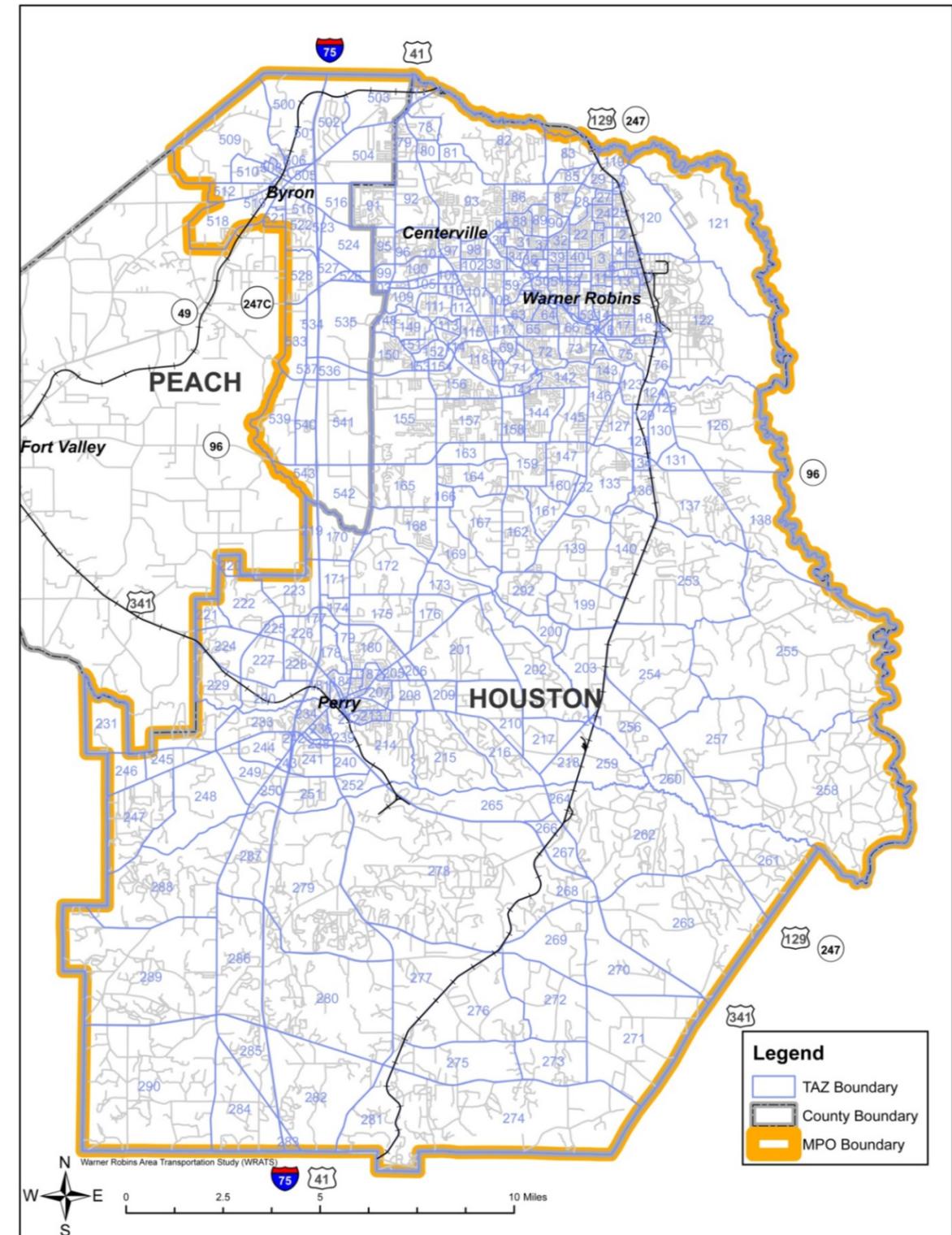
City of Perry Detail



City of Warner Robins and Centerville Detail



City of Byron Detail



Administration in order to qualify for funding of preliminary engineering, right of way purchase, and construction of projects from the Highway Trust Fund.

As shown in Figure 1.3 the LRTP process begins with existing and future land use, existing and future socioeconomic data and the existing transportation network for the WRATS area. Basically, the end result is to develop the future transportation network. The 2035 LRTP uses the same Goals and Objectives developed for the 2030 LRTP. These goals and objectives led to performance measures used in the modeling process to determine the effectiveness of proposed transportation improvements. The goals and objectives will be further discussed in section 2. The modeling process is documented in Appendix A.

From the modeling process, transportation needs were identified.¹ These needs were broken down and defined for six different areas including:

- Roads and Bridges
- Public Transportation
- Bicycles and Pedestrians
- Other Modes
- Freight and Goods Movement
- Operations and Maintenance

From the needs analysis, a list of improvements was produced to address the deficiencies identified. Costs were estimated for each improvement project and compared to the projected funding available during the time frame of this plan. Plan recommendations were then developed for short-term, mid-term and long-term improvement projects. The plan recommendations are shown in section 7.

1.4 WRATS Transportation Public Involvement Process (TPIP)

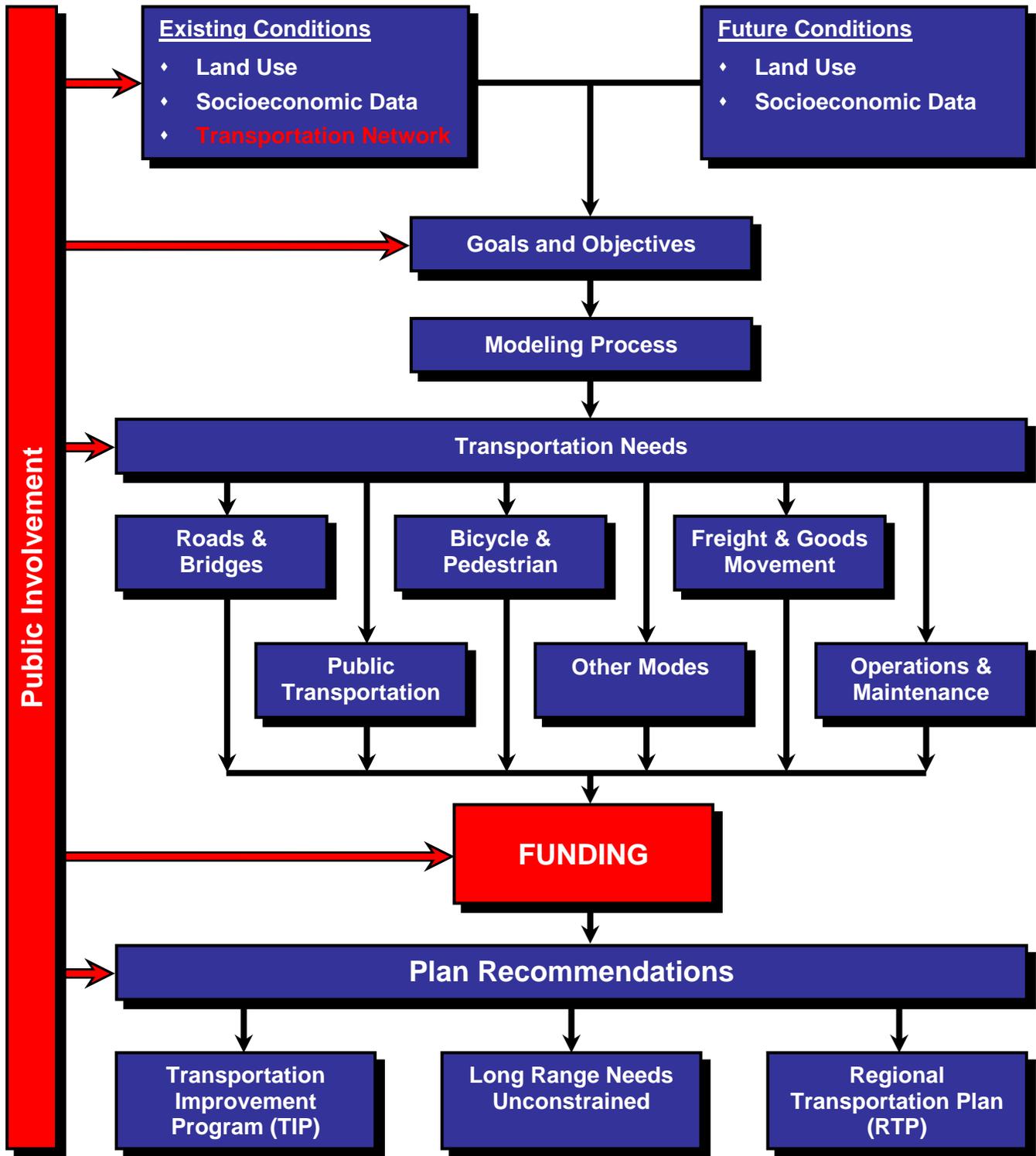
Paramount to the development of an effective LRTP is a sound public involvement process. Meetings were held during a public review period to present the draft plan recommendations. The flyers used to advertise the public involvement meetings, the environmental justice analysis used to determine locations for these meetings and all comments received from these meetings is found in Appendix B.

Federal transportation planning rules require that all urbanized areas such as Warner Robins have written guidelines incorporating citizen participation into the planning process. This formal process continues to ensure that substantive public input will be given to WRATS transportation plans and programs.

Public involvement in transportation planning was required with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. Federal regulations to implement ISTEA

¹ Only road improvement projects are identified during the modeling process. Other transportation needs were drawn from WRATS staff and published documents.

Figure 1.3
The Long Range Transportation Plan Development Process



called for a proactive citizen participation process. This regulation has continued in the Transportation Equity Act for the 21st Century (TEA-21), the successor to ISTEA legislation, and the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the current federal transportation legislation. The public involvement process must also comply with the Civil Rights Act of 1964 and the Americans with Disabilities Act of 1990. The public involvement process is intended to provide a framework through which the citizens of the community can participate in an advisory capacity in the planning and programming of transportation improvements.

1.4.1 Process Design

The MPO staff is responsible for developing a detailed schedule of individual transportation plans and program deadlines for the fiscal year. The schedule includes such dates as: estimated completion dates, public notices, committee meetings, outreach activities, key decision points and when reference material or educational tools are needed.

1.4.2 Process Initiation

Media Campaign

The MPO staff uses local media sources to provide clear and timely information about transportation issues and processes to citizens and any other interested parties and segments of the community affected by transportation plans, programs and projects. The MPO staff can use the media to inform the public by writing and distributing press releases, public service announcements, public access TV, talk radio, speaking engagements, and/or public notice advertisements.

Citizen Resource List

The staff is responsible for directly contacting known interested parties and identifying other persons or groups who are interested in the transportation planning process, plans or programs. Every effort is made to reach and accommodate hard-to-reach audiences such as persons with disabilities, foreign speaking citizens, and those with other special needs who are traditionally underserved by existing transportation systems.

Background Information

The MPO staff gathers and makes available any pertinent background information or materials. The information is made available through the established media, citizen and special groups network. It is an ongoing challenge to put technical issues in terms that are understandable and interesting to the general public. The MPO is committed to continue to simplify its documents, including or referring to background information, summaries of the information contained, and the goals and policies of the transportation plans or programs.

1.4.3 Process Implementation

Citizens Advisory Committee

The Citizens Advisory Committee (CAC) consists of individuals who provide a broad representation of the community. The function of this committee is to inform and advise the community of the process, recommendations and results of the Warner Robins Area Transportation Study and to offer any suggestions which would benefit the Study. The CAC also advises the MPO and Policy Committee on matters of public opinion from individual

citizens and citizen groups regarding transportation plans and programs. The CAC will be utilized to the fullest extent possible in the outreach activities of informing their counterparts of any transportation plans, programs, and projects.

Information Dissemination

Appropriate transportation planning documents are made available at central locations such as public libraries, chambers of commerce, city and county departments of planning, Georgia Department of Transportation field offices, and/or Regional Commissions. Typically, these documents include draft plans or programs which are to be reviewed by the public prior to the WRATS Policy Committee's final adoption. A similar procedure is used to make final plans or programs, or amendments thereto, available for information purposes. Additionally, copies of draft and final plans or programs will be mailed directly to individuals upon request.

Public Notice/Review Period Guidelines

Public notices are placed in local newspapers, prior to all public review periods. Public review periods for draft plans and programs run at least 30 days. If the Policy Committee determines that the final plan or program differs significantly from the one which was made available for public comment, and raises new material issues which interested parties could not reasonably have foreseen from the public involvement efforts, an additional 15 days for public comment on the revised plan or program shall be made available.

If the Policy Committee determines it necessary to amend the final plan or program, the Policy Committee may approve the proposed amendment(s) subject to a 15 day public review and comment period. If no significant comments are received, the amendment(s) will stand as approved with no further action required by the Policy Committee. Results of the public review and comment period will be provided to the Policy Committee, for their information, at the next regularly scheduled meeting. If comments are received which the MPO staff considers as potentially significant, the comments will be presented to the Policy Committee for consideration and appropriate action.

1.4.4 Process Conclusion

When significant written and oral comments are received on the draft transportation plan or program, as a result of the public involvement process, a summary, analysis or report on the content of comments and the MPO responses, is prepared and made part of the final document, which is available at central locations. This summary report is then distributed throughout the established network of committees and to individual commenters.

Plan and/or program amendments and the resulting public comments, will be made part of the Policy Committee minutes and will be kept on file in the MPO office. Amendments and comments also will be incorporated into copies of the affected plans and programs, made available at central locations.

1.4.5 Process Review

The public involvement process shall be periodically reviewed by the MPO and the Federal Highway Administration in terms of its effectiveness in assuring that the process provides full and open access to all persons. The process will be evaluated and refined by following up with the established network and involved citizens for any suggestions on improvement. The preceding public involvement process will be repeated and refined as necessary during the course of the WRATS transportation planning process.

1.4.6 Committees

As a result of many organizational meetings, three committees were formed and participants identified. The Policy Committee (PC) is responsible for establishment of policy and overall guidance for the Study. Voting members are policy level representatives from Warner Robins, Centerville, Byron, Perry, Robins AFB, Houston County, Peach County, and Georgia DOT and the Chairman of the Citizens Advisory Committee. The Federal Highway Administration (FHWA) is represented in a non-voting capacity.

The Technical Coordinating Committee (TCC) is comprised of individuals whose special skills and training are necessary to undertake development of a comprehensive transportation planning process. Voting members are technical positions representing the same entities listed above in the Policy Committee, plus the Middle Georgia Regional Commission (formerly the Middle Georgia Regional Development Center). Non-voting members are representatives from the Federal Highway Administration, Board of Education, Trucking Association, Railroad, Federal Transit Administration, Citizens Advisory Committee, and the private sector.

Currently, most transportation planning documents and items to be considered by the WRATS Policy Committee, are first reviewed by the Technical Coordinating Committee (TCC) and then by the Citizens Advisory Committee (CAC). The full Policy Committee (PC) is the policy making body of the Metropolitan Planning Organization and the Chairman of the CAC is also a voting member of the PC. A citizen may at any time attend and participate in the TCC, CAC or PC meetings.

Regularly Scheduled Committee Meetings

The time, place, and date of regularly scheduled meetings will be posted in the Warner Robins City Hall, Centerville City Hall, and the Houston County Annex building. The Policy Committee rotates meeting locations and also has meetings in the Byron City Hall and the Byron Train Depot.

Special Called Committee Meetings

The Chairman of each committee may call a special meeting provided that a notice of the time, place, and date of the meeting is posted twenty-four hours in advance of said meeting. The written notice for the special called meeting will be in the same manner as for the regularly scheduled meeting.

Agendas and Minutes

Agendas for each committee will be available to the committee members and general public no later than one week prior to each regularly scheduled committee meeting. The minutes of each committee meeting will be available at the next regularly scheduled meeting.

All elements of this public involvement process will be implemented as personnel and monetary resources allow. Many of these activities will be ongoing throughout the year, while others will occur on an "as needed" basis. With each planning activity, the input of the public will be encouraged from the earliest point possible.

2 Goals and Objectives

Development of the 2035 Long Range Transportation Plan was guided by a set of goals, objectives and strategies. The major focus in developing the goals was to ensure that the 2035 LRTP addresses the needs of all transportation modes in a manner which supports local community goals and aspirations, and complies with the latest federal requirements.

The Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998, established seven planning factors which MPOs must consider in the formulation of transportation plans and programs. SAFETEA-LU, enacted in 2005, revised this to eight planning factors by splitting the goal supporting increased safety and security of the transportation system for all users into two goals; one supporting safety and the other supporting security. The eight SAFETEA-LU planning factors are:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
2. Increase the safety of the transportation system for motorized and non-motorized users;
3. Increase the security of the transportation system for motorized and non-motorized users;
4. Increase the accessibility and mobility options available to people and for freight;
5. Protect and enhance the environment, promote energy conservation, and improve quality of life;
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
7. Promote efficient system management and operation; and
8. Emphasize the preservation of the existing transportation system.

A series of two public involvement meetings were held using the TEA-21 planning factors as the basis to formulate a set of goals and objectives to guide the 2030 LRTP. The Goals and objectives developed from these meetings lent themselves to measurable performance criteria used in the evaluation and prioritization of transportation projects for the LRTP. The 2035 LRTP uses the same goals, objectives and performance measures as the 2030 LRTP to maintain continuity in the planning process.

2.1 Goal 1 – Economic Vitality

Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency

Objectives

- Minimize work trip congestion delay
- Increase the efficiency in the movement of goods and services

Performance Measures

- Peak Hour VMT
- Vehicle Hours of Delay (VHD)
- Route Miles Traveled at LOS E or LOS F

2.2 Goal 2 – Safety and Security

Increase the safety and security of the transportation system for motorized and non-motorized user

Objectives

- Ensure all transportation systems are structurally and operationally safe
- Minimize frequency and severity of vehicular accidents
- Eliminate at-grade rail crossings

Performance Measures

- Total accidents per million miles traveled
- Injury accidents per million miles traveled
- Fatal accidents per million miles traveled
- Number of other safety projects

2.3 Goal 3 – Accessibility, Mobility and Connectivity

Increase the accessibility and mobility options available to people and for freight and enhance the integration and connectivity of the transportation system, across and between modes, for people and freight

Objectives

- Minimize congestion delays
- Maximize regional population and employment accessibility
- Provide efficient & reliable freight corridors
- Encourage transportation services for the transportation disadvantaged
- Encourage use of non-motorized modes

Performance Measures

- Volume/Capacity (V/C) ratio
- Daily trucks per lane
- Number of bike/pedestrian corridors
- Vehicle Hours of Delay (VHD)
- Route Miles Traveled at LOS E or LOS F

2.4 Goal 4 – Environment and Quality of Life

Protect and enhance the environment, promote energy conservation, and improve quality of life

Objectives

- Protect wetlands, historic resources, neighborhoods, recreational facilities and other important resources
- Support infill development

Performance Measures

- Impacts on the natural environment
- Impacts on historical and cultural resources

2.5 Goal 5 – Management and Preservation of the Existing System

Promote efficient system management and operation and emphasize the preservation of the existing transportation system

Objectives

- Require improvements necessary to accommodate future growth in the development review process
- Review all development proposals for transportation impacts
- Maximize the efficiency of signalized intersections
- Expand use of Intelligent Transportation Systems (ITS)

Performance Measures

- Average Daily Traffic (ADT)/lane
- Operational improvement

3 Socioeconomic Data

The socioeconomic data is a set of demographic characteristics of the study area used to project trips made on the transportation network. For the modeling purposes of a LRTP, the socioeconomic data was collected for population, occupied households, employment, average household income and school enrollment for each transportation analysis zone (TAZ). Employment was then broken into four different types: retail, service, manufacturing and wholesale. These four generalized types of employment are used since they each generate different trip patterns for employees, customers and inbound and outbound deliveries.

The socioeconomic data used in the modeling process is adjusted in certain circumstances to better reflect the trip patterns in a particular TAZ. For example, a hospital may have a large population, but the people staying at the hospital are not making a daily work trip. In this example, the employment associated with the hospital will generate the additional trips for visitors and other service related trips. A complete list of the base year socioeconomic data can be found in Appendix C.

3.1 Base Year

The base socioeconomic data was compiled for the year 2006 to correspond to the base transportation network used in the modeling process. Base year population and employment estimates were created by WRATS in conjunction with the Middle Georgia Regional Commission (MGRC).

3.1.1 Occupied Units and Population

Occupied units and population data was obtained by reviewing 2008 building permit files. These files provided information on all single-family units, duplexes and multi-family dwellings where available. After the building permit information was obtained, the specific location of each dwelling was established using an automated mapping system. Next, this map was combined with the TAZ map to assign each dwelling to a corresponding TAZ. Dwelling units were then summarized for each TAZ. Once the number of dwellings in each TAZ was identified, the vacancy rate was applied producing the number of occupied units for the TAZ. Occupied units for 2008 were factored back to estimate the 2006 base year. Population was projected for each TAZ by multiplying the occupied units by the estimated 2006 population per household ratio.

3.1.2 Employment

Base year employment data was estimated using the business license files provided by the various local governments. This information included the name of the business, business location, the number of employees and the business type. To ensure the legitimacy of this data, special attention was given to locations where it was known that a new business opened or an existing business closed. The Peach County and Houston County Boards of Education also provided employment for area schools. The type of business (retail, service, manufacturing and wholesale) was identified and finally, the information was summarized for each TAZ.

3.1.3 School Enrollment

School enrollment data was gathered by contacting the Peach County and Houston County Boards of Education. The Boards of Education provided the 2006-07 school enrollments the schools in their jurisdiction located within the WRATS Study Area.

3.2 Area Wide Projections

Table 3.1 shows socioeconomic data used in updating the 2035 Transportation Plan for the Warner Robins Area Transportation Study (WRATS). These projections were used to allocate 2035 socioeconomic data to the various traffic analysis zones (TAZs). These projections are consistent with other (relatively higher than) demographic forecasts used in Houston and Peach Counties, such as those used in the updating of Comprehensive Plans. These projections describe the level of human activity that Houston and Peach County governments intend to support in the future.

**Table 3.1
Future Year Socioeconomic Data Control Totals**

Socioeconomic Variable	Area	Base Year 2006	Future Year 2035	Cumulative % Change 2006 to 2035	Avg. Annual % Change 2006 to 2035
Population	Houston County	137,808	218,812	58.8%	2.0%
	Peach County	24,836	38,520	55.1%	1.9%
	Peach Co. (portion)	8,726	13,532	55.1%	1.9%
	WRATS Study Area	146,534	232,344	58.6%	2.0%
Households	Houston County	50,332	80,649	60.2%	2.1%
	Peach County	9,341	14,475	55.0%	1.9%
	Peach Co. (portion)	3,298	5,111	55.0%	1.9%
	WRATS Study Area	53,630	85,760	59.9%	2.1%
Total Employment	Houston County	64,615	96,192	48.9%	1.7%
	Peach County	10,887	14,396	32.2%	1.1%
	Peach Co. (portion)	2,630	6,351	141.5%	4.9%
	WRATS Study Area	67,245	102,543	52.5%	1.8%

Base Year 2006 control totals, cumulative percentage changes and average annual percentage changes are also shown in Table 3.1. Population forecasts are based on projections of decennial census population from 1970 to 2000 and census estimated population for 2006 and 2008. They are generally consistent with, though slightly higher than, projections made from the Georgia Department of Community Affairs website and the Governor's Office of Planning and Budget. Total Employment was forecast by projecting annual Georgia Department of Labor estimates from 1990 through 2006.

As soon as the area wide control totals were adopted, the process of allocating the future year 2035 population, household and total employment into the Traffic Analysis Zones (TAZs) began. There are 329 TAZs in the study area, 292 in Houston County and 37 in Peach County². There is a small portion of the City of Perry that lies within Peach County which is not included in the current WRATS Study Area. Since this is a mostly undeveloped area, we assumed that none of the population and employment for the City of Perry is included within the study area.

3.3 Growth Allocations

A copy of the WRATS 2035 Socioeconomic Data allocated to the individual TAZs is shown in Appendix C. The original projections for employment in the area were adjusted in order to account for a slower growth rate for the Robins Air Force Base (RAFB) as compared to the rest of Houston County. Employment at RAFB was assumed to grow by approximately 20% over the WRATS LRTP study period – less than half the rate of overall employment growth.

Table 3.2 shows the final numbers for population, households and total employment. This table also includes the corresponding totals for the draft socioeconomic data presented with this document.

**Table 3.2
Future Year Socioeconomic Data Population Totals**

	2035 Population	2035 Households	2035 Total Employment	2035 School Enrollment
Houston County	218,812	80,649	96,192	46,023
Peach County (portion)	13,532	5,111	6,351	2,180
Total for WRATS Area	232,344	85,760	102,543	48,203

Employment was further broken down into four groups including retail, commercial, industrial and wholesale employment. Table 3.3 shows the totals for these types of employment.

**Table 3.3
Future Year Socioeconomic Data Employment Totals**

	2035 Retail Employment	2035 Service Employment	2035 Manufacturing Employment	2035 Wholesale Employment
Houston County	13,875	73,533	8,531	253
Peach County (portion)	2,417	3,376	397	161
Total for WRATS Area	16,292	76,909	8,928	414

² 3 TAZs in Houston County comprise Robins Air Force Base which is modeled as external stations

With the total growth in the socioeconomic factors determined, the next step was to distribute this growth to the various traffic analysis zones (TAZs) in the study area. The total growth for the study area was separated by county. Initially a portion of the growth in each socioeconomic factor was assigned to the TAZs based on the current development in each TAZ. For example, if one TAZ contained 5% of the total population in Houston County, this TAZ would be given 5% of the total growth in population for Houston County. Similar calculations were done for households and employment as well.

Next, growth was adjusted to distribute additional growth in socioeconomic factors along identified growth areas. Growth areas include the Interstate 75 corridor and the general development trends for Warner Robins to the southwest. TAZs were given a “tag” for growth and a factor was developed for their growth rate. The growth rates developed for the individual TAZs were then used to distribute this second portion of the growth.

Finally, growth in the socioeconomic factors was adjusted based on the future land use map for Houston and Peach Counties. The growth in population and households were assigned to areas where the land use changed to indicate additional residential development or change from other land uses on the existing land use map. For employment growth, the growth was distributed in a more complex manner using the breakdown of the four types of employment for the socioeconomic data which include retail, commercial, industrial and wholesale employment. Employment growth was assigned to TAZs where the percentage future land use maps indicated an increase in land use area associated with the different employment categories.

School enrollment projections were developed using a percentage of the population. The proportion of students to general population was assumed to remain constant. School enrollment was distributed to individual TAZs where a school was identified. New facilities that were identified were assigned population based on the average enrollment for elementary, middle and high schools. Schools where improvements were identified were then given a 20% growth in their student population over existing enrollment. Finally, the remaining school enrollment that was not satisfied by either a new school or improvements to an existing school was distributed equally to the TAZs based on the portion of school enrollment they contained. This would represent overcrowding of all the existing schools in an equal manner and that there is a need for additional schools not currently planned before the year 2035.

Other factors were reviewed to insure the credibility of the socioeconomic data obtained such as the existence of water and sewer or type of soil present. Current planned developments were added and the distribution of socioeconomic data for the TAZs was then reviewed and modified as needed.

3.4 Motor Vehicle Registrations

Table 3.4 lists the current number of total vehicles registered in Houston and Peach Counties by vehicle type. Houston County has 0.96 vehicles per capita while Peach County has 0.94 per capita.³

³ Based on 2009 population estimates from the US Census Bureau (<http://quickfacts.census.gov/qfd>) and March 2010 DMV total vehicles.

Table 3.4
Number of Registered Vehicles by County by Vehicle Type

Type of Vehicle	Houston County	Peach County
Passenger Vehicles	82,638	14,034
Trucks	28,164	6,809
Trailers	15,267	3,923
Motorcycles	3,776	641
Buses	475	154
Other	1	0
Total	130,321	25,561

Source: Georgia Department of Motor Vehicles

3.5 Commuting Patterns

3.5.1 Houston County

As shown in Tables 3.5 and 3.6, Houston County tends to be an area where people both live and work. Slightly over 75% of employees in Houston County are residents of Houston County and nearly 80% of Houston County workers live in Houston County. The large numbers of people both working and living in Houston County lead to fewer external trips from outside of WRATS study area. The number of people who either live or work in Houston County but not both will likely grow by 2035 as the urban area expands with development occurring in neighboring counties.

Table 3.5
Place of Employment for Residents of Houston County

Residence County	Workplace County	Employees	Percent of Total
Houston	Houston	39,954	75.3%
Houston	Bibb	8,570	16.1%
Houston	Peach	1,561	2.9%
Houston	Dooly	404	0.8%
Houston	Macon	277	0.5%
Houston	Pulaski	249	0.5%
Houston	Fulton	194	0.4%
Houston	Washington	170	0.3%
Houston	Monroe	119	0.2%
Houston	Laurens	115	0.2%
Total		53,089	97.2%

Source: US Census

Table 3.6
Place of Residence for Employees Working in Houston County

Residence County	Workplace County	Employees	Percent of Total
Houston	Houston	39,954	79.7%
Bibb	Houston	3,703	7.4%
Peach	Houston	1,947	3.9%
Crawford	Houston	642	1.3%
Bleckley	Houston	596	1.2%
Pulaski	Houston	534	1.1%
Jones	Houston	357	0.7%
Macon	Houston	320	0.6%
Twiggs	Houston	250	0.5%
Dooley	Houston	220	0.4%
Total		50,148	96.8%

Source: US Census

3.5.2 Peach County

In contrast to Houston County being a place where people both live and work, Peach County appears to be more of a bedroom community with only 42.5% of County residents remaining in the County for work. Since the 2035 population in Peach County is expected to grow more than the County's 2035 employment, it is likely that this trend will continue during the study period.

Table 3.7
Place of Employment for Residents of Peach County

Residence County	Workplace County	Employees	Percent of Total
Peach	Peach	4,137	42.5%
Peach	Bibb	2,361	24.3%
Peach	Houston	1,947	20.0%
Peach	Washington	431	4.4%
Peach	Macon	149	1.5%
Peach	Taylor	121	1.2%
Peach	Crawford	63	0.6%
Peach	Fulton	49	0.5%
Peach	Jones	41	0.4%
Peach	Sumter	36	0.4%
Total		9,731	95.9%

Source: US Census

Table 3.8
Place of Residence for Employees Working in Peach County

Residence County	Workplace County	Employees	Percent of Total
Peach	Peach	4,137	48.4%
Houston	Peach	1,561	18.3%
Bibb	Peach	721	8.4%
Crawford	Peach	639	7.5%
Macon	Peach	374	4.4%
Taylor	Peach	324	3.8%
Dodge	Peach	101	1.2%
Dooly	Peach	93	1.1%
Jones	Peach	71	0.8%
Pulaski	Peach	65	0.8%
Total		8,553	94.5%

Source: US Census

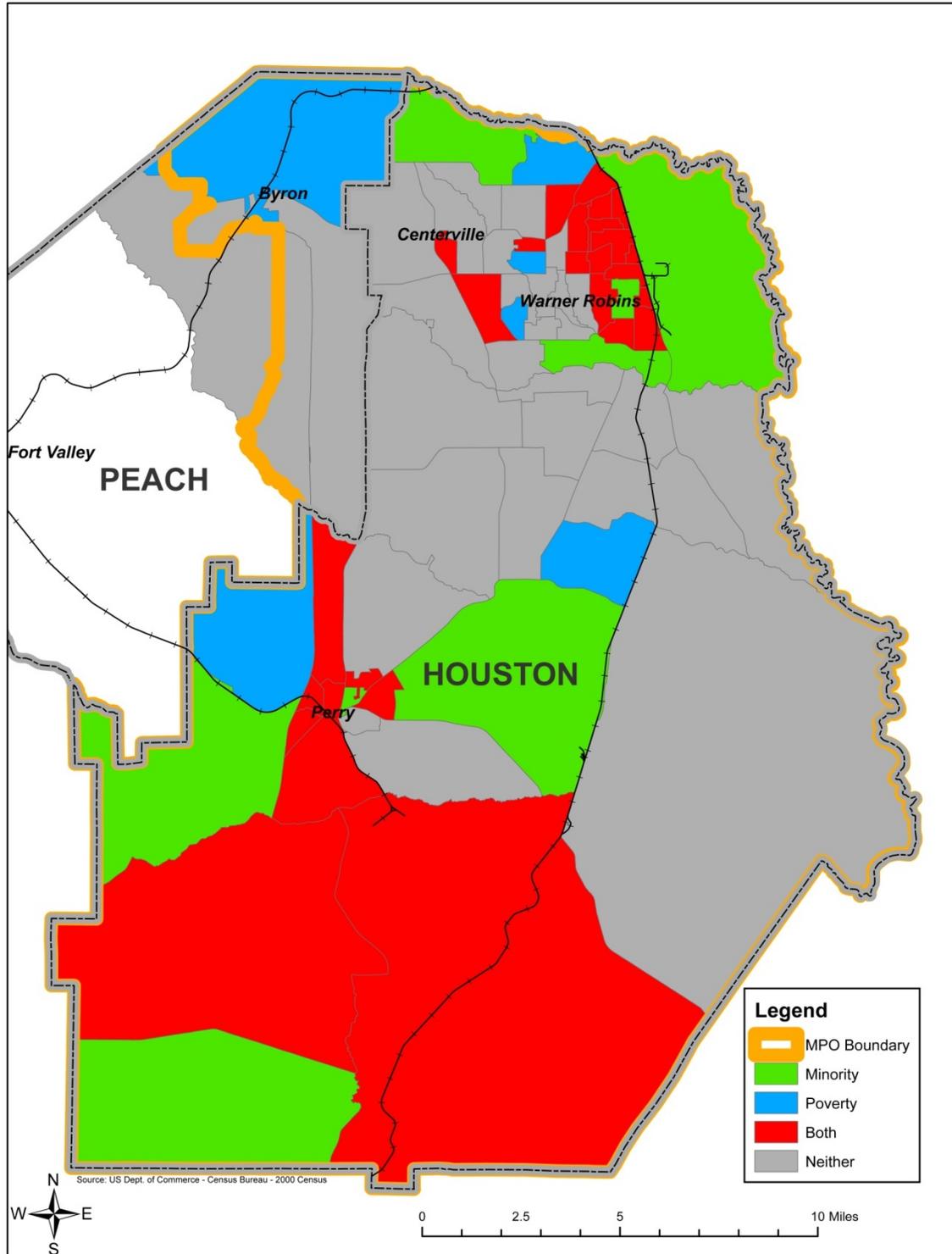
3.6 Environmental Justice

All Federally funded programs, including the transportation planning process, must consider the program's impact on Environmental Justice (EJ) populations. EJ populations include minorities and low income populations. The intention of the focus on EJ populations is to identify potential transportation planning projects and programs that could adversely impact EJ populations early in the project development process. If potential adverse impacts are identified, the impacts can be weighed against other goals and objectives of the planning process, and if appropriate, mitigating changes to the plans and programs can be made. Planning-level EJ procedures should:

- Assist in identifying plans and programs that have negative EJ impacts
- Document the details of the decision-making process related to impact on EJ populations
- Document how EJ populations were given full and fair opportunities to participate in the planning process
- Provide information to subsequent project development activities that may assist in mitigating negative EJ impacts of plans and programs that proceed beyond the planning level.

Geographic areas identified as containing significant EJ populations are dispersed throughout the study area, as shown on Figure 3.1. Figure 3.1 uses 2000 Census data to show locations where the percentage of minority populations or population of people below the poverty level exceeds the average within the WRATS study area.

Figure 3.1
Environmental Justice Locations by Census Block Group



4 Land Use

4.1 Existing

This section of the report includes an inventory and analysis of existing land use patterns within the WRATS Study Area. It begins with a review of the methodology used to obtain the existing land use. From there, existing land use is studied from two different perspectives.

The first examines the Study Area as a whole. The second perspective is taken from the view of specific high growth corridors. In development of the 2030 LRTP the WRATS staff and local planning officials identified a total of fifteen (15) corridors based on the expected growth that was to occur in those areas, and with the anticipation that they would be considered as future “character areas” for the local comprehensive plans. These corridors were defined as being approximately 4,000 feet in width (2,000 feet on either side of the highway) and included those parcels that fell within this boundary. These character areas were refined in the 2006 Houston and Peach County Joint Comprehensive Plans, the most recent county comprehensive plans, which are the basis for the future land use assumptions of the 2035 LRTP.

4.1.1 Existing Land Use Definitions

The following existing land use categories were used:

- **Residential:** The predominant use of the land within this category is for single-family and multi-family dwelling units.
- **Commercial:** This category is for land dedicated to non-industrial business uses, including retail sales, office, service and entertainment facilities, organized into general categories of intensities. Commercial uses may be located as a single use in one building or grouped together in a shopping center or office building.
- **Industrial:** This category is for land dedicated to manufacturing facilities, processing plants, factories, warehousing and wholesale trade facilities, mining or mineral extraction activities, or other similar uses.
- **Public/Institutional:** This category includes certain state, federal, or local government uses and institutional uses. Government uses include city halls and government building complexes, police and fire stations, libraries, prisons, post offices, schools, military installations, etc. Examples of institutional land uses include colleges, churches, cemeteries, hospitals, etc.
- **Transportation/Communication/Utilities:** This category includes such uses as major transportation routes, public transit stations, power generation plants, railroad facilities, radio towers, telephone switching stations, airports, or other similar uses.
- **Park/Recreation/Conservation:** This category is for land dedicated to active or passive recreation uses. These areas may be either publicly or privately owned and may include playgrounds, public parks, nature preserves, wildlife management areas, national forests, golf courses, recreation centers, or similar uses.

- **Agriculture/Forestry:** This category is for land dedicated to farming (fields, lots, pastures, farmsteads, specialty farms, livestock production, etc.), agriculture, or commercial timber, or pulpwood harvesting.
- **Undeveloped/Vacant:** This category is for lots or tracts of land that are served by typical urban public services (water, sewer, etc.) but have not been developed for a specific use or were developed for a specific use that has since been abandoned.

These existing land use categories are consistent with the 2006 Joint Comprehensive Plans for Houston and Peach Counties.

4.1.2 Total Study Area Perspective

Figure 4.1 shows the existing land use for the WRATS Study Area. Because of the size of the WRATS Study Area, it was decided to illustrate existing land use with a graphic showing the region and insets showing the cities of Byron, Centerville, Perry, and Warner Robins. The existing land use narrative includes an analysis of each land use category for the study area as a whole. Table 4.1 portrays the total acreage by land use category for the entire study area.

**Table 4.1
Total Acreage by Land Use Category in WRATS Study Area**

Land Use Category	Total Acreage	% of Study Area Acreage
Residential	57,110	22.4%
Commercial	7,153	2.8%
Industrial	6,353	2.5%
Public/Institutional	33,777	13.2%
Trans/Comm./Utilities*	355	0.1%
Park/Rec./Conservation	2,096	0.8%
Agriculture/Forestry	141,482	55.4%
Undeveloped	7,128	2.8%
Total	255,454	100.00%

* Does not include highway and railroad rights-of-way
Source: MGRC

Residential

Residential land use within the WRATS Study Area is concentrated in general between Dunbar Road in the north to Highway 127 to the south and in portions of the City of Byron and Perry. The higher density (greater than four units per acre) residential uses that include a mixture of single-family, duplex, and multi-family are located: (1) east of Houston Lake Road, south of Dunbar Road, and north of Russell Parkway in Warner Robins; and (2) in the City of Perry in close proximity to the downtown area. South of Russell Parkway to approximately Highway 127 north of Dunbar Road, the City of Centerville and in portions of Byron and Perry, residential development is suburban-like in character with lower densities (less than four units per acre) and almost entirely single-family development. The area below Highway 127 in the unincorporated

area of Houston County and south of the Russell Parkway Extension in unincorporated Peach County can be classified as rural residential with most of the lots over one acre in size and the parcels containing a mixture of single-family site-built and manufactured homes units.

Commercial

The types of commercial development in the WRATS Study Area can be classified as follows: (1) Central Business District; (2) strip highway commercial development; (3) neighborhood commercial centers; (4) regional commercial centers; (5) interstate commercial development; and (6) rural convenience commercial development.

Central Business District

The Cities of Perry and Byron are the only communities in the WRATS Study Area that have central business districts. In these areas, there is a mixture of government, retail, and services uses blended together into one cohesive and well-defined area.

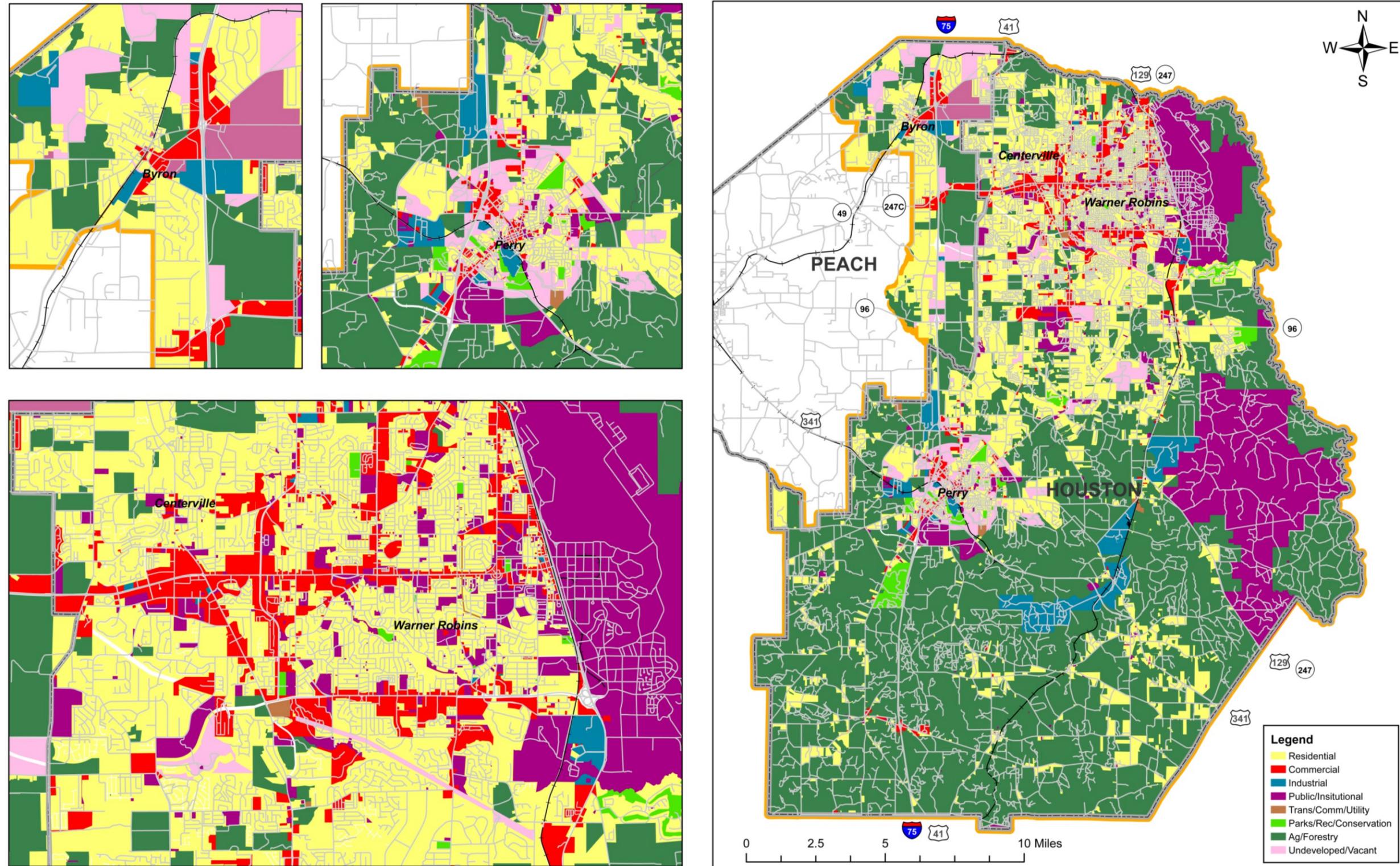
The City of Perry, Downtown Development Authority, Perry Chamber of Commerce and the business owners have made a considerable investment in the downtown area over of the last decade to make it an attractive place to shop and work. In addition, the shared-use trail system that is currently under development will connect the downtown area with the community's residential areas and the State's Agri-Center, thus bringing more residents and visitors into the area, but without the traffic congestion and the need for more parking.

The City of Byron has been designated as a Better Hometown Community by the Georgia Department of Community Affairs. The local Better Hometown Committee along with the City of Byron and business owners, like the City of Perry, are making major investments in the central business area both in terms of time and money to make it appealing for both local residents to shop and entrepreneurs to invest into new businesses.

Strip Highway Commercial Development

Strip highway development is the predominant commercial use in the WRATS Study. It first began in the older section of Warner Robins on Watson Boulevard and North Davis Drive, and from there it has now spread all along Watson Boulevard/Highway 247 Connector to US 41, Russell Parkway from just west of Highway 247 to Houston Lake Road, portions of Houston Lake Road from Watson Boulevard to Russell Parkway, Highway 49 in Byron from White Road to Interstate 75, and along Sam Nunn Boulevard in Perry. This type of commercial is characterized by its variety and intensity of commercial uses; both retail and service, numerous curb cuts (that impacts traffic flow), and general unattractiveness due to the amount of signage and utility poles and a lack of building design controls. Another concern about strip commercial developments is the tendency for businesses to move out of older strip areas and move into new developments. From a business point of view, this makes sense because the new development is more attractive, has more parking, and is closer to the growing residential markets.

Figure 4.1
Existing Land Use Map



From a community standpoint, these older commercial areas become abandoned and create a blighted effect on the surrounding area, thus reducing property values, tax base, and the initiative for private investment. It will be important for the communities in the WRATS Study Area to: (1) establish redevelopment strategies for these older strip commercial areas that correspond with the overall neighborhood redevelopment plans; and (2) establish a balanced approach for encouraging new commercial developments in the growing urban area, while at the same time making it more attractive for private investment in older neighborhoods, both in terms of creating new residential and commercial opportunities.

This type of development is likely to take place along several other major thoroughfares in the WRATS Study Area unless some changes in commercial development regulations take place to encourage more mixed-use development and controls on signs, curb cuts, utility installations and building design and appearance.

Neighborhood Commercial Centers

Neighborhood commercial centers have been developed within the strip commercial areas along Watson Boulevard and Russell Parkway in Warner Robins, Sam Nunn Boulevard in Perry, and Highway 49 in Byron. The older centers have found it difficult to compete with the new suburban centers and have lost many tenants. Fortunately, however, several have recently been renovated and have found new tenants, thus maintaining the flow of tax monies and jobs, and preventing it from being a blight to the area.

As mentioned above, there have been new neighborhood commercial centers constructed in the suburban areas (along Highway 96) to keep up with the demand for retail and services of those residents moving to the area. In addition to Highway 96, another popular area for new neighborhood centers is along the Highway 247 Connector west of Houston Lake Road. These centers are taking advantage of the proximity to Galleria Mall and the growing population in Centerville and east Peach County.

An important aspect of the commercial development along Highway 96 is that the new centers are located at key nodal points (Houston Lake Road and Lake Joy Road). Local planners should take advantage of this nodal development by encouraging a mixture of residential, office, and retail development to occur along Highway 96 and connect them to these nodal areas with alternative transportation modes and appropriate access management. These concepts should be incorporated into the design of an improved and widened Highway 96. Enacting certain regulatory measures in the near future will likely prevent a reoccurrence of strip commercial development that has taken place along the major thoroughfares to the north; establish an attractive living, shopping, and working environment; reduce traffic congestion; and also establish a trend for development along other major thoroughfares likely to face commercial pressures such as Highway 127 and Perry Parkway. Such regulations are being recommended along the Russell Parkway Extension in hopes of accomplishing the above objectives. An overlay zoning ordinance was adopted in 2005.

Regional Commercial Centers

Regional commercial centers take on several forms in the WRATS Study Area; retail malls and specialty centers and large shopping centers anchored by big-box retail establishments. The largest retail center in the WRATS Study Area is the Galleria Mall located in Centerville at the intersection of Highway 247 Connector (Watson Boulevard) and Houston Lake Road. The Galleria Mall not only attracts customers from the study area, but also from many other cities and counties in the region. The size and importance of this retail center, along with the customer base it attracts, has led to the development of other satellite centers and retail/service/office

establishments along Houston Lake Road and the Highway 247 Connector. This area is likely to see continued commercial growth towards US 41 and Interstate 75; but as was mentioned in the strip commercial development and the regional commercial centers discussion above, it is recommended that development regulations be put into place that will encourage a greater mixture of uses, a pleasant and attractive street appearance, an increased reliance on alternative transportation modes, and which maintain the free flow of traffic along the Highway 247 Connector by reducing ingress/egress points on this major thoroughfare.

The one specialty center in the WRATS Study Area is the Peach Outlet Mall on Highway 49 in Byron. This center has taken advantage of its location near Interstate 75 (though it has lost and gained many different tenants over the years) to become an important retail center that attracts large numbers of people from the region and beyond. The widening of Highway 49 from I-75 to US 41 in Houston County again presents an opportunity for local planners to shape the way this area develops during planning period. Using the increased accessibility created by the widening project and the presence of the currently successful Peach Outlet Mall and South Industrial Park, in nearby Bibb County, lends itself to many creative ways of mixing existing and new residential/commercial development into an appealing entranceway to Peach and Houston Counties.

The remaining regional commercial centers within the WRATS Study Area are those that are being anchored by big-box retailers. These centers are located on Watson Boulevard in Warner Robins and Sam Nunn Boulevard in Perry. One of the biggest problems with regional commercial centers such as these is that the big-box retail establishment(s) has no loyalty to an area. Once another area becomes more attractive, the respective big-box retailer(s) will leave an existing center and move to the new one. This leaves an enormous vacant building or buildings in which to fill, many times remaining vacant for months or even years, thus impacting other commercial establishments in the area. Sections of Watson Boulevard are currently in the midst of such an experience. A new regional center has recently been built near Carl Vinson Parkway, while further to the east several older centers that were abandoned by the big-box retailers to go to this new center are struggling to find new tenants.

It is possible that a similar scenario may occur in the Perry area, particularly as the growth of that community is planned to move to the north and east. It is important to learn from the Watson Boulevard experience and establish a plan early to maintain this portion of Sam Nunn Boulevard as an important regional commercial center if and when a decision is made by the big-box retailers to vacate and move to other areas.

In all likelihood, the future land use plan will recommend new regional commercial areas in the WRATS Study Area. Local planners and community officials should take advantage of the time that they have between the now and when these centers will be built to prepare development scenarios for the respective areas and adopt the necessary regulations to successfully implement these scenarios. If one fails to learn from the past, they are doomed to repeat it.

Interstate Commercial Development

Commercial development that has occurred at the interstate interchanges at Highway 49 and the Highway 247 Connector are the typical uses that generally serve the interstate traveling public; service stations, restaurants and motels, and entertainment venues. Though there are land development regulations in place, there are no overall development plans for these areas that address building design and appearance, signage, ingress/egress, etc. These interchanges are opportunities to establish striking entranceways that will leave a positive and lasting impression on

the visitor about that community. These opportunities exist for the new interchanges at the Russell Parkway Extension and Highway 96 and the interstate corridor north to White Road.

Rural Convenience Commercial Development

Many people want to live and enjoy the rural life away from the frantic pace of urban life; however, they also want the reassurance they can drive a short distance to pick up necessity items without having to go back and face the traffic congestion in the city. Realizing this fact, a number of entrepreneurs with permission granted through the local zoning ordinances have constructed small commercial centers that meet this specific need. These centers that include a convenience food store, gas station, dry cleaners and possibly other related uses are situated throughout the WRATS Study Area. With the likely conversion of once rural areas to urban or suburban areas in the future, these centers will likely become prime locations for new neighborhood centers to serve this newly planted population base. Convenient commercial centers will still have their importance in the future, but will be relegated to a much smaller rural area in the WRATS Study Area.

Industrial

Industrial activity in the WRATS Study Area can be classified as either light industrial or heavy industrial. Light industrial uses are generally those operations where the effects of the industrial operation are not detectable beyond the boundaries of the property. Light industrial uses include warehousing and wholesale trade facilities. Heavy industrial uses contain most of the fabrication, processing, storage, and assembly operations in the community. These uses may generate noise, odors, and smoke that are detectable beyond the boundaries of the property.

Most of the light industrial activity is found within the Perry City Limits; the Airport Industrial Park in the northern part of the City, the industrial park along Valley Drive in the western section of the City, and a small industrial area off General Courtney Hodges Boulevard. The other large industrial area in the WRATS Study Area, dedicated primarily to light industrial uses, is along Highway 247 just south of Russell Parkway.

Heavy industrial uses are concentrated in the southern portion of Houston County along Highway 247/Highway 247 Spur/US 341. These include the Frito-Lay and Perdue Farms processing facilities and the Medusa cement plant. The remaining heavy industrial site in the study area includes several well-established companies; Tolleson Lumber Company and Davis Oil Company situated off Jernigan Street south of Perry's central business district.

In addition to those described above, there are several smaller industrial uses scattered throughout the Study Area. Though the industrial employment sector is relatively small compared to several of the other sectors of the WRATS Study Area economy, it will certainly gain in importance over the planning period in an effort by the local economic development strategists to diversify the economy and reduce its dependence on Robins Air Force Base.

Public/Institutional

By far, the largest public/institutional use in the WRATS Study Area is Robins Air Force Base. The other large public/institutional uses include: the Houston and Peach County Board of Education schools; the administrative offices; fire stations and law enforcement centers for the Cities of Byron, Centerville, Perry, and Warner Robins and Houston and Peach Counties; the University of Georgia Fruit and Nut Research Center off Dunbar Road; Middle Georgia Technical College; the Georgia National Fairgrounds and Agricenter; the Houston County Medical Center facilities in Warner Robins and Perry; and the Advance Technology Park that is the home of several university research centers designed to support Robins Air Force Base and the aerospace industries in the

area. There are also numerous public libraries, churches, cemeteries, and post offices scattered throughout the area.

Transportation/Communication/Utilities

The transportation/communication/utilities land use category includes the sites within the study area that are occupied by radio towers, telephone switching stations, electric substations and other similar uses. The largest of the T/R/C uses is the Perry-Houston County Airport. Though railroad and street/highway rights-of-way are included in this particular category, the acreage shown in Table 4 does not reflect this because of the extreme difficulty in determining an accurate acreage figure for these rights-of-way.

Park/Recreation/Conservation

Included in this land use category are the Oaky Woods Wildlife Management Area; the state park site south of Perry; the public and private golf courses; and the public parks, playgrounds, and recreation centers located within the six jurisdictions comprising the WRATS Study Area. Establishing new parks, recreation, and conservation areas should be an important priority for local governments during the planning period. It is critical that attention be brought to this matter rather quickly in order to protect potential areas of passive and active recreation and important conservation areas before they are consumed by urban development. The local governments in the WRATS Study Area should take advantage of state programs to acquire land to set aside for conservation and open space purposes or for the development of greenways, particularly in major wetland and floodplain areas. They should also strongly consider amending their regulations to encourage conservation subdivisions that allow for the clustering of housing units, thus freeing the remaining land for open space and passive recreation areas. A major metropolitan area has as its major responsibilities; to protect its sensitive natural resources, and to provide its residents with various recreational choices and places to live that are developed within natural surroundings.

Agriculture/Forestry

In terms of acreage, this is the largest land use category in the WRATS Study Area. Though most of the agricultural/forestry areas are presently situated south of Highway 127 and the Ocmulgee River floodplain in Houston County, there are still many parcels in the “urbanized” portion of the study area that still remain in this land use and provide excellent locations for infill-type development. These areas include: (1) the section between US 41 and Interstate 75 from White Road to south of Highway 96; and (2) portions of Dunbar Road, the Highway 96 corridor and the Byron area.

It is assumed that despite efforts for infill development in the areas mentioned above, many acres currently in agricultural/forestry usage will succumb to urban-type development. As was explained in the park/recreation/conservation section, local development regulations should be amended that will encourage developers to maintain portions of their sites for open space and conservation purposes, thus maintaining some semblance of the rural character within the urban setting. For those areas that are planned to remain in agriculture/forestry uses, the same development regulations should insure that such uses can be continued without intrusion and interference by urban uses.

Undeveloped/Vacant

Land that is served by public utilities, but has not been developed for a specific purpose is primarily located within the City of Perry, north and east of the City of Byron, and along the I-75 Corridor from White Road and Highway 96. As with tracts of agriculture/forestry land within the urbanized

portion of the WRATS Study Area, these undeveloped or vacant parcels become potential infill development sites. Several of above undeveloped areas will be reviewed in more detail in the next section under the corridor area perspective.

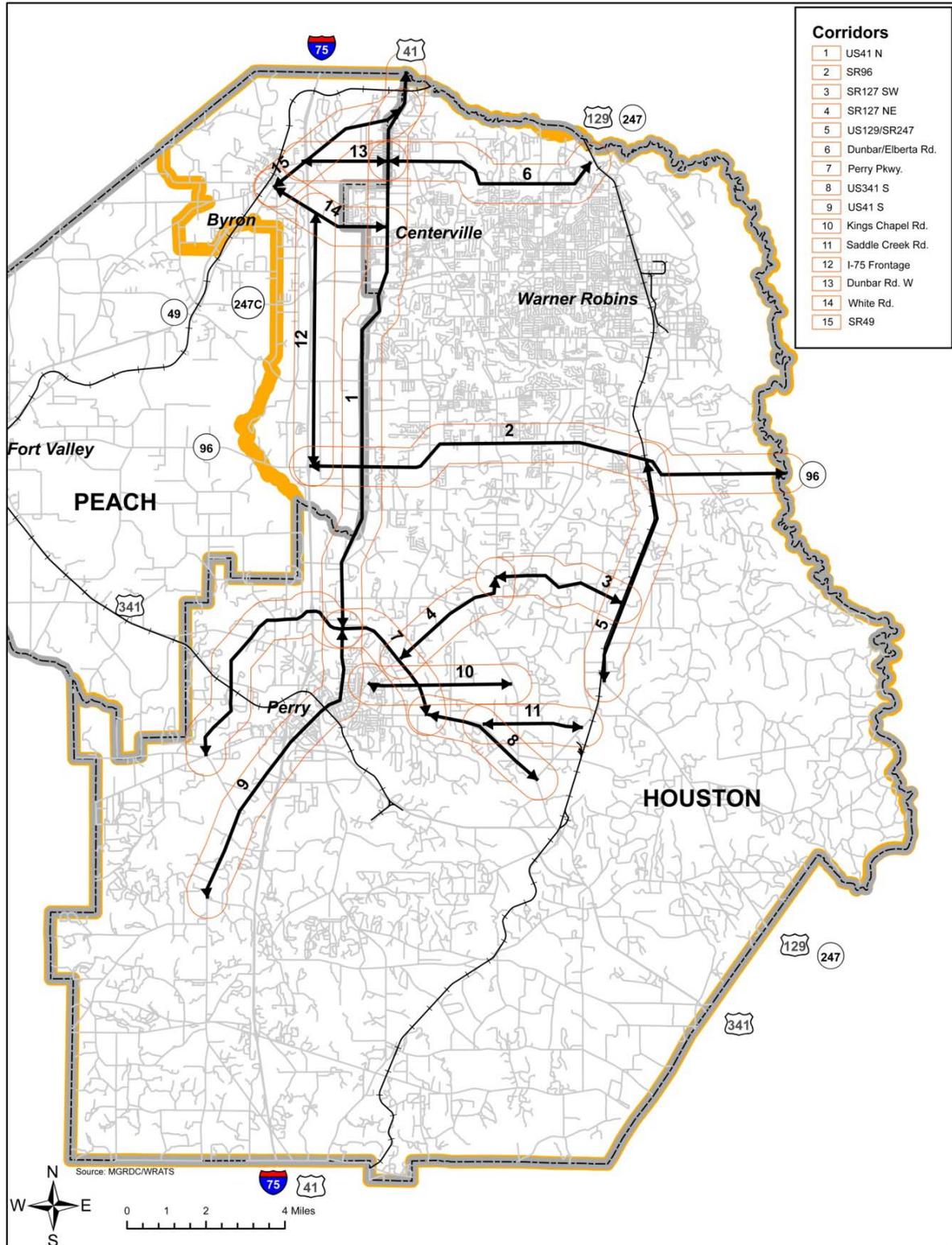
4.1.3 Corridor Area Perspective

There are certain highway corridors in the WRATS Study Area, according to local planning officials that are expected to see substantial land use changes during the planning period. These land use changes will, in turn, have a considerable impact on the surrounding highway system to accommodate the growth in traffic demand. With this in mind, a decision was made by the WRATS and Regional Commission staffs to study the land use and transportation characteristics of fifteen (15) high-growth highway corridors. These high growth corridors are depicted in Figure 4.2 This section will include a review of existing land use and 2006 Base Year and 2035 Network 5 Level of Service.

The corridors that have been selected for this study are as follows:

- Corridor 1: US 41 - North County Line to Perry City Limits
- Corridor 2: Highway 96 - I-75 to Ocmulgee River
- Corridor 3: Highway 127 - Houston Lake Road to SR 247
- Corridor 4: Highway 127 - Perry Parkway to Houston Lake Road
- Corridor 5: Highway 247 - Highway 96 to Highway 247 Spur
- Corridor 6: Dunbar Road/Elberta Road - Highway 41 to Highway 247
- Corridor 7: Perry Parkway - US 341 to Highway 224
- Corridor 8: Highway 341S - Perry Parkway to Highway 247 Spur
- Corridor 9: Highway 41S - Perry Parkway to Fire Tower Road
- Corridor 10: Kings Chapel Road - Highway 127 to Arena Road
- Corridor 11: Saddle Creek Road - Highway 341 to Highway 247
- Corridor 12: I-75 Frontage - SR 96 to White Road
- Corridor 13: Dunbar Road W - Highway 41 to I-75 and Highway 49
- Corridor 14: White Road - Highway 49 to Highway 41
- Corridor 15: Highway 49 - White Road to Highway 41

Figure 4.2
15 High Growth Corridors



Corridor 1: US 41 - North County Line to Perry City Limits

- Existing Land Use Conditions
 - Residential development consists primarily of single-family, low-density subdivisions and single-family units on large lots throughout the entire length of the corridor.
 - Commercial uses are concentrated at the intersections of other major thoroughfares; Highway 49, Highway 247 Connector, and the Perry Parkway.
 - Agriculture/forestry and undeveloped lots scattered along the corridor provide opportunities for infill residential development, with the exception of those close to the intersection of major thoroughfares where office and retail development is likely to occur.
- Level of Service (LOS) and Other Transportation Issues
 - Maintains a Base Year LOS C for most of the corridor except between White Road and Highway 247 Connector where it reaches LOS D/E.
 - In the Year 2035 Network 5, LOS problems exist between Highway 49 and White Road and in short segments between Highway 247 and Lakeview Road.
 - Numerous ingress/egress points on this major thoroughfare create serious conflicts with through traffic. The problem will likely get worse once the vacant parcels are developed.

Corridor 2: Highway 96 - I-75 to Ocmulgee River

- Existing Land Use Conditions
 - Residential development includes mixture of single-family, low-density subdivisions and single-family units on large lots.
 - Commercial development located at certain nodal points; Lake Joy Road, Houston Lake Road, and Highway 247.
- Level of Service and Other Transportation Issues
 - Some Base Year LOS problems beginning to show between Houston Lake Road and Moody Road. LOS problems persist in the 2035 Network between I-75 and Highway 11/US41 and from Houston Lake Road to east of Moody Road (despite proposed improvements); again emphasizing the importance of establishing an alternative transportation mode along the corridor, as well as controlling ingress/egress points to reduce conflicts with heavy through traffic.

Corridor 3: Highway 127 - Houston Lake Road to SR 247

- Existing Land Use Conditions
 - Primarily rural residential with many vacant parcels until Moody Road, then it begins to take on a suburban character.
- Level of Service and Other Transportation Issues
 - LOS D/E from Houston Lake Road to Moody Road in 2006 worsening to LOS F by 2035 with some LOS D to the east of Moody Road. Part of the design plan for this area is to insure that traffic congestion between Houston Lake Road and Moody Road does not worsen, while at the same time maintain as much as possible the good LOS for the remainder of the corridor.

Corridor 4: Highway 127 - Perry Parkway to Houston Lake Road

- Existing Land Use Conditions

- Very similar to Corridor 3 with its single-family developments and abundant vacant parcels gives the impression that this is an area in transition from rural to suburban with its two nodal points; Perry Parkway and Houston Lake Road ready to explode with more intense urban development
- Level of Service and Other Transportation Issues
 - Emerging LOS problems that were identified in the 2006 Network no longer exist in the 2035 Network due to a proposed widening project.
 - The key is to protect this LOS throughout the planning period while this corridor experiences enormous change in land use development. That is another reason for an effective design concept and for it being a possible character area.

Corridor 5: Highway 247 - Highway 96 to Highway 247 Spur

- Existing Land Use Conditions
 - An unusual mix of developments within this corridor; low-density, single-family residential with some strip commercial in the north to a primarily rural area in the south that is punctuated with a major heavy industrial use (Frito-Lay).
- Level of Service and Other Transportation Issues
 - Some limited LOS D beginning to show during the 2006 base year to the north of Bear Branch Road. The 2035 Network shows no LOS problems due to a proposed widening project.

Corridor 6: Dunbar Road E/Elberta Road - Highway 41 to Highway 247

- Existing Land Use Conditions
 - The transition from rural to urban is extreme along this major thoroughfare that cuts across the northern portion of Houston County. Heading east from Highway 41, it is entirely rural with some scattered residential and institutional uses. However, when going past General Lee Road, the scene transitions immediately to urban with its mixture of residential, commercial, industrial, and institutional uses that gives the appearance that the development occurred with little or no planning.
- Level of Service and Other Transportation Issues
 - LOS problems are beginning to show up on the 2006 base year network to the west of Carl Vinson Parkway with the remainder operating at LOS C or better, and the 2035 Network shows the LOS reaching E/F on this section, while it worsens to LOS D further east to its intersection with Highway 247.

Corridor 7: Perry Parkway - US 341 to Highway 224

- Existing Land Use Conditions
 - The corridor along the Perry Parkway has a very diverse land use mix. At the northern end near I-75 to US 41 there are residential, commercial, and industrial uses; between US 41 and US 341 there are residential, public/institutional, several parcels of commercial and numerous vacant parcels; and between I-75 and Highway 224, it is mostly vacant land on either side with an industrial park and a major residential retirement community sandwiched between.
- Level of Service and Other Transportation Issues
 - The 2006 and the 2035 Network shows the LOS as C or better. The ultimate challenge is to establish a design concept that will create an effective mixture of uses that will

allow traffic to move in such a manner as to not negatively impact on the Parkway's LOS.

- A system of bicycle/pedestrian trails should be investigated as part of the design concept for the Parkway to promote connectivity between the various uses and with the shared-use trail system under development in the City of Perry.

Corridor 8: Highway 341 S - Perry Parkway to Highway 247 Spur

- Existing Land Use Conditions
 - A predominately rural area that includes a major rural-residential single-family subdivision at its central point and heavy industrial uses to the south.
- Level of Service and Other Transportation Issues
 - The LOS is C or better on both the 2006 and 2035 Networks. The maintenance of this LOS is an essential ingredient for any development plan for this corridor.

Corridor 9: Highway 41 S - Perry Parkway to Fire Tower Road

- Existing Land Use Conditions
 - Beginning at Perry Parkway, most of the existing land use is highway commercial designed to serve the traveling public coming off I-75. Proceeding south, there is Georgia National Fairgrounds and Agricenter, with the remainder in agriculture/forestry use except for a few scattered residential and commercial uses. Just north of Fire Tower Road, the State of Georgia has completed work on the new Houston County State Park/Flat Creek Public Fishing Area that changes the diversity and intensity of the land uses in the area.
- Level of Service and Other Transportation Issues
 - LOS is C or better in the 2006 Base Year Network, but gradually worsens to LOS D in certain portions of this corridor by 2035.
 - Bicycle/Pedestrian trails should be strongly considered that connect the Agricenter with the Houston County State Park.

Corridor 10: Kings Chapel Road - Highway 127 to Arena Road

- Existing Land Use Conditions
 - In another corridor in the Perry area there is a stark contrast in land uses. At the beginning point on Highway 127, most of the development is low-density, single-family subdivisions with a few commercial uses between Highway 127 and Morningside Drive. East of Morningside Drive, the land use changes to mainly public/institutional (Morningside Elementary, Rozar Park, Houston County Public Works, State Detention Center, and the Houston County Administrative Center, Law Enforcement Center and Jail). Beyond the Perry Parkway, the area becomes almost entirely rural, though the construction of a new residential subdivision in this area provides a hint that changes will be taking place very soon.
- Level of Service and Other Transportation Issues
 - Both the 2006 and 2035 Network identifies a LOS of C or better. Maintaining this excellent LOS will have much to do on how the traffic is handled in the newly developed area between Perry Parkway and Arena Road.

Corridor 11: Saddle Creek Road - Highway 341 to Highway 247 Spur

- Existing Land Use Conditions
 - Another unique corridor with urban uses at both the beginning and its terminus, with rural uses in between. At its intersection with Highway 341, there is a large single-family subdivision; at the east end, there is the Perdue Farms property.
- Level of Service and Other Transportation Issues
 - LOS for 2006 and 2035 is C or better. Saddle Creek Road has potential as an important collector road between two major arterial highways and the anticipated transition to urban development along the corridor will require a close review of its LOS during the planning period. Regulating the ingress/egress points from the various developments that will occur in the area will help maintain a good flow of traffic and LOS.

Corridor 12: I-75 Frontage - SR 96 to White Road

- Existing Land Use Conditions
 - The east side of I-75 corridor consists of agriculture/forestry and undeveloped sites with scattered rural residential uses between Russell Parkway Extension and Hwy 96; the west side is almost entirely rural residential with several undeveloped parcels.
 - The Highway 247 Connector is the only interchange where highway commercial has taken place with most of these uses located south of the Hwy 247 Connector.
- Level of Service and Other Transportation Issues
 - The LOS is for the most part C or better on I-75 in the 2006 Network with some LOS D at the northern end of the corridor north of Highway 247C. During the next 25 years, the LOS becomes dramatically worse with LOS E and F shown in the 2035 Network between the north county line and the Russell Parkway; with LOS D south to the Perry Parkway.
 - The challenge mentioned earlier is an understatement; creating a development plan for the corridor where the LOS on I-75 and the connector roads from the east (Highway 247 Connector, Russell Parkway Extension and SR 96) are projected to be E or F. Any development plan will have to be closely coordinated with the highway improvement projects in the Long-Range Transportation Plan.

Corridor 13: Dunbar Road W - Highway 41 to I-75 and Highway 49

- Existing Land Use Conditions
 - This corridor is almost entirely developed with an array of urban uses; residential, commercial, industrial, and public/institutional (Byron Public Works and UGA Fruit and Nut Research Center). There are only a few vacant lots in the corridor, and those will likely soon see urban development.
 - Substantial residential growth that is occurring in Byron, northern Peach County and into neighboring Crawford County will greatly impact this corridor because of the increased traffic that will be generated by these developments and the desire of this traffic to go to Warner Robins and Houston County.
- Level of Service and Other Transportation Issues
 - The section of Dunbar Road between US-41 and I-75 begins to show LOS D in the 2006 Base Year network. The lack of a bridge connection over I-75 skews the traffic projections on Dunbar Road east of the interstate because the desire line is to Warner Robins and Houston County; but this movement can only be handled by the frontage

road coming from Highway 49--not very desirable from a motorist standpoint, thus traffic is routed by the model to White Road or Highway 49.

- Highway 49 and White Road are not going to be able to handle all of the new traffic generated by anticipated development without improvement. Serious discussion will have to take place with WRATS and DOT officials about a new bridge over the interstate to reduce the traffic loads on Highway 49 and White Road, and to establish another viable route to Warner Robins, Houston County, and Robins Air Force Base.
- As Dunbar Road takes on greater importance in the future, an extension is needed from US 41 to connect it with the Dunbar Road on the east side. This will insure a free flow of traffic from the Byron area to SR 247.

Corridor 14: White Road - Highway 49 to Highway 41

- Existing Land Use Conditions
 - I-75 provides an important demarcation between the more intense urban uses on the west to the more rural and rural residential setting to the east. It is highly unlikely that the development patterns east of I-75 will remain as they are in the near future, due to the enormous housing demand and the increased importance of White Road as a major travel route to Warner Robins and Houston County from Byron, northern Peach County, and Crawford County.
- Level of Service and Other Transportation Issues
 - LOS along White Road begins to show LOS D/E in the 2006 Base Year network and gradually worsens during the planning period. However, improvements on New Dunbar and Dunbar Roads mentioned above may result in improvements to the LOS on White Road. In any event, traffic volumes should be closely monitored along White Road to capture any changes to the LOS as they occur.
 - White Road has the potential of being an excellent alternative transportation route between Byron and Warner Robins/Houston County, thus any development or road improvement plans should incorporate such a route.

Corridor 15: Highway 49 - White Road to Highway 41

- Existing Land Use Conditions
 - The corridor has three distinct land use sections: (1) White Road to Interstate 75 - includes highway commercial uses that serve the highway traveling public coming from the interstate, a regional specialty mall, community commercial that serves residents in Byron and the surrounding area and several residential subdivisions and public/institutional uses; (2) West of the Peach Outlet Mall to Highway 49 - includes several residential subdivisions, the UGA Fruit and Nut Research Center, and several large vacant parcels; and (3) Intersection around Highway 41 - combination of residential, commercial, and public/institutional uses. To the north and west of the interchange of I-75 and Highway 49 a new freight logistics center is currently planned.
- Level of Service and Other Transportation Issues
 - The 2006 network shows LOS E/F to the northeast of the I-75 interchange. This should be improved by a near term widening project on Highway 49 between I-75 and Highway 11/US41 but again shows LOS E/F by 2035. Proposed Dunbar Road and White Road improvements should help.
 - Highway 49 will likely remain a major route for traffic headed for Bibb County and portions of Houston County. As Dunbar Road and White Road take on greater

importance, some of the traffic currently going to Warner Robins, Houston County, and Robins Air Force Base will be diverted to these routes and help with the LOS on Highway 49.

4.2 Future Land Use Plan

This report incorporates recommended future land use plans for the WRATS Study Area that were developed as part of the 2006 Houston and Peach County Joint Comprehensive Plans. These Comprehensive Plans embody the development trends and utility expansion plans that are occurring in their respective jurisdictions, and the collective insights of planning and zoning officials from their constituent communities. The Comprehensive Plans drew their future transportation system assumptions from the 2030 WRATS LRTP. This interrelation between the region's Comprehensive Plans and LRTP ensures consistency between the regions land use and transportation objectives.

Figure 4.3 illustrates the recommended future development plan for the WRATS Study Area from the 2006 Houston and Peach County Joint Comprehensive Plans. Because the future land uses from the Joint Comprehensive Plans are a blend of character area overlays and land use categories, these had to be related back to changes in residential, commercial and industrial development for use in the 2035 WRATS LRTP.

This plan was formulated using the data analysis presented earlier in the report and the policy statements that were outlined in the previous section. The existing land use maps displayed earlier in the report showed parcels that were in agriculture/forestry or undeveloped uses. The future land use plans attempt to establish specific uses for most of the agriculture/forestry and undeveloped property identified on the existing land use maps knowing that some of the parcels will continue to be used for agriculture/forestry uses or remain vacant throughout the planning period. It is impossible to determine where and how much land will be developed for what purpose; therefore, a determination was made as to the best possible use of the land with the knowledge available.

With the exception of the Ocmulgee River floodplain, no new parks/recreation/conservation areas were identified. It is obvious that the general public will demand new passive and active recreation and conservation/greenspace areas in the future. There are many different factors, however, that the state and local governments will have to consider before deciding on the location of these areas, including the policy statements above on natural/historic resources thus the decision not to recommend any new p/r/c areas outside the Ocmulgee River floodplain.

The same holds for new public/institutional and transportation/communication/utilities uses. Again, like recreation and conservation uses, there will be a need and a demand for new police and fire stations, schools, libraries, post offices, churches, utility substations, radio towers, and the like during the planning period. However, as with p/r/c uses, many variables will need to be considered by the public and/or private sectors before decisions can be reached on their specific locations.

With this in mind, the focus was then placed on determining the future location of residential, commercial, and industrial uses and the different degrees of intensity of these uses. The 2006 Houston and Peach Counties Joint Comprehensive Plans further refine future land use. The information from these plans was incorporated in the 2035 LRTP analysis and recommendations.

One other factor that was considered was the recently completed 2035 Macon Area Transportation Study (MATS) Long-Range Transportation Plan. It was the opinion of the RC staff that the

proposed transportation improvements for this study match as closely as possible with those used in the MATS study in order to show the continuity between the planning processes.

4.2.1 Future Land Use Definitions

Outlined below are the residential, commercial, and industrial land use definitions used in the WRATS 2035 LRTP. These definitions are different than those used for the Joint Comprehensive Plans for Houston and Peach Counties; though a number of categories are similar. ***The description in parentheses next to each land use definition below shows the Joint Comprehensive Plan land use categories associated with that land use.***

In order to determine the changes in residential, commercial and industrial development, the future land use categories in the Houston and Peach County Joint Comprehensive Plans had to be equated to existing land use categories used in the WRATS LRTP. The future land use categories are somewhat different than the existing land use categories and there is some variation in the categories between Houston and Peach counties. Future land use categories accommodate more mixed use development and allow for differing intensity of land uses within some categories. These future land uses were used in part to determine the location of population, households and employment for analysis of future transportation needs.

Future Land Use Definitions used for the WRATS 2035 LRTP

Residential

- **Rural Residential (Rural Residential)**
 - District meant to preserve rural character of outlying areas of WRATS Study area.
 - Homes on large-lot subdivisions (under one unit per acre) and agricultural/ forestry uses are expected in this district.
 - Public sewer is not anticipated in this district.
- **Suburban Residential (Suburban and Developing Suburban Residential)**
 - District promotes single-family detached dwellings in subdivision settings with higher density single-family attached at appropriate locations.
 - Mixed-use developments that are predominately single-family in nature but may include single-family attached.
 - Smaller single-family lots that are ¼ to ¾ acres in size would be appropriate.
 - Other appropriate housing types are condominiums and senior citizen housing.
 - Smaller lot developments, cluster developments, and attached/multi-family developments should incorporate substantial park or open space.
 - Mixed use developments which contain small scale commercial or office in addition to residential uses may be allowed, where appropriate.
 - Small scale office developments may be located at appropriate locations to serve a small market area in nearby neighborhoods.
- **Urban Residential (Downtown, Neighborhood, Crossroads and Corridor Residential)**
 - District may include such residential uses as single-family houses; single-family attached and multi-family developments along with nearby small-scale neighborhood convenience retail and services that are intended to serve the needs of the immediate surrounding neighborhood.
 - Developments higher in density than in rural or suburban subcategories should be expected in this classification.

- Office conversions in single-family residences may be suitable along major thoroughfares where appropriate in this classification. Scale, compatibility, and protection of residential properties are key issues to the appropriateness of the use.
- Mixed-use village development concept should be considered which allows a variety of residential uses along with small-scale retail and office uses that are blended together under a specific design concept.

Commercial

- **Office (Downtown, Cross Roads Town Center, In Town Corridor, and Regional Activity Center)**
 - Various types of professional, corporate, and administrative office establishments including stand-alone offices, multi-tenant establishments and office supply stores are appropriate in this classification. This district may also include office/warehouse or service centers where deemed appropriate.
- **Community Commercial (Neighborhood, In Town Corridor, and Outlying Corridor)**
 - Retail sales, office, and service uses with the largest establishments being less than 100,000 square feet of floor area, and whose market is primarily community-oriented are expected in this district.
 - Mixed use center concept that allows a variety of retail and office uses with limited residential development that is brought together by a specific design concept on a large tract may be expected.
- **Regional Commercial (Regional Activity Center, Major Highway Corridor)**
 - Retail sales, office, and service uses that support commercial establishments of over 100,000 square feet of floor space whose market is predominately regional in nature are expected. Uses are to be located on highways and major thoroughfares.
- **Central Business (Downtown, Cross Roads Town Center)**
 - Uses include a mix of residential, commercial, and light industrial that are compatible and appropriately scaled to encourage the continued pedestrian nature and ambiance of the downtown area.

Industrial

- **Light Manufacturing (Robins AFB and Environs, Regional Activity Center)**
 - Effects of the industrial operation are not detectable beyond the boundaries of the property.
 - Includes warehousing and wholesale trade facilities
- **Heavy Manufacturing (Major Highway Corridor, Industrial)**
 - Contain most of the fabrication, processing, storage, and assembly operations in the community.
 - Areas designated for heavy manufacturing may generate noise, odors, and smoke that are detectable beyond the boundaries of the property.

Future Land Use Definitions in the Houston and Peach County Joint Comprehensive Plans

Downtown

- There are four distinct downtown districts within the study area: Byron, Centerville, Perry, and Warner Robins. While the downtowns are well established in Byron and Perry, Centerville and Warner Robins seek to develop more identifiable downtowns.
 - The specific land uses that will be allowed in the Downtown Districts will be as follows: Community Commercial, Public/Institutional, PUD development, Residential Development, Office, and Mixed Use.
 - Downtown districts seek to foster a mix of transportation alternatives, and accommodate and encourage pedestrians and bicyclists
 - Downtown districts may adopt urban design standards to enhance the character and quality of development

Historic District

- There are several distinct historic districts within the study area in Byron, Perry, Elko, and Henderson. Historic districts maintain the integrity of site plans, building design, and landscaping ensure that such resources are not lost within the community.
 - Uses include a mix of Residential, Commercial, Parks/Open Space, small scale Office, Public/Institutional and mixed use where appropriate
 - Generally include preservation and enhancement of pedestrian access and streetscapes

Declining Neighborhood

- Peach County seeks to redevelop declining neighborhoods in the community while at the same time preserving the history and identity of these neighborhoods.
 - Uses include a mix of Residential, Commercial, and Parks/Open Space
 - Accommodate a mix of transportation alternatives

Traditional Neighborhood

- Primarily auto oriented single family housing and subdivisions.
 - Uses include Single-Family Residential, Neighborhood Commercial, Public (especially schools), Parks/Open Space, and mixed use as appropriate to the area.
 - Auto oriented but may accommodate pedestrians and bicyclists within neighborhoods and should be redeveloped to improve pedestrian and bicycle access

Neighborhood Commercial

- Commercial uses oriented toward serving a neighborhood or localized area within a city.
 - Uses include Single-family residential, Multi-family residential, Light commercial uses, Small Scale Office where appropriate, Mixed use developments, which contain small-scale commercial or office in addition to residential uses, where appropriate.
 - Public/institutional uses such as schools, police and fire stations, library, post office, government and utility office buildings, and churches

In Town Corridor

- Mixed use character/overlay area that promotes: growth, employment options, open space preservation, housing alternatives, transportation alternatives, and a sense of place.
 - Uses include a mix of urban residential, commercial uses, and community facilities at a scale and proximity to encourage walking between destinations

- May include urban design standards including signage, landscaping, landscape buffering of parking lots, reduced parking requirements, on site storm water retention or detention, and pedestrian and bicycle accommodation,

Regional Activity Center

- Mixed use character/overlay area that promotes: employment options, housing opportunities, transportation alternatives, infill development, support for traditional neighborhoods, and a sense of place.
 - Uses include Industrial; Commercial; Single-Family Residential; Manufactured Housing, Multi-Family Residential, Mixed-Use Developments; Office; Institutional uses including hospitals, nursing homes, and assisted living facilities; and Public uses including schools, police and fire stations, library, post office, government and utility office buildings, and churches
 - May include both architecture and urban design standards to promote compatible character and quality of development
 - Permitted uses vary by regional activity center

Outlying Corridor

- Rural or Suburban Mixed use character/overlay area that promotes growth, employment options, open space preservation, housing alternatives, transportation alternatives, and a sense of place.
 - Permitted land uses depend on the specific character of these corridors

Crossroads Town Center

- Primarily located along major thoroughfares and intersections, these character/overlay areas promote: regional identity, growth preparedness, appropriate businesses, educational opportunities, employment opportunities, historic preservation, open space preservation, environmental protection, transportation alternatives, and a sense of place.
 - Uses include Single-family residential, Multi-family residential, Mixed use developments, Public/institutional uses such as schools, police and fire stations, library, post office, government and utility office buildings, and churches

Crossroads Community

- Character Area overlay includes seven small communities located within the unincorporated areas of Houston County: Bonaire, Kathleen, Clinchfield, Haynesville, Grovania, Elko, and Henderson, which seeks to preserve the existing character of these communities.
 - Permitted land uses depend on the specific character of these locations which range from strictly industrial to purely residential

Robins Air Force Base and Environs

- Character Area overlay identified for areas within or in the vicinity of Robins Air Force Base that present issues of compatibility related to security, noise and accident potential.
 - The vision for these areas is a gradual transition of use towards those compatible with the mission requirements as described in the recently completed Joint Land Use Study

Major Highway Corridor

- Character area overlay in Peach County which envisions the development of corridors that present an attractive welcome to visitors as well as depicting a thriving and progressive community.
 - Focus on commercial zoning at Interstate interchanges and clustering high-density development at nodes along major corridors, separated by areas of open space or attractive residential development.

- Should include appropriate access management, signage, landscaping, lighting and pedestrian and bicycle accommodation as appropriate

Industrial

- **Light Manufacturing**

- Effects of the industrial operation are not detectable beyond the boundaries of the property.
- Includes warehousing and wholesale trade facilities

- **Heavy Manufacturing**

- Contain most of the fabrication, processing, storage, and assembly operations in the community.
- ⊖ Areas designated for heavy manufacturing may generate noise, odors, and smoke that are detectable beyond the boundaries of the property.

Airport Hazard

- Overlay zoning to restrict development in the vicinity of the Perry-Fort Valley Airport

Developing Suburban

- Character area in rapidly growing portions of Peach County that seeks to promote moderate density, traditional neighborhood development style residential subdivisions.
 - New development should be master-planned with mixed-uses, blending residential development with schools, parks, recreation, retail businesses and services.
 - Mix of appropriate housing types, densities, and prices in the same neighborhood.
 - Good vehicular and pedestrian/bike connections to retail/commercial services.
 - Promote street design that fosters traffic calming such as narrower residential streets, on-street parking, and addition of bicycle and pedestrian facilities.
 - Addition of neighborhood/village commercial centers on appropriate infill sites to serve surrounding neighborhood.

Suburban Residential

- District promotes single-family detached dwellings in subdivision settings with higher density single-family attached at appropriate locations.
 - Mixed-use developments that are predominately single-family in nature but may include single-family attached.
 - Smaller single-family lots that are ¼ to ¾ acres in size would be appropriate.
 - Other appropriate housing types are condominiums and senior citizen housing.
 - Smaller lot developments, cluster developments, and attached/multi-family developments should incorporate substantial park or open space.
 - Mixed use developments which contain small scale commercial or office in addition to residential uses may be allowed, where appropriate.

Rural Residential

- District meant to preserve rural character of outlying areas of WRATS Study area.
 - Homes on large-lot subdivisions (under one unit per acre) and agricultural/ forestry uses are expected in this district.
 - Public sewer is not anticipated in this district.

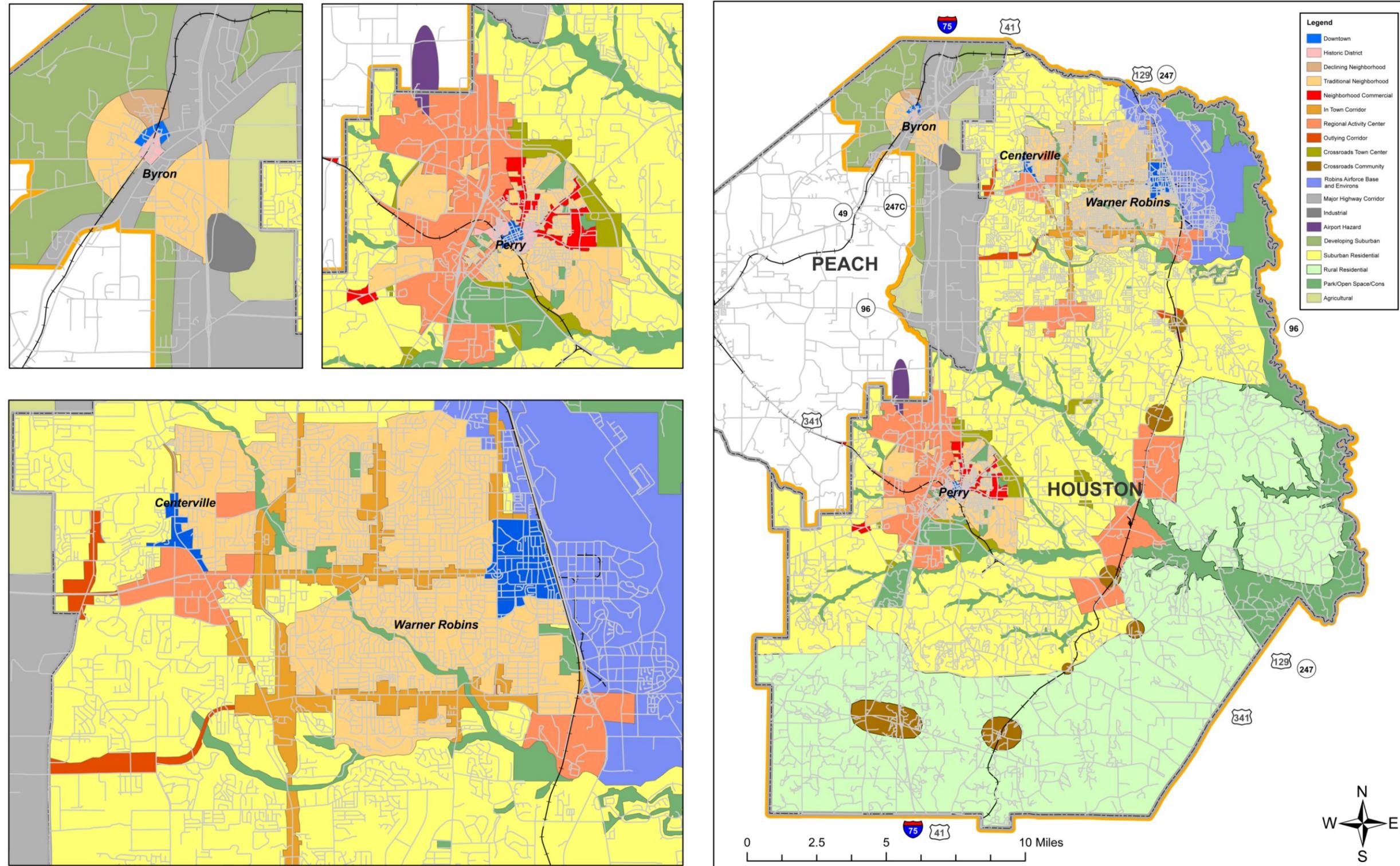
Park/Open Space/Conservation

- A character area in Houston County that includes the wetland and floodplain areas around the Ocmulgee River and major streams in the unincorporated area and Houston County/Flat Creek State Park that seeks to preserve natural habitat, provide public access to undeveloped land and recreational areas.

Agricultural

- Agricultural land uses and preservation of agricultural lands and open space in Peach County

Figure 4.3
Future Development Map



4.2.2 Total Study Area Perspective

Residential

Urban Residential land use is expected by Year 2035 to encompass the area from the Bibb/Houston County line south to Highway 341S/Highway 247 Spur including the City of Perry, the City of Byron, and the unincorporated areas of Peach County. Another area of urban residential is all of the area north and east of Highway 247 to the Ocmulgee River floodplain and Robins Air Force Base. This is dependent on the City of Warner Robins and the City of Perry providing the necessary sewerage service within their respective service areas. It is also assumed, as stated earlier, that some of the existing agriculture/forestry and undeveloped land that has been designated as for urban residential uses will still remain in that use.

Because there is considerable amount of land designated as urban residential does not give license to the continuation of the existing sprawl development. Instead, local communities should follow the policy statements established in the previous section that calls for a phased expansion of the urban development boundary line that is coordinated with water and sewer infrastructure expansion. In addition, a closer look needs to be taken to redevelop the older sections of the WRATS Study Area, and encourage mixed-use developments that attract both residents and businesses to this area and, in turn, help to curb sprawl.

Suburban Residential is planned to expand south and west of the City of Perry and east of Highway 247 Spur to Highway 247. The southern boundary will be Felton Road, Firetower Road, Pyles Road, and Grovania Road. To accommodate the growth, the City of Perry will likely have to expand sewer service to this area necessitating a change in the service delivery map, and Houston County will more than likely have to expand the water systems that serve the southern section of the county. It would be desirable that this type of growth not occur in this area until much later in the planning period, and instead focus the growth and public water/sewer infrastructure investment in the urban residential areas, including redeveloped areas of the older sections of the WRATS Study Area.

Rural Residential and rural life in general will still have a place in the WRATS Study Area in the next 25 years. There will be opportunities for citizens who want to have a residence on a large lot or who want to farm or harvest timber to do so. The area south of Felton Road, Firetower Road, Pyles Road, and Grovania Road to the county line, and the area south and east of Highway 247 to the Ocmulgee River have been mostly classified as rural residential. At the present time, the Houston County water systems serving these areas appear to have adequate capacity to handle the growth in the areas designated for rural residential in the foreseeable future.

Commercial

Because of the continued growth in the service and financial/insurance/real estate employment sectors over the planning period, there will be considerable demand for **office** use in the WRATS Study Area. Many of the offices will likely be located in the community and regional commercial areas, as part of mixed use villages and centers located along the major thoroughfares. Specific office use sites have been identified in the Future Land Use Plan for the Perry Parkway. It is very possible that the Perry Parkway could become the major office center in the study area, housing many professional, corporate, and administrative establishments either in stand-alone buildings or part of a multi-tenant establishment. These office complexes could also be part of

large mixed-use developments that include residential, commercial, and entertainment uses creating significant work, live, play, and shop environments that become alternatives to the separate sprawl-like environments of today.

As growth in the WRATS Study Area expands in the urban boundary area, there will be need for additional retail and service uses to meet the needs of the new residents. As was briefly mentioned in the existing land use narrative, lessons from the past are learned and the existing strip-type commercial should not be duplicated in the future. Instead, **community commercial** areas should be concentrated along specific nodal points (intersections) on major thoroughfares, and possibly these nodal commercial areas be connected to the residential areas by bicycle/pedestrian trails eliminating the need for the automobile. These community commercial areas have been recommended in the Future Land Use Plan on Highway 96, Highway 127, Highway 247, and Perry Parkway, US 41 at Dunbar Road, White Road, and Saddle Creek Road. The only “strip commercial” suggested in the Future Land Use Plan is along Highway 49 near Byron. It is strongly suggested that in this area, a design plan be developed to give specific details on how this area should be developed, and an overlay district be established along this corridor to implement this design plan.

In addition to those that currently exist, there will be a demand for large commercial areas that serve a regional market or interstate travelers. To satisfy this demand, the future land use plan has identified certain areas of the WRATS Study Area for **regional commercial** use. Most of the new regional commercial areas are expected to occur at or near the Highway 247 Connector and Russell Parkway Extension Corridors from Highway 41 to Interstate 75, and in close proximity to the Highway 49/I-75 interchange in Byron. Regional Commercial uses have also been identified for Highway 96 near Houston Lake Road and Russell Parkway close to its intersection with South Davis Drive. As has been expressed throughout this report, it is strongly encouraged that these new regional commercial uses not stand alone, but instead be connected with other uses, such as residential and light industrial uses to provide work, live, and shop environments that will entice new residents and create alternatives to sprawl.

The Cities of Byron and Perry are the two communities in the WRATS Study Area that have definable **Central Business Districts**. The City of Byron is a Better Hometown Community and as result of this designation, has a committee that works on different aspects to improve the downtown area, including design, marketing, and accessibility. In addition, the Byron Better Hometown Committee receives technical assistance from the Georgia Department of Community Affairs and the University of Georgia when requested. During the development of the Regional Bicycle/Pedestrian Plan, the RC staff met with representatives from the Byron Better Hometown Program to discuss bicycle/pedestrian access to their downtown. As a result of these discussions, a plan was developed to construct new sidewalks and allow for improved bicycle accessibility through shared-lane facilities.

The City of Perry, though not a designated Better Hometown or Main Street Program, has taken great strides in providing a quality downtown area for its residents and visitors. One of these improvements includes increasing accessibility for pedestrians and bicyclists. As a result of TE grant, facility improvements are being made along General Courtney Hodges Boulevard to provide greater pedestrian/bicyclist access between the Georgia National Fairgrounds and Agricenter and the downtown area. It is hoped that through these facility improvements, visitors to the Agricenter will be encouraged to walk or ride a bicycle instead of taking an automobile to downtown. In addition to this specific improvement, the City of Perry has an ambitious plan to

establish a shared-use trail system throughout the entire community that will connect to the downtown area.

A resource team from the Georgia Department of Community Affairs prepared a report outlining recommendations to revitalize the older commercial and residential areas of the City and to encourage infill development. One of the recommendations was related to the Commercial Circle area, which at one time was the “CBD” of Warner Robins. A satellite campus of Macon State College has recently been constructed in close proximity to Commercial Circle. It is believed that this will set the stage for future construction and renovation in the area and an opportunity for Commercial Circle and the neighboring commercial areas to again bask in the glory it once held 50 years ago.

Industrial

Recent newspaper articles have decried the lack of new industrial development in portions of the WRATS Study Area. It is very clear that industrial development has taken on a very different appearance than it did 20 or 30 years ago. Though there have been some recent developments related to new heavy industrial expansion over the last several months, and certainly there will be some additional land needed for new or expanded heavy industrial use over the planning period, the movement has been to accommodate light industrial and wholesale/warehousing type activities. Recent studies completed on the diversification of the area’s economy confirm this trend and recommend new industries that will create quality jobs, take advantage of resources and technologies that are located within the study area, increase the tax base, while at the same time having little or no impact on the area’s environment.

Realizing this fact, local planners are recommending three new **light industrial** areas for the WRATS Study Area and suggesting two existing industrial areas move in this same direction. The three new areas are the I-75 Corridor between White Road and Russell Parkway Extension, the redevelopment of an old commercial use area along Highway 247 north of Watson Boulevard, and the third is part of an existing technology park which takes advantage of the university research centers already in the park. The first is located next to a major highway providing interstate connections and would be excellent for warehousing or other light industries that need interstate access or high visible exposure. The second provides an outstanding location next to Robins Air Force Base which should attract new light industrial uses that would benefit from such a location. One recent success at this second location is the proposed GRAMP project, a joint development by Robins Air Force Base and the City of Warner Robins. The proposed project includes the construction of an approximately 420,000 square foot aerospace industrial complex on approximately 90 acres of land owned by the City of Warner Robins adjacent to Robins AFB. The proposed complex will facilitate a Public-Private Partnership between the Warner Robins Air Logistics Center (WR-ALC) and private industry to share weapon system sustainment capabilities in order to improve aircraft availability and reduce costs. The third location would take advantage of the university research centers already in the park. New, small light industrial uses could utilize the research and development technologies from these centers and manufacture items based on these new technologies.

The two existing industrial areas being proposed to move in this direction are located in the City of Perry; the Perry Industrial Park off Valley Drive and the Airport Industrial Park just off I-75/Thompson Road interchange.

Heavy Industrial uses have not been forgotten in the Future Land Use Plan. In addition to the current Frito-Lay, Medusa, and Perdue Farms sites and the heavy industrial area off Jernigan

Street, the Plan calls for the expansion of the Warner Robins Industrial Park west of its current location off Booth Road.

It is in all likelihood that future light and heavy industrial sites will gain additional attention during future local comprehensive planning processes in both Houston and Peach Counties. As discussions take place with local economic and policy officials and citizens during this process, the locations of future industrial areas and the types of uses allowed in those areas may change. This narrative was an attempt to establish an initial discussion point for all concerns.

4.2.3 Corridor Area Perspective

Along with looking at future development for the WRATS Study Area as whole, a future land use plan has been developed for fifteen (15) corridors that will experience significant land use changes and impacts to the surrounding transportation network caused by these changes over the course of the planning period. This section provides an overview of the recommended future land use, highway projects that have been identified in the WRATS 2035 Long-Range Transportation Plan, pedestrian/bicycle facilities recommended in the Regional Bicycle/Pedestrian Plan, and other transportation issues.

The corridors that were identified in the future land use plan include:

- Corridor 1: US 41 - North County Line to Perry City Limits
- Corridor 2: Highway 96 - I-75 to Ocmulgee River
- Corridor 3: Highway 127 - Houston Lake Road to SR 247
- Corridor 4: Highway 127 - Perry Parkway to Houston Lake Road
- Corridor 5: Highway 247 - Highway 96 to Highway 247 Spur
- Corridor 6: Dunbar Road/Elberta Road - Highway 41 to Highway 247
- Corridor 7: Perry Parkway - US 341 to Highway 224
- Corridor 8: Highway 341S - Perry Parkway to Highway 247 Spur
- Corridor 9: Highway 41S - Perry Parkway to Fire Tower Road
- Corridor 10: Kings Chapel Road - Highway 127 to Arena Road
- Corridor 11: Saddle Creek Road - Highway 341 to Highway 247
- Corridor 12: I-75 Frontage - SR 96 to White Road
- Corridor 13: Dunbar Road W - Highway 41 to I-75 and Highway 49
- Corridor 14: White Road - Highway 49 to Highway 41
- Corridor 15: Highway 49 - White Road to Highway 41

Corridor 1: US 41 - North County Line to Perry City Limits

- Future Land Use
 - Residential development will consist of urban residential uses. Considerable amount of vacant land exists in this corridor and provides great opportunity of infill development.
 - Commercial uses will be primarily community commercial along Highway 49, White Road/Thomason Road intersection, and near the Perry Parkway; regional commercial uses along Highway 247 Connector and Russell Parkway Extension.

- Transportation Issues
 - The LRTP recommends a long-range project from SR 49 to Russell Parkway; and illustrative projects from Russell Parkway to Mossy Creek, and from Mossy Creek to SR 127, should additional funds become available.
 - The WRATS Bicycle and Pedestrian Facilities Plan recommends signage in the short-term and 4' bike lane in the long-term.
 - Numerous ingress/egress points on this major thoroughfare create serious conflicts with through traffic. Suggest greater access control along this corridor once the vacant parcels are developed.

Corridor 2: Highway 96 - I-75 to Ocmulgee River

- Future Land Use
 - Residential development will be urban residential uses.
 - Commercial development will be community commercial between Lake Joy Road to Houston Lake Road, and the Moody Road and SR 247 intersection; regional commercial east of Houston Lake Road.
 - Great potential for a character area; with an excellent design concept, the existing residential, institutional, and commercial developments and vacant parcels can be transformed into a showcase mixed-use area connected by bicycle/pedestrian trail system., not to mention that the corridor has two outstanding anchors; I-75 and the Ocmulgee River.
- Transportation Issues
 - LRTP recommends short-range projects from I-75 to SR 87 in Twiggs County all through the corridor. These projects are already programmed in the TIP.
 - The WRATS Bicycle and Pedestrian Facilities Plan recommends signage and four-foot bike lane in the short-term.

Corridor 3: Highway 127 - Houston Lake Road to SR 247

- Future Land Use
 - Residential development will be exclusively urban residential uses.
 - Community commercial development will be at the intersections of Houston Lake Road, Talton Road, and Highway 247.
 - Light industrial use will continue near the intersection of Highway 247.
 - Excellent potential character area; can benefit from a good design scheme where a current beautiful rural/suburban setting begins to transition to more intense urban uses over the planning period.
- Transportation Issues
 - LRTP recommends mid-range project from Bear Branch Road to Moody Road; long-range project from SR 247 to Moody Road.
 - WRATS Bicycle and Pedestrian Facilities Plan recommends a four-foot bike lane in the long term.
 - Considerable amount of vacant land in the corridor provides opportunities for new residential subdivisions, thus access to these new subdivisions from this major thoroughfare should be monitored closely in the future to maintain proper traffic flow.

Corridor 4: Highway 127 - Perry Parkway to Houston Lake Road

- Future Land Use
 - Residential use projected to be urban residential.
 - Office use planned near the Perry Parkway, with community commercial limited to the intersection of Houston Lake Road.
 - Excellent potential character area; unlike Corridor 3 to the east, Corridor 4 will see the transition to urban uses much sooner, thus will need a good design plan to avoid the situation that has occurred along Watson Boulevard and Russell Parkway to the north.
- Transportation Issues
 - LRTP recommends mid-range project from Bear Branch Road to Moody Road.
 - The WRATS Bicycle and Pedestrian Facilities Plan calls for sidewalks and bike signs in the short-term and four-foot bike lane in the long-term.
 - The key is to protect this LOS throughout the planning period while this corridor experiences enormous change in land use development. That is an important reason for effective access control and land use design plan along the corridor.

Corridor 5: Highway 247 - Highway 96 to Highway 247 Spur

- Future Land Use
 - Residential use is expected to be urban residential.
 - Community Commercial will be located near Highway 96, along Highway 247 south of Highway 96, and at the intersection of Highway 127.
 - Heavy industrial use will likely remain east of Highway 247 and south of Oakey Woods Road (Frito-Lay)
- Transportation Issues
 - LRTP recommends mid-range project from SR 96 to SR 247 Spur.
 - No bicycle/pedestrian facilities are planned for this corridor.

Corridor 6: Dunbar Road E/Elberta Road - Highway 41 to Highway 247

- Future Land Use
 - Urban residential uses are planned for this corridor.
 - Community commercial has been recommended for the intersections at North Houston Lake Road, Carl Vinson Parkway, Sullivan Road, North Houston Road, Highway 247, and several other parcels scattered throughout the corridor.
 - Light industrial will continue at the intersection of Carl Vinson Parkway, between Sullivan and Fairground Roads, and at the intersection of Highway 247.
 - Outstanding potential for character area between Highway 41 and General Lee Road - It is an absolutely stunning area with its outstanding scenery and peaceful rural character. Because of its intrinsic beauty, this section of Dunbar Road will come under enormous pressure to transition from rural to urban residential. It is crucial that during the comprehensive planning process, a closer look needs to be taken on how the transition in uses can take place, while at the same time protecting the area's outstanding natural beauty.
- Transportation Issues

- LRTP recommends short-range project Dunbar Extension from US 41 to Dunbar Road; mid-range project Dunbar Road from Houston Lake Road to North Houston Road; mid-range project Elberta Road from Dunbar Road to SR 247; mid-range project from Houston Lake Road to Centerville/Elberta Road; long-range project Dunbar Extension from Elberta Road to SR 247.
- The Regional Bike/Pedestrian Plan does not recommend any bicycle/pedestrian facilities for this corridor. This would be an excellent corridor to provide new bicycle/pedestrian facilities and should be given a close review during the local comprehensive planning process. If the comprehensive plan does recommend new bicycle/pedestrian facilities along this corridor, then the Regional Bike/Pedestrian Plan should be amended accordingly.
- With the extensive amount of vacant land available for residential use between US 41 and Carl Vinson Parkway, future road improvement plans should take a very close look at access control to insure adequate traffic flow and LOS on what will become a very important major thoroughfare in the future.

Corridor 7: Perry Parkway - US 341 to Highway 224

- Future Land Use
 - Most of the land from Highway 41 to Highway 341 and from Highway 341 W to Highway 224 is planned for urban residential uses.
 - Office uses are being recommended south of Kings Chapel Road, south of Houston Lake Road, and between Houston Lake Road and US 41.
 - Community Commercial is planned for the intersections of Highway 41, Thompson Road, Airport Road, Highway 341 W and Highway 341; with several other community commercial parcels scattered along the Parkway.
 - Light industrial use is expected to take place in this corridor off of Thompson Road, Airport Road, and Valley Drive.
 - The Parkway is in need of a development plan that will shape the overall character of the area, provide a variety of uses that can be linked together into a cohesive unit, establish it as an important gateway into the City of Perry, and also protect the Parkway as an important transportation artery moving vehicular traffic through and around the City. The Parkway Corridor can actually be divided into three separate character areas using the locations described above, while blending the areas together into one coordinated plan for the Parkway.
- Transportation Issues
 - The LRTP and the Regional Bike/Pedestrian Plan do not recommend any improvements along this corridor.
 - A system of bicycle/pedestrian trails should be investigated as part of the design concept for the Parkway so as to promote connectivity between the various uses and with the shared-use trail system under development in the City of Perry.

Corridor 8: Highway 341 S - Perry Parkway to Highway 247 Spur

- Future Land Use
 - Urban residential uses are planned with the exception of community commercial uses at the intersection of Perry Parkway and Arena Road and heavy industrial uses at the intersection of Highway 247 Spur.

- Possible character area realizing residential development will likely expand, and connections can be established with the industrial areas, the Houston County Government Center on Perry Parkway located just north of the corridor, and other uses that will likely occur along the Parkway.
- Transportation Issues
 - LRTP recommends mid-range project from Arena Road to Grovania Road and a long-range project from Langston/Arena Road from SR 127 to US 341. (This will become part of a new major east-west connector road that will tie into the proposed Todd Road Extension to US 41.)
 - Though no bike/pedestrian facilities have been recommended in the Regional Bike/Pedestrian Plan, this corridor would be an excellent candidate for such a facility that connects with a possible trail system along the Parkway and along the new Todd Road Extension. If recommended by the local comprehensive plan, the Regional Bike/Pedestrian Plan should be amended accordingly.

Corridor 9: Hwy 41 S - Perry Parkway to Fire Tower Road

- Future Land Use
 - Most of the future development will take place south of Hay Drive; urban residential will occur between Hay Drive and Moss Oaks Drive, while south of Moss Oaks Drive, residential use will be suburban in character; community commercial will be isolated to a few scattered parcels; the new state park will likely be completed during the planning period. North of Hay Drive, new development that is expected to take place is continued expansion of the Georgia National Fairgrounds and Agricenter, and community commercial near the interstate.
 - Possible character area would be the area south of the Agricenter to Fire Tower Road. There will be a need to establish a development plan that would provide a smooth transition of uses from rural to urban and incorporate a design concept that would blend well with the new state park.
- Transportation Issues
 - LRTP does not recommend any improvements for this corridor.
 - Traffic conditions will have to be monitored closely when the state park becomes fully operational to determine if the LOS becomes worse than projected and improvements needed. Another unknown is the impact of the planned Agricenter convention center hotel and additional expansion of the Agricenter itself.
 - Regional Bike/Pedestrian Plan recommends a four-foot bike lane along this corridor that connects with the City of Perry's shared use trail system. It is recommended that rather than the bike lane, the shared-use trail system should be extended to at least the new state park to accommodate pedestrian as well as bicycle traffic from the City and the Agricenter. If the local comprehensive plan concurs with this recommendation, the Regional Bike/Pedestrian Plan should be amended to reflect this change.

Corridor 10: Kings Chapel Road - Highway 127 to Arena Road

- Future Land Use
 - The dominant land uses in this corridor during the planning period is anticipated to be urban residential.

- The State of Georgia, Houston County, and the Houston County Board of Education are expected to maintain a large presence in the corridor with various public/institutional uses.
- Office and community commercial uses will occupy parcels along the Perry Parkway and Kings Chapel Road.
- Possible character area would be section east of Perry Parkway to ease the transition from rural to urban uses and to review ingress/egress points along Kings Chapel Road so as not to interfere with the flow of traffic along this major thoroughfare.
- Transportation Issues
 - LRTP recommends long-range project from SR 127 to Arena Road.
 - This corridor, as with several of the other corridors mentioned earlier, lends itself well to a planned bicycle/pedestrian trails system that connects the new residential areas to themselves, Rozar Park, Morningside Elementary, and the employment centers along Kings Chapel Road and Perry Parkway.

Corridor 11: Saddle Creek Road - Highway 341 to Highway 247 Spur

- Future Land Use
 - Urban residential uses are planned for most of this corridor.
 - Community commercial development is expected to occupy several nodal points along Arena Road and SR 247 Spur.
 - Heavy industrial uses will continue near the Highway 247 Spur.
 - Because of the extensive amount of the vacant land that is available, this corridor is a prime candidate for character area designation, which can look into the possibility of transforming this area into a mixed-use village or a similar concept.
- Transportation Issues
 - Because of the area's extensively rural character and the relatively low traffic volumes on Saddle Creek Road, the LOS has not been identified for this corridor in the 2006 and 2035 Networks. Its potential as an important collector road between two major arterial highways and the anticipated transition to urban development along the corridor will require a close review of its LOS during the planning period. Regulating the ingress/egress points from the various developments that will occur in the area will help maintain a good flow of traffic and LOS.
 - Any development plan for this area should include a provision for a coordinated bicycle/pedestrian trail system.

Corridor 12: I-75 Frontage - SR 96 to White Road

- Future Land Use
 - Urban residential uses will occupy selected locations along the corridor; between Russell Parkway and Highway 96 and between White Road and Red Oak Drive.
 - Regional commercial uses will dominate near the interstate interchanges along the SR 247 Connector and Russell Parkway Extension.
 - North of the regional commercial, light industrial uses are planned.
 - This is a definite character area for the local comprehensive plan. It will be an incredible challenge but will also create incredible possibilities in designing three

- gateways to the WRATS Study Area that will leave lasting impressions on thousands of people.
- Transportation Issues
 - LRTP recommends three long-range projects on I-75 that will include the section from Bibb County Line to Perry Parkway and several projects that connect with this corridor on White Road, SR 247 Connector, Russell Parkway Extension, and SR 96.
 - Design plans for this corridor should examine possible bicycle/pedestrian system that will connect the residential, commercial, and industrial uses.

Corridor 13: Dunbar Road W - Highway 41 to I-75 and Highway 49

- Future Land Use
 - This corridor will continue to be developed with a variety of uses; urban residential, community commercial, and light industrial. The public/institutional uses (Byron Public Works and UGA Fruit and Nut Research Center) are expected to remain in the future.
- Transportation Issues
 - LRTP recommends long-range project from SR 49 to US 41 that includes a new bridge over I-75 and alignment along New Dunbar Road
 - The Regional Bike/Pedestrian Plan does not recommend any bike/pedestrian along this corridor.

Corridor 14: White Road - Highway 49 to Highway 41

- Future Land Use
 - Bordering Highway 49 in Byron will be predominately community commercial uses.
 - Between the commercial uses on Highway 49 and Interstate 75, the future land use plan recommends a mixture of urban residential, light industrial, and public/institutional.
 - On the east side of I-75, light industrial uses are expected with urban residential continuing along White Road until US 41.
 - At the intersection of White Road and US 41, community commercial is planned for several of the corners with urban residential occupying the remainder.
- Transportation Issues
 - LRTP recommends long-range project on White Road/Thomson Road from SR 49 to Houston Lake Boulevard.
 - The Regional Bike/Pedestrian Plan recommends a shared roadway bike facility and sidewalks from SR 49 to the Byron Middle School (short-term); from the middle school to the subdivision just across the interstate would be a shared-use trail, and the remainder would be a four-foot bike lane (long-term).

Corridor 15: Highway 49 - White Road to Highway 41

- Future Land Use
 - The corridor will continue to have three distinct land use sections during the planning period: (1) White Road to Interstate 75 - includes regional commercial uses such as those that serve the highway traveling public coming from the Interstate along with the regional specialty mall, community commercial that serves residents in Byron and the

surrounding area, and several urban residential subdivisions and public/institutional uses; (2) West of the Peach Outlet Mall to Highway 49 - includes several urban residential subdivisions, the UGA Fruit and Nut Research Center, and community commercial uses; and (3) Intersection around Highway 41 - combination of urban residential, community commercial, and public/institutional uses.

- Transportation Issues
 - LRTP recommends short-range project from Byron to US 41.
 - The Regional Bike/Pedestrian Plan does not recommend any bicycle/pedestrian facilities for this corridor.

4.3 Future Land Use Policies

This section is intended to provide a link between what is occurring today as described in the previous section and what will hopefully be in the future as outlined in the section that follows. Providing this link are policy statements that relate to the future development of land in the WRATS Study Area, the relationship land use development has with the natural environment and public infrastructure including water, sewer, and the transportation network. It is desirable that these policies be adopted by the respective member governments of WRATS in order to insure a satisfactory implementation of the land development recommendations in this report.

The policy statements presented below were in large measure derived from discussions with local planning and zoning officials during a retreat in July 2005. In these discussions, the participants were asked to comment on general land use and infrastructure policy statements. The participants in the retreat were also given an assignment to identify actions related to land use development that should be stopped or changed, continued, and started. This exercise generated some very interesting and informative discussions and revealed many issues that need to be addressed in the policy statements. In addition to input obtained at the Planning Retreat, ideas outlined in the natural and historic resources, community facility network, and existing land use sections of this report were used to help formulate these policy statements. For clarity, the recommended policy statements have been placed under the following headings: land use development and natural/historic resources; land use development and water/sewer infrastructure, land use development and transportation infrastructure, land use development coordination, and general land development issues.

4.3.1 Land Use Development and Natural/Historic Resources

- Protect sensitive natural resources, such as wetlands, groundwater recharge areas, river corridors, and floodplains through the establishment of greenspace areas, and the development of conservation subdivisions.
- Conduct a study on the alternatives to protect the water quality in the Study Area's streams, with particular attention to those listed on the EPA 303 (d) list. Amend the land development regulations accordingly. Alternatives that should be given consideration include buffers or setbacks from all perennial streams and targeted percentages of impervious surface in the affected watershed.
- Complete necessary repairs on the Phase I section of the Wellston Path, and complete Phases II and III of the path within the next five years.

- Conduct historic resource surveys in the remaining jurisdictions in the Study Area to determine those historic resources that should be protected and promoted.
- Amend land development regulations to require the submittal of landscape plans for certain types and sizes of developments.

4.3.2 Land Use Development and Water/Sewer Infrastructure

- Future land development should maximize existing water and sewer infrastructure as much as possible before expansion of such infrastructure occurs.
- When expansion of the water and sewer infrastructure does occur, it should go along with the phased expansion of the urban development boundary.
- New residential developments should be encouraged to locate where sanitary sewer service exists instead of developing new septic tank systems.

4.3.3 Land Use Development and Transportation Infrastructure

- Future land use development in the WRATS Study Area should not worsen the Level of Service shown in the Year 2035 Network 5.
- Future 2035 highway network in the WRATS Study Area should be coordinated with the Future Land Use Plan, rather than the future development plan having to be tailored to meet the future highway network.
- Establish under the umbrella of WRATS, a common major thoroughfare system that each community adopts into their land development regulations and is coordinated with the setback requirements.
- Future land use development patterns should take into account the development of bicycle and pedestrian facilities that will encourage more citizens to walk or ride a bicycle to work, shop, or school. Sidewalks and bicycle paths should relate to specific pedestrian and bicycle corridors that are recommended in the community's comprehensive plan. (NOTE: some of these corridors are recommended in Existing Land Use Section of this report under Corridor Area Perspective.)
- Require traffic impact analysis for all new major developments.

4.3.4 Land Development Coordination

- Establish a coordination process with Houston County and Peach County Boards of Education during development of the local comprehensive plans and during the zoning review process of major developments.
- Establish on-going educational program with builders and developers on new development techniques, such as, conservation subdivisions and other methods to protect wetlands and other sensitive natural resources on the property, incorporating bicycle/pedestrian paths and other user-friendly amenities into new residential developments, mixed-use villages and centers, and other New Urbanism ideas.

4.3.5 General Land Development Issues

- Consider the impact of the surrounding neighborhood when making decisions on major developments.
- Establish common areas near high density residential developments for passive and active recreation purposes.
- Reduce the number of entrances for new subdivisions to the absolute minimum needed for safety and adequate ingress/egress.
- Establish more connectivity to residential neighborhoods, one example is to provide for the Traditional Neighborhood Design concept in the land development regulations.
- Promote neighborhood-oriented businesses near residential area, mixed-use villages and centers.
- Require access easements for subdivision frontage lots at the time of platting.

5 Transportation Needs

5.1 Roads and Bridges

5.1.1 Existing Conditions

The existing level of service (LOS) for the WRATS transportation network is shown in Figure 5.1. Substandard levels of service are almost all located in northern Houston County primarily in the City of Warner Robins.

5.1.2 Needs Analysis

From the transportation modeling process, it is obvious that the capacity of several roadway segments in the WRATS area will operate at substandard levels in the year 2035. Figure 5.2 shows the level of service for the roads in the transportation model without any planned improvements (i.e., today's roads with tomorrow's volume). The existing number of lanes for the roadways in the WRATS network is shown on Figure 5.3.

The acceptable level of service obtained in the modeling process aimed at eliminating all roadway segments at LOS E and F. There remain additional segments at LOS D, which provide a diminished mobility in these areas. These segments were reviewed to determine whether to incorporate additional capacity enhancement projects to provide increased mobility along the road segments at LOS D. With the exception of I-75, the remaining road segments that operate at LOS D are localized issues. These segments might be the result of a generalized network that does not include all roads. Several of these segments would be easily remedied with turning lanes and/or intersection improvements, access management and enhanced traffic signal systems and signal coordination. The LRTP should include a generous amount for turning lanes, intersection improvements and other access management or ITS implementation to address these localized deficiencies as needed.

The obvious exception to this is I-75. In the current plan, I-75 is widened to 8-lanes from Bibb County to Perry. South of Perry, the interstate remains a 6-lane cross section. With minor exceptions, I-75 operates at LOS D or better. Transportation improvements were developed to address the capacity deficiencies identified in the modeling process. These transportation improvements are shown on Figure 5.4. The LOS on roadways in the WRATS study area with these planned improvements is shown on Figure 5.5. The number of lanes for the improved transportation network is shown on Figure 5.6.

5.2 Public Transportation

In July 2003, a Transit Feasibility Study was prepared for the WRATS.² This study recommended a phased approach in the implementation of a new public transit system for the Warner Robins area. At this time, the funding has not been secured as outlined in this study and the initial steps have not been taken to begin this service. The demand for public transit is nearing levels where a public transportation system is on the horizon, but as for an implementation a specific time frame has yet to be identified. Public involvement uncovered interest in expanding and enhancing the paratransit services supplied in the region. This issue will be further explored in a Transit Feasibility Study scheduled for FY 2012.

² Warner Robins Transit Feasibility Study: Final Report, July 2003

Figure 5.1
Existing Level of Service (2006)

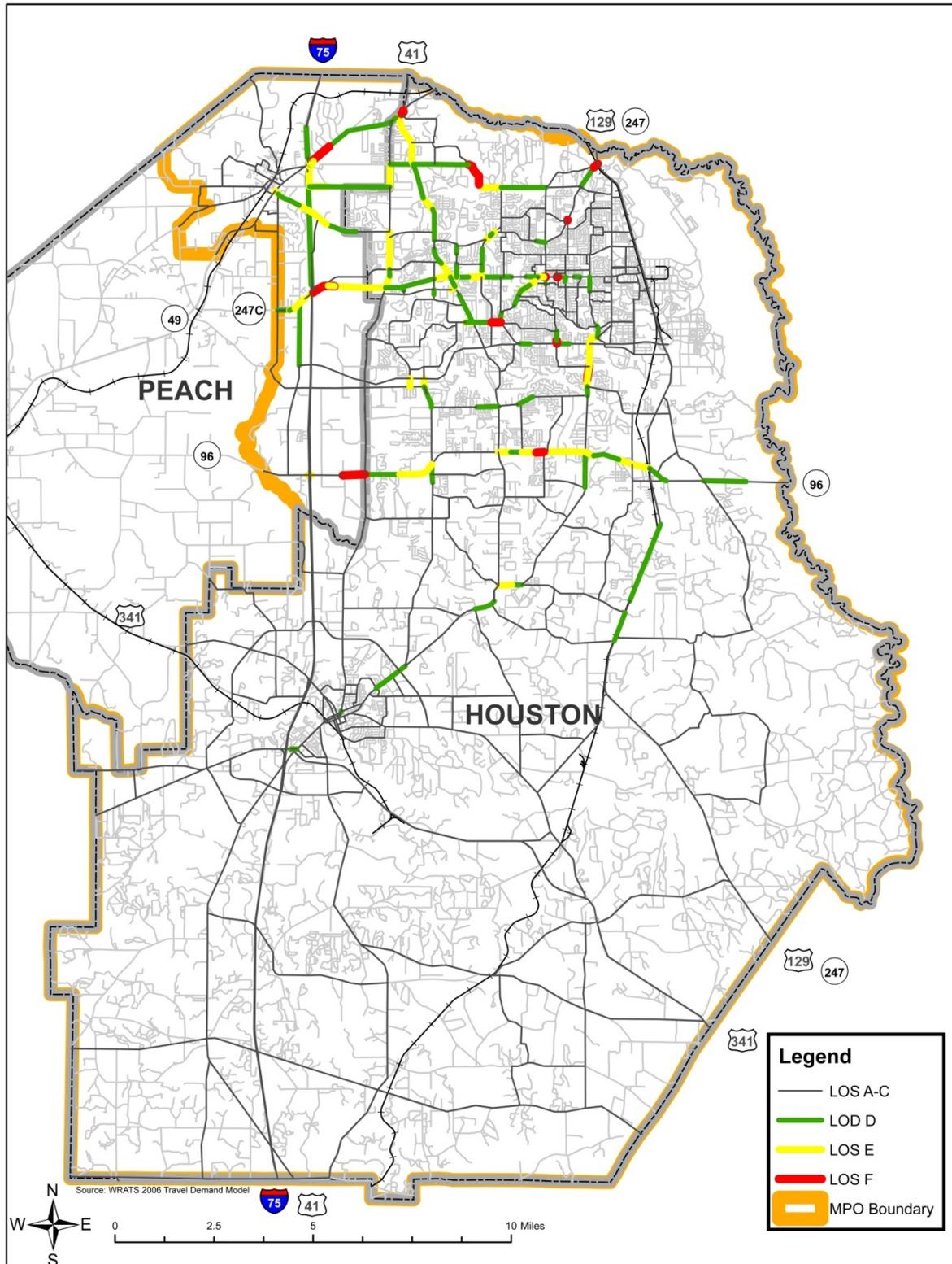


Figure 5.2
Future Level of Service with No Improvements (2035)

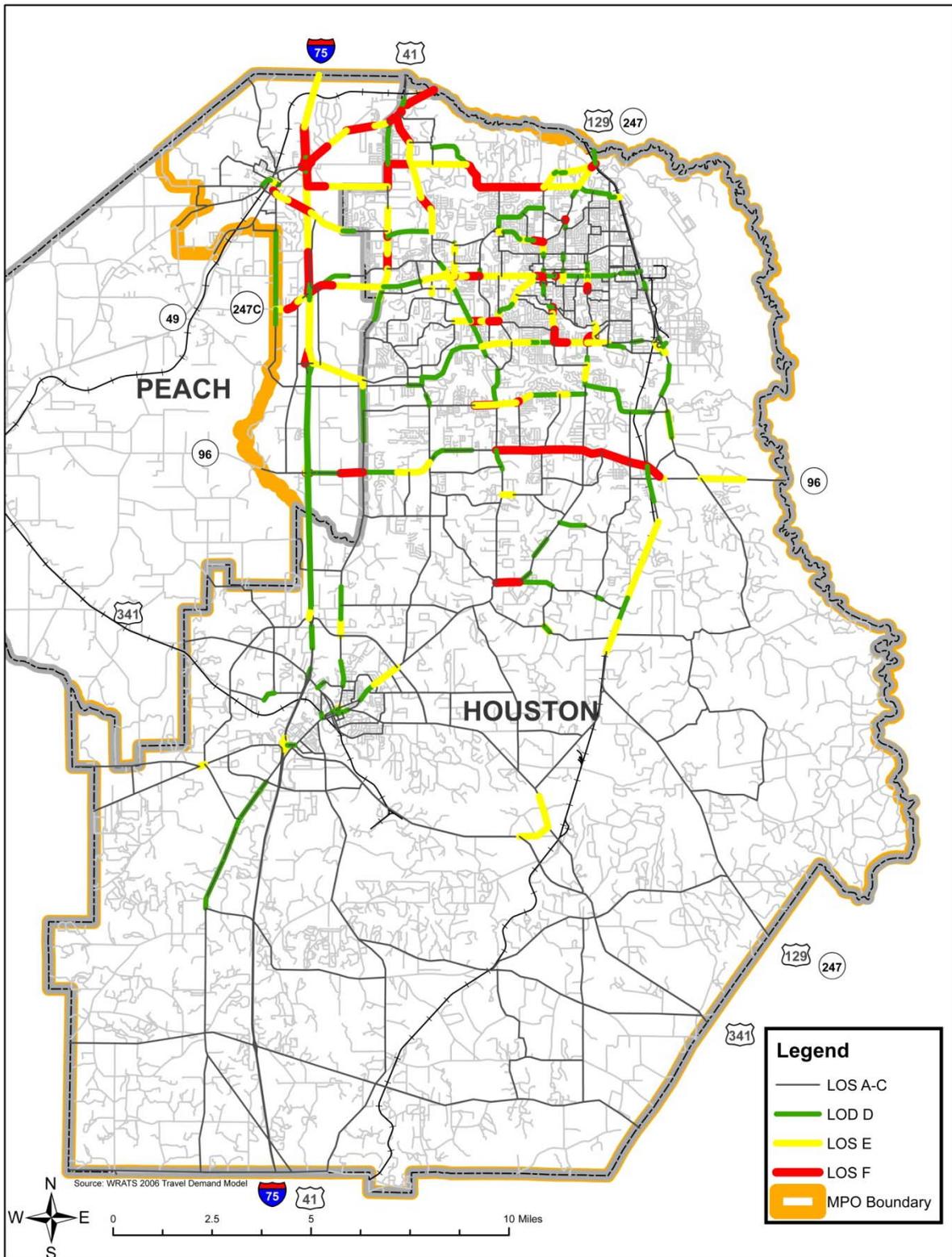


Figure 5.3
Existing Number of Lanes per Direction (2006)

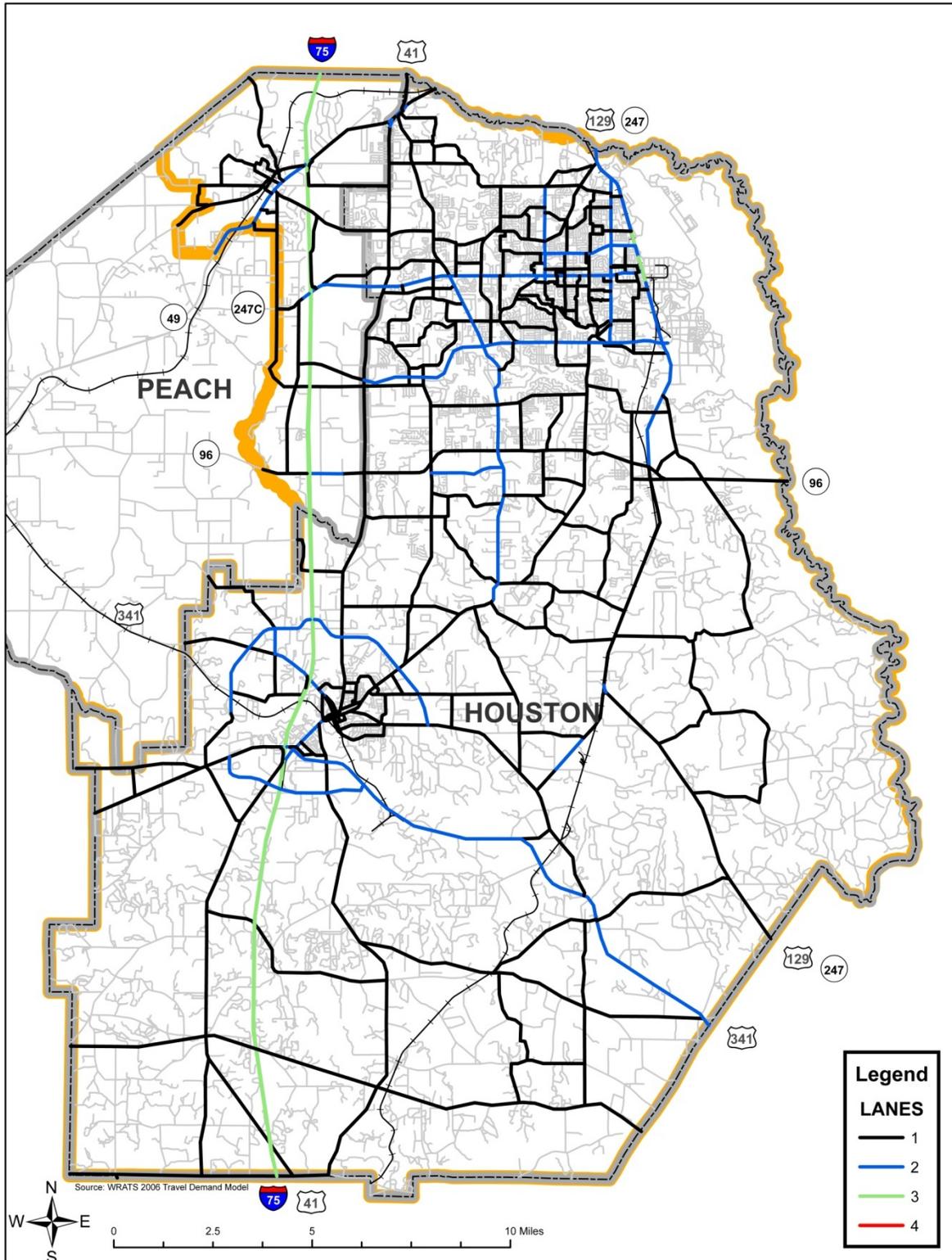


Figure 5.4
All 2035 Planned Road and Bridge Improvements

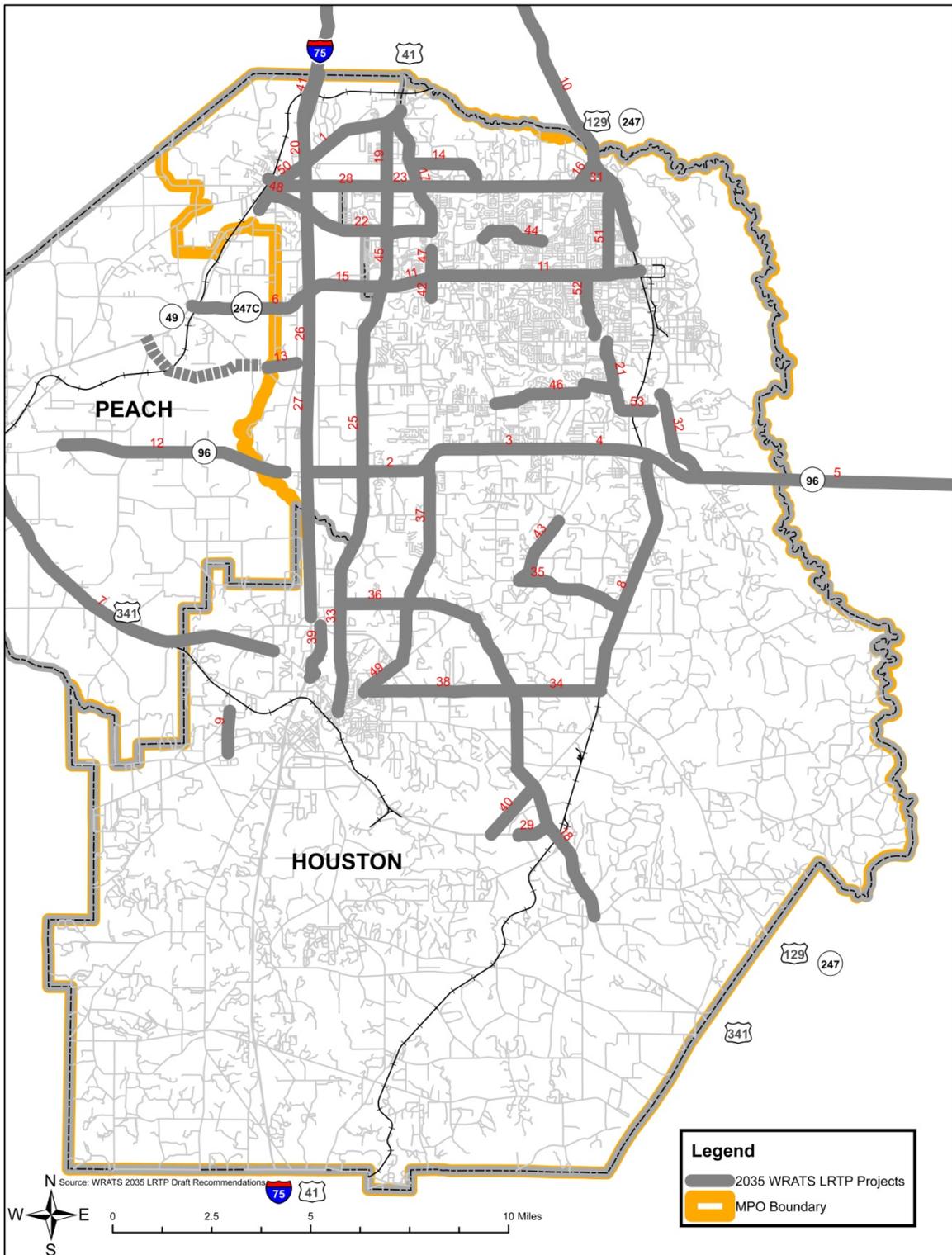


Figure 5.5
Future LOS (2035)

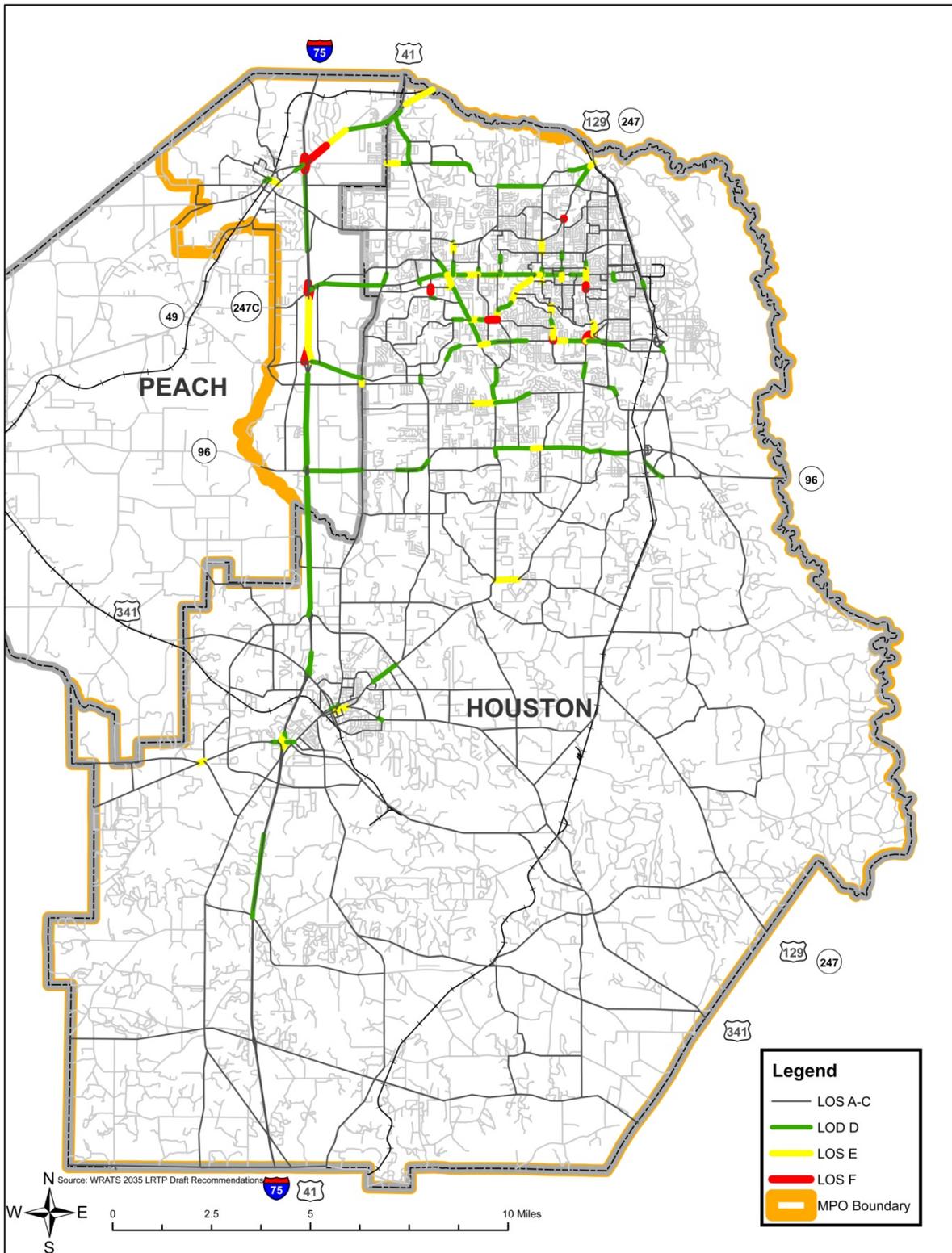
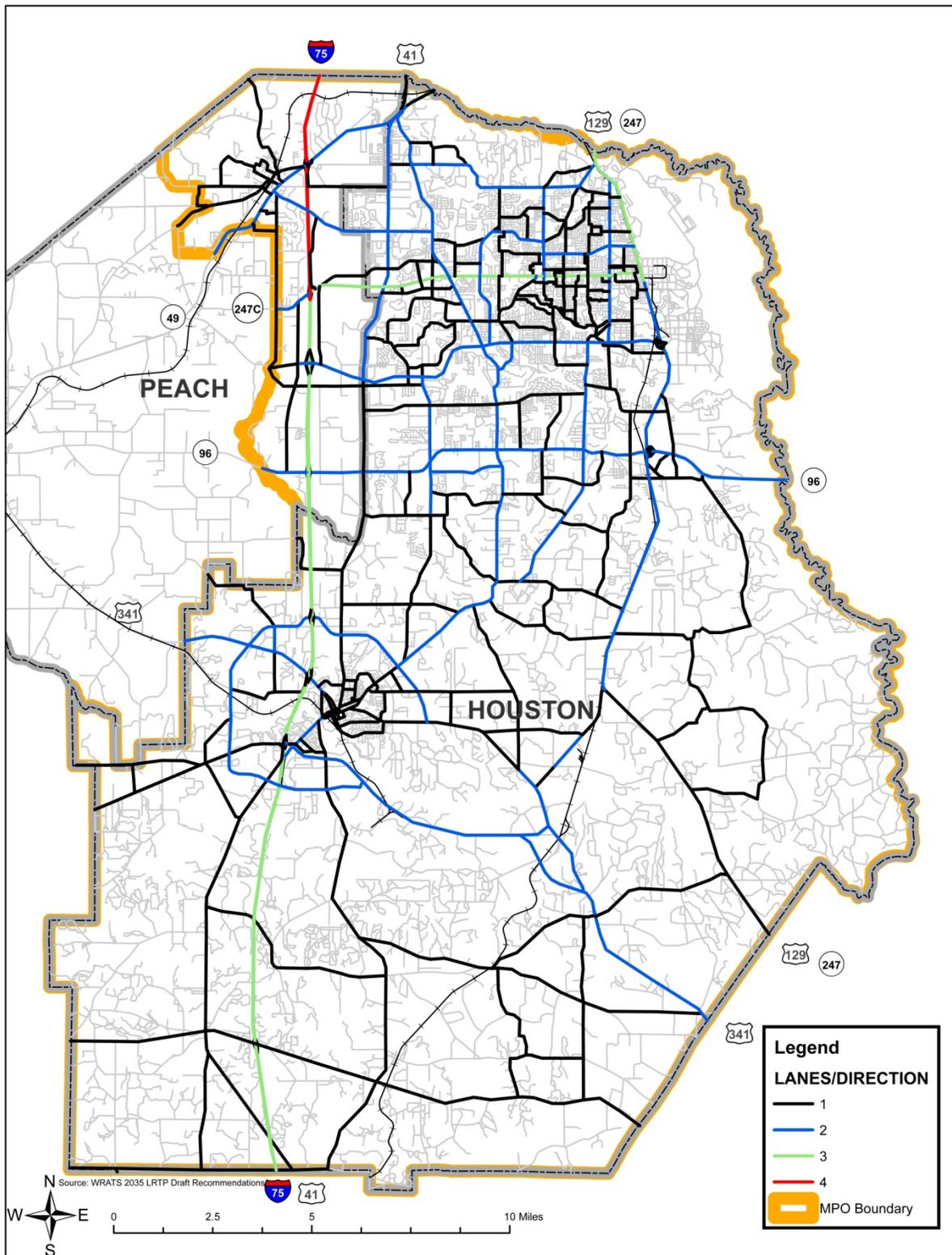


Figure 5.6
Future Number of Lanes per Direction



5.3 Bicycle and Pedestrian

WRATS completed a Bicycle and Pedestrian Facilities Plan in conjunction with The Middle Georgia Regional Commission in 2007.³ Since this plan was very comprehensive and completed fairly recently, it served as a basis for the bicycle and pedestrian analysis used in this plan. The focus of the Bicycle and Pedestrian Facilities Plan was:

- Establishing a plan for future bicycle and pedestrian facilities
- Providing viable transportation alternatives to automobile travel to enhance mobility, and improve traffic congestion and air quality
- Increasing the number of school-age children who walk or ride a bike to school

The presence of the bicycle facilities may produce intangible economic benefits, such as:

- Enhancement of property values along areas that feature the bike paths and trails.
- Reduced health care costs resulting from increased opportunities for healthful exercise, and improved quality of life.
- Less damage to roads and preservation of the highway infrastructure resulting from wider paved shoulders.
- Improved mobility for short trips.
- Improved air quality.
- Improved access and circulation within downtown areas.

Parking for automobiles is a constant problem in downtown areas, along with the congestion and pollution that they bring. Increasing the use of bicycling and walking transportation to the downtown areas from outlining residential areas would not only reduce the existing problems associated with the automobile, but would greatly enhance the safety and pleasure of the downtown visitor.

5.3.1 Existing Conditions

State Bike System Routes

There are two statewide bike routes that cross into the study area. The first route is **#15 - Central Route Corridor** that begins in Cobb County at Georgia 243 and terminates in Echols County and the Florida border on U.S. 41. Route #15 enters the study area from Highway 41 in Bibb County, and crosses through Houston County and the City of Perry. It leaves the City of Perry south of the Ag Center, and enters a rural area with little traffic until it reaches the Dooly County line.

The second State Bike System Route that comes through the study area is **#40 -TransGeorgia Corridor**. Route #40 begins in the western portion of the State in Harris County on Georgia Highway 315. After passing through Harris, Muscogee, and Talbot Counties, it enters the Middle Georgia region on Georgia Highway 96 in Crawford County. It continues its trek on

³ <http://www.warner-robins.org/downloadfile.php?f=4697ebc987>

Georgia Highway 96 through Crawford, Peach, Houston, and Twiggs Counties until the Georgia Highway 96 intersection with Georgia Highway 358. For approximately 6.4 miles, it follows Georgia Highway 358 until it intersects with U.S. 80 in southeastern Twiggs County. It maintains its path on U.S. 80 through Wilkinson County into Laurens County. Route #40 ends at Bull Street in Savannah.

Houston County Routes

Phase I of the greenway along Bay Gall Creek, now called the Wellston Trail, in the City of Warner Robins is open and includes a shared-use path for use by bicyclists and pedestrians.

Through the use of transportation improvement initiatives funded by the Special Local Option Sales Tax (SPLOST) in Houston County, miles of sidewalks have either been constructed or are planned to serve both existing and future populations. It is hoped that future initiatives such as these can be used to expand the sidewalk network in Peach and Houston Counties and to establish new networks in the growing areas of the region. The use of the Special Purpose Local Option Sales Tax is also an excellent source of funds to implement bicycle transportation improvements in the areas that currently have and are projected to have higher population densities and activity centers.

Bicycle Crash Statistics

Bicycle related crashes for the period 2002 to 2006 are shown in Table 5.1 below. Data for Peach County are countywide, not just the portion within the WRATS study area. During this period there were 67 reported bicycle crashes in Houston County resulting in 52 injuries. In Peach County, for the same 5 year period, there were 13 reported bicycle crashes resulting in 10 injuries. There were no fatalities from bicycle crashes during this period.

Table 5.1
Bicycle Crash Data for Houston and Peach Counties
2002 – 2006

Bicycle Crash Data				
County	Year	Crashes	Injuries	Fatalities
Houston	2002	11	8	0
Houston	2003	13	13	0
Houston	2004	12	8	0
Houston	2005	20	14	0
Houston	2006	11	9	0
Peach	2002	3	3	0
Peach	2003	2	2	0
Peach	2004	5	4	0
Peach	2005	3	1	0
Peach	2006	0	0	0

Source: Georgia DOT – Office of Traffic Safety and Design

Laws Regarding Bicycle and Pedestrian Safety

The National Highway Traffic Safety Administration recently produced a document entitled, "Resource Guide on Laws Related to Pedestrian and Bicycle Safety." The document is intended to be a comprehensive list of traffic and vehicle laws by state, and an assessment of possible impact on pedestrian and bicycle safety. It begins with a recommended Uniform

Vehicle Code (UVC) and shows whether the state has an exact, equivalent or variation to that UVC, or if that state has no such code related to that subject. The next segment is a listing of existing vehicular ordinances on various traffic-related subjects from a number of states. Like the UVC, it presents whether the other states have an exact, equivalent variation or no match to that particular ordinance. Finally, the Resource Guide includes several model ordinances from which states and local governments can use to create similar ordinances on those subjects. It contains an immense wealth of data that should be reviewed carefully by the State Bicycle and Pedestrian task forces to determine applications for both the State of Georgia and the respective local governments.

A survey of local law enforcement officials in the Middle Georgia region reveals that most communities use the existing state laws related to bicycle and pedestrian safety. (See 36-60-5, 40-1-1, 40-6-290, and 40-6-299 of the Georgia Code.) The small number of communities in the region that do have local ordinances in place are mostly related to the definition of sidewalks and pedestrian traffic. Because of the lack of demand and limited resources, local enforcement agencies have either eliminated or severely reduced bicycle/pedestrian safety programs.

The Quality Core Curriculum for Georgia public schools identifies that Kindergarten through 4th grade students are required to be taught basic street and highway safety and bicycle safety. The Bicycle and Pedestrian Facilities Plan supports development of a Safe Routes to School Program for the Warner Robins region. USDOT and GDOT have been very supportive of these programs as a way to increase walking and biking among school age children and to foster community awareness of the benefits this offers in terms of long term health and quality of life.

If an effort to alert drivers when they run off the road, the Georgia DOT is installing shoulder rumble strips (SRS) on new and reconstruction projects. These rumble strips are a great concern to bicyclists because it is a safety hazard, and it is seen as discouragement to bicycle travel. The bicycle community has requested that SRS should only be used as a last resort, and if and when warranted, SRS should only be placed at the locations of historical ROR crashes and meet AASHTO's guidelines.

Pedestrian Crash Statistics

Pedestrian related crashes for the period 2002 to 2006 are shown in Table 5.2 below. Data for Peach County are countywide, not just the portion within the WRATS study area. During this period there were 102 reported pedestrian crashes in Houston County resulting in 88 injuries and 7 fatalities. In Peach County, for the same 5 year period, there were 24 reported pedestrian crashes resulting in 20 injuries and 3 fatalities.

Sidewalks and Walkability

The Bicycle and Pedestrian Facilities Plan notes that there is a need to develop pedestrian facilities in proximity to schools, parks, activity center, and in areas that currently have high levels of pedestrian demand with no sidewalks or discontinuous sidewalks. It notes that inadequate lighting is a significant factor in pedestrian crashes and should be considered in designs for new and improved sidewalks. The plan supports flexible design guidelines for incorporating sidewalks into different area types but with adherence to minimum widths and street buffers. Similarly it supports guidance for shared use paths such that all users have a safe and pleasant travel experience.

Table 5.2
Pedestrian Crash Data for Houston and Peach Counties
2002 – 2006

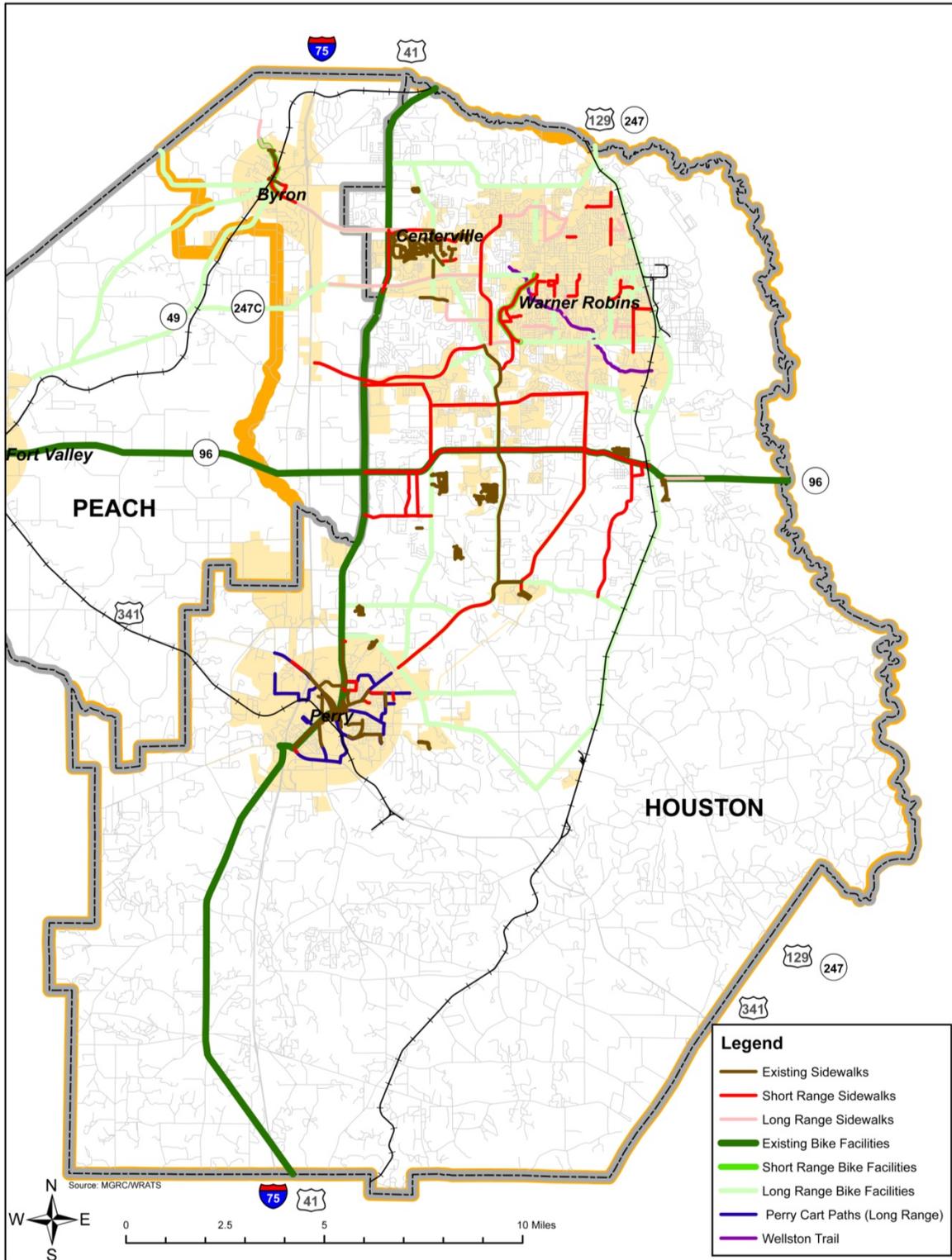
Pedestrian Crash Data				
County	Year	Crashes	Injuries	Fatalities
Houston	2002	28	23	3
Houston	2003	24	20	1
Houston	2004	21	18	1
Houston	2005	16	12	2
Houston	2006	13	15	0
Peach	2002	5	4	1
Peach	2003	4	2	1
Peach	2004	7	8	0
Peach	2005	5	3	1
Peach	2006	3	3	0

Source: Georgia DOT – Office of Traffic Safety and Design

5.3.2 Needs Analysis

The LRTP supports and encourages the implementation of the bicycle and pedestrian facilities shown in the WRATS Bicycle and Pedestrian Facilities Plan. A map showing the recommendations from this plan is presented on Figure 5.7. Public involvement has shown strong desire for improved bicycle and pedestrian paths in the WRATS area. For this reason, a line item of \$250,000 per year has been added to the LRTP for bicycle and pedestrian path enhancements. This totals \$5,000,000 over the study period dedicated to this need.

Figure 5.7
Bicycle and Pedestrian Facilities Plan



5.4 Other Modes

The WRATS study area does not include an airport or any other modes that warranted study and consideration in the LRTP at this time. A regional airport exists in Bibb County just north of the study area along SR 247. Consideration for travel along SR 247 should be given to aid in travel to and from the airport. Another, smaller airport is located in Peach County just outside the WRATS study area. At this time, there do not appear to be special considerations that should be provided for mobility to and from this area, but it is likely that this airport will grow and gain additional commercial and light industrial development as the region expands.

5.5 Freight and Goods Movement

5.5.1 Existing Conditions

Currently, the WRATS area has major industrial facilities located along SR 247 east of Perry. A Frito-Lay plant and a Perdue chicken processing facility both are major regional employers in the area with upwards of 10,000 employees at both facilities. Recently announced plans will nearly double the size of the Perdue plant and add to the number of trucks traveling along SR 247. Since the area has major industrial development and because of the regional employment they provide in the area, it is necessary to ensure that adequate roads exist providing for freight and goods movement to this portion of the study area.

In the northeast portion of Houston County and inside the Warner Robins City Limits, there is a railroad that parallels SR 247. Currently, all roads that cross the railroad do so with at-grade crossings. These crossings present obvious safety issues.

5.5.2 Needs Analysis

SR 247 east of Perry was identified as a roadway with inadequate capacity in 2035. Since the volumes on this road will continue to grow at a rapid rate and due to the presence of larger than average volumes of truck traffic, the priority of widening this roadway should be given special consideration. Additionally, the network connecting SR 247 in this portion of the study area to I-75 was reviewed. New roadways should be established allowing for an east-west connection in this portion of Houston County and establishing a new link for travel from SR 247 to I-75.

Consideration should be given to the construction of a bridge over the railroad providing access to SR 247 in northeast Houston County. This connection should occur at a major roadway allowing for regional travel ensuring the greatest impact for this safety and capacity improvement.

5.6 Operations and Maintenance

5.6.1 Existing Conditions

Existing levels of operation and maintenance expenditures have been adequate to keep pace with growth in the WRATS area. Current local government annual spending on operations and maintenance is shown in Table 5.3

Table 5.3
Annual Operations and Maintenance Spending by Jurisdiction

Local Government	O&M Spending (2006 - 2010)
Peach County (part)	\$1.0 Million
Houston County	\$25.2 Million
City of Centerville	\$1.0 Million
City of Perry	\$1.9 Million
City of Warner Robins	\$6.0 Million
SPLOST	\$5.9 Million
TOTAL	\$41.0 Million
Average Per Year	\$8.2 Million

5.6.2 Needs Analysis

Current levels of Operations and Maintenance expenditures should be continued. This will total approximately \$260 Million over the study period (from 2011 through 2035).

6 Transportation Plan Funding

6.1 Estimated Costs

Once all improvement projects were identified, a cost was estimated for the engineering, right-of-way, and construction for each project. The transportation needs for the WRATS are shown in Table 6.1. Certain expenditure estimates were programmatic in that they reflect a desire to allow for project expenditures within a category of project or activity rather than a specific project. A number of these expenditure categories reflect policies of the WRATS LRTP to encourage funding of these types of projects – for instance setting aside a projected amount of funding in support of the bicycle and pedestrian element of the LRTP.

Costs for all Road and Bridge Projects were estimated using the GDOT CEST software to estimate project construction cost in 2010 dollars. Construction costs were then factored to estimate PE, right-of-way, and utility relocation costs associated with the project. Projects costs were then inflated to year of expenditure for mid-term and long term projects. No inflation was applied to short-range projects that are currently in the 2011 – 2014 TIP, because TIP projects should already account for year of expenditure costs. In addition, project phase costs for projects in the TIP reflect estimates that are more refined than those for projects in the last 20 years of the plan. Projects in the mid-term and long-term were inflated to the mid-year of these periods (2020 for mid-term projects and 2030 for long-term projects) consistent with GDOT guidance. In addition, after projects were inflated to the year of expenditure they were further increased by 15% to reflect allowance for project cost contingencies.

Table 6.1
Estimated Cost of Transportation Needs in the WRATS Area

	Funding Needed (in year 2010 \$000s)
Roads and Bridges	\$848,184
Intersection Improvements	\$185,000
Public Transportation	\$0
Bicycle and Pedestrian	\$5,000
Freight and Goods Movement	Included in Roads & Bridges Above
Operations and Maintenance (local)	\$260,000
TOTAL	\$1,298,184

**Table 6.2
Financially Constrained LRTP Road and Bridge Projects**

Map Number	Project Number	Route	From	To	Project Description	County	Time Period	PE YOE	ROW & Utility YOE	CST YOE	PE Cost (\$)	ROW & Utility Cost (\$)	CST Cost (\$)	Total Cost (\$)
1	0000480	SR49	SR49 Byron/Peach County	US-41/Houston County	Widening	Both	ST	2007	2011	2015	\$684,800	\$3,663,560	\$4,211,640	\$8,560,000
2	322450	SR96 (Phase I)	I-75/Peach County	Lake Joy Road/Houston	Widening	Both	ST	1998	2010	2014	\$5,733,843	\$14,633,000	\$31,366,000	\$51,732,843
3	0008406	SR96 (Phase II)	Lake Joy Road	Moody Road	Widening	Houston	ST	1998	2010	2012	*	\$8,766,000	\$11,585,000	\$20,351,000
4	0008407	SR96 (Phase III)	Moody Road	Old Hawkinsville/Thompson Mill Road	Widening	Houston	ST	1998	2010/2011	2013	*	\$16,187,000	\$34,637,183	\$50,824,183
5	322460	SR96	Old Hawkinsville/ Thompson Mill Road	SR87/(Twiggs)	Widening	Houston	ST	2009	2011	2013	\$365,040	\$1,621,000	\$2,576,960	\$4,563,000
6	321660	SR247C	SR49	I-75	Widening	Peach	ST	2015	2015	2015	\$1,803,360	\$6,086,340	\$14,652,300	\$22,542,000
43	12	Moody Road - Phase II	Woodard Road	SR-127	Widening	Houston	ST	2010	2011	2012	\$780,000	\$2,632,500	\$6,337,500	\$9,750,000
44	342930	Elberta Road	Houston Road	Carl Vinson Parkway	Widening	Houston	ST	2010	2011	2012	\$872,945	\$2,946,189	\$7,092,677	\$10,911,810
45	1	US-41/SR11	Osgian Drive	Thomson Road	Widening	Houston	ST	2010	2011	2012	\$860,642	\$2,904,665	\$6,992,713	\$10,758,020
46	2	Feagin Mill Road (Phase II)	Houston Lake Road	Moody Road	Widening	Houston	ST	2010	2011	2012	\$237,973	\$803,158	\$1,933,529	\$2,974,660
47	3	Margie Drive	Gunn Road	Houston Lake Road	New 2 lane	Houston	ST	2010	2011	2012	\$140,577	\$474,447	\$1,142,187	\$1,757,210
48	42 (343250)	White Road	SR42/SR49	Linda Dr.	Realignment/New 2 lane	Peach	MT	2016-2025	2016-2025	2016-2025	\$270,998	\$914,618	\$2,201,857	\$3,387,472
49	350930	SR127	West of King's Chapel Road	North Perry Bypass	Median	Houston	MT	2016-2025	2016-2025	2016-2025	\$495,920	\$1,673,729	\$4,029,348	\$6,198,997
50	45	SR49	Pine Ridge Drive	I-75	Median	Peach	MT	2016-2025	2016-2025	2016-2025	\$330,667	\$1,116,001	\$2,686,670	\$4,133,338
51	46	North Davis Dr.	Watson Blvd.	Bargain Rd.	Add Turn Lanes	Houston	MT	2016-2025	2016-2025	2016-2025	\$705,409	\$2,380,754	\$5,731,445	\$8,817,608
52	47	Pleasant Hill Rd.	Watson Blvd.	Booth Rd.	Median	Houston	MT	2016-2025	2016-2025	2016-2025	\$685,473	\$2,313,470	\$5,569,466	\$8,568,409
53	48	Sandy Run Rd.	Moody Rd.	SR247@Hawkinsville Dr.	Add Turn Lanes	Houston	MT	2016-2025	2016-2025	2016-2025	\$657,670	\$2,219,637	\$5,343,570	\$8,220,877
7	0000405	SR7/US341	SR96 (Peach Co.)	Existing 4 lane SR7/US341 (Houston Co.)	Widening	Both	MT	2016-2025	2016-2025	2016-2025	\$1,624,678	\$5,483,289	\$13,200,511	\$20,308,478
8	0008583	SR247/US129	SR247 Spur	SR96	Widening	Houston	MT	2016-2025	2016-2025	2016-2025	\$4,230,889	\$14,279,251	\$34,375,975	\$52,886,116
9	0008649	West Perry Bypass	CR100/SW Perry Bypass	CR106/Perry Parkway	New 4 lane	Houston	MT	2016-2025	2016-2025	2016-2025	\$1,093,674	\$3,691,151	\$8,886,104	\$13,670,929
10	322960	SR247/US129	SR247C/Watson Blvd. (Houston Co.)	SR11/US41 (Bibb Co.)	Widening	Houston	MT	2016-2025	2016-2025	2016-2025	\$2,134,176	\$7,202,844	\$17,340,180	\$26,677,199
11	342340	SR247C/Watson Blvd.	SR11/US41	SR247/US129	Widening/Median	Houston	MT	2016-2025	2016-2025	2016-2025	\$4,341,938	\$14,654,040	\$35,278,245	\$54,274,222
12	0008387	SR96	Fire Tower Road	Housers Mill Road	Widening	Peach	MT	2016-2025	2016-2025	2016-2025	\$651,651	\$2,199,322	\$5,294,664	\$8,145,636
13	363765	Russell Parkway Extension	Housers Mill Road	Lakeview Road	New 2 lane	Peach	MT	2016-2025	2016-2025	2016-2025	\$426,583	\$1,439,717	\$3,465,985	\$5,332,284
14	18	Dunbar Road	Houston Lake Rd.	Centerville/Elberta Rd.	Widening	Houston	MT	2016-2025	2016-2025	2016-2025	\$3,211,301	\$10,838,141	\$26,091,822	\$40,141,265
15	13	SR247C/Watson Boulevard	I-75	SR11/US41	Widening	Both	MT	2016-2025	2016-2025	2016-2025	\$2,025,922	\$6,837,485	\$16,460,612	\$25,324,019
16	16	Elberta Road	Dunbar Road	SR247/US129	Widening	Houston	LT	2026-2035	2026-2035	2026-2035	\$1,052,791	\$3,553,169	\$8,553,926	\$13,159,886
17	17	Houston Lake Road	Thomson Road	SR11/SR49/US41	Widening	Houston	LT	2026-2035	2026-2035	2026-2035	\$1,912,730	\$6,455,462	\$15,540,928	\$23,909,119
18	19	SR11/US341	Arena Rd.	Grovania Rd.	Widening	Houston	LT	2026-2035	2026-2035	2026-2035	\$2,409,455	\$8,131,912	\$19,576,825	\$30,118,193
19	21	SR11/US41	SR 49	Russell Pkwy.	Widening	Both	LT	2026-2035	2026-2035	2026-2035	\$6,616,950	\$22,332,206	\$53,762,719	\$82,711,875
20	23	I-75	Sardis Church Road (Bibb Co)	SR247C/Watson Blvd.	Widening	Peach	LT	2026-2035	2026-2035	2026-2035	\$9,202,429	\$31,058,197	\$74,769,734	\$115,030,361
21	31	South Davis Drive Extension	Russell Pkwy.	Sandy Run Road	New 3 lane	Houston	LT	2026-2035	2026-2035	2026-2035	\$2,350,834	\$7,934,065	\$19,100,527	\$29,385,426
22	32	White Road/Thomson Road	SR49	Houston Lake Road	Widening	Both	LT	2026-2035	2026-2035	2026-2035	\$5,244,664	\$17,700,743	\$42,612,899	\$65,558,306
29	27	Limerock Rd/Boutwell Rd	SR-224/Golden Isles Pkwy	SR11/US341	Widening	Houston	LT	2026-2035	2026-2035	2026-2035	\$1,142,608	\$3,856,304	\$9,283,694	\$14,282,606

* PE for Project Number 8406 and 8407 is included in 322450

Note: Project phase amounts shown in red were programmed outside the timeframe of the LRTP

6.2 Available Funding

Once the costs of the transportation improvements outlined for the study area were identified, the anticipated level of funding for projects in the WRATS area was determined. Historical and anticipated funding figures for federal and state funds coming to the WRATS area were provided by GDOT. These supporting documents are included in Appendix E of this plan. Projected funding assumes that the current growth in the level of funding provided to the area remains constant at approximately 2.5% per year.

Using the figures provided by GDOT and estimates of local Special Purpose Local Options Sales Tax (SPLOST) funding; funding for the 2035 LRTP is anticipated to be a total of \$1,560 million, which includes \$942 million of Federal and State funds, exclusive of set asides for maintenance and operations, and \$618 million in local SPLOST funds, over the 25 years of the plan. Estimated SPLOST funding is based on projecting annual transportation funding in the current 2006 Houston County SPLOST.

Table 6.3 shows the total expected available resources for transportation purposes within the WRATS Study area from 2011 – 2035. It was projected that SPLOST funds would grow by the same 2.5% per year on average as used for projecting federal and state transportation funds.

Table 6.3
Estimated Transportation Funding Available to WRATS over the 2035 LRTP Planning Horizon (in 2010 \$ Millions)

Time Period	Federal and State Funds (Planning, Right of Way, and Construction)	Federal and State Funds (Maintenance)	Total Federal and State Funds	Local (SPLOST) Funds	Total Transportation Funding
Short Term 2011 - 2015	\$116.0	\$28.9	\$145.0	\$95.1	\$240.0
Mid-Term 2016 - 2025	\$279.8	\$69.7	\$349.6	\$229.3	\$578.9
Long Term 2026 - 2035	\$358.2	\$89.3	\$447.5	\$293.6	\$741.0
Total	\$754.0	\$187.9	\$942.1	\$618.0	\$1,559.9

Table 6.4 shows additional detail for the projected revenues by time period shown in Table 6.3

Table 6.4
Estimated Transportation Funding by Year

Year	Federal and State Funds (Planning, Right of Way, and Construction)	Federal and State Funds (Maintenance)	Total Federal and State Funds	Local (SPLOST) Funds	Total Transportation Funding
2011	\$22.1	\$5.5	\$27.6	\$18.1	\$45.7
2012	\$22.6	\$5.6	\$28.3	\$18.5	\$46.8
2013	\$23.2	\$5.8	\$29.0	\$19.0	\$48.0
2014	\$23.8	\$5.9	\$29.7	\$19.5	\$49.2
2015	\$24.4	\$6.1	\$30.4	\$20.0	\$50.4
2016	\$25.0	\$6.2	\$31.2	\$20.5	\$51.7
2017	\$25.6	\$6.4	\$32.0	\$21.0	\$53.0
2018	\$26.2	\$6.5	\$32.8	\$21.5	\$54.3
2019	\$26.9	\$6.7	\$33.6	\$22.0	\$55.6
2020	\$27.6	\$6.9	\$34.4	\$22.6	\$57.0
2021	\$28.3	\$7.0	\$35.3	\$23.2	\$58.5
2022	\$29.0	\$7.2	\$36.2	\$23.7	\$59.9
2023	\$29.7	\$7.4	\$37.1	\$24.3	\$61.4
2024	\$30.4	\$7.6	\$38.0	\$24.9	\$63.0
2025	\$31.2	\$7.8	\$39.0	\$25.6	\$64.5
2026	\$32.0	\$8.0	\$39.9	\$26.2	\$66.1
2027	\$32.8	\$8.2	\$40.9	\$26.9	\$67.8
2028	\$33.6	\$8.4	\$42.0	\$27.5	\$69.5
2029	\$34.4	\$8.6	\$43.0	\$28.2	\$71.2
2030	\$35.3	\$8.8	\$44.1	\$28.9	\$73.0
2031	\$36.2	\$9.0	\$45.2	\$29.6	\$74.8
2032	\$37.1	\$9.2	\$46.3	\$30.4	\$76.7
2033	\$38.0	\$9.5	\$47.5	\$31.1	\$78.6
2034	\$39.0	\$9.7	\$48.7	\$31.9	\$80.6
2035	\$39.9	\$9.9	\$49.9	\$32.7	\$82.6
Total	\$754.1	\$187.9	\$942.0	\$618.0	\$1,559.9

6.3 Financial Constraint

As can be seen by comparing the total cost of transportation needs identified in the 2035 WRATS LRTP, in Table 6.1, with estimated transportation funding over the LRTP planning horizon, in Table 6.3, expenditures do not exceed anticipated resources so the plan is financially constrained.

7 Plan Recommendations

Transportation improvements were developed in the modeling process that added necessary capacity to achieve an acceptable level of service for the roads in the WRATS study area. After costs for these improvements were calculated, the projects were categorized into short-range, mid-range and long-range improvements. The cost for each funding period is shown in Table 7.1.

Table 7.1
Total Cost of Road and Bridge Improvement Projects by Short-, Mid- or Long-Range
In Year 2010 \$000s

	Short-Range	Mid-Range	Long-Range	Total
ROW (000's)	\$4,695	\$22,887	\$29,932	\$57,515
Engineering (000's)	\$60,718	\$77,243	\$101,022	\$238,983
Construct Cost (000's)	\$122,528	\$185,956	\$243,201	\$551,685
Total Cost (000's)	\$187,941	\$286,087	\$374,156	\$848,184

Note: Project costs include inflation and contingency

7.1 Short Range Projects

Transportation improvements recommended for short range implementation (2011 – 2015) are shown on Figure 7.1 and include:

SR49 from Byron to US 41 (Project ID – 0000480/Map 1)

Widen from 2 to 4 lanes, 2.71 Miles
 Total Cost - \$8,560,000

SR96 (Phase I) from I-75 to Lake Joy Rd. (Project ID – 322450/Map 2)

Widening from 2 to 4 Lanes, 3.27 Miles
 Total Cost \$14,633,000

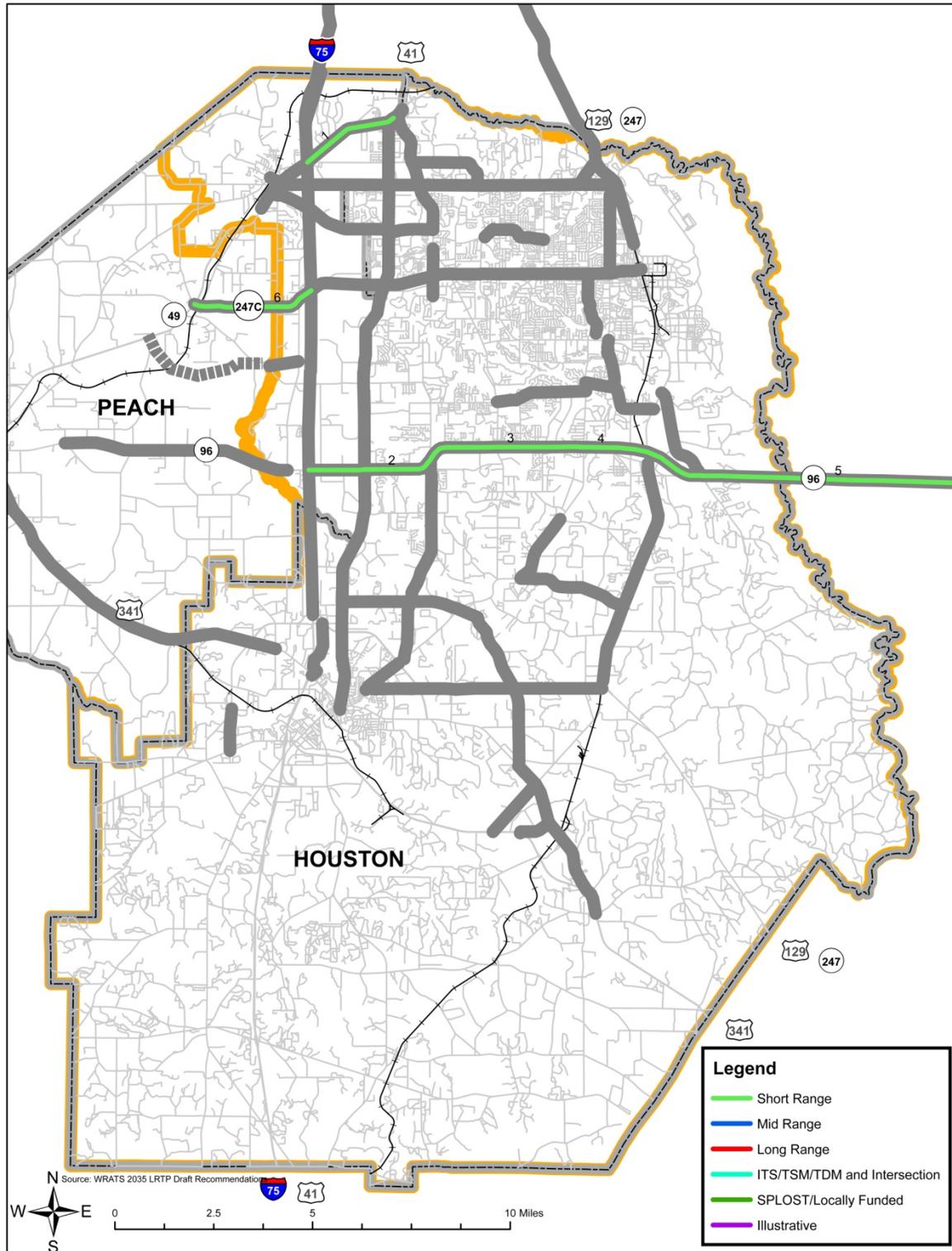
SR96 (Phase II) from Lake Joy Rd. to Moody Road (Project ID – 0008406/Map 3)

Widening from 2 to 4 Lanes, 4.00 Miles
 Total Cost \$20,351,000

SR96 (Phase III) from Moody Road to Old Hawkinsville/Thompson Mill Rd. including interchange at SR247/US129 (Project ID – 0008407/Map 4)

Widening from 2 to 4 Lanes, 3.40 Miles
 Total Cost \$40,273,000

Figure 7.1
Short Range Road and Bridge Improvements



**SR96 from Old Hawkinsville/Thompson Mill Rd. to SR87 (Twiggs)
(Project ID – 322460/Map 5)**

Widening from 2 to 4 Lanes, 7.80 Miles (2.19 Miles within WRATS Study Area)
Total Cost \$4,563,000

SR247C from SR49 to I-75 (Project ID – 321660/Map 6)

Widening from 4 to 6 Lanes, 3.00 Miles
Total Cost \$22,542,000

7.2 Mid Range Projects

Mid-Range implementation projects are shown on Figure 7.2 and cover the period from 2016 to 2025. These projects include:

SR7/US 341 from SR96/Peach to 4 lane section in Houston County (Project ID – 0000405/Map 7)

Widen from 2 to 4 lanes, 3.55 Miles (2.30 Miles within WRATS Study Area)
Total Cost - \$13,720,000

SR247/US129 from SR247Spur to SR 96 (Project ID – 0008583/Map 8)

Widening from 2 to 4 Lanes, 5.89 Miles
Total Cost \$35,728,000

West Perry Bypass from CR100/SW Perry Bypass to CR106/Perry Parkway (Project ID – 0008649/Map 9)

New 4 Lane Road, 1.66 Miles
Total Cost \$9,236,000

SR247/US129 from Green St. to US41 in Bibb County (Project ID – 322960/Map 10)

Widen from 4 to 6 lanes, 7.70 Miles (3.52 Miles within WRATS Study Area)
Total Cost - \$6,864,000

SR247C/Watson Blvd. from SR11/US41 to SR247/US129 (Project ID – 342340/Map 11)

Widening from 4 to 6 lanes 2.45 miles from SR11/US41 to Carl Vinson Parkway and Add Median from Carl Vinson Parkway to SR247/US129 4.10 Miles
Total Cost - \$36,666,000

SR96 from Fire Tower Road to Housers Mill Road (Project ID – 0008387/Map 12)

Widen from 2 to 4 lanes, 5.70 Miles (0.65 Miles within WRATS Study Area)
Total Cost - \$5,503,000

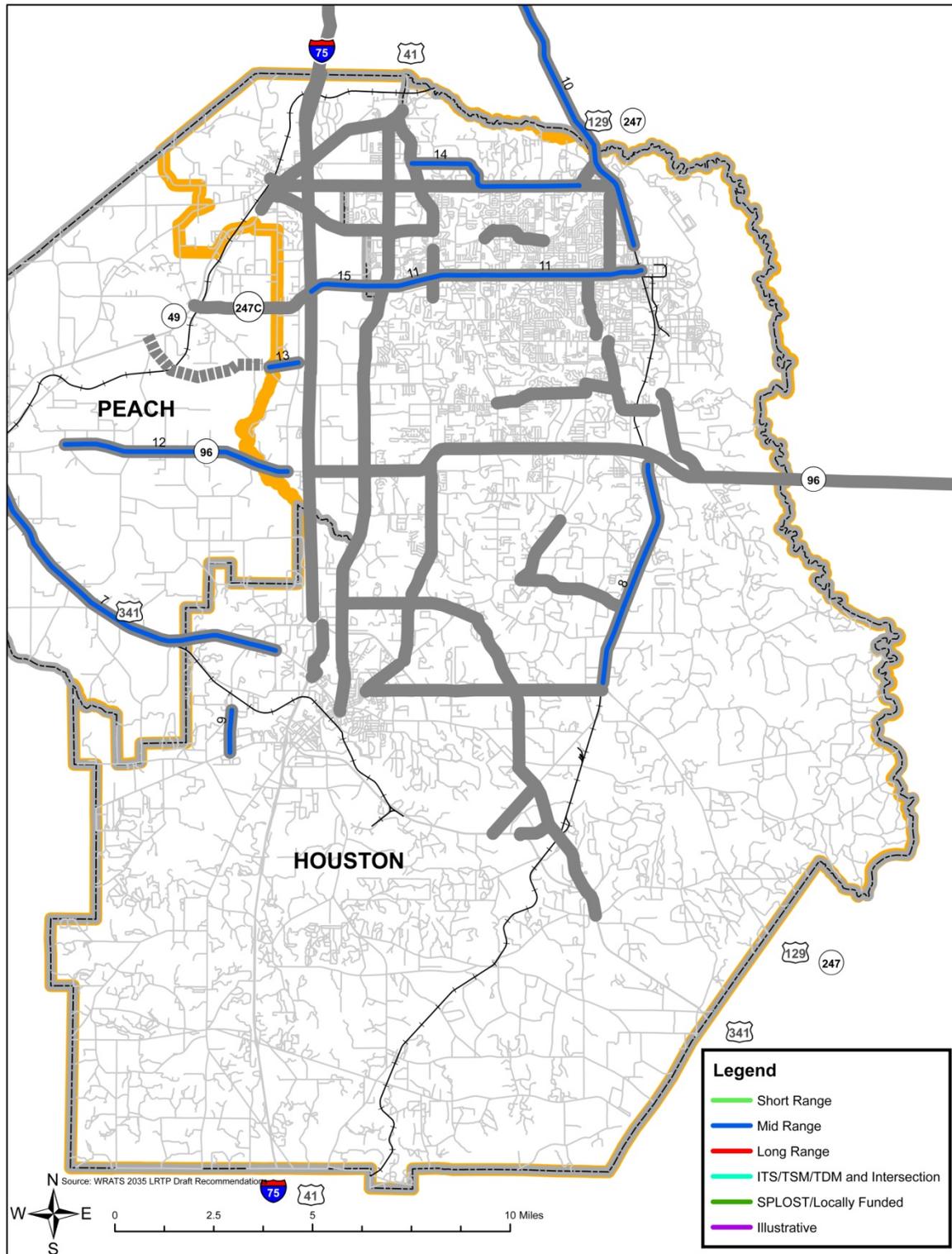
**Russell Parkway Extension from Housers Mill Road to Lakeview Road
(Project ID – 363765/Map 13)**

New 2 Lane Road, 0.53 Miles
Total Cost - \$3,602,000

Dunbar Rd from Houston Lake Rd. to Centerville/Elberta Rd. (Project ID – 18/Map 14)

Widening from 2 to 4 Lanes, 4.50 Miles
Total Cost \$27,118,000

Figure 7.2
Mid Range Road and Bridge Improvements



SR247C/Watson Blvd. from I-75 to SR11/US41 (Project ID – 13/Map 15)

Widen from 4 to 6 lanes, 1.84 miles
Total Cost - \$17,108,000

7.3 Long Range Projects

The remaining projects needed in the WRATS study area in order to achieve an acceptable LOS in 2035 are shown on Figure 7.3 and are planned for 2026 to 2035. These projects include:

Elberta Rd. from Dunbar Rd. to SR247/US129 (Project ID – 16/Map 16)

Widening from 2 to 4 Lanes, 0.72 Miles
Total Cost \$6,006,000

Houston Lake Rd. from Thomson Rd. to US 41 (Project ID – 17/Map 17)

Widening from 2 to 4 Lanes, 3.19 Miles
Total Cost \$10,912,000

SR11/US341 from Arena Rd. to Grovania Rd. (Project ID – 19/Map 18)

Widening from 2 to 4 Lanes, 3.58 Miles
Total Cost \$13,746,000

SR 11/US41 from SR49 to Russell Parkway (Project ID – 21/Map 19)

Widening from 2 to 4 Lanes, 6.69 Miles
Total Cost \$37,749,000

I-75 from Sardis Church Road (Bibb County) to Watson Blvd. (Project ID – 23/Map 20)

Widening from 6 to 8 Lanes, 7.30 Miles (5.31 Miles within WRATS Study Area)
Total Cost \$52,498,000

South Davis Dr. Extension from Russell Pkwy. to Sandy Run Rd. (Project ID – 31/Map 21)

New Construction of a 2 Lane Road with center turn lane, 2.11 Miles
Total Cost \$13,411,000

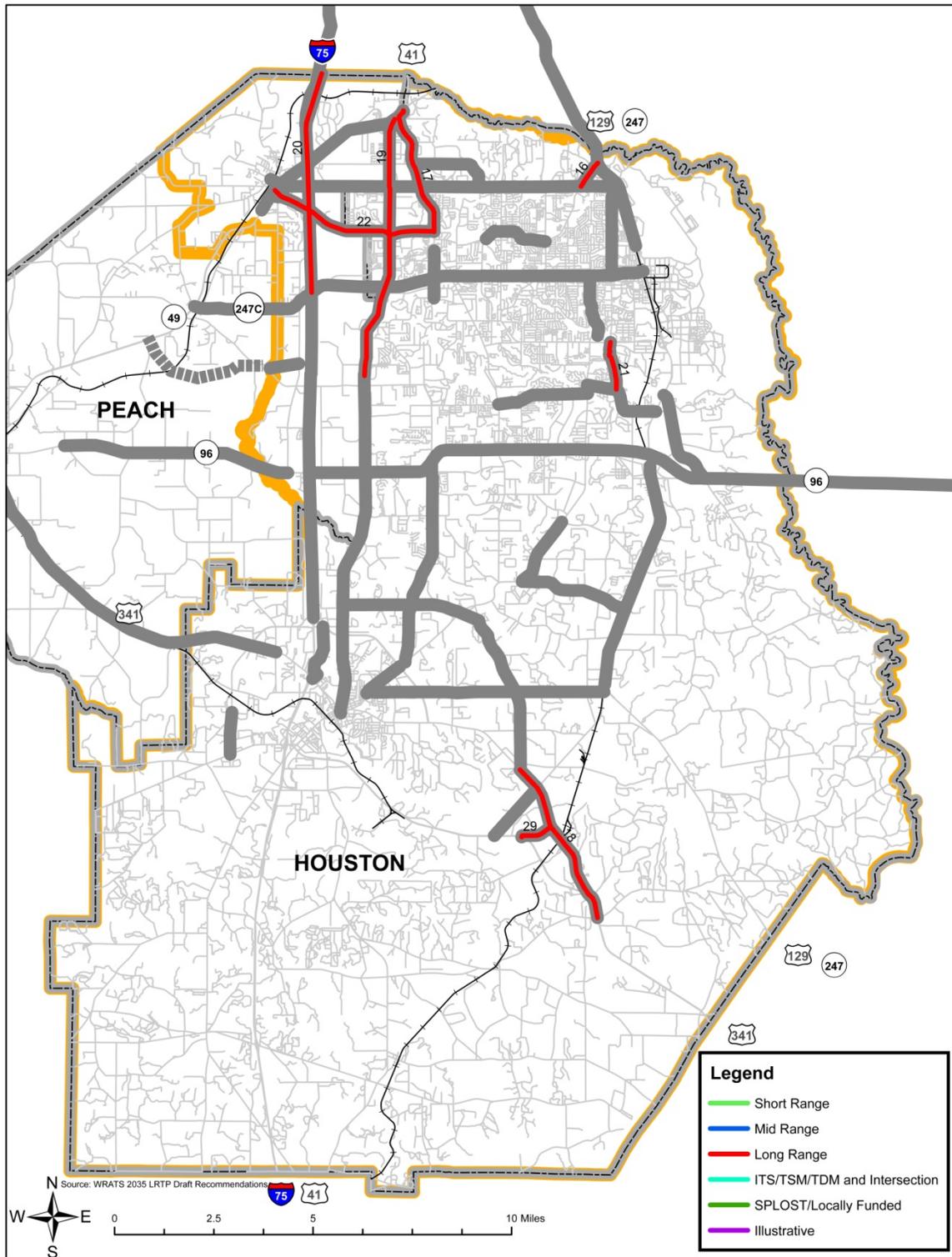
White Rd./Thomson Rd. from SR 49 to Houston Lake Blvd. (Project ID - 32/Map 22)

Widening from 2 to 4 Lanes, 4.47 Miles
Total Cost \$29,920,000

Limerock Rd./Boutwell Rd. from SR224/Golden Isles Parkway to SR11/US341 (Project ID - 27/Map 29)

Widening from 2 to 4 lanes, 0.76 Miles
Total Cost \$6,518,000

Figure 7.3
Long Range Road and Bridge Improvements



7.4 Illustrative Projects

Illustrative projects are those that the region would pursue if additional funding or financial capacity were available. Although not within the financial capacity of the 2035 LRTP they are still important to the region and should be considered in subsequent plans or as amendments to the LRTP if additional funds or financial capacity are identified. These projects include:

Dunbar Extension from US41 to Dunbar Rd. (Project ID - 14/Map 24)

New Construction to 4 Lanes, 1.29 Miles
Total Cost \$17,201,000

SR11/US41 from Russell Pkwy. to Mossy Creek (Project ID - 22/Map 25)

Widening from 2 to 4 Lanes, 4.07 Miles
Total Cost \$21,730,000

I-75 from Watson Blvd. to Russell Pkwy. (Project ID - 24/Map 26)

Widening from 6 to 8 Lanes, 1.77 Miles
Total Cost \$22,724,000

I-75 from Russell Pkwy. to SR11/Perry Pkwy. (Project ID - 25/Map 27)

Widening from 6 to 8 Lanes, 5.66 Miles
Total Cost \$51,980,000

Dunbar Rd. from SR49 to SR11/US41 (Project ID - 26/Map 28)

(includes bridge over I-75 and alignment along New Dunbar Rd.)

New Construction to 4 Lanes, 2.77 Miles
Total Cost \$18,017,000

Note: this project is related to a proposed widening of I-75 (Project ID – 23) from 6 to 8 lanes

SR42 from SR49 to Mosley Rd in Byron (Project ID - 28/Map 30)

Widening from 2 to 4 Lanes, 0.28 Miles
Total Cost \$2,969,000

Dunbar Extension from Elberta to SR247 (Project ID - 29/Map 31)

New Construction of 4 Lane Road, 0.94 Miles
Total Cost \$13,863,000

Old Hawkinsville Rd. from SR247 to SR96 (Project ID - 30/Map 32)

Widening from 2 to 4 Lanes, 2.45 Miles
Total Cost \$16,278,000

SR11/US 41 from Mossy Creek to SR127 (Project ID - 33/Map 33)

Widening from 2 to 4 Lanes, 3.73 Miles
Total Cost \$22,856,000

Kings Chapel Rd. from Arena Rd. to SR247 (Project ID - 34/Map 34)

New Construction of a 2 Lane Road, 2.20 Miles
Total Cost \$9,431,000

SR127 from SR247 to Moody Rd. (Project ID - 36/Map 35)

Widening from 2 to 4 Lanes, 2.77 Miles
Total Cost \$17,875,000

Langston/Arena Rd. from US41 to US341 (Project ID - 37/Map 36)

Widening from 2 to 4 Lanes, 7.50 Miles
Total Cost \$41,993,000

Lake Joy Rd. from Sandefur Rd. to SR 127 (Project ID - 38/Map 37)

Widening from 2 to 4 Lanes, 2.12 Miles
Total Cost \$23,069,000

Kings Chapel Rd. from SR 127 to Arena Rd. (Project ID - 39/Map 38)

Widening from 2 to 4 Lanes, 3.74 Miles
Total Cost \$22,755,000

**St. Patrick's Drive Extension from St. Patrick's Drive to Thompson Rd.
(Project ID - 40/Map 39)**

New 2 lane road section, 1.10 Miles
Total Cost - \$5,285,000

**Highway 247 Connector from SR247 Spur to SR224/Golden Isles Parkway
(Project ID - 41/Map 40)**

New 2 lane road section, 1.57 Miles
Total Cost - \$7,032,000

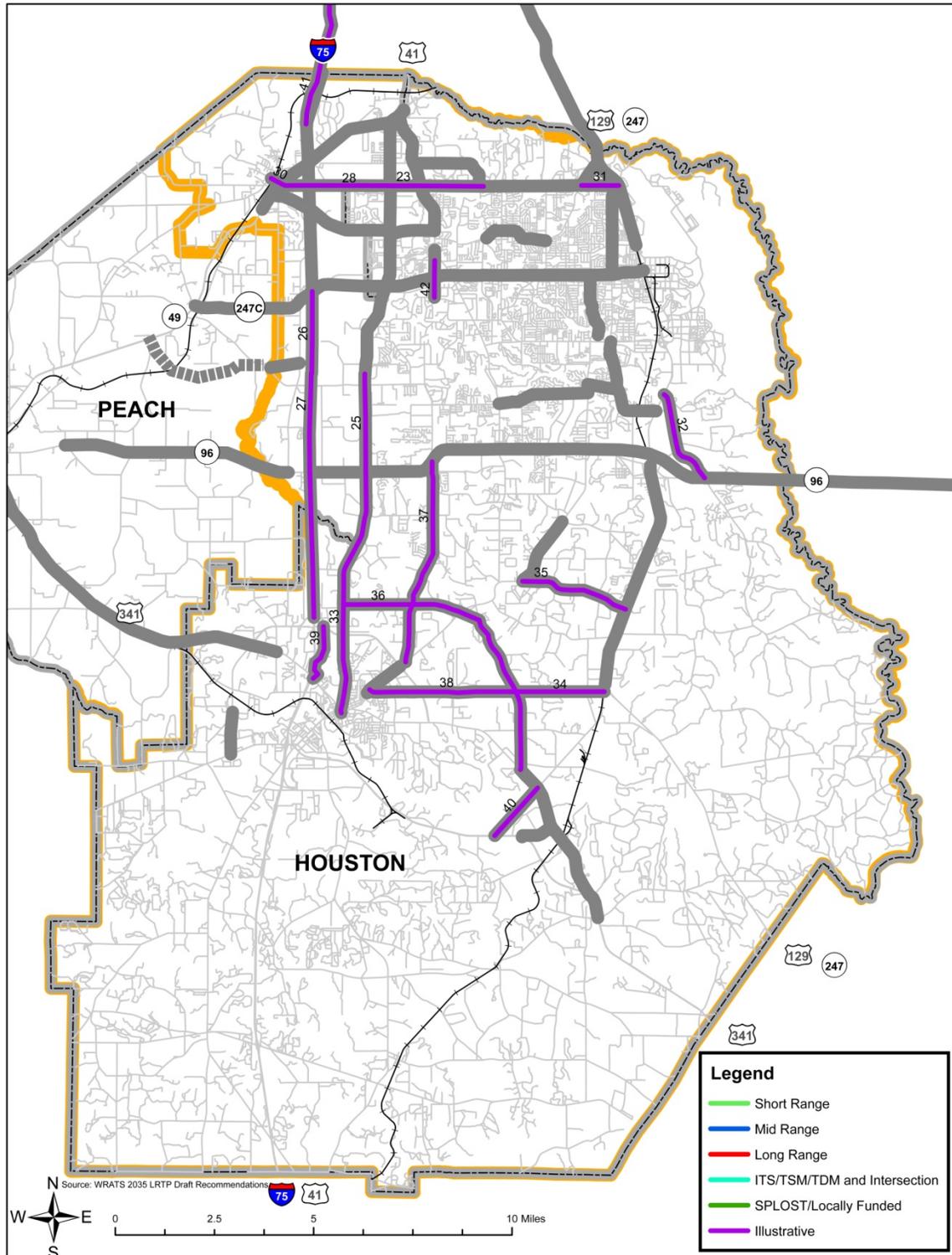
**Chapman/Old Macon Road from Benjamin Hawkins Parkway to Frank Amerson Jr.
Parkway (Project ID - 43/Map 41)**

New 2 lane road section with center turn lane and bridge over Echeconnee Creek, 1.50 Miles
Total Cost - \$12,844,000

Margie Dr. from Smithville Church Rd. to Gunn Rd. (Project ID - 44/Map 42)

Widening from 2 to 4 Lanes, 1.01 Miles
Total Cost \$7,861,000

**Figure 7.4
Illustrative Road and Bridge Improvements**



7.5 SPLOST/Locally Funded and Intelligent Transportation System/Transportation Systems Management/Travel Demand Management (ITS/TSM/TDM) and Intersection Projects

SPLOST/Locally Funded projects are those near term projects with specific identified local funding. ITS/TSM/TDM and Intersection Projects are identified non-capacity road projects that are intended to improve operations and safety in localized areas. These projects may be funded through some combination of the federal, state and local operations funds identified as a line item in the funding estimates for the LRTP. Identified SPLOST/Locally funded road projects include:

Moody Rd. – Phase II from Woodard Rd. to SR127 (Project ID - 12/Map 43)

Widening from 2 to 4 Lanes, 1.80 Miles
Total Cost \$9,750,000

Elberta Rd. from North Houston Rd. to Carl Vinson Parkway (Project ID - 342930/Map 44)

Widen from 2 to 4 lanes, 1.50 Miles
Total Cost - \$10,912,000

SR11/US41 from Osigian Blvd. to Thomson Rd. (Project ID - 1/Map 45)

Widening from 2 to 4 Lanes, 1.50 Miles
Total Cost \$10,758,000

Feagin Mill Rd. – Phase II from Houston Lake Rd. to Moody Rd. (Project ID - 2/Map 46)

Widening from 2 to 3 Lanes, 3.86 Miles
Total Cost \$2,975,000

Margie Drive from Gunn Rd. to Houston Lake Rd. (Project ID - 3/Map 47)

New 2 lane road extension, 0.25 Miles
Total Cost \$1,757,000

Identified ITS/TSM/TDM and Intersection projects include:

White Road from SR42/SR49 to Linda Dr. (Project ID - 343250/Map 48)

Realignment of intersection/New 2 lane road, 0.29 Miles
Total Cost \$2,288,000

SR127 from West of Kings Chapel Rd. to North Perry Bypass (Project ID - 350930/Map 49)

Adding a Median, 1.16 miles
Total Cost - \$4,188,000

SR49 from Pine Ridge Dr. to I-75 through Byron, GA (Project ID - 45/Map 50)

Adding a Median, 1.60 miles
Total Cost - \$2,792,000

North Davis Dr. from Watson Blvd. to Bargain Rd. (Project ID - 46/Map 51)

Adding Turn Lanes, 1.90 Miles

Total Cost \$5,957,000

Pleasant Hill Rd. from Watson Blvd. to Booth Rd. (Project ID - 47/Map 52)

Adding a Median, 1.95 Miles

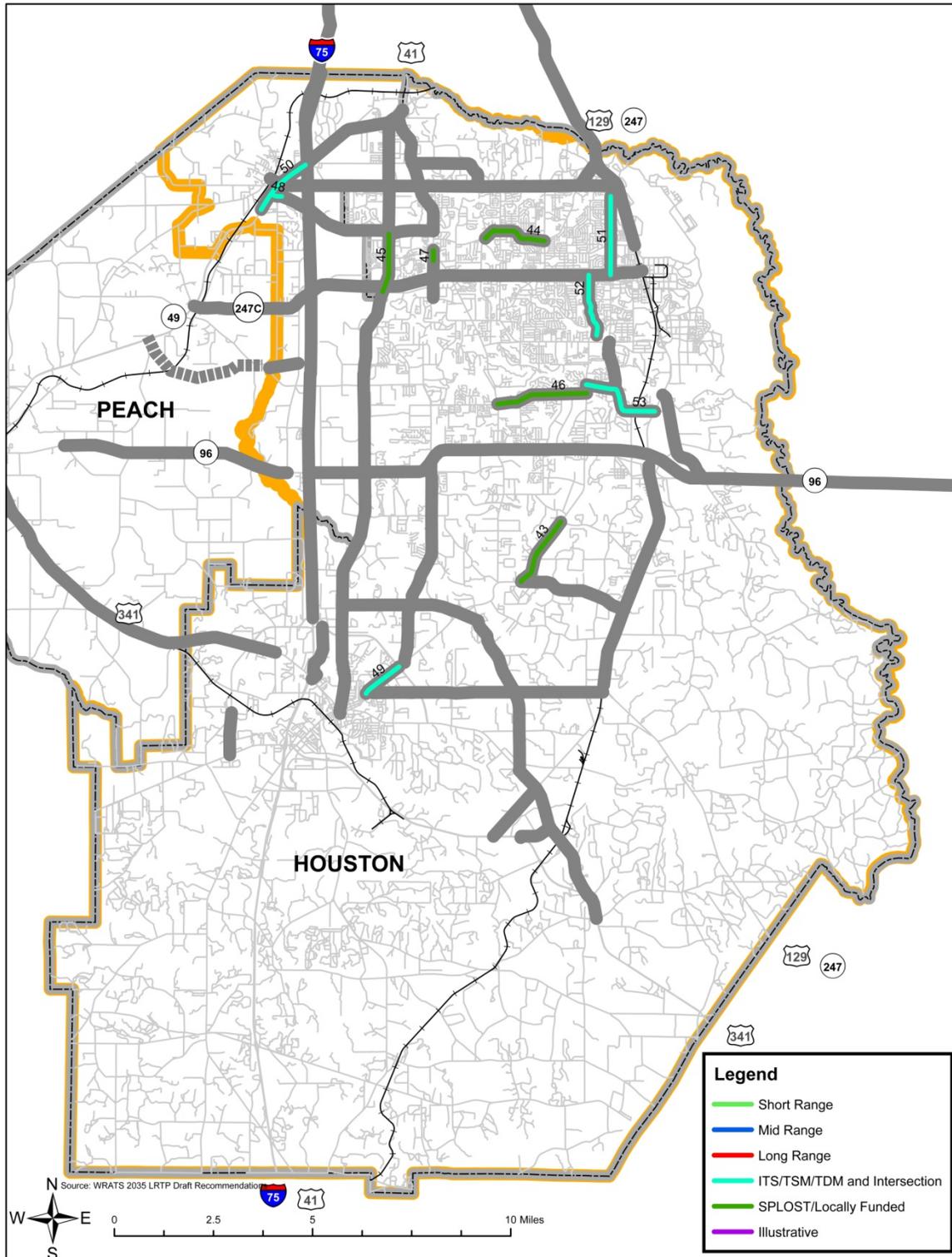
Total Cost \$5,789,000

Sandy Run Rd. from Moody Rd. to SR247 (Project ID - 48/Map 53)

Adding Turn Lanes, 1.80 Miles

Total Cost \$5,554,000

Figure 7.5
SPLOST/Locally Funded Road and Bridge Improvements
and ITS/TSM/TDM and Intersection Projects



Appendix A

Model Development Methodology

1.0 Travel Demand Forecasting Model

Transportation system studies are done periodically by GDOT and the Warner Robins Area Transportation Study (WRATS) to determine what types of transportation improvements or investments would best serve the public. GDOT and WRATS are primarily responsible for technical studies pertaining to the roadway system.

A travel demand forecasting (TDF) model is used by GDOT and WRATS to evaluate the performance of the roadway system in and around Houston and Peach Counties. The WRATS model is a traditional urban area analysis tool that is used to identify where major improvements should be made to its principal thoroughfare system. Since there are usually several strategies proposed to address future congestion and safety concerns, the model is frequently used to study which combination of improvements provides the most end-user benefits. A TDF model, however, is only one resource drawn upon to identify needs. Staffs from WRATS and GDOT were involved in the process of identifying potential projects.

The WRATS model was developed by GDOT for use in the WRATS 2035 LRTP. The process of projecting travel 25 years into the future has a strong correlation with the level of growth anticipated for the region and where growth will occur inside the region. It is in this area of model development that land use and community planning are connected to the transportation planning process.

The other key element of the model is referred to as a highway network. A highway network consists of links and nodes that represent roadway segments and intersections. The attributes of links contain characteristics of roadways such as speed, distance, number of lanes, area type (density of population and employment), facility type (similar to functional classification) and capacity. The attributes of nodes contain positional, two dimensional x and y coordinates to enable the network file to be displayed pictorially. The node representing a traffic analysis zone (TAZ) also includes socioeconomic data of TAZ such as population, households, employment, school enrollment, median income and acreage.

The detailed description of WRATS model is presented in Section 2. This section includes an explanation on how trips are estimated, how person trips are converted to vehicle trips, what attributes comprise a highway network and how trips are assigned onto a highway network. Each of traditional modeling steps involved in developing an urban TDF model is described. These steps are trip generation, trip distribution, mode choice and traffic assignment.

2.0 Model Development

The Office of Planning at GDOT developed and applied the Warner Robins Area Transportation Study (WRATS) travel demand forecasting (TDF) model for WRATS during the development of the 2035 LRTP.

The structure of the WRATS model is standard, in comparison with other TDF models used in urban areas that are similar in size to the WRATS. Descriptions of each principal model element are presented in the subsequent parts of this section.

2.1 Highway Network Coding

GDOT examined and revised the base year network before sending this network to WRATS for review, examination and revisions as necessary. The WRATS planning staff revised the base year network to reflect completed projects so that the network reflects base year 2006 conditions.

The purpose of a highway network is to provide paths based on the minimum time to travel from one traffic analysis zone (TAZ) to another. A highway network is a model that replicates the main roadways in the study area.

Facility Type and Area Type. These two link attributes provide a framework for organizing the roadways included in the network. Based on the facility type and area type identified for a link in the network, a corresponding speed and capacity is then assigned. In combination with the distance and number of lanes, these attributes make up the base layer of data needed to update and apply the transportation model for the study area. The facility type and area type designations used in the WRATS highway network and modeling process are shown in Figure 2-1 and Figure 2-2.

Capacity. Link capacities for the model network are obtained from a lookup table of per-lane hourly capacities based on facility type and area type. The final link capacity is calculated by multiplying the per-lane hourly capacity by the number of lanes.

Speed. Link speed in the model network is derived from a speed lookup table based on facility type and area type. During the model calibration process, a default speed matrix is interactively adjusted to obtain accurate system traffic assignments.

**Figure 2-2 WRATS Network
FacilityTypes**

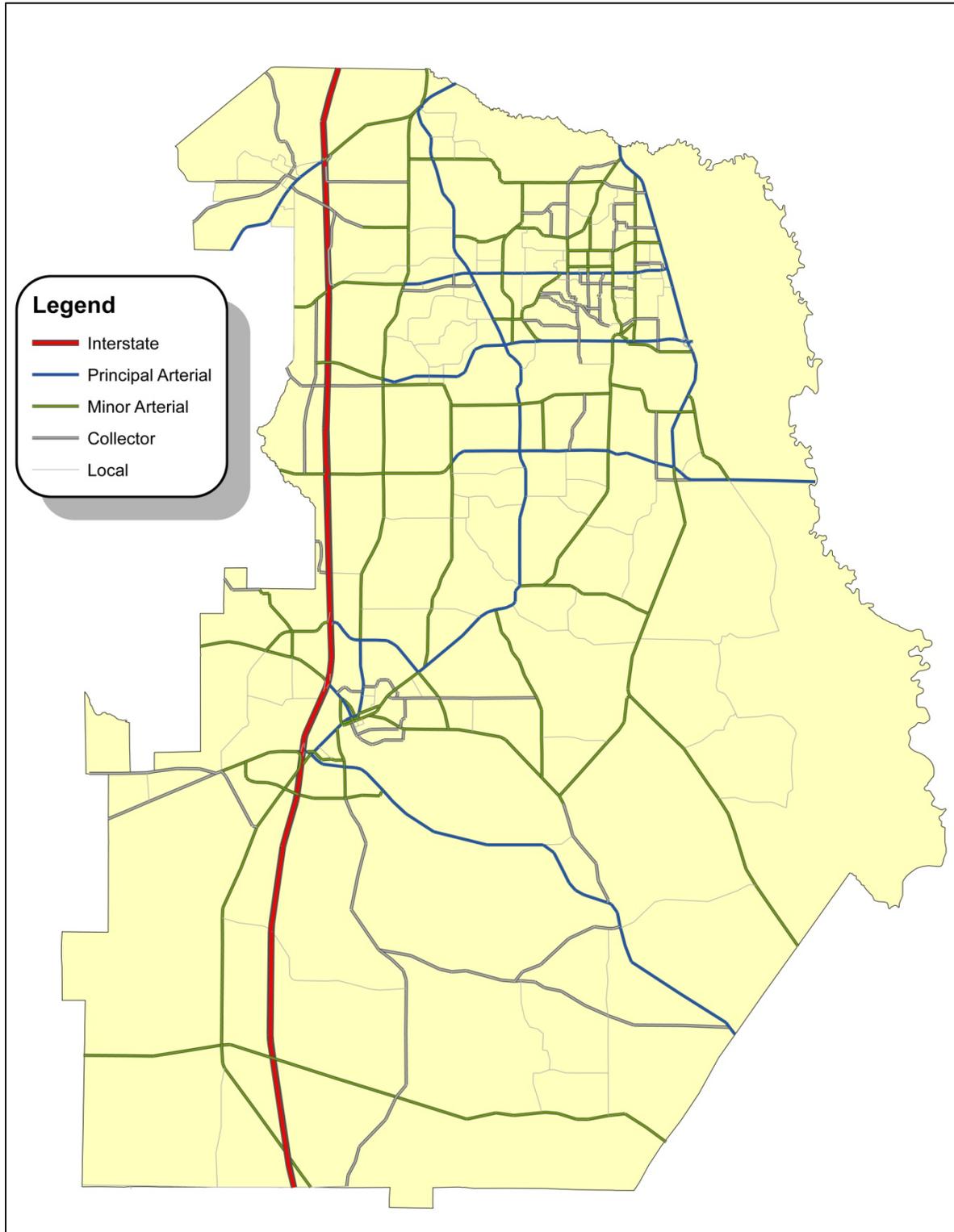
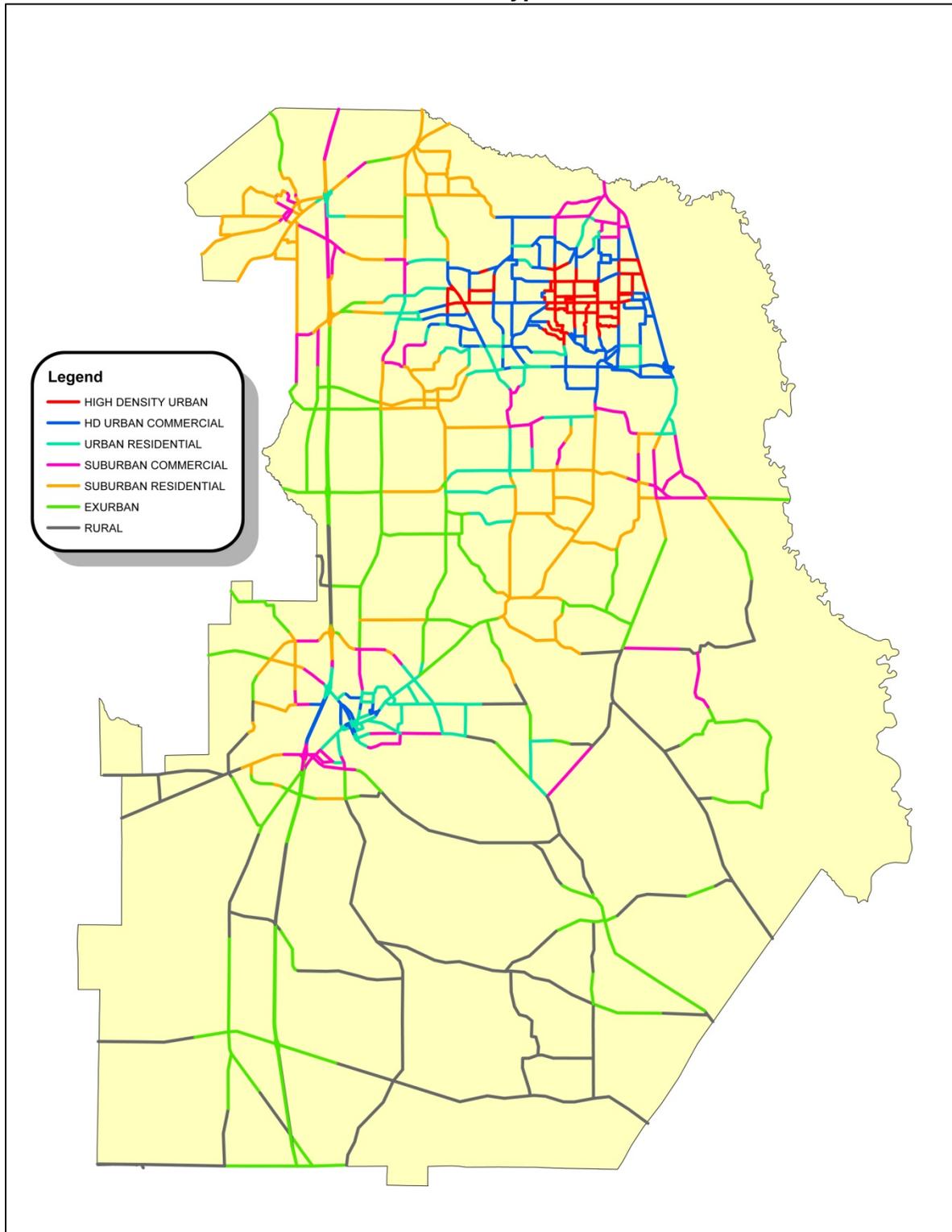


Figure 2-2 WRATS Network – Area Types



2.2 Trip Generation

Trip generation is the first step in the traditional four-step model process. It estimates the number of trips that will begin and end in each individual traffic analysis zone (TAZ). These are referred to as “trip ends”. Trip ends generated by households are referred to as productions. Trips ends calculated from employment or student enrollments are referred to as attractions. This process is accomplished by establishing relationships between trips and socioeconomic variables. The process estimates the number of trip ends, or productions and attractions, for each TAZ by various trip purposes. Trip generation does not determine the origin and destination of each trip, but total trips generated by each TAZ’s socioeconomic characteristics.

In 1997, GDOT contracted with a consulting firm to assist in developing a new standardized trip generation process for state’s urbanized areas outside of Atlanta. The Trip Generation Update Project included a household travel survey and external travel survey in Augusta, Georgia. Household travel behavior by household size and income group is homogeneous from one urban area to another if transportation choices and land-use patterns are similar. The Augusta survey information was used to formulate and recommend a trip generation process that is considered transferable to the state’s other urbanized areas.

The new trip generation process begins with a sub-model that evaluates trip productions and trip attractions. For non truck trips with an origin and/or a destination inside the WRATS study area trip rates are determined by cross-classification with household size (1,2,3,4+) and automobiles available (0,1,2,3+). Aggregate household data for each TAZ is disaggregated into 16 cross-classified cells using a household stratification model. This model breaks out the total number of households into cross-classification cells using zonal income, data from Census Transportation Planning Package 2000 (CTTP 2000) and data from the Augusta household survey. The trip production sub-model applies regression equations for other trip purposes. The trip attraction sub-model applies regression equations for all trip purposes.

Typically, there are three types of trips that model include: (1) Internal-Internal (I-I) trips whose origin and destination are inside the study area; (2) Internal-External (I-E) trips that have exactly one trip end inside the study area; and (3) External-External (E-E) trips that have both trip ends outside of the study area. I-I trips follow the production and attraction logic of trip formulation. They are commonly grouped into trip purposes so their characteristics can be reproduced by the chain of sub-models in the four-step process. I-E and E-E trips are developed separately using a different methodology that is heavily dependent on traffic counts observed on the principal roads leading into and out of the region.

2.2.1 Trip Purposes

Seven trip purposes were included in the trip generation process as summarized below:

1. **Home Based Work (HBW):** Trips made for the purpose of work that begin or end at a traveler’s home
2. **Home Based Other (HBO):** Trips made with one end at the home except those for the purposes of work or shopping
3. **Home Based Shopping (HBS):** Trips made for the purpose of shopping that begin and end at a traveler’s home
4. **Non Home Based (NHB):** Trips that neither begin nor end at home
5. **Internal-Internal Truck (IIT):** Internal trips made by commercial vehicles

6. **Internal-External Passenger Car (IEPC):** Internal passenger car trips beginning or ending outside the study area
7. **Internal-External Truck (IET):** Internal truck trips beginning or ending outside the study area

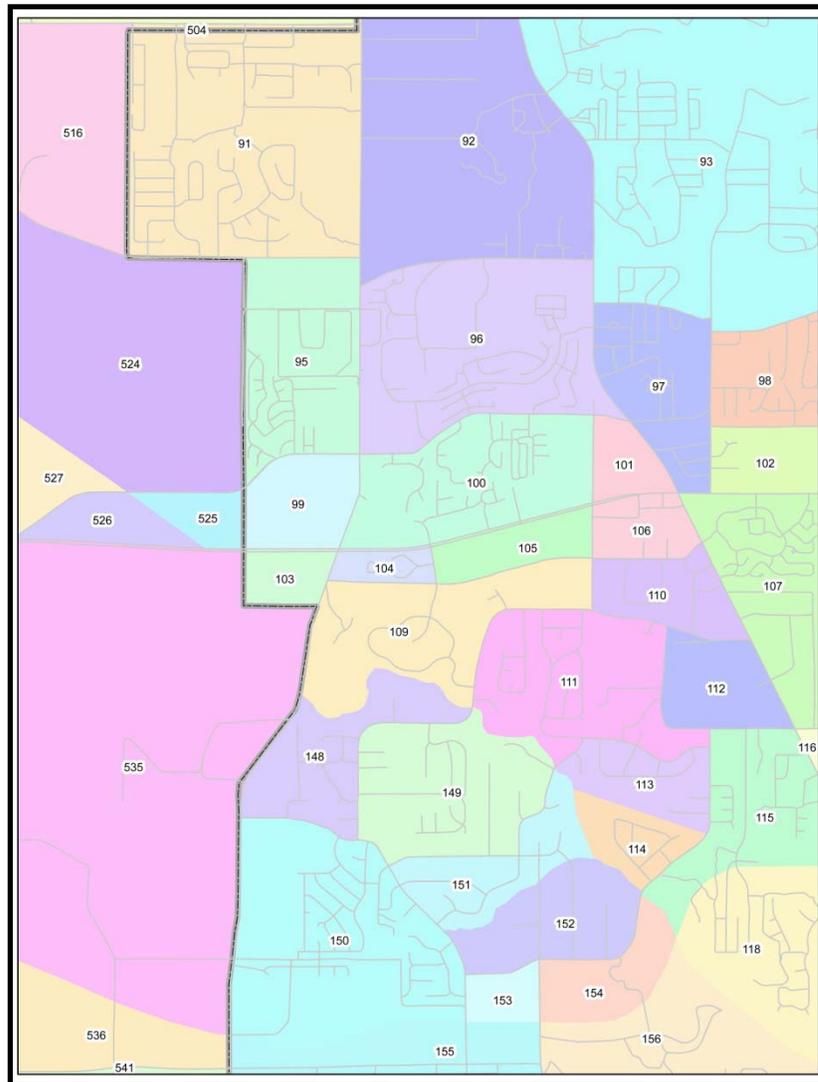
2.2.2 Socioeconomic Data

The WRATS provided 2006 base year socioeconomic data for a base year model. For each of the 329 traffic analysis zones (TAZs), the following socioeconomic variables were collected for use in the trip generation model:

- **Population:** The total number of individuals that are residing in each TAZ.
- **Households:** Total number of occupied households in a given TAZ.
- **Median Income:** Median household income in TAZ in 2000 dollars.
- **Retail Employment:** The number of employees working for retail businesses in a given TAZ where the business is located.
- **Service Employment:** The number of employees working for service based business in a given TAZ where the business is located.
- **Manufacture Employment:** The number of employees working for manufacture business in a given TAZ where the business is located.
- **Wholesale Employment:** The number of employees working for wholesale business in a given TAZ where the business is located.
- **Total Employment:** The total number of employees in a given TAZs where business is located.
- **School Enrollment:** The total number of enrolled students (including elementary, secondary and post-high school) in a given TAZ where educational facilities are located.
- **Acres:** Area of a TAZ in acre.

An illustrative image of the TAZ boundary system is presented in Figure 2-3.

Figure 2-3
TAZ Boundary System for the 2035 WRATS



2.2.3 Household Stratification Model

The household stratification model subdivides the total number of households by TAZ into 16 household strata defined by household size and the number of automobiles available. Stratification is done using TAZ median income, data from Census Transportation Planning Package (CTPP) 2000 and data from the Augusta household survey. The model distributes the total households in a TAZ to each cross-classification cell by calculating a relative probability that a household will be a particular size with a particular number of automobiles. The relative probability is calculated with the following equation:

$$P(i, j) = S \times I \times CF$$

where

$P(i, j)$ = Relative probability that a household will be size i and own j autos

S = Household size factor from CTPP 2000 lookup table

I = Income factor from CTPP 2000 lookup table

CF = Composite household factor from Augusta household survey lookup table

An estimate of the number of households in a particular cross-classification cell is then calculated by multiplying the total number of households in the TAZ by the corresponding relative probability. The final number of households in each cross-classification cell is calculated by applying an adjustment factor to each calculated value. The adjustment factor is applied to insure that the sum of resulting disaggregated households equals the original aggregate number of households.

Tables 2-1, 2-2 and 2-3 show the values used in the household stratification model.

Table 2-1
WRATS 2000 CTPP Household Size Distribution

Computed Persons/HH		Household Size			
		1	2	3	4+
0.0	1.0	1.0000	0.0000	0.0000	0.0000
1.0	1.2	0.7812	0.2056	0.0133	0.0000
1.2	1.4	0.6898	0.2568	0.0331	0.0203
1.4	1.6	0.5752	0.3128	0.0687	0.0433
1.6	1.8	0.4839	0.3511	0.1021	0.0630
1.8	2.0	0.4141	0.3537	0.1279	0.1043
2.0	2.2	0.3487	0.3563	0.1464	0.1486
2.2	2.4	0.2872	0.3471	0.1689	0.1968
2.4	2.6	0.2389	0.3274	0.1879	0.2458
2.6	2.8	0.1939	0.3140	0.1985	0.2935
2.8	3.0	0.1553	0.2947	0.2076	0.3424
3.0	3.2	0.1253	0.2749	0.2074	0.3924
3.2	3.4	0.1152	0.2489	0.1996	0.4363
3.6	3.8	0.1119	0.2116	0.1932	0.4832
3.8	4.0	0.1038	0.2042	0.1688	0.5232
4.0	4.2	0.1028	0.2032	0.1608	0.5332

Table 2-2 WRATS 2000 CTPP Household Median Income Distribution

TAZ-Level Median HH Income		Income Group			
		1 Less than \$20,000	2 \$20,000 - \$39,999	3 \$40,000 - \$59,999	4 Over \$60,000
\$0	\$2,499	0.8835	0.1165	0.0000	0.0000
\$2,500	\$4,999	0.8549	0.1168	0.0232	0.0050
\$5,000	\$7,499	0.8300	0.1318	0.0300	0.0081
\$7,500	\$9,999	0.7585	0.1468	0.0427	0.0521
\$10,000	\$12,499	0.6933	0.1826	0.0718	0.0523
\$12,500	\$14,999	0.6311	0.2131	0.0802	0.0756
\$15,000	\$17,499	0.5771	0.2465	0.0894	0.0870
\$17,500	\$19,999	0.5031	0.2938	0.1046	0.0985
\$20,000	\$22,499	0.4326	0.3321	0.1257	0.1096
\$22,500	\$24,999	0.3927	0.3387	0.1449	0.1236
\$25,000	\$27,499	0.3316	0.3581	0.1702	0.1401
\$27,500	\$29,999	0.3071	0.3488	0.1824	0.1617
\$30,000	\$32,499	0.2734	0.3395	0.1945	0.1926
\$32,500	\$34,999	0.2399	0.3356	0.2152	0.2093
\$35,000	\$37,499	0.2108	0.3322	0.2254	0.2316
\$37,500	\$39,999	0.1825	0.3143	0.2418	0.2615
\$40,000	\$42,499	0.1655	0.2840	0.2612	0.2893
\$42,500	\$44,999	0.1501	0.2688	0.2676	0.3134
\$45,000	\$47,499	0.1391	0.2550	0.2663	0.3396
\$47,500	\$49,999	0.1207	0.2387	0.2649	0.3758
\$50,000	\$52,499	0.1188	0.2142	0.2569	0.4101
\$52,500	\$54,999	0.1016	0.2012	0.2566	0.4407
\$55,000	\$57,499	0.0945	0.1894	0.2480	0.4682
\$57,500	\$59,999	0.0901	0.1853	0.2256	0.4990
\$60,000	\$62,499	0.0844	0.1684	0.2102	0.5371
\$62,500	\$64,999	0.0766	0.1598	0.2025	0.5612
\$65,000	\$67,499	0.0688	0.1510	0.1948	0.5854
\$67,500	\$69,999	0.0653	0.1416	0.1926	0.6004
\$70,000	\$72,499	0.0601	0.1271	0.1833	0.6295
\$72,500	\$74,999	0.0535	0.1218	0.1698	0.6549
\$75,000	\$77,499	0.0512	0.1087	0.1636	0.6765
\$77,500	\$79,999	0.0485	0.1042	0.1551	0.6922
\$80,000	\$82,499	0.0446	0.0991	0.1465	0.7099

TAZ-Level Median HH Income		Income Group			
		1 Less than \$20,000	2 \$20,000 - \$39,999	3 \$40,000 - \$59,999	4 Over \$60,000
\$82,500	\$84,999	0.0405	0.0939	0.1455	0.7202
\$85,000	\$87,499	0.0364	0.0889	0.1359	0.7387
\$87,500	\$89,999 or more	0.0350	0.0839	0.1238	0.7573

**Table 2-3
Household Size/Income/Auto Ownership Distribution
(Augusta Household Survey)**

Income Group	Persons per Household	Autos Available			
		0	1	2	3+
1	1	0.3063	0.6689	0.0248	0.0000
	2	0.0978	0.6578	0.2222	0.0222
	3	0.0733	0.6909	0.1628	0.0730
	4+	0.1000	0.5694	0.1765	0.1541
2	1	0.2548	0.4776	0.2259	0.0417
	2	0.0400	0.2140	0.6320	0.1140
	3	0.1111	0.1256	0.6033	0.1600
	4+	0.0900	0.1080	0.5942	0.2078
3	1	0.1833	0.6056	0.1578	0.0533
	2	0.0274	0.1677	0.6343	0.1707
	3	0.0900	0.1050	0.5033	0.3017
	4+	0.0600	0.0438	0.3862	0.5100
4	1	0.0577	0.6654	0.2000	0.0769
	2	0.0694	0.1044	0.5322	0.2939
	3	0.0200	0.0581	0.5098	0.4121
	4+	0.0189	0.0405	0.5405	0.4000

2.2.4 Trip Production

The routine for computing trip productions uses cross-classified data from the household stratification model and applied trip rates to calculate HBW, HBO, HBS and NHB productions. Trip rates for each purpose are shown below.

**Table 2-4
Trip Generation Trip Rates
(Augusta Household Survey)**

Household Size	Autos Available	Trip Type			
		HBW	HBO	HBS	NHB
1	0	0.420	0.769	0.407	0.504
	1	0.860	1.790	0.618	1.032
	2	0.860	2.087	0.321	1.032
	3+	0.860	1.784	0.624	1.032
2	0	0.920	1.500	0.620	0.960
	1	1.449	2.255	1.084	1.512
	2	1.725	3.091	0.884	1.800
	3+	1.725	3.165	0.810	1.800
3	0	1.320	3.086	0.154	1.440
	1	1.936	4.170	0.582	2.112
	2	2.332	5.106	0.618	2.544
	3+	2.860	5.832	1.188	3.120
4	0	1.350	4.200	0.300	1.650
	1	2.160	6.224	0.976	2.640
	2	2.520	7.673	0.727	3.080
	3+	2.880	8.294	1.306	3.520

Trip end productions for other purposes are calculated using the following regression equations:

$$I-I \text{ Truck Production} = 0.35 * \text{Households} + 1.14 * \text{Retail Employment} + 1.18 * (\text{Manufacturing} + \text{Wholesale Employment}) + 0.51 * \text{Service Employment}$$

$$I-E \text{ Passenger Car Production} = 0.331 * \text{Households} + 0.724 * \text{Total Employment}$$

$$I-E \text{ Truck Production} = 0.078 * \text{Retail Employment} + 2.149 * \text{Wholesale Employment} + 0.228 * \text{Manufacturing Employment}$$

2.2.5 Attraction Sub-model

The trip attraction routine to computer the estimated number of trips attracted to each TAZ uses the following regression equations:

$$HBW \text{ Attraction} = 1.50 * \text{Total Employment}$$

$$HBO \text{ Attraction} = 0.6500 * \text{Population} + 1.300 * \text{Total Employment} + 1.750 * \text{School Enrollment}$$

$$HBS \text{ Attraction} = 4.50 * \text{Retail Employment}$$

$$NHB \text{ Attraction} = 0.320 * (\text{Population}) + 3.00 * (\text{Retail Employment} + \text{Wholesale Employment}) + 0.800 * \text{Service Employment}$$

Internal Truck Attractions = Internal Truck Productions

I-E Attractions = Based on counts and E-E% (internal TAZs=0)

I-E Truck Attractions = Based on counts, E-E% and Truck% (internal TAZs=0)

The total number of I-E trips for each external station is calculated by subtracting the estimated number of E-E trips (based on an assumed percentage) from the daily traffic volume of the station. Then the total I-E trips are separated into I-E truck trips and other I-E trips based on an assumed truck percentage at each external station. Table 2-6 displays the percentages that are used to calculate I-E attractions at each external station.

**Table 2-6
Model External Station Percent E-E Trips**

External Station	Road Name	HPMS Description	2006 Lanes	County	Estimated Truck %	Estimated E-E %
601	US129/SR247 N	Principal Arterial	4	Houston	10	30
602	US41/SR49 N	Principal Arterial	2	Houston	10	5
603	SR11 N	Minor Arterial	2	Houston	10	5
604	I-75 N	Freeway	6	Crawford	25	65
605	Boy Scout Rd.	Collector	2	Peach	4	0
606	SR42 W	Collector	2	Peach	4	5
607	Burnett Rd.	Local	2	Peach	2	0
608	Moseley Rd.	Collector	2	Peach	4	5
609	SR49 W/Peach Pkwy.	Principal Arterial	4	Peach	10	30
610	SR247C	Minor Arterial	2	Peach	10	30
611	Lakeview Rd.	Collector	2	Peach	4	5
612	SR96 W	Minor Arterial	2	Peach	10	30
613	Buckeye/Todd Rd.	Collector	2	Peach	2	0
614	Harper Rd.	Collector	2	Peach	2	0
615	US341/SR7 W	Minor Arterial	2	Peach	10	20
616	SR127/Marshallville Rd.	Collector	2	Houston	10	30
617	SR224 W	Collector	2	Houston	10	30
618	SR26 W	Minor Arterial	2	Houston	10	30
619	SR329 W/County Line Rd.	Collector	2	Houston	4	6
620	SR329 S	Collector	2	Dooly	4	6
621	I-75S	Freeway	6	Dooly	25	65
622	US41/SR7 S	Minor Arterial	2	Dooly	10	5
623	Elko Rd.	Collector	2	Dooly	2	0
624	SR26 E	Minor Arterial	2	Pulaski	10	30
625	SR11 SE	Principal Arterial	2	Pulaski	10	30
626	SR247 SE	Minor Arterial	2	Pulaski	10	30
627	SR96 E	Principal Arterial	2	Twiggs	15	18
628	Russell Parkway (Gate 14)	N/A	N/A	NA	0	25
629	MLK (Gate 5)	N/A	N/A	NA	0	25
630	Peacekeeper (Gate 4)	N/A	N/A	NA	50	0
631	Watson (Gate 3)	N/A	N/A	NA	0	25
632	Green St. (Gate 1)	N/A	N/A	NA	0	25

2.2.6 External-External Trips

Two external-external trip tables were developed for year 2006, one for passenger cars and the other for trucks. A matrix of distances in mile between all external stations was developed using the base year 2006 network. Illogical movements were eliminated (replace calculated distances with zero). This matrix serves as a “seed” to develop E-E trip tables. The theory behind using distance between external stations to help predict external-external trips is that the greater the distance between two external stations, the more likely there will be external-external trips between these external stations. For example, typically, the distance between two external stations on either end of an interstate facility would be longer and, likewise, the number of trips that will travel between the two external stations on either end of the interstate would be higher. The final 2006 external trip tables were developed by applying the Fratar model.

2.2.7 Balancing Productions and Attractions

The trip generation process is executed by means of a computer program called TP+. Office of Planning at GDOT developed the TP+ code for the trip generation process. Using 2006 socioeconomic data, the program calculates and balances the productions and attractions, writes the productions and attractions to a file, builds E-E trip tables, calculates Fratar factors and applies the Fratar model to adjust the E-E tables so that traffic volumes at external stations closely match traffic counts.

For most trip purposes in the WRATS model, production and attraction trip ends are computed separately. As such, the sum of productions across all TAZs does not necessarily equal the sum of attractions. In reality though, each trip has two trip ends; one is a production or origin and the other is an attraction or destination. In theory, it makes sense to equalize the sum of productions with the attractions across all TAZs which, in effect, “balances” the two types of trip ends. This balancing or reconciliation is performed in the trip generation TP+ script.

2.3 Trip Distribution

Trips are calculated for persons, by trip purpose, from the production and attraction trip ends. The trip distribution step uses the gravity model process, which is commonly used for this purpose in urban models. The estimated number of trips between any two origin-destination zones will, in general, is proportional to the number of trip ends and inversely proportional to the travel time between these two zones. The gravity model computes trips such that the resulting distribution approximately matches an observed distribution of trips by travel time for each of the trip purposes.

Minimum time paths for the network were calculated using the TP+ travel demand modeling software. These times include turn prohibitions. The minimum times were then adjusted to include intrazonal times, terminal times and topographical penalties. Intrazonal times, the average time it takes to make a trip inside a particular TAZ, were created by TP+ using travel time to the nearest four TAZs. Terminal times were assigned based on the employment density of the origin and destination TAZs. At the trip origin end, terminal time generally refers to the time walking from residence to cars. At the trip destination end, it generally represents the time to go from cars to destination. Table 2-7 summarizes the terminal time criteria.

Table 2-7
WRATS Terminal Time Criteria (Minutes)

	Employment Density (Total Employment Per Acre)					
	0-3.00	3.01-15.00	15.01-25.00	25.01-50.00	50.01-75.00	>75.00
Origin Zone	1	1	2	2	2	2
Destination Zone	1	2	2	3	4	5

Average trip lengths in the WRATS model are displayed in Table 2-8. These are retrieved from model output. I-E Truck trip is the longest, with an average trip length of 17.7 minutes. Home Based Work trips have an average length of 12.4 minutes¹. The shortest average trip length is Non Home Based with an average trip length of 9.1 minutes.

Table 2-8
WRATS Average Trip Lengths

Trip Purpose	Average Trip Length (Minutes)
Home Based Work	12.4
Home Based Other	11.0
Home Based Shopping	10.4
Non Home Based	9.1
Trucks	9.7
I-E Passenger Cars	17.3
I-E Trucks	17.7

Gravity model input consists of a set of travel time impedance factors (friction factors), in addition to production trip ends, attraction trip ends and minimum time skim. These parameters force the gravity model to produce sets of trips by trip purpose, whose distributions approximate an observed travel time distribution. The friction factors for the WRATS model are calculated by one minute travel time increments.

Four of trip tables, computed in the trip distribution process, are estimated in terms of person trips. For trip assignment process, the four person trip tables were converted to vehicle trips. The four trip tables were: (1) Home Based Work; (2) Home Based Other; (3) Home Based Shopping; and (4) Non Home Based. The other trip tables, for I-E and E-E trips, were calculated in terms of vehicle trips at their inception. Conversion to vehicle trip table enables comparison to vehicle counts and capacity analyses. Table 2-9 shows vehicle occupancy rates were used in WRATS model.

¹ (Note: average work trip travel time reported in the Census Transportation Planning Package (CTPP) is considerably higher – 20.8 minutes. The model times reflect only the average work trip time internal to the model area; trips outside the study area are treated separately as internal-external trips. There are a relatively high proportion of IE work trips due to the proximity of Macon, GA and the presence of Robins AFB which draws employees over a large area. These external trip travel times are excluded from the 12.4 minute internal Home Based Work Trip average.)

**Table 2-9
Vehicle Occupancy Rates**

Trip Purpose	Occupancy Rate
Home Based Work	1.11
Home Based Other	1.67
Home Based Shopping	1.44
Non Home Based	1.66
Trucks	No adjustment, already vehicle trip
I-E Passenger Cars	No adjustment, already vehicle trip
I-E Trucks	No adjustment, already vehicle trip

2.4 Traffic Assignment

The last step in modeling sequence is trip assignment to logical routes on a highway network. Trip assignment for the WRATS model was accomplished using equilibrium assignment technique. The traffic assignment algorithm is iterative, running through successive applications until equilibrium occurs. Equilibrium occurs when no trip can be made by an alternate path without increasing total travel time of all trips on the network. Equilibrium assignment is an iterative process that reflects travel demand assigned to minimum time paths as well as the effects of congestion. In each iteration, traffic volumes are loaded onto network links and travel times are adjusted in response to volume to capacity relationships.

2.4.1 Base Year Model Calibration

GDOT made refinements to various parameters until base year 2006 model sufficiently simulated observed 2006 traffic patterns. The model was tested along screenlines to indicate if there were any broad areas where trips appeared to be consistently overestimated or underestimated. The base year model was also checked for accuracy by determining the percent RMSE of assigned volumes compared to ground counts as well as for reasonableness of the modeled vehicle miles traveled (VMT) statistics. Results from each of these tests are presented in following three subsections. The WRATS Technical Coordination Committee (TCC) approved the calibrated 2006 base year model for use in forecasting future year travel demand.

2.4.1.1 Screenline and Cutline Comparison

A total of nine screenlines and cutlines were established to intercept major traffic flows through the WRATS study area. Screenlines cross the entire study area boundary. Cutlines cross strategic sections of the study area. Screenlines and cutlines are used to examine the validity of travel demand model assignments. The two screenlines used for assessing the WRATS model are shown in Figure 2-4. The seven cutlines used for assessing the WRATS model are shown in Figure 2-5.

Assigned volumes in 2006 model are compared with 2006 traffic counts at each screenline and cutline crossing. In evaluating screenlines during a model calibration, the maximum desirable deviation for each screenline is taken from NCHRP 255. Target ranges for screenlines as well as individual links are based on the assumption that the maximum desirable traffic assignment deviation should not result in a design deviation of more than one highway travel lane. Figure 2-6 summarizes the screenline analysis. The screenline analysis shows that all screenlines in the WRATS model are modeled within the maximum desirable deviation.

Figure 2-4
Screenlines used in the Model Calibration Process

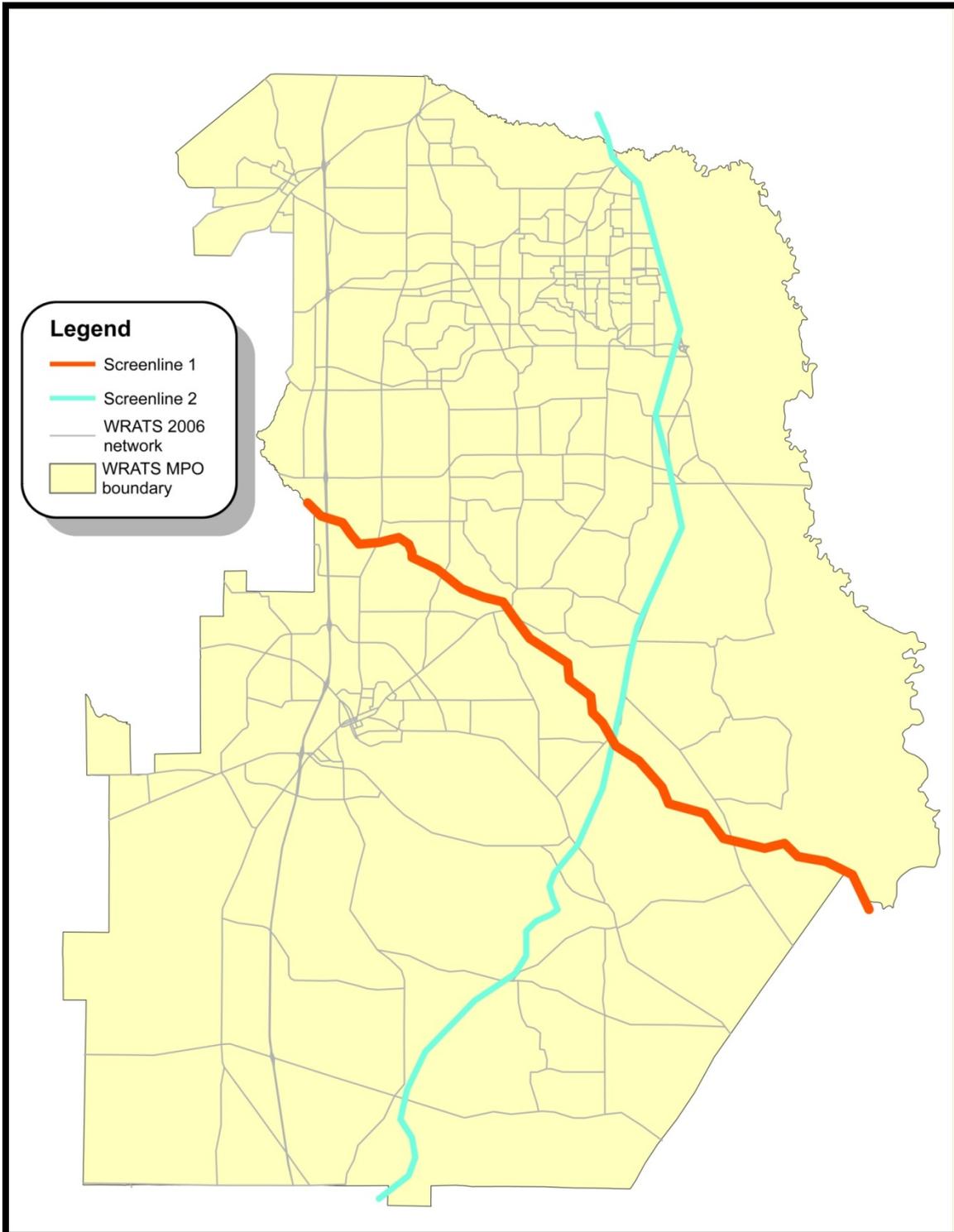
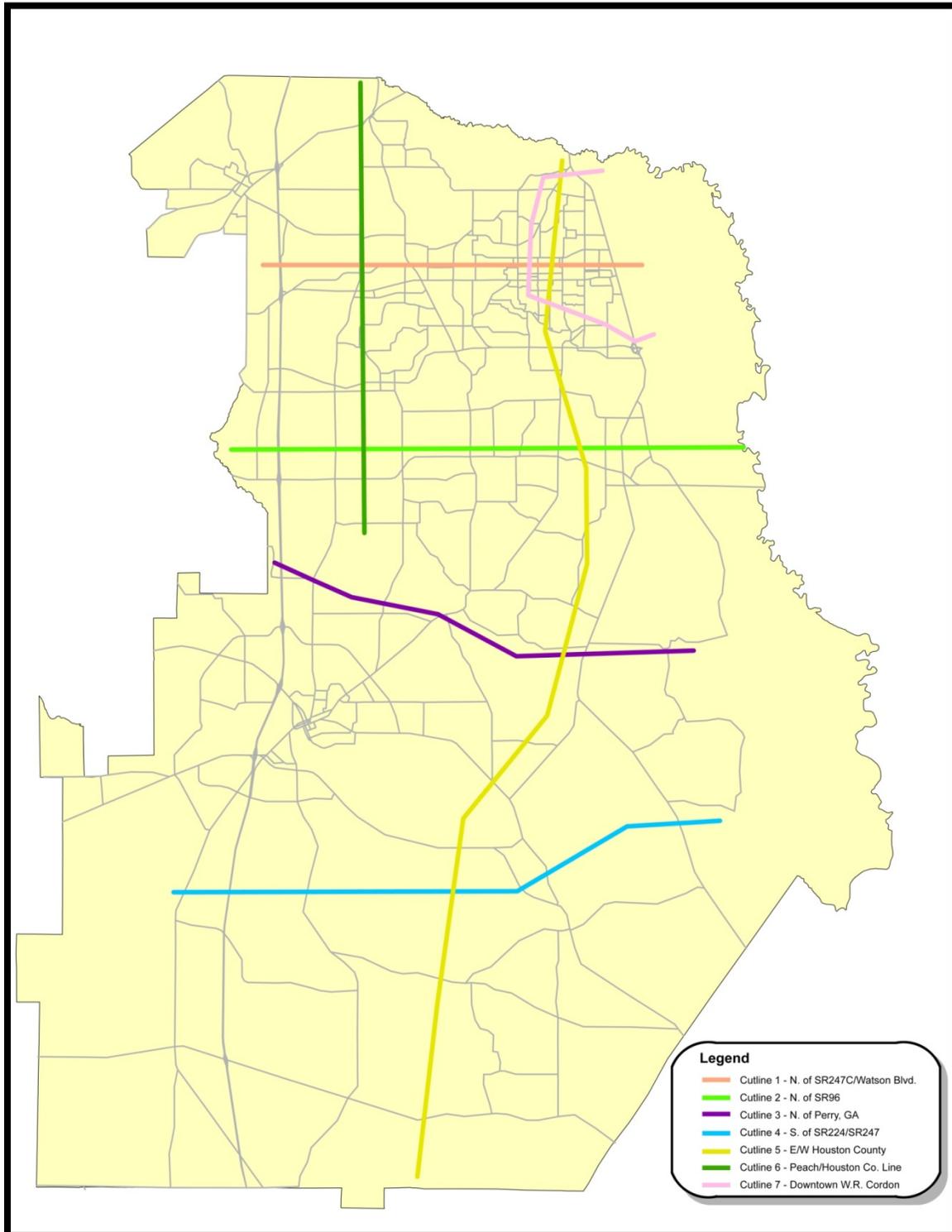
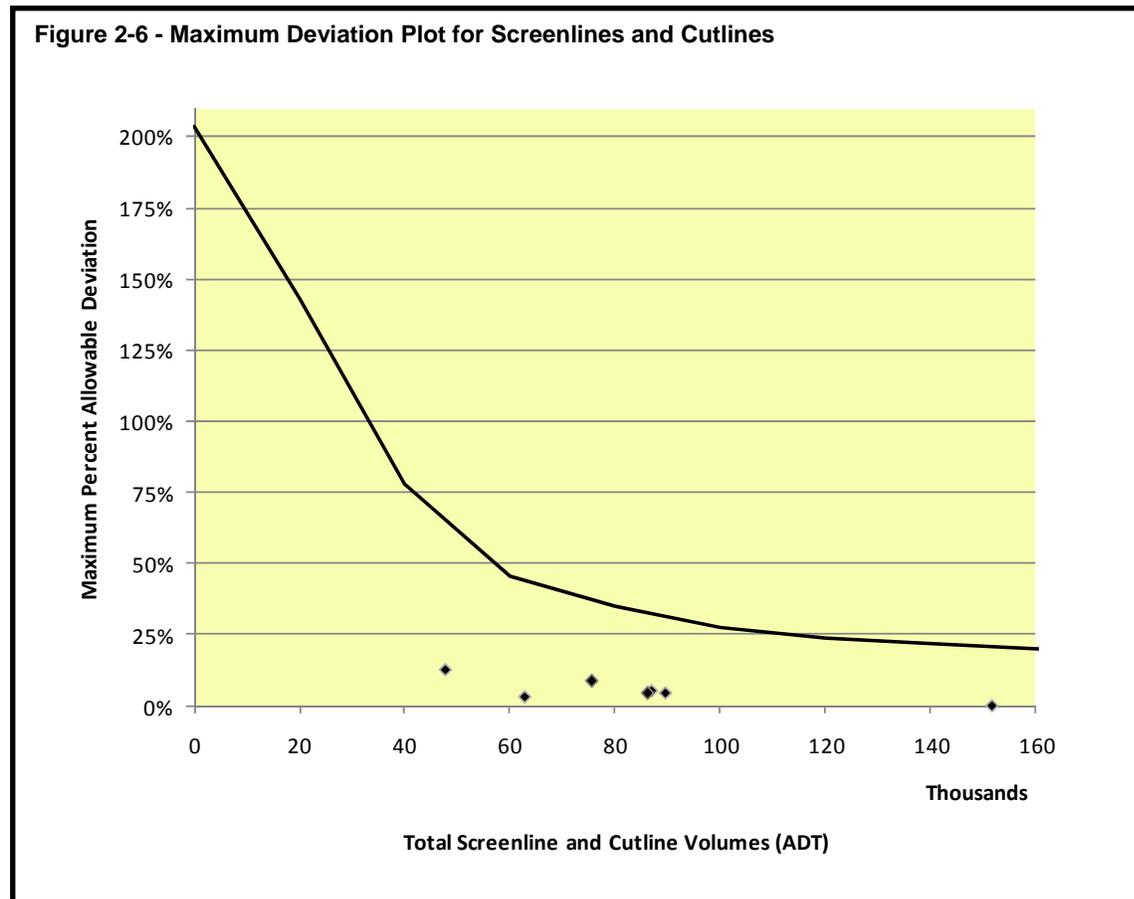


Figure 2-5
Cutlines used in the Model Calibration Process





2.4.1.2 Percent RMSE Comparison

Another method used to assess the ability of a model to reasonably predict travel patterns in an urban area is to determine the percent RMSE (root mean squared error) of the assigned volumes. The percent RMSE is the average percent deviation between the actual daily traffic count and the modeled daily traffic volume. The goal RMSE for urban areas varies based on the number and magnitude of the traffic counts available within the model study area. For the WRATS model, the goal RMSE for the entire model was 30%. The WRATS model achieved a percent RMSE of 24%.

2.4.1.3 VMT Comparison

Assigned VMT provides another method to check the reasonableness of assignment. Table 2-10 shows the 2006 VMT statistics aggregated by functional classification for both the modeled VMT and the actual VMT for Houston and Peach Counties. Actual VMT is from the GDOT's 400 series reports (report 445).

**Table 2-10
WRATS Model VMT Comparison**

Warner Robins Model Area VMT Statistics				
Facility Type	VMT		Between Model and Actual	
	Model	Actual	Difference	Percent
Freeway	1,633,561	1,644,822	-11,261	-0.7%
Principal Arterials	996,420	931,671	64,749	6.9%
Minor Arterials	964,088	1,092,056	-127,968	-11.7%
Collectors	234,534	206,134	28,400	13.8%
Total excluding Local Roads	3,828,603	3,874,683	-46,080	-1.2%
Local	133,443	780,502	-647,059	-82.9%
Total including Local Roads	3,962,046	4,655,185	-693,139	-14.9%

As seen in Table 2-10, the WRATS model is modeling the magnitude of VMT as well as the distribution of VMT among the different functional classifications well in the base year for those facility types included in the model.

Appendix B

Public Involvement Information

1.0 Public Notice

Consistent with the adopted WRATS Public Involvement Plan and requirements of the US Department of Transportation Statewide and Metropolitan Transportation Planning Rules, the 2035 WRATS LRTP is subject to a 30 day public review and comment period prior to official action on the draft plan. Notice of availability of the draft plan for review and comment is published in the *Houston Home Journal*, the county's official legal publication. A sample of the Notice of Availability advertisement from the *Houston Home Journal* appears below.

PUBLIC NOTICE

Public Review Period: 2035 Long Range Transportation Plan for the Warner Robins Area Transportation Study (WRATS)

The Warner Robins Metropolitan Planning Organization (MPO) is seeking public comment on the draft 2035 Long Range Transportation Plan for the Warner Robins Urban Area. Federal and State planning regulations require that the MPO prepare a Long Range Transportation Plan that addresses at least a 25-year planning horizon. The current Long Range Plan, which was produced in 2005, defines the needed street and highway programs for the year 2030. The Long Range Plan is presently being updated to address the transportation needs for the year 2035. The Georgia DOT uses the Long Range Plan as a guide for planning and programming the construction of transportation facilities in the WRATS area. The Warner Robins MPO will hold a public review period of thirty days to solicit comments from the public on the 2035 Plan. Copies of the draft Plan will be available at the following locations from September 22, 2010 through October 22, 2010: Warner Robins City Hall, Transportation Planner's Office; Houston County Annex, Commissioners Office; Centerville City Hall, City Clerk's Office; Byron City Hall, Public Works Department; Perry City Hall, Department of Community Development; Centerville Public Library; Warner Robins Public Library and www.warnerrobinsga.gov. Public comments on the draft Plan are encouraged and welcome.

In addition to publishing notice of availability of the draft 2035 WRATS LRTP, notices are posted in the Warner Robins, Centerville, Perry and Byron City Halls and in the Administrative Offices of Houston County, Georgia.

2.0 Meeting Announcement

Two public meetings are held on the draft 2035 WRATS LRTP to provide information to the public and to allow the public to ask questions and make comment on the draft plan. The

PUBLIC NOTICE

Public Meeting: Year 2035 Warner Robins Area Transportation Study

The Warner Robins Metropolitan Planning Organization (MPO) is seeking public comment on the Year 2035 Long Range Transportation Plan (LRTP) for the Warner Robins Area Transportation Study (WRATS). The MPO will hold two public information meetings to review the LRTP. These meetings will be held on October 5 in the Centerville Community Center (300 East Church Street, Centerville, GA) and on October 14 in the Perry City Hall Council Chambers (1211 Washington Street, Perry, GA). The purpose of these meetings is to provide the public with an opportunity to comment and offer their input to the draft LRTP before the adoption of the final plan.

Both meetings will be conducted from 5:00 p.m. to 7:00 p.m. The public is invited to attend either of these two meetings. The meetings will be in an open house format with an opportunity for the public to review presentation materials and engage in discussion with staff who worked on the plan. Staff will be available at each meeting to discuss the plan, the plans recommendations, and to answer questions and address concerns interested individuals may have. The LRTP identifies the transportation needs for roads, bridges, public transportation, bicycles, pedestrians, and freight movement in the year 2035 based on the anticipated growth in the MPO area.

4.0 Press and Media Coverage

There was no press or media coverage of the WRATS 2035 LRTP.

5.0 Summary of Public Comments Received

There were no public comments received on the draft WRATS 2035 LRTP at either of the two public meetings or via the WRATS 2035 LRTP email posted on the City of Warner Robins website on the same page as the plan document. Comments were received from the Georgia Department of Transportation (GDOT) and the Federal Highway Administration (FHWA). These comments appear in the exhibits below.

GDOT Review of WRATS 2035 Draft LRTP

GDOT Planning has reviewed the WRATS DRAFT 2035 LRTP, and below are the comments. Please feel free to contact me if you need further clarification on any of these. Thanks.

- 1) The Table of Contents is missing 'Long Range Improvements' in Section 7
- 2) All of the maps have the road labels off the map. Is that purposely done?
- 3) p. 1-4: 1st full paragraph looks to be smaller font than everything else
- 4) p. 4-17: above 4.2.1, the 'the' is crossed out
- 5) p. 5-1: 2nd paragraph, last sentence; specify funding for operational improvements
- 6) p. 5-6: What is the roadway that is showing LOS F near Perry?
- 7) p. 5-13: Should 'other modes' just be labeled 'Aviation'? What are the 'other modes' besides aviation? I didn't see any discussed.
- 8) P. 7-1: What is 32245X on the SR 96- I-75 to Lake Joy project?
- 9) P. 7-3: 322460; tell length in WRATS area (this includes other projects outside WRATS boundary ie: 322960 – since a precedent was set w/ the PI 0000405 project of showing the MPO length, I would think it would be good to do it w/ all split county projects
- 10) What are the numbers on the maps corresponding with if the projects aren't numbered?
- 11) Also, the numbers (ie: Project ID-18 Dunbar Rd) are not corresponding w/ the maps
- 12) P. 7-5 Project ID-23: Bibb County line is not logical termini; the MATS 2035 LRTP showing I-75 widening fm Sardis Ch Rd to Watson Blvd
- 13) P. 7-7: 2nd illustrative project; add 'Rd' after 'Dunbar', why is an overlap project being kept in? Can't the termini of the 2 overlaps be addressed and fixed now since it's an update?
- 14) There doesn't appear to be any bridge projects, but all of the maps are titled 'Road and Bridge Projects'
- 15) P. 7-7: Project ID-28; it's related to which I-75 project?
- 16) P. 7-10: needs more descriptive limits on Project ID-50
- 17) Where are the project sheets as in the 2030 LRTP?
- 18) A few of the Dunbar Rd projects just seem rather confusing in their descriptions.

FHWA Review of WRATS 2035 Draft LRTP**(1) Please include a *financial section***

- This section should be clearly labeled as such
- Financial element section overview should include
 - Process and methodology for identifying funding available for the development of the constrained plan
 - Identify sources of revenue (city, county, etc.)
 - Explain how these source funding were identified, the process (inflation rate, etc)
- Federal funding (reasonable expected)
 - Overview
 - Historical trend/source of funding
 - Allocation of funding (maintenance, lumpsum, etc)
- State Funding (reasonable expected)
 - Overview
 - Historical trend/source of funding
- Local funding (reasonable expected)
 - Overview
 - Historical trend/source of funding
- Revenue Estimates
 - Transportation funding from the various localities (cities, counties, etc)
 - *Table* with local jurisdiction transportation funding
 - Estimated future funding for projects with table
 - Fiscal year (2011, 12, 13,2021-2025, etc)
 - County(s)
 - City (s)
 - Local total
 - State/federal
 - Total
 - Estimated future funding for special projects if any (TE)
 - Fiscal years (2011,.....2035)
 - Totals
 - Estimated future funding for identified project areas (maintenance, etc)
 - Fiscal years (2011-2020, etc)
 - Sources (counties, cities, state, etc.)
 - Totals
- Include summary table (s)
- Include tables with
 - projects and phase (priority)
 - Projects location (roadway)

FHWA Review of WRATS 2035 Draft LRTP (continued)

- Projects description
- Projects begin and end point (to – from)
- Projects PE with YOE, ROW & Utility with YOE, CST with YOE
- Projects PE cost, ROW & Utility Cost, CST cost, and totals for each project and phases

(2) Please include a *separate section* for projects and label as such

- Overview (explanation, YOE, inflation)
- Priority phase
- Roadway
- Improvement Description
- From – to

(3) Plan recommendations /Projects Listing

- Make this a summary table that demonstrates fiscal constraint
 - Project Priority/range (short, medium, etc)
 - Roadway (location)
 - Project description
 - To & From
 - PE YOE
 - ROW& Utility YOE
 - CST YOE
 - PE Cost
 - ROW & Utility cost
 - CST Cost
 - Totals

(4) Existing document

- Please incorporate all financial and project list into the body of the document and not appendix
- In the “Cost Estimate” table
 - Funding needed is in year 2010 dollars. Keep in mind that we are already in FY 2011 and that the plan goes to 2035.

(5) Documentation of public participation meetings /outreach(this can go in t he appendix section)**(6) Appendix**

- Please include all financial information in the body of the actual document

(7) Table 2 is confusing (“funding needed in year 2010”)

6.0 Actions in Response to Public Comment

In response to the comments from GDOT, changes were made to the LRTP document to correct typographical and formatting errors, to clarify project termini and present information on projects that are only partially within the WRATS study area in a uniform way. Also, Map numbers were added to the project descriptions in Chapter 7 to make it easier to locate the projects on the associated project maps.

In response to the comments from FHWA, Chapter 6 was renamed Transportation Plan Funding and portions of Appendix E – Financial Summaries and Support, were relocated into that chapter. In addition, a Table was created to show LRTP project funding for year of expenditure by phase, and additional language was added to clarify how the estimated transportation plan funding was derived.

Appendix C

WRATS Socioeconomic Data

Appendix C: Socio-Economic Variables by Zone for 2006

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
1	319	885	0	55	94	0	0	149	140	19,844
2	300	830	0	54	78	0	0	132	123	19,844
3	394	935	0	83	219	0	4	306	242	30,913
4	1	3	0	18	216	0	0	225	117	19,844
5	138	313	0	8	9	0	0	17	96	17,898
6	5	14	0	8	733	0	0	741	49	26,250
7	46	99	0	38	166	12	0	216	43	26,250
8	55	164	0	24	45	0	0	69	17	25,119
9	48	100	0	55	631	0	0	686	81	26,250
10	26	81	0	8	43	0	0	51	46	26,250
11	29	29	0	16	115	0	1	132	116	25,119
12	259	651	1,920	4	249	1	4	258	83	24,327
13	383	1,415	500	2	149	0	0	151	397	38,333
14	181	454	518	0	96	0	0	96	191	24,327
15	78	195	0	0	0	0	0	0	32	24,327
16	23	53	0	5	56	0	0	61	56	31,667
17	347	928	0	0	711	0	8	719	206	31,667
18	146	444	739	1	96	0	0	97	391	30,962
19	0	0	0	0	42	0	0	42	24	30,962
20	167	417	0	2	2	0	0	4	156	30,962
21	0	0	0	7	7	0	0	14	44	30,962
22	757	1,936	1,877	17	510	0	0	527	314	35,721
23	44	124	0	4	9	0	0	13	31	28,281
24	402	1,114	0	36	87	0	0	123	171	28,281
25	685	1,186	0	24	122	0	0	146	196	35,721
26	30	71	0	0	64	26	0	90	40	12,984
27	214	543	0	13	12	0	0	25	113	28,281
28	227	632	0	11	58	0	0	69	254	35,721
29	218	605	0	0	131	0	0	131	220	29,135
30	191	508	0	4	48	7	0	59	148	47,685
31	469	1,096	0	27	102	4	0	133	285	38,721
32	540	1,371	0	38	89	1	0	128	175	40,909
33	102	269	0	282	60	0	0	342	206	47,685
34	278	646	0	4	168	0	0	172	120	31,571
35	20	51	0	3	117	0	0	120	52	47,685
36	230	497	363	6	235	0	0	241	139	19,844
37	0	0	0	0	478	0	0	478	18	31,571
38	171	283	0	0	358	0	0	358	59	31,571
39	180	391	0	5	127	0	0	132	137	40,909

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
40	206	516	996	0	204	0	0	204	143	35,000
41	141	353	0	100	236	0	0	336	65	35,000
42	0	0	0	44	102	0	0	146	13	41,983
43	56	102	0	44	101	0	0	145	29	41,983
44	2	2	0	4	89	0	0	93	30	41,983
45	3	6	0	8	42	0	0	50	23	41,983
46	12	28	0	46	157	0	0	203	33	41,983
47	52	148	0	28	76	0	0	104	30	44,444
48	54	101	0	33	1,251	0	0	1,284	57	45,567
49	97	236	0	83	32	60	0	175	45	45,567
50	137	326	0	20	57	0	0	77	126	41,983
51	10	14	460	0	221	0	0	215	170	44,444
52	228	569	0	0	0	0	0	0	114	45,567
53	357	896	0	14	271	0	0	285	232	45,567
54	38	96	0	3	6	0	0	9	35	41,983
55	12	30	0	0	0	0	0	0	15	44,444
56	6	22	0	0	0	0	0	0	8	44,444
57	64	163	0	0	0	0	0	0	46	45,567
58	0	0	0	0	0	0	0	0	52	45,567
59	339	734	0	164	456	0	0	620	263	39,875
60	64	162	0	0	0	0	0	0	33	39,875
61	72	96	0	0	3	0	0	3	40	39,875
62	30	86	0	0	86	0	0	86	23	39,875
63	540	1,374	1,234	8	246	0	0	254	279	39,875
64	506	1,270	0	0	0	0	0	0	162	39,875
65	531	1,261	80	262	541	0	0	803	303	51,696
66	437	1,063	695	82	381	0	0	463	283	45,536
67	0	0	0	12	49	0	0	61	12	45,536
68	5	12	0	5	5	0	0	10	17	31,667
69	16	43	0	14	180	2	0	196	212	50,288
70	17	48	0	0	120	0	0	120	96	50,288
71	252	694	0	0	0	0	0	0	414	50,288
72	1,045	2,331	0	10	125	1	0	136	469	43,963
73	1,458	2,926	0	207	472	2	0	681	333	37,638
74	179	538	0	65	106	0	0	171	140	37,638
75	209	623	0	297	65	119	0	481	437	37,638
76	0	0	0	0	256	685	0	941	296	37,638
77	47	116	0	21	2	0	1	24	171	52,308
78	62	199	0	6	9	0	0	15	305	52,308
79	166	529	0	9	19	0	0	28	329	52,308
80	62	199	0	6	9	0	0	15	200	52,308

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
81	0	0	0	0	0	0	0	0	195	52,308
82	267	731	501	11	148	0	0	159	2,837	44,226
83	45	115	0	17	215	0	0	232	736	28,063
84	0	0	0	5	40	0	0	45	30	28,063
85	114	382	0	6	97	0	0	103	218	28,063
86	628	1,588	0	14	84	26	3	127	466	48,726
87	659	1,678	0	0	148	0	0	148	357	35,000
88	517	1,383	0	94	138	0	0	232	210	48,726
89	345	922	628	140	208	0	0	348	220	48,726
90	205	369	0	43	57	3	0	103	158	35,000
91	801	2,251	0	6	53	0	0	59	807	51,914
92	250	690	0	2	0	0	0	2	988	51,914
93	1,559	4,230	0	71	217	0	3	291	2,072	48,829
94	8	8	0	0	3	0	0	3	8	53,015
95	304	989	798	20	164	0	0	184	349	51,914
96	656	1,657	828	73	289	0	2	364	582	51,914
97	384	1,013	564	41	192	0	0	233	243	34,022
98	269	787	0	890	260	95	0	1,245	213	44,643
99	34	110	0	2	18	0	0	20	146	51,914
100	267	660	0	257	168	0	0	425	366	51,914
101	2	6	0	499	150	0	3	652	73	51,914
102	115	338	0	0	8	0	0	8	132	44,643
103	0	0	0	0	0	0	0	0	72	57,917
104	0	0	0	3	10	0	0	13	51	52,277
105	0	0	0	23	92	0	0	115	109	52,277
106	0	0	0	120	13	5	0	138	93	52,277
107	769	1,742	0	386	466	0	1	853	461	42,303
108	475	1,169	0	93	95	0	0	188	259	42,303
109	332	715	0	45	551	0	1	597	358	52,277
110	0	0	0	338	712	0	9	1,059	141	52,277
111	490	1,524	646	0	192	0	0	192	374	52,277
112	12	31	0	20	30	0	0	50	149	52,277
113	70	211	0	0	0	0	0	0	135	52,277
114	63	192	0	0	0	0	0	0	98	52,277
115	545	1,558	0	12	0	0	1	13	287	52,277
116	259	668	0	27	552	0	0	579	128	42,303
117	132	363	0	14	305	0	0	319	160	42,303
118	263	773	0	3	27	0	0	30	513	52,277
119	23	46	0	23	68	0	0	91	330	36,622
123	116	369	0	2	18	0	0	20	322	62,222
124	143	399	0	23	26	0	0	49	201	62,222

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
125	134	298	0	0	0	0	0	0	57	62,222
126	505	1,448	0	2	97	0	0	99	3,444	80,732
127	340	934	0	0	0	0	0	0	631	62,222
128	31	77	0	5	9	0	0	14	198	62,222
129	11	27	0	30	38	0	0	68	171	62,222
130	45	99	0	85	85	3	0	173	493	62,222
131	20	54	812	0	192	0	0	192	325	62,222
132	75	221	0	0	0	0	0	0	68	73,188
133	248	686	541	5	45	0	0	50	1,453	50,804
134	49	137	601	10	110	0	0	120	101	50,804
135	0	0	0	6	0	0	0	6	5	50,804
136	114	321	0	6	74	0	0	80	420	50,804
137	742	2,250	0	30	44	0	0	74	1,974	50,804
138	406	1,300	0	1	16	0	0	17	2,560	80,732
139	165	469	0	9	0	4	0	13	1,706	40,345
140	385	1,074	0	7	24	0	0	31	1,271	40,345
141	187	540	0	0	5	0	0	5	188	61,912
142	561	1,607	0	20	82	23	1	126	465	61,912
143	300	765	0	0	96	0	0	96	299	61,912
144	999	2,959	0	75	92	0	1	168	739	73,188
145	262	731	0	65	43	0	0	108	706	73,188
146	227	623	0	21	140	0	0	161	519	62,222
147	99	295	0	10	16	0	0	26	512	73,188
148	180	553	0	0	0	0	0	0	230	62,058
149	270	829	0	0	67	0	0	67	343	62,058
150	569	1,804	0	40	58	0	0	98	607	62,058
151	140	404	0	0	0	0	0	0	179	62,058
152	135	404	0	0	0	0	0	0	207	62,058
153	135	403	0	11	18	7	0	36	56	62,058
154	0	0	0	10	19	7	0	36	133	62,058
155	1,586	5,186	1,117	120	260	1	0	381	2,461	62,058
156	369	1,099	0	6	39	0	0	45	753	62,058
157	1,502	4,550	600	139	245	0	0	384	1,253	62,058
158	526	1,568	0	115	166	0	1	282	438	62,058
159	352	1,014	0	19	118	0	0	137	741	58,833
160	75	221	0	0	15	0	0	15	388	73,188
161	239	766	0	10	21	0	1	32	520	58,833
162	553	1,787	0	23	49	0	1	73	1,100	58,833
163	336	336	0	100	606	0	0	706	560	58,750
164	101	1,246	3,372	50	912	0	0	962	823	58,750
165	372	1,149	610	63	120	0	0	183	1,217	58,750

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
166	45	127	0	0	1	0	0	1	149	58,750
167	222	617	0	3	22	38	0	63	1,274	58,750
168	476	1,424	0	6	23	0	0	29	993	58,750
169	232	612	0	0	33	0	0	33	1,084	58,750
170	182	497	0	0	0	0	1	2	699	21,964
171	70	194	0	4	8	0	0	12	471	21,964
172	252	693	0	7	17	0	0	24	1,700	54,625
173	89	229	0	1	2	0	0	3	632	54,625
174	10	25	0	1	20	0	0	21	243	21,964
175	283	686	0	5	35	12	0	52	1,100	54,625
176	165	426	0	9	18	0	0	27	648	54,625
177	0	0	0	6	3	0	0	9	111	21,964
178	68	149	0	0	463	24	1	488	383	21,964
179	204	448	0	0	5	0	0	5	211	21,964
180	543	1,357	707	45	229	2	0	276	780	34,006
181	124	331	0	229	321	0	0	550	270	13,375
182	54	122	0	41	24	0	0	65	61	17,478
183	0	0	0	81	214	9	0	304	23	17,478
184	112	237	0	9	24	1	0	34	145	17,478
185	0	0	1,147	5	131	0	0	136	45	22,500
186	115	261	0	21	49	0	0	70	74	27,188
187	186	470	0	3	90	0	0	93	138	22,500
188	35	93	0	35	12	0	0	47	43	27,188
189	0	0	0	7	5	0	0	12	7	17,478
190	0	0	0	0	13	0	0	13	3	17,478
191	0	0	0	0	13	0	0	13	3	17,478
192	1	2	0	14	35	0	1	50	7	17,478
193	1	1	0	22	36	5	0	63	3	17,478
194	0	0	0	22	36	5	0	63	2	17,478
195	2	6	0	28	75	0	27	130	15	17,478
196	9	21	0	3	9	0	0	12	11	17,478
197	7	14	0	0	0	0	0	0	8	17,478
198	15	37	0	4	48	0	0	52	13	27,188
199	180	514	0	3	20	0	0	23	1,260	45,511
200	576	1,624	627	8	100	5	0	113	636	45,511
201	140	350	0	1	3	0	0	4	2,327	45,511
202	144	443	458	1	59	0	0	60	2,253	45,511
203	31	81	0	1	0	2	0	3	1,300	45,511
204	52	125	0	0	0	0	0	0	20	30,385
205	101	224	0	4	4	0	0	8	133	30,385
206	4	4	0	81	34	0	0	115	126	30,385

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
207	384	956	532	26	175	0	0	201	239	30,385
208	67	350	408	3	819	0	2	824	498	45,511
209	60	108	0	2	0	0	0	2	340	45,511
210	88	201	0	0	0	0	0	0	1,321	45,511
211	0	0	0	0	0	0	0	0	21	37,297
212	146	328	0	10	114	3	3	130	167	51,971
213	285	646	0	7	12	3	3	25	201	51,971
214	428	1,218	355	7	117	0	1	125	1,383	58,214
215	48	135	0	0	2	0	0	2	2,096	58,214
216	196	568	0	5	21	0	0	26	1,256	58,214
217	0	0	0	0	3	0	0	3	904	45,511
218	9	23	0	5	0	2,272	0	2,277	656	37,297
219	18	43	0	0	0	0	0	0	298	39,083
220	7	16	0	0	1	0	0	1	174	39,083
221	34	101	0	1	1	0	0	2	344	39,083
222	17	56	0	0	6	0	0	6	1,116	39,083
223	2	6	0	0	0	0	0	0	955	39,083
224	72	241	0	2	2	0	0	4	762	39,083
225	2	6	0	1	0	0	0	1	164	39,083
226	197	404	0	13	75	0	0	88	590	39,083
227	167	387	0	3	9	0	0	12	751	39,083
228	54	126	0	74	82	0	0	156	405	39,083
229	2	6	0	0	0	0	0	0	822	46,953
230	0	0	0	74	89	76	33	272	728	43,018
231	3	12	0	2	0	0	0	2	1,043	46,953
232	17	50	0	0	1	0	0	1	829	46,953
233	103	307	0	0	7	11	0	18	876	43,755
234	367	1,217	0	44	406	0	4	454	295	26,570
235	1	3	0	15	34	0	1	50	3	17,478
236	204	646	0	3	20	0	1	24	153	22,292
237	0	0	0	4	21	0	1	26	42	22,292
238	0	0	0	4	21	0	0	25	64	22,292
239	25	70	0	1	0	182	0	183	441	22,292
240	1	4	0	1	3	0	0	4	332	22,292
241	2	8	0	1	75	0	0	76	608	22,292
242	0	0	0	76	16	0	0	92	47	26,570
243	0	0	0	1	1	13	0	15	75	46,953
244	95	276	0	4	31	0	0	35	590	46,953
245	3	6	0	0	0	0	0	0	472	46,953
246	1	3	0	0	0	0	0	0	572	46,953
247	73	219	0	2	6	0	0	8	1,801	46,953

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
248	51	124	0	1	1	0	0	2	2,274	46,953
249	32	92	0	0	4	0	0	4	666	46,953
250	33	87	0	0	0	1	0	1	353	46,953
251	18	59	0	0	2	0	0	2	812	22,292
252	1	4	0	2	2	0	0	4	349	22,292
253	97	229	0	2	1	0	0	3	4,193	37,297
254	12	44	0	1	10	823	11	845	3,231	37,297
255	0	0	0	0	0	0	0	0	9,638	37,297
256	39	97	0	1	0	0	0	1	1,320	37,297
257	3	12	0	1	3	205	3	212	2,854	37,297
258	25	80	0	0	0	0	0	0	8,589	37,297
259	9	22	0	5	0	0	0	5	1,114	37,297
260	11	36	0	0	0	0	0	0	867	37,297
261	1	3	0	0	1	0	0	1	2,223	37,297
262	29	73	0	0	1	0	0	1	5,197	37,297
263	215	581	0	9	29	0	0	38	5,931	37,297
264	8	18	0	1	0	0	0	1	314	37,297
265	25	55	0	0	0	0	0	0	1,795	39,792
266	6	13	0	0	0	0	0	0	236	39,792
267	5	19	0	0	0	0	0	0	469	39,792
268	46	136	0	4	3	50	1	58	1,373	39,792
269	51	142	0	1	1	0	0	2	1,693	39,792
270	97	273	0	11	4	0	0	15	2,002	39,792
271	122	357	0	5	2	0	0	7	3,953	39,792
272	38	106	0	0	5	0	0	5	2,159	39,792
273	18	53	0	0	1	0	0	1	1,231	39,792
274	60	183	0	2	7	0	0	9	7,357	39,792
275	53	144	0	1	5	1	0	7	1,876	39,792
276	39	107	0	0	1	0	0	1	2,865	39,792
277	81	216	0	2	5	2	0	9	2,459	39,792
278	47	137	0	3	3	76	1	83	9,770	39,792
279	40	102	0	0	2	0	0	2	5,325	45,987
280	41	116	0	0	2	0	0	2	5,259	45,987
281	15	46	0	0	0	0	0	0	1,389	39,792
282	10	27	0	0	1	0	0	1	3,680	30,795
283	29	83	0	0	2	0	0	2	112	30,795
284	35	96	0	0	1	0	0	1	2,139	30,795
285	34	88	0	5	5	0	0	10	1,189	30,795
286	32	84	0	6	20	3	0	29	2,383	45,987
287	1	1	0	0	3	0	0	3	1,534	45,987
288	89	278	0	3	8	0	0	11	3,909	45,987

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
289	157	511	0	4	26	0	0	30	6,233	45,987
290	104	287	0	0	5	0	0	5	7,109	30,795
291	0	0	0	14	38	1	7	60	1	27,388
292	200	390	0	35	54	0	0	89	877	45,511
500	153	437	0	3	1	0	0	4	1,231	45,354
501	161	451	0	80	43	6	1	130	611	45,354
502	163	452	0	349	94	7	0	450	691	45,354
503	136	379	0	14	14	6	0	34	1,530	45,354
504	609	1,668	0	99	147	8	2	256	1,659	45,354
505	5	12	0	131	114	15	1	261	134	45,354
506	20	61	0	3	91	0	0	94	65	45,354
507	28	60	0	3	25	0	0	28	26	45,354
508	67	177	0	0	6	0	0	6	87	45,354
509	144	413	0	0	6	0	0	6	2,660	45,354
510	127	375	0	13	66	0	0	79	392	45,354
512	64	176	0	1	12	0	0	13	378	45,354
513	22	59	0	2	11	0	0	13	16	45,354
514	10	25	0	47	17	0	0	64	38	45,354
515	24	51	1,421	16	209	3	0	228	200	45,354
516	4	9	0	2	59	94	24	179	538	45,354
518	297	839	0	1	9	2	0	12	1,094	43,521
519	37	73	0	118	45	19	0	182	150	45,354
520	36	92	0	1	0	0	0	1	89	57,917
521	25	67	0	0	0	0	0	0	159	45,354
522	332	916	0	2	6	0	1	9	685	54,529
523	0	0	0	10	1	0	0	11	97	57,917
524	0	0	0	5	1	0	0	6	911	57,917
525	151	257	0	1	0	0	0	1	65	57,917
526	151	257	0	3	0	0	0	3	91	57,917
527	0	0	0	2	1	0	0	3	251	57,917
528	168	486	0	53	47	0	0	100	662	51,141
533	63	190	0	0	11	0	0	11	717	51,141
534	11	29	0	1	300	0	0	301	320	51,141
535	38	82	0	25	26	0	0	51	2,042	57,917
536	2	14	0	0	10	0	0	10	340	57,917
537	4	12	0	0	0	0	0	0	109	51,141
539	36	101	0	0	10	0	0	10	1,201	51,141
540	50	129	0	1	1	0	0	2	694	51,141
541	83	207	0	10	7	0	0	17	1,989	57,917
542	43	85	0	5	0	4	38	47	1,282	57,917
543	34	85	0	0	7	1	0	8	396	51,141

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
SUM	52,946	142,673	26,655	9,094	28,301	5,084	215	42,680	255,115	

* totals exclude RAFB which is treated as external stations

Appendix C: Socio-Economic Variables by Zone for 2035

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
1	526	1,460	0	88	150	0	0	238	140	19,844
2	496	1,370	0	86	124	0	0	210	123	19,844
3	649	1,542	0	166	437	0	8	611	242	30,913
4	2	6	0	36	432	0	0	468	117	19,844
5	285	645	0	16	18	0	0	34	96	17,898
6	10	30	0	13	1,171	0	0	1,184	49	26,250
7	95	204	0	76	332	24	0	432	43	26,250
8	68	203	0	48	90	0	0	138	17	25,119
9	99	206	0	88	1,008	0	0	1,096	81	26,250
10	54	167	0	16	86	0	0	102	46	26,250
11	48	48	0	25	183	0	2	210	116	25,119
12	321	806	2,803	6	401	2	6	415	83	24,327
13	632	2,336	886	2	179	0	0	181	397	38,333
14	225	562	918	0	154	0	0	154	191	24,327
15	96	241	0	0	0	0	0	0	32	24,327
16	38	88	0	10	112	0	0	122	56	31,667
17	572	1,532	0	0	851	0	10	861	206	31,667
18	301	917	1,310	2	191	0	0	193	391	30,962
19	0	0	0	0	84	0	0	84	24	30,962
20	345	860	0	4	4	0	0	8	156	30,962
21	0	0	0	14	14	0	0	28	44	30,962
22	938	2,397	2,414	20	513	0	0	533	314	35,721
23	55	153	0	5	10	0	0	15	31	28,281
24	664	1,838	0	57	139	0	0	196	171	28,281
25	1,131	1,956	0	38	196	0	0	234	196	35,721
26	49	118	0	0	102	42	0	144	40	12,984
27	265	672	0	16	14	0	0	30	113	28,281
28	280	782	0	13	70	0	0	83	254	35,721
29	270	749	0	0	157	0	0	157	220	29,135
30	394	1,048	0	8	96	14	0	118	148	47,685
31	581	1,357	0	32	122	5	0	159	285	38,721
32	1,115	2,828	0	76	177	2	0	255	175	40,909
33	210	555	0	563	120	0	0	683	206	47,685
34	574	1,333	0	8	335	0	0	343	120	31,571
35	42	105	0	6	234	0	0	240	52	47,685
36	380	820	643	12	469	0	0	481	139	19,844
37	0	0	0	0	764	0	0	764	18	31,571
38	352	584	0	0	572	0	0	572	59	31,571
39	370	806	0	10	253	0	0	263	137	40,909

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
40	255	639	1,765	0	407	0	0	407	143	35,000
41	291	728	0	200	471	0	0	671	65	35,000
42	0	0	0	88	204	0	0	292	13	41,983
43	115	210	0	88	202	0	0	290	29	41,983
44	4	4	0	8	177	0	0	185	30	41,983
45	5	10	0	16	84	0	0	100	23	41,983
46	24	57	0	92	313	0	0	405	33	41,983
47	86	244	0	45	121	0	0	166	30	44,444
48	89	166	0	53	1,997	0	0	2,050	57	45,567
49	200	487	0	133	51	96	0	280	45	45,567
50	226	538	0	32	90	0	0	122	126	41,983
51	12	18	815	0	265	0	0	265	170	44,444
52	282	705	0	0	0	0	0	0	114	45,567
53	442	1,109	0	17	325	0	0	342	232	45,567
54	48	119	0	4	7	0	0	11	35	41,983
55	15	37	0	0	0	0	0	0	15	44,444
56	7	27	0	0	0	0	0	0	8	44,444
57	80	202	0	0	0	0	0	0	46	45,567
58	0	0	0	0	0	0	0	0	52	45,567
59	559	1,212	0	327	911	0	0	1,238	263	39,875
60	80	200	0	0	0	0	0	0	33	39,875
61	89	119	0	0	3	0	0	3	40	39,875
62	47	142	0	0	138	0	0	138	23	39,875
63	890	2,266	2,187	13	393	0	0	406	279	39,875
64	835	2,096	0	0	0	0	0	0	162	39,875
65	876	2,082	142	523	1,080	0	0	1,603	303	51,696
66	721	1,754	1,232	131	609	0	0	740	283	45,536
67	0	0	0	24	98	0	0	122	12	45,536
68	10	24	0	10	10	0	0	20	17	31,667
69	34	89	0	28	360	4	0	392	212	50,288
70	28	80	0	0	240	0	0	240	96	50,288
71	417	1,146	0	0	0	0	0	0	414	50,288
72	1,725	3,846	0	20	250	2	0	272	469	43,963
73	2,406	4,828	0	413	943	4	0	1,360	333	37,638
74	295	888	0	130	212	0	0	342	140	37,638
75	345	1,028	0	593	130	238	0	961	437	37,638
76	0	0	0	0	511	1,368	0	1,879	296	37,638
77	58	144	0	25	2	0	1	28	171	52,308
78	77	246	0	7	11	0	0	18	305	52,308
79	205	654	0	11	22	0	0	33	329	52,308
80	77	246	0	7	11	0	0	18	200	52,308

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
81	0	0	0	0	0	0	0	0	195	52,308
82	330	904	888	13	177	0	0	190	2,837	44,226
83	74	190	0	20	258	0	0	278	736	28,063
84	0	0	0	6	48	0	0	54	30	28,063
85	141	473	0	7	116	0	0	123	218	28,063
86	1,036	2,620	0	28	167	52	6	253	466	48,726
87	1,087	2,770	0	0	177	0	0	177	357	35,000
88	854	2,282	0	150	220	0	0	370	210	48,726
89	711	1,901	1,113	280	415	0	0	695	220	48,726
90	424	760	0	86	113	6	0	205	158	35,000
91	1,321	3,714	0	7	64	0	0	71	807	51,914
92	412	1,140	0	3	0	0	0	3	988	51,914
93	2,573	6,980	0	85	260	0	4	349	2,072	48,829
94	16	16	0	0	6	0	0	6	8	53,015
95	502	1,632	1,414	32	262	0	0	294	349	51,914
96	1,082	2,734	1,467	117	462	0	3	582	582	51,914
97	634	1,672	1,000	49	230	0	0	279	243	34,022
98	444	1,300	0	1,066	311	114	0	1,491	213	44,643
99	42	137	0	2	22	0	0	24	146	51,914
100	440	1,088	0	513	335	0	0	848	366	51,914
101	4	12	0	996	300	0	6	1,302	73	51,914
102	238	697	0	0	16	0	0	16	132	44,643
103	0	0	0	0	0	0	0	0	72	57,917
104	0	0	0	5	15	0	0	20	51	52,277
105	0	0	0	46	184	0	0	230	109	52,277
106	0	0	0	239	26	10	0	275	93	52,277
107	1,269	2,876	0	616	744	0	2	1,362	461	42,303
108	784	1,930	0	186	189	0	0	375	259	42,303
109	411	885	0	54	660	0	1	715	358	52,277
110	0	0	0	540	1,138	0	14	1,692	141	52,277
111	606	1,886	1,145	0	230	0	0	230	374	52,277
112	20	50	0	32	48	0	0	80	149	52,277
113	87	261	0	0	0	0	0	0	135	52,277
114	78	237	0	0	0	0	0	0	98	52,277
115	900	2,572	0	24	0	0	2	26	287	52,277
116	428	1,102	0	43	881	0	0	924	128	42,303
117	273	748	0	28	609	0	0	637	160	42,303
118	434	1,276	0	6	54	0	0	60	513	52,277
119	29	57	0	28	81	0	0	109	330	36,622
123	144	456	0	2	22	0	0	24	322	62,222
124	177	495	0	28	31	0	0	59	201	62,222

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
125	167	369	0	0	0	0	0	0	57	62,222
126	1,042	2,986	0	3	155	0	0	158	3,444	80,732
127	421	1,156	0	0	0	0	0	0	631	62,222
128	38	95	0	6	11	0	0	17	198	62,222
129	13	33	0	36	45	0	0	81	171	62,222
130	93	204	0	170	170	6	0	346	493	62,222
131	30	88	1,439	0	383	0	0	383	325	62,222
132	93	273	0	0	0	0	0	0	68	73,188
133	408	1,132	959	10	140	0	0	150	1,453	50,804
134	101	283	1,065	20	220	0	0	240	101	50,804
135	0	0	0	12	0	0	0	12	5	50,804
136	236	662	0	12	148	0	0	160	420	50,804
137	1,531	4,642	0	60	88	0	0	148	1,974	50,804
138	502	1,608	0	1	20	0	0	21	2,560	80,732
139	272	774	0	10	0	5	0	15	1,706	40,345
140	794	2,216	2,414	70	242	0	0	312	1,271	40,345
141	309	890	0	0	10	0	0	10	188	61,912
142	694	1,989	0	24	98	28	1	151	465	61,912
143	371	947	0	0	115	0	0	115	299	61,912
144	1,237	3,662	0	90	110	0	1	201	739	73,188
145	324	904	0	78	51	0	0	129	706	73,188
146	280	771	0	25	168	0	0	193	519	62,222
147	122	365	0	12	19	0	0	31	512	73,188
148	298	912	0	0	0	0	0	0	230	62,058
149	445	1,368	0	0	108	0	0	108	343	62,058
150	939	2,976	0	64	92	0	0	156	607	62,058
151	231	666	0	0	0	0	0	0	179	62,058
152	223	666	0	0	0	0	0	0	207	62,058
153	173	516	0	22	36	14	0	72	56	62,058
154	0	0	0	20	38	14	0	72	133	62,058
155	2,617	8,558	1,980	191	415	2	0	608	2,461	62,058
156	608	1,814	0	10	62	0	0	72	753	62,058
157	2,479	7,508	1,063	222	392	0	0	614	1,253	62,058
158	868	2,586	0	184	265	0	2	451	438	62,058
159	727	2,091	0	30	188	0	0	218	741	58,833
160	93	273	0	0	18	0	0	18	388	73,188
161	296	948	0	12	26	0	1	39	520	58,833
162	684	2,211	0	27	58	0	1	86	1,100	58,833
163	780	693	2,600	160	968	0	0	1,128	560	58,750
164	514	2,570	3,376	80	1,456	0	0	1,536	823	58,750
165	613	1,896	1,081	126	239	0	0	365	1,217	58,750

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
166	56	157	0	0	1	0	0	1	149	58,750
167	274	764	0	4	26	45	0	75	1,274	58,750
168	589	1,762	0	7	28	0	0	35	993	58,750
169	288	758	0	0	39	0	0	39	1,084	58,750
170	226	615	0	0	0	0	2	2	699	21,964
171	145	400	0	8	16	0	0	24	471	21,964
172	417	1,144	0	11	27	0	0	38	1,700	54,625
173	111	284	0	1	2	0	0	3	632	54,625
174	20	52	0	2	40	0	0	42	243	21,964
175	467	1,132	0	10	70	24	0	104	1,100	54,625
176	273	704	0	15	29	0	0	44	648	54,625
177	0	0	0	12	6	0	0	18	111	21,964
178	141	307	0	0	740	38	2	780	383	21,964
179	336	740	0	0	8	0	0	8	211	21,964
180	897	2,240	1,253	72	365	3	0	440	780	34,006
181	255	683	0	366	512	0	0	878	270	13,375
182	89	202	0	82	48	0	0	130	61	17,478
183	0	0	0	162	427	18	0	607	23	17,478
184	186	392	0	18	48	2	0	68	145	17,478
185	0	0	2,433	11	287	0	0	298	45	22,500
186	190	430	0	34	78	0	0	112	74	27,188
187	307	776	0	5	143	0	0	148	138	22,500
188	57	154	0	57	19	0	0	76	43	27,188
189	0	0	0	12	8	0	0	20	7	17,478
190	0	0	0	0	20	0	0	20	3	17,478
191	0	0	0	0	20	0	0	20	3	17,478
192	2	4	0	22	56	0	2	80	7	17,478
193	2	2	0	35	57	8	0	100	3	17,478
194	0	0	0	35	57	8	0	100	2	17,478
195	3	10	0	45	120	0	43	208	15	17,478
196	14	34	0	5	15	0	0	20	11	17,478
197	11	24	0	0	0	0	0	0	8	17,478
198	25	62	0	6	78	0	0	84	13	27,188
199	296	848	0	6	40	0	0	46	1,260	45,511
200	950	2,680	1,111	10	169	6	0	185	636	45,511
201	231	578	0	2	5	0	0	7	2,327	45,511
202	238	730	812	2	94	0	0	96	2,253	45,511
203	51	134	0	2	0	4	0	6	1,300	45,511
204	86	206	0	0	0	0	0	0	20	30,385
205	167	370	0	6	6	0	0	12	133	30,385
206	8	8	0	162	68	0	0	230	126	30,385

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
207	634	1,578	943	42	280	0	0	322	239	30,385
208	111	578	723	5	1,308	0	3	1,316	498	45,511
209	123	224	0	4	0	0	0	4	340	45,511
210	110	249	0	0	0	0	0	0	1,321	45,511
211	0	0	0	0	0	0	0	0	21	37,297
212	241	542	0	16	182	5	5	208	167	51,971
213	470	1,066	0	11	19	5	5	40	201	51,971
214	706	2,010	629	11	187	0	2	200	1,383	58,214
215	79	224	0	0	4	0	0	4	2,096	58,214
216	323	938	0	8	34	0	0	42	1,256	58,214
217	0	0	0	0	6	0	0	6	904	45,511
218	18	48	0	8	0	3,630	0	3,638	656	37,297
219	30	72	0	0	0	0	0	0	298	39,083
220	14	33	0	0	2	0	0	2	174	39,083
221	55	166	0	2	2	0	0	4	344	39,083
222	36	115	0	0	12	0	0	12	1,116	39,083
223	4	12	0	0	0	0	0	0	955	39,083
224	119	398	0	3	3	0	0	6	762	39,083
225	4	12	0	2	0	0	0	2	164	39,083
226	406	833	0	21	119	0	0	140	590	39,083
227	275	638	0	6	18	0	0	24	751	39,083
228	111	260	0	148	164	0	0	312	405	39,083
229	3	10	0	0	0	0	0	0	822	46,953
230	0	0	0	148	178	152	66	544	728	43,018
231	5	20	0	3	0	0	0	3	1,043	46,953
232	21	62	0	0	1	0	0	1	829	46,953
233	169	506	0	0	11	17	0	28	876	43,755
234	605	2,008	0	53	486	0	5	544	295	26,570
235	1	4	0	24	54	0	2	80	3	17,478
236	337	1,066	0	6	40	0	2	48	153	22,292
237	0	0	0	8	42	0	2	52	42	22,292
238	0	0	0	8	42	0	0	50	64	22,292
239	52	145	0	2	0	363	0	365	441	22,292
240	2	6	0	2	6	0	0	8	332	22,292
241	3	12	0	2	150	0	0	152	608	22,292
242	0	0	0	151	32	0	0	183	47	26,570
243	0	0	0	2	2	26	0	30	75	46,953
244	196	568	0	8	62	0	0	70	590	46,953
245	4	7	0	0	0	0	0	0	472	46,953
246	1	3	0	0	0	0	0	0	572	46,953
247	90	271	0	2	7	0	0	9	1,801	46,953

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
248	84	204	0	2	2	0	0	4	2,274	46,953
249	52	152	0	0	8	0	0	8	666	46,953
250	54	144	0	0	0	2	0	2	353	46,953
251	37	120	0	0	4	0	0	4	812	22,292
252	2	6	0	4	4	0	0	8	349	22,292
253	160	378	0	4	2	0	0	6	4,193	37,297
254	26	91	0	2	20	1,643	22	1,687	3,231	37,297
255	0	0	0	0	0	0	0	0	9,638	37,297
256	49	120	0	1	0	0	0	1	1,320	37,297
257	4	15	0	1	4	246	4	255	2,854	37,297
258	31	99	0	0	0	0	0	0	8,589	37,297
259	18	45	0	10	0	0	0	10	1,114	37,297
260	13	45	0	0	0	0	0	0	867	37,297
261	1	3	0	0	1	0	0	1	2,223	37,297
262	47	120	0	0	2	0	0	2	5,197	37,297
263	266	719	0	11	34	0	0	45	5,931	37,297
264	16	38	0	2	0	0	0	2	314	37,297
265	41	90	0	0	0	0	0	0	1,795	39,792
266	12	28	0	0	0	0	0	0	236	39,792
267	10	40	0	0	0	0	0	0	469	39,792
268	76	224	0	8	6	99	2	115	1,373	39,792
269	84	234	0	2	2	0	0	4	1,693	39,792
270	160	450	0	22	8	0	0	30	2,002	39,792
271	151	442	0	6	3	0	0	9	3,953	39,792
272	48	131	0	0	6	0	0	6	2,159	39,792
273	23	66	0	0	1	0	0	1	1,231	39,792
274	74	227	0	2	9	0	0	11	7,357	39,792
275	87	238	0	2	10	2	0	14	1,876	39,792
276	65	176	0	0	2	0	0	2	2,865	39,792
277	133	356	0	4	10	4	0	18	2,459	39,792
278	77	226	0	5	5	121	2	133	9,770	39,792
279	50	126	0	0	3	0	0	3	5,325	45,987
280	68	192	0	0	4	0	0	4	5,259	45,987
281	19	57	0	0	0	0	0	0	1,389	39,792
282	16	44	0	0	2	0	0	2	3,680	30,795
283	36	102	0	0	3	0	0	3	112	30,795
284	43	119	0	0	1	0	0	1	2,139	30,795
285	56	146	0	10	10	0	0	20	1,189	30,795
286	53	140	0	12	40	6	0	58	2,383	45,987
287	1	1	0	0	3	0	0	3	1,534	45,987
288	111	345	0	4	9	0	0	13	3,909	45,987

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
289	260	842	0	8	52	0	0	60	6,233	45,987
290	171	474	0	0	10	0	0	10	7,109	30,795
291	0	0	0	22	61	2	11	96	1	27,388
292	93	280	0	70	108	0	0	178	877	45,511
500	237	677	0	8	3	0	0	11	1,231	45,354
501	250	700	0	193	104	14	2	313	611	45,354
502	253	701	0	843	227	17	0	1,087	691	45,354
503	211	588	0	34	34	14	0	82	1,530	45,354
504	944	2,586	0	239	355	19	5	618	1,659	45,354
505	7	19	0	316	275	36	2	629	134	45,354
506	31	95	0	7	220	0	0	227	65	45,354
507	43	92	0	7	61	0	0	68	26	45,354
508	104	274	0	0	14	0	0	14	87	45,354
509	223	640	0	0	14	0	0	14	2,660	45,354
510	196	582	0	31	160	0	0	191	392	45,354
512	100	272	0	2	29	0	0	31	378	45,354
513	34	91	0	5	26	0	0	31	16	45,354
514	15	39	0	114	41	0	0	155	38	45,354
515	37	79	2,180	39	505	7	0	551	200	45,354
516	6	13	0	5	142	227	58	432	538	45,354
518	460	1,301	0	2	22	5	0	29	1,094	43,521
519	58	113	0	285	109	46	0	440	150	45,354
520	55	143	0	2	0	0	0	2	89	57,917
521	39	104	0	0	0	0	0	0	159	45,354
522	515	1,420	0	5	15	0	2	22	685	54,529
523	0	0	0	25	2	0	0	27	97	57,917
524	0	0	0	12	2	0	0	14	911	57,917
525	234	399	0	2	0	0	0	2	65	57,917
526	234	399	0	7	0	0	0	7	91	57,917
527	0	0	0	5	2	0	0	7	251	57,917
528	260	753	0	128	114	0	0	242	662	51,141
533	98	295	0	0	27	0	0	27	717	51,141
534	17	45	0	2	725	0	0	727	320	51,141
535	60	127	0	60	63	0	0	123	2,042	57,917
536	3	22	0	0	24	0	0	24	340	57,917
537	6	19	0	0	0	0	0	0	109	51,141
539	56	156	0	0	24	0	0	24	1,201	51,141
540	78	200	0	3	3	0	0	6	694	51,141
541	128	322	0	24	17	0	0	41	1,989	57,917
542	67	133	0	12	0	10	92	114	1,282	57,917
543	52	133	0	0	17	2	0	19	396	51,141

Traffic Zone	Households	Population	School Enrollment	Employment					Acres	Average Income
				Retail	Service	Manufacturing	Wholesale	Total		
SUM	84,913	227,565	48,203	16,286	47,487	8,928	414	73,115	255,112	

* totals exclude RAFB which is treated as external stations

Appendix D

GDOT Socioeconomic Data Development Methodology



Introduction

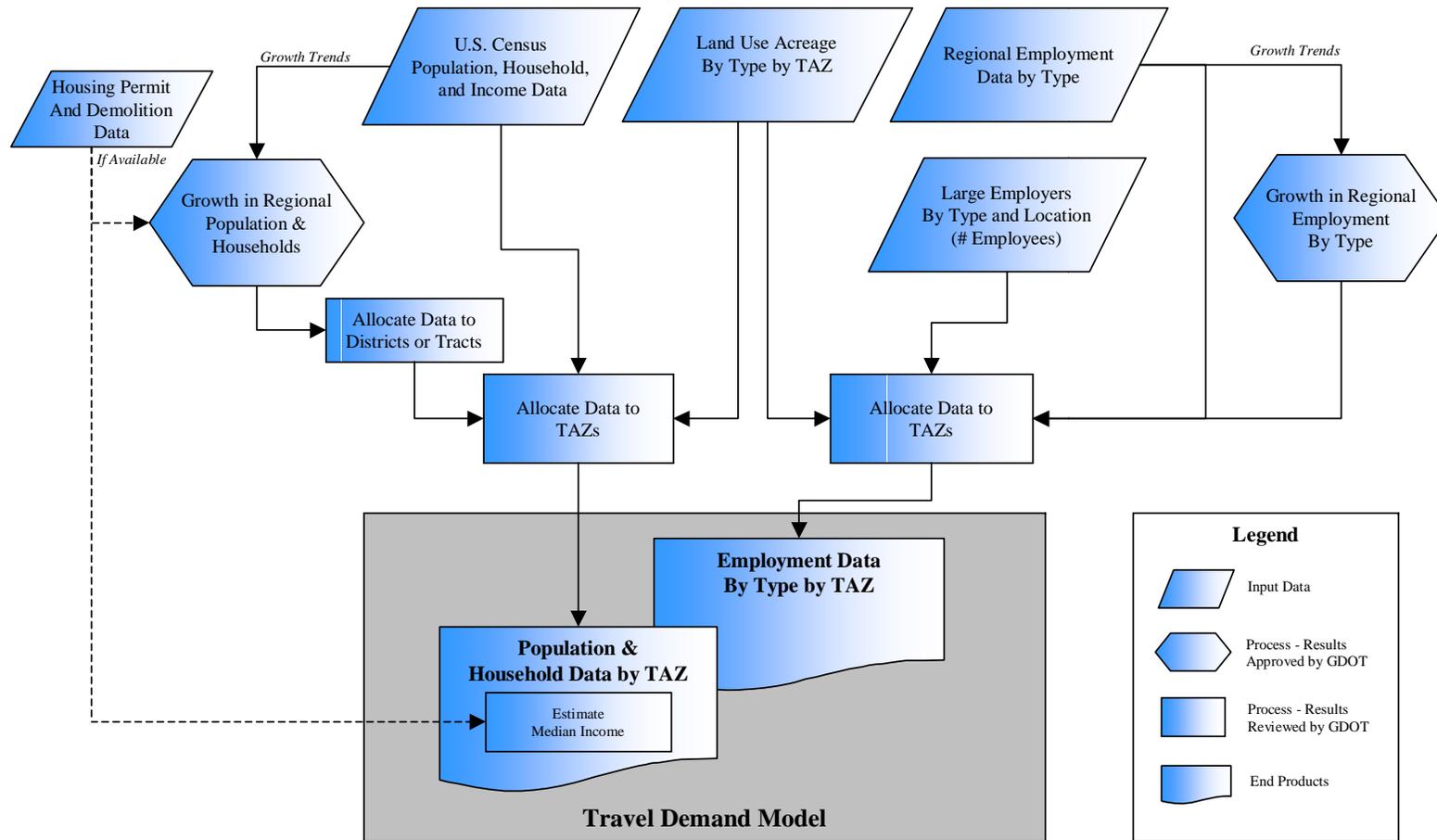
This document is intended to serve as an introductory guide for preparing socio-economic data for Georgia DOT travel demand modeling purposes. The guide is intended for planners in Metropolitan Planning Organization (MPO) areas that may not have established methodologies or may be considering revising current methodologies. Base year data produced by MPOs with locally knowledgeable staff and regularly maintained socio-economic data will often be more reliable than would be produced by the general methods that are presented.

All MPOs are encouraged to consider future land use plans and significant infrastructure changes (sewer extensions, new highway access, economic development plans, etc.) into long-range socio-economic forecasts and scenario development. A relatively simple, but effective, method of considering such factors uses a panel of people who are knowledgeable of the local area and have expertise in the fields of transportation, business, real estate, environmental planning or other related fields. Such panels review alternative scenarios of infrastructure investment and levels of future economic growth and are then asked to apply their expertise to develop expected growth patterns. Another common method uses mathematical land use models to develop expected future growth patterns. Land use models generally distribute changes in socio-economic data based on transportation accessibility and the availability of land for development. This approach is data intensive and usually requires a similar panel of experts to review the results of the land use model.

Figure 1 displays a generalized socio-economic data development process that is supported by GDOT. This process can be applied in developing base year and future year data, although specific steps in the process may differ. This guidebook provides an overview of a generalized data development process. Specific methods are offered for performing particular steps, but should not be considered required.



**Figure 1
Generalized Travel Model Socio-Economic Data Development Process**





Background

Traffic Analysis Zones

Georgia DOT's standard trip generation process requires socio-economic data to be compiled at the Traffic Analysis Zone (TAZ) level. TAZs are polygons that help to organize complex development patterns into more manageable units.

Most urban areas in Georgia have established TAZ boundaries. Some areas do not currently have travel demand models and need to establish TAZ boundaries in cooperation with GDOT. Areas with models should conduct an evaluation of their TAZ structures before beginning model updates. Since MPOs develop socio-economic data for TAZs, it is important to understand the best practices for establishing TAZ boundaries.

Level of Detail

A fine TAZ structure, if the associated socio-economic data is accurate, helps to produce more accurate travel estimates at smaller geographic scales. But, our ability to accurately allocate socio-economic data to TAZs diminishes as zone size decreases (particularly for future forecasts). Therefore, it is important to establish zone boundaries that are appropriate for the purpose of the model. For example, appropriate TAZs for a statewide model may be census tracts, counties, or larger areas. A model for a corridor study may use very small zones. Urban area model TAZ structures generally fall somewhere in between.

A rule-of-thumb that can be used to estimate the approximate number of TAZs for an urban area model is to take the square root of the study area population. Table 1 displays the estimated number of zones for different population levels using this rule-of-thumb:

Table 1 – Estimated Number of TAZs

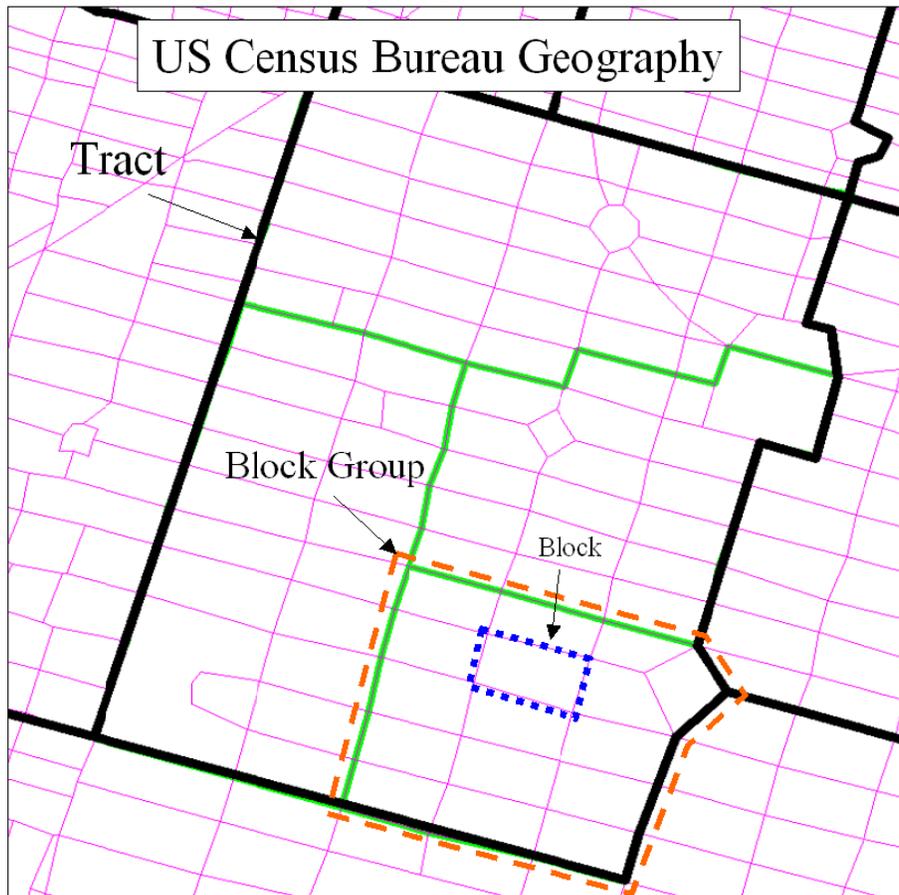
Study Area Population	Estimated # Zones
50,000	225
75,000	275
100,000	315
150,000	385
200,000	445
250,000	500
500,000	705
750,000	865
1,000,000	1000



Census Boundaries

US Census Bureau geography usually serves as the foundation for developing TAZ boundaries. Figure 2 displays an example of the most common Census Bureau geographic units: blocks, block groups, and tracts. Census blocks are the lowest level of geography. Blocks are combined to produce block groups. Block groups are combined to produce tracts.

Figure 2

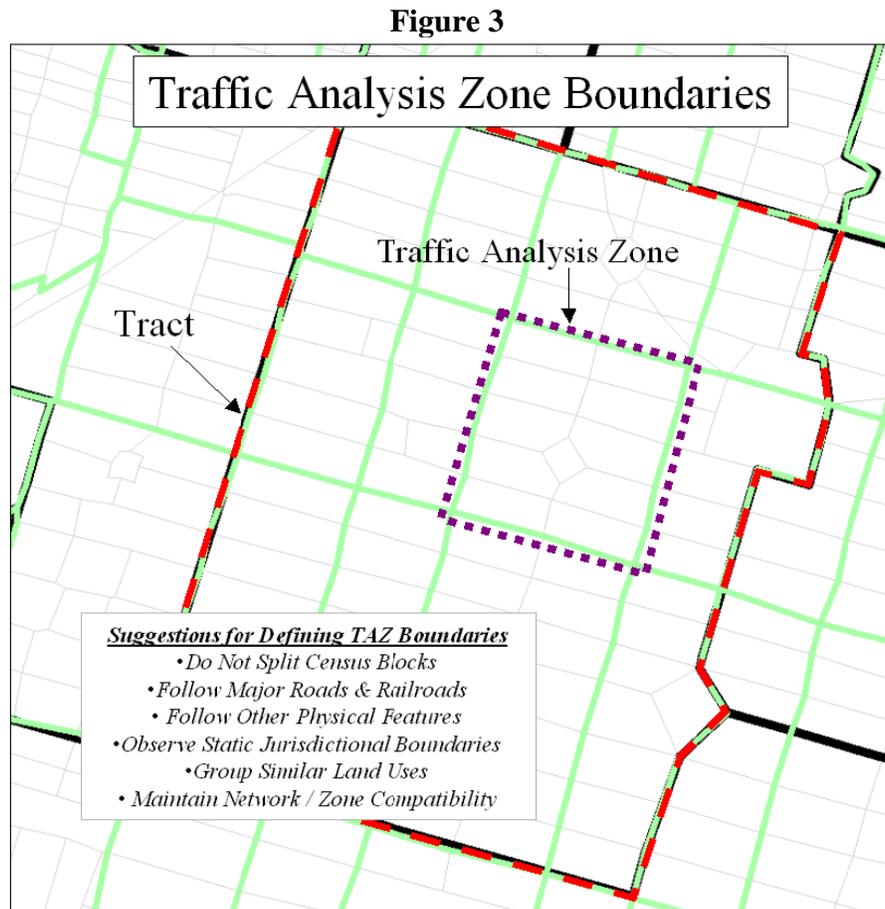


Census block boundaries (and associated data) are available in various GIS formats from multiple sources (Recommend site: <http://www.geographynetwork.com/data/index.html>). TAZ boundaries can be developed efficiently by assigning each block to a TAZ (i.e., Block to TAZ equivalency table), then “dissolving” boundaries based on the TAZ ID number.

Assigning TAZ boundaries that cross block group boundaries is relatively common. It is less common (and not recommended) to assign TAZ boundaries that cross Tract boundaries.



Figure 3 displays an example of TAZ boundaries. There are several guidelines that should be followed during the process of assigning blocks to a TAZ.



Physical Features

TAZ boundaries should follow tangible physical features such as major roads, railroads, or rivers/streams. Major roads and railroads should be used as zone boundaries when possible (i.e., considering other guidelines such as not splitting census tracts).

Non-Physical Boundaries

TAZ boundaries should not be assigned to dynamic jurisdictional lines such as city limits that do not abut other city limits. Fixed jurisdictional boundaries such as county lines or abutting city limits can be used. Assigning TAZ boundaries to intangible arbitrary lines is highly discouraged.

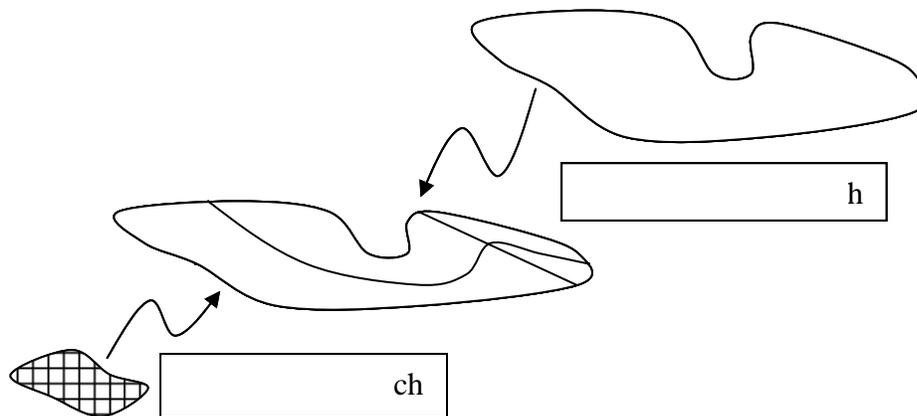


Land Use

Areas that have similar trip-making characteristics (similar land uses, incomes, auto ownership levels, etc.) should be grouped together. This supports the statistical validity of several aspects of the travel demand modeling process.

Base Year Data

Since base year data can be based on observed conditions, data preparation is generally a data gathering and compilation exercise. Preferred approaches to base year socio-economic data preparation generally apply either step-down or step-up data operations. Step-down methods disaggregate regional-level data to smaller geographic area. Step-up methods aggregate detailed data for small geographic areas to larger geographic areas. Most base-year data preparation exercises make use of both approaches.



Where data is available for small geographic areas, such as census blocks, it is recommended that this data be aggregated to traffic analysis zones (TAZ). For data that is generally available only at the county-level, such as employment¹ by type, it is recommended that this data be disaggregated to planning districts, and further disaggregated using TAZ specific information, such as land use data.

Future Data Allocation

Since future conditions cannot be observed, planners often develop several growth scenarios. Forecasts often rely on extrapolations of recent growth patterns, known or planned infrastructure improvements, current planning policies and programs, and other

¹ Developing a regularly maintained, accurate employment database (geocoded to TAZ) using commercially available employment data sets, state labor statistics, and local knowledge is preferred.



locally specific information. Forecasts that are based heavily on political agendas and unreasonably optimistic growth in economic conditions are discouraged. To deter such problems, GDOT encourages MPOs to form a socio-economic data review panel consisting of people who are knowledgeable of the study area’s growth trends and real estate market, as well as those with knowledge of transportation–land use interactions.

Data Preparation

Required Data

The data required for each TAZ using Georgia DOT’s standard trip generation process are shown in Table 1.

Table 1 – Data Required for GDOT Trip Generation Process	
TAZ Data Variables	Potential Data Source(s)
Population	U.S. Census (www.census.gov) and local building and demolition permits
Households	
Median Income	
Total Employment	U.S. Census, Georgia Department of Labor (www.dol.state.ga.us), commercial sources, and local employment data
Retail Employment	
Service Employment	
Manufacturing Employment	
Wholesale Employment	
School Enrollment	Georgia Department of Education, Georgia Independent Schools Association, local school systems, private schools, and Georgia Board of Regents
Acres	Geographic Information Systems

Population, Households, and Income

U.S. census data is the primary source for developing population and household data at the TAZ level. Population and household totals are available at the census block level. TAZ boundaries should not cross census block boundaries, so estimation of population and housing data are usually aggregation processes. This is often aided with the use of Geographic Information Systems (GIS). GIS makes such an aggregation process from block data to TAZ data relatively straightforward (i.e., tag each block with its associated TAZ number, then aggregate data using TAZ number).

Georgia DOT Guide for Preparing Socio-Economic Data For Travel Demand Modeling



Growth or decline that occurs between census counts must be reflected in base year data (for base years between census years). TAZ specific adjustments can usually be made using local building and demolition permit data, supplemented by local knowledge of building activity. If building activity data is unavailable, planners should use a step-down estimation process. Begin by estimating the regional growth in population, then allocate that growth to planning districts (perhaps based on discussions with people who are knowledgeable of local building patterns), then further disaggregate the growth to TAZs. Existing land uses can be used as a basis for TAZ level allocation.

Income data is available at the census tract (and block group) level. Since detailed income data is not available for smaller geographic areas, TAZ income data can be estimated from its associated census tract's data. Relatively large changes in development patterns (e.g., high cost homes constructed in a low income area) are usually necessary to produce significant changes in median income at the census tract level. Such changes often occur slowly, so most TAZs will not require adjustments from census income data. However, if specific TAZs have experienced considerable changes in development patterns since the last census (e.g., new residential areas in a rural tract), some adjustments to income data are recommended. To reflect the influence of households with significant income differences one could assume they have the median income for their respective income group², and then prorate the tract's income. An example may help to explain this.

Assumptions:

Household Totals:
 Census: 1000
 Base Year: 3000 (additional 2000)
 Higher Income New: 1500
 Similar Income New: 500

Income:
 Census Median: \$15,000
 New Higher Income Group: \$30,000-\$47,999 (Median=\$39,000)

Revised Income Estimation:

$$\frac{((\text{Census HH}) * \$15,000) + ((\text{New Similar HH}) * \$15,000) + ((\text{New Higher Income HH}) * \$39,000)}{(\text{Total Base Year Households})}$$

$$\frac{(1000 * \$15,000) + (500 * \$15,000) + (1500 * \$39,000)}{3000}$$

Revised Income = \$27,000

² GDOT's trip generation process uses four income groups: Income Group 1: <=\$14999; Group 2: \$15000-\$29999; Group 3: \$30000-\$47499; Group 4: >=\$47500 (in 1989 dollars; i.e., 1990 census base).



Employment by Type

Employment data are not readily available for geographic areas smaller than counties. But, there are many data sources at the county-level. The Georgia Department of Labor provides excellent county profiles and other reports that include county employment totals by employment class. The US Census Bureau produces County Business Patterns reports, which provide employment by type at the county level. There are also private vendors for employment data, such as Woods & Poole Inc. and ESRI Business Information Solutions.

GDOT’s trip generation procedures were developed using Georgia Department of Labor (DOL) data as its basis. Therefore, Department of Labor data³ should be used as the primary source of employment data. Other data sources can be used to support the data development and allocation process. Table 2 contains the DOL employment categories and the corresponding more generalized GDOT employment category.

Table 2 – DOL / GDOT Employment Equivalency Table	
DOL Category	GDOT Category
Agriculture, forestry, and fishing	Omit
Mining	Omit
Construction	Omit
Manufacturing	Manufacturing
Transportation and public utilities	Service
Wholesale Trade	Wholesale
Retail Trade	Retail
Finance, insurance, and real estate	Service
Services	Service
Federal, State, Local government (or Public Administration)	Service

TAZ estimates should be developed using a step-down process. The largest employers in a county should be identified and employment totals (by category) assigned to their respective TAZ. Remaining county employment totals would then be allocated to TAZs using a rational process.

One reasonable method of allocating employment data to TAZs is based on existing acreage for various land uses. A simple land use categorization scheme provides sufficient detail to allocate employment data. Land use can be categorized as either commercial, industrial, residential, rural/vacant developable, or un-developable (rivers, wetland, parks, utility easements, etc.). Employment is then allocated to TAZs based on

³ See ftp://quicksourc.dol.state.ga.us/Industry_Information/Georgia_Employment_and_Wage/Counties/ for the most recent employment reports. County profiles are available at ftp://quicksourc.dol.state.ga.us/Data_Compilations/Georgia_Area_Labor_Profiles/



each TAZ’s share of the county’s corresponding land use category⁴. Retail employment can be allocated based on a TAZ’s share of the county’s commercial land use acreage. Service employment can be allocated based on a TAZ’s share of the commercial and residential acreage. Manufacturing employment can be allocated based on a TAZ’s share of the county’s industrial land use acreage. Wholesale employment can be allocated based on a TAZ’s share of the county’s industrial and commercial acreage. Residential acreage can be used in conjunction with census data to allocate county population to TAZs (particularly in future allocation). Rural/vacant developable acreage and un-developable acreage is useful in determining developable acreage for each TAZ (i.e., subtracting from total acreage). Developable acreage can serve as a weighting factor for data allocation (growth from the base year to the future year).

Table 3 – Potential TAZ Land Use Database Variables
Total Acres
Existing Commercial Acres
Existing Residential Acres (best if stratified into density classes)
Existing Industrial Acres
Existing Rural/Vacant Developable Acres
Un-developable Acres
Future Commercial Acres
Future Residential Acres (best if stratified into density classes)
Future Industrial Acres
Future Rural/Vacant Developable Acres

GIS-based land use data can significantly support the employment allocation process. If land use data is unavailable in a digital format, similar data can be estimated using a TAZ classification scheme. “Typical” development categories for TAZs can be established, where each “typical” category has predefined shares for commercial, residential, industrial, rural/vacant developable, and un-developable land. Each TAZ can then be assigned to one of the development categories based on local knowledge (and preferably by the socio-economic data panel). Once assigned to a development category, estimates of the acres of land by type can be estimated using each TAZ’s total acreage. TAZ Regional employment totals (minus manually assigned large employers) are then allocated to TAZs using the estimated acreages just as outlined above.

Since development densities are not homogenous throughout urban areas, it is useful to develop weighting factors for various areas of the region or to manually allocate county-level data to planning districts. For example, central business zones will likely have more employees per acre than would be allocated using geographic area alone. Therefore, it

⁴ Future data development can be supported by similar land use acreage assignments based on proposed future land use plans.



may be appropriate to allocate more employees per acre to CBD zones than other less densely developed zones.

School Enrollment

It is preferable to obtain enrollment totals for each school in the study area (Elementary, Middle, High School, Private Schools, Technical Schools, Colleges, and Universities). If individual enrollments are not available, then system-wide totals by type of school could be an option. When combined with a comprehensive list of schools, an average school size could be calculated and allocated to each school (by type) equally. School enrollments should be available from school systems or through directly contacting individual schools. However, other potential data sources also exist, such as the State Board of Education, the Georgia Department of Technical and Adult Education, or the State Board of Regents.

Acres

TAZ acreage can be estimated best using GIS. MPOs should each maintain a GIS layer for TAZ boundaries. A regularly maintained land use database would also assist in developing consistency in socio-economic data estimates.

Future Year Projections

The first step in developing future year projections is estimating regional population growth. Control totals for other forecast variables can be estimated based on the projected growth rate in population. For example, future total employment can be estimated by multiplying the base year ratio of employment and population to the projected population. The socio-economic data committee could provide guidance on shifts in the employment base that may need to be applied to future employment totals by type (e.g., reflect national trends of shifting to a more service oriented economy). Future school enrollment control totals (by type of school) can be estimated using the base year ratio of enrollment and population. Average enrollments can then be allocated to schools by type. Unless significant changes in unemployment rates and age distributions are expected, assuming employment and school enrollments follow the growth in population should be sufficient for transportation planning purposes.

There are many methods (and assumptions) for projecting population. Each MPO is responsible for developing future population forecasts. GDOT is responsible for insuring that growth forecasts are reasonable. Prior to allocating future projections to TAZs, MPOs should provide GDOT documentation of the process and assumptions for their growth forecasts. GDOT conducts reasonableness checks on county population growth forecasts. Reasonableness checks will compare MPO forecasts to population projections



using various methods (linear, exponential, share, etc.). If MPO forecasts are substantially different from GDOT's expectations, GDOT will work with the MPO to resolve any disparities.

Summary

There are many approaches to developing socio-economic data for travel demand models. This guidebook provides relatively simple approaches for developing data. Provided below are simplified descriptions of the approaches that have been presented.

Population & Households

- Primary data source: US Census block-level data
- Assign each block to a TAZ
- Aggregate block-level data to produce TAZ-level census data
- If the base year is different than the census:
 - Estimate growth in population & households since the last census
 - Allocate the growth in population & households using share of residential acreage (perhaps weighted by district or area type) or some other rational process
- Socio-economic data review panel reviews data and recommends appropriate modifications
- Submit base year data for GDOT review and use in developing the base year travel model
- Develop and document the future regional projection methodology
- Socio-economic data review panel reviews methodology and projections and recommends appropriate modifications
- Submit projection methodology and proposed control totals to GDOT
- GDOT concurs or works with the MPO to reach an agreement on the methodology and control totals
- Allocate future population growth to TAZs
- Socio-economic data review panel reviews data and recommends appropriate modifications (may include multiple growth scenarios – at the discretion of the MPO and the data review panel)
- Submit future year data for GDOT review and use in developing the future year travel models

Income

- Primary source: US Census tract or block group level data
- Assign each TAZ to a tract or block group



- Assign the census median income to each TAZ
- If the base year is different than the census (or for future data):
 - Estimate the share of new households that fall within each income group (likely based on tract or planning level assumptions and/or local knowledge of specific new developments)
 - Estimate the median income by calculating a weighted average of the census data and the assumed distribution of new households.
 - Income should be reported in 1989 dollars⁵
 - Consumer Price Index 1999 (2000 census): 166.6
 - Consumer Price Index 1989 (1990 census): 124.0
 - Factor 2000 census to 1990 census: $124.0 / 166.6 = 0.74$
 - $\$.99 * 0.74 = \$.89$

Employment by Type

- Primary data source: Georgia Department of Labor (supplemented with County Business Patterns, private vendor sources, etc.)
- Identify the area's largest employers, determine employment levels for them, and categorize the employment by type
- Assign the largest employers data to their respective TAZs
- Subtract the largest employers from the county-level data
- Allocate the remaining employment using share of appropriate land-use acreage (perhaps weighted by district or area type) or some other rational process
 - Employment Class and Potential Associated Land Use Categories
 - Retail – Commercial
 - Service – Commercial & Residential
 - Manufacturing – Industrial
 - Wholesale – Industrial & Commercial
- Socio-economic data review panel reviews data and recommends appropriate modifications
- Submit base year data for GDOT review and use in developing the base year travel model
- Estimate future employment control totals as a function of projected population growth and projected shifts in the economic base of the region
- Socio-economic data review panel reviews employment projections and recommends appropriate modifications
- Submit employment projection assumptions and proposed control totals to GDOT
- GDOT concurs or works with the MPO to reach an agreement on the assumptions and control totals
- Allocate future employment growth to TAZs

⁵ Or report the assumed year and GDOT will account for the time value of money by adjusting appropriate modeling procedures.



- Socio-economic data review panel reviews data and recommends appropriate modifications (may include multiple growth scenarios – at the discretion of the MPO and the data review panel)
- Submit future year data for GDOT review and use in developing the future year travel models

School Enrollment

- Primary data sources: Local school boards, private schools, State Board of Education, State Board of Regents, and the Georgia Department of Technical and Adult Education.
- Manually assign school enrollment data to TAZs
- If specific school enrollments are unavailable:
 - Obtain school system total enrollments by type of school
 - Obtain lists of schools and assign each school to its appropriate TAZ
 - Determine the number of schools by type and calculate an average school size by type
 - Assign the average number of students in each school by type to each school's TAZ

Acres

- Develop a GIS-based TAZ layer and calculate total acres using the geography of the zones (if possible determine and report the total acreage that is developable and un-developable)

Appendix E

Financial Summaries and Support

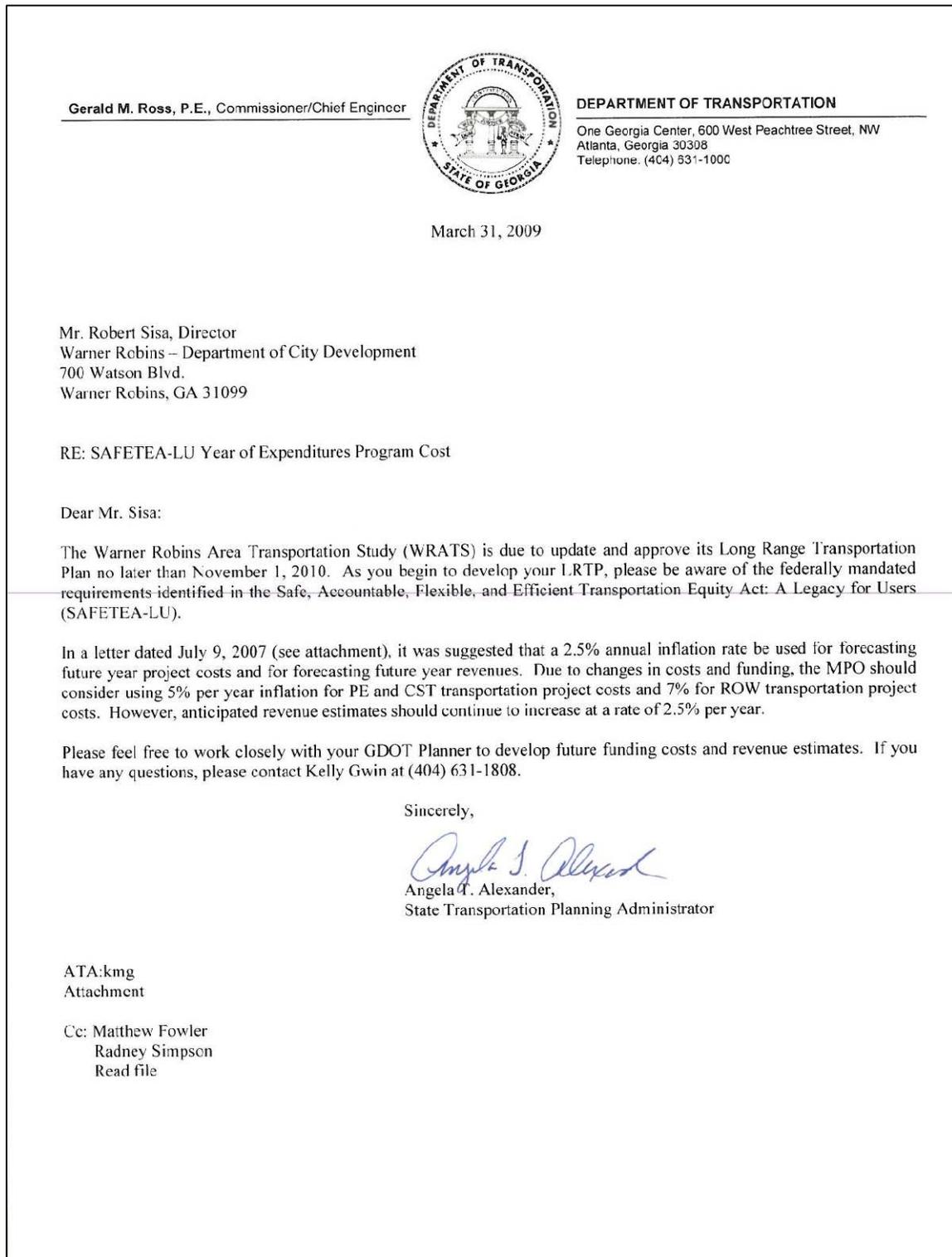
1.0 Introduction

Consistent with USDOT requirements for Statewide and Metropolitan Transportation Planning, GDOT provided WRATS with estimates of federal and state transportation funding likely to be available to the WRATS area over the planning horizon of the 2035 WRATS LRTP. Estimates are provided separately for projected programming funds for transportation improvements and for maintenance activities. The funding information provided by GDOT is listed in Figure 1.

The projections are based on the most recent annual 10 year history of funding for transportation improvement and maintenance activities in the WRATS area. These estimates in conjunction with estimates of available local funding form the basis of a required Financial Capacity Analysis for the LRTP which requires that the total cost of planned projects and programs not exceed resources anticipated to be available over the period of the LRTP.

In addition to providing projected available funding, GDOT also provided an estimate of the likely annual increase in project cost inflation and an estimate of the probable annual growth in funding. For the 2035 WRATS LRTP, projects costs are anticipated to increase at a rate of 4.0% per year, while transportation funding is anticipated to increase at a rate of 2.5% per year, over the time period of the plan. The GDOT provided estimates of project cost increase and funding growth is provided in Figure 2.

Figure 1 - Funding Letter from GDOT



Oct. 3. 2007 11:57AM

No. 1934 P. 2



Department of Transportation

State of Georgia

#2 Capitol Square, S.W.
Atlanta, Georgia 30334-1002

HAROLD E. LINNENKOHL
COMMISSIONER
(404) 656-5206

DAVID E. STODSTILL, JR., P.E.
CHIEF ENGINEER
(404) 656-5277

BUDDY GRATTON, P.E.
DEPUTY COMMISSIONER
(404) 656-5212

EARL L. MAHFUZ
TREASURER
(404) 656-5224

July 9, 2007

Mr. Jesse Fountain, Director
Warner-Robins Department of City Development
700 Watson Boulevard
Warner Robins, Georgia 31099

RE: SAFETEA-LU Year of Expenditures Program Cost

Dear Mr. Fountain:

As its core mission, the Georgia Department of Transportation provides a safe, seamless and sustainable transportation system that supports Georgia's economy and is sensitive to its citizens and environment. Because we accomplish a significant portion of our work through federal transportation funds, compliance with federal statutes is vital.

The federal transportation bill "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU), was signed by President Bush on August 10, 2005 and includes several new planning requirements. Regulations promulgated by US DOT were released on February 14, 2007 that finalized the draft regulations released on June 9, 2006. The final regulations clarified the draft version, as well as adding some new requirements. One specific requirement (enclosed) that is most relevant for MPOs instructs them to include in their Long Range Transportation Plans (LRTP) a "financial plan that demonstrates how the adopted transportation plan can be implemented." (Sect. 450.322(f)(10)). "In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Starting December 11, 2007, revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s)." (Sect. 450.322(f)(10)(iv)).

While this requirement did not pertain to State DOTs in regards to Statewide Transportation Plans (SWTP), GDOT proactively adopted Georgia's SWTP with these provisions to meet planning "best practices". Enclosed for your consideration is the section of the SWTP that discusses how we accomplished this; it may be used to provide guidance to Georgia MPOs on developing their LRTP financial plans in Year of Expenditure (YOE) dollars prior to the December 11, 2007 deadline. During the last LRTP update, many MPOs listed revenues and project costs in current year dollars.

Due to the new Federal requirement, your LRTP may need to be amended to reflect YOE dollars for revenues and project cost estimates. Consistent with the enclosed regulation, for projects outside the first ten years it is suggested

Oct. 3. 2007 11:58AM

No. 1934 P. 3

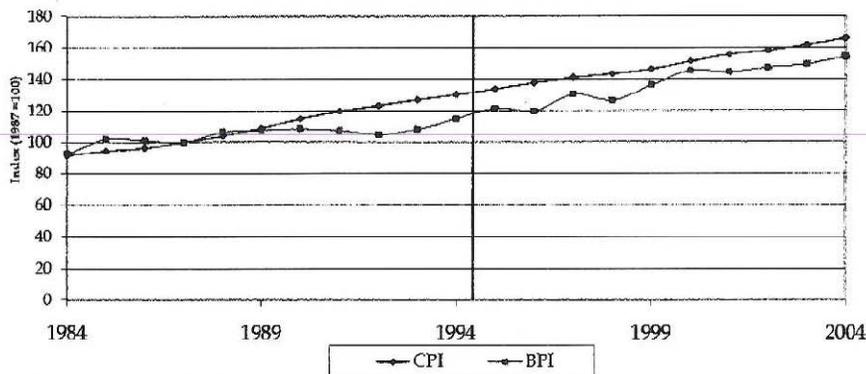
Mr. Fountain
Page 2
July 9, 2007

that you group the remaining LRTP projects into ten-year implementation blocks (i.e. years 11-20 and 21-30). Then apply a "cost band" for each of those projects based on the earliest and latest year of that band.

For example, a \$1 million project (in 2003 dollars, or the base year of your MPO's plan) shown in the current LRTP for the "year 21-30" implementation block will have an inflated cost estimate between \$1,638,616 million and \$2,097,568 million. This range results from inflating the \$1 million by 2.5% annually over 20 and 30 years, respectively.

It is suggested that a 2.5% annual inflation rate be used, which is consistent with the Bid Price Index (BPI), for use in forecasting future year project costs and that the Consumer Price Index (CPI) be used for forecasting future year revenues. The Federal Highway Administration tracks highway project cost inflation using BPI. On average, the CPI and the BPI compare somewhat similarly, however BPI is a more sensitive and applicable index to use for LRTP project costs, while the CPI may be more appropriate for forecasting revenue increases:

Consumer Price Index versus Bid Price Index



The main reason for developing financial plans in YOE dollars is to more accurately analyze potential shortfalls (gaps) between revenues and costs over the years of the LRTP. By working with the enclosed documents, MPOs will be able to meet the latest SAFETEA-LU requirements by the December 11, 2007 deadline.

At the upcoming MPO Conference scheduled in Atlanta for July 13, 2007 and being organized by a committee led by the Atlanta Regional Commission, you will be provided with an opportunity to hear further information on this SAFETEA-LU requirement from FHWA representatives. If you have any questions, feel free to contact your GDOT Transportation Planner.

Sincerely,

Angela T. Alexander

Angela T. Alexander
State Transportation Planning Administrator

ATA:MAC
Enclosures (2)

Oct. 3. 2007 11:58AM

No. 1934 P. 4

Federal Register / Vol. 72, No. 30 / Wednesday, February 14, 2007 / Rules and Regulations 7275

(4) Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures. The following categories of strategies, or combinations of strategies, are some examples of what should be appropriately considered for each area:

- (i) Demand management measures, including growth management and congestion pricing;
- (ii) Traffic operational improvements;
- (iii) Public transportation improvements;
- (iv) ITS technologies as related to the regional ITS architecture; and
- (v) Where necessary, additional system capacity;

(5) Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy (or combination of strategies) proposed for implementation; and

(6) Implementation of a process for periodic assessment of the effectiveness of implemented strategies, in terms of the area's established performance measures. The results of this evaluation shall be provided to decisionmakers and the public to provide guidance on selection of effective strategies for future implementation.

(d) In a TMA designated as nonattainment area for ozone or carbon monoxide pursuant to the Clean Air Act, Federal funds may not be programmed for any project that will result in a significant increase in the carrying capacity for SOVs (i.e., a new general purpose highway on a new location or adding general purpose lanes, with the exception of safety improvements or the elimination of bottlenecks), unless the project is addressed through a congestion management process meeting the requirements of this section.

(e) In TMAs designated as nonattainment for ozone or carbon monoxide, the congestion management process shall provide an appropriate analysis of reasonable (including multimodal) travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in capacity for SOVs (as described in paragraph (d) of this section) is proposed to be advanced with Federal funds. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and

additional SOV capacity is warranted, then the congestion management process shall identify all reasonable strategies to manage the SOV facility safely and effectively (or to facilitate its management in the future). Other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the SOV facility itself, shall also be identified through the congestion management process. All identified reasonable travel demand reduction and operational management strategies shall be incorporated into the SOV project or committed to by the State and MPO for implementation.

(f) State laws, rules, or regulations pertaining to congestion management systems or programs may constitute the congestion management process, if the FHWA and the FTA find that the State laws, rules, or regulations are consistent with, and fulfill the intent of, the purposes of 23 U.S.C. 134 and 49 U.S.C. 5303.

§ 460.322 Development and content of the metropolitan transportation plan.

(a) The metropolitan transportation planning process shall include the development of a transportation plan addressing no less than a 20-year planning horizon as of the effective date. In nonattainment and maintenance areas, the effective date of the transportation plan shall be the date of a conformity determination issued by the FHWA and the FTA. In attainment areas, the effective date of the transportation plan shall be its date of adoption by the MPO.

(b) The transportation plan shall include both long-range and short-range strategies/actions that lead to the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

(c) The MPO shall review and update the transportation plan at least every four years in air quality nonattainment and maintenance areas and at least every five years in attainment areas to confirm the transportation plan's validity and consistency with current and forecasted transportation and land use conditions and trends and to extend the forecast period to at least a 20-year planning horizon. In addition, the MPO may revise the transportation plan at any time using the procedures in this section without a requirement to extend the horizon year. The transportation plan (and any revisions) shall be approved by the MPO and submitted for information purposes to the Governor.

Copies of any updated or revised transportation plans must be provided to the FHWA and the FTA.

(d) In metropolitan areas that are in nonattainment for ozone or carbon monoxide, the MPO shall coordinate the development of the metropolitan transportation plan with the process for developing transportation control measures (TCMs) in a State Implementation Plan (SIP).

(e) The MPO, the State(s), and the public transportation operator(s) shall validate data utilized in preparing other existing modal plans for providing input to the transportation plan. In updating the transportation plan, the MPO shall base the update on the latest available estimates and assumptions for population, land use, travel, employment, congestion, and economic activity. The MPO shall approve transportation plan contents and supporting analyses produced by a transportation plan update.

(f) The metropolitan transportation plan shall, at a minimum, include:

- (1) The projected transportation demand of persons and goods in the metropolitan planning area over the period of the transportation plan;
- (2) Existing and proposed

transportation facilities (including major roadways, transit, multimodal and intermodal facilities, pedestrian walkways and bicycle facilities, and intermodal connectors) that should function as an integrated metropolitan transportation system, giving emphasis to those facilities that serve important national and regional transportation functions over the period of the transportation plan. In addition, the locally preferred alternative selected from an Alternatives Analysis under the FTA's Capital Investment Grant program (49 U.S.C. 5309 and 49 CFR part 611) needs to be adopted as part of the metropolitan transportation plan as a condition for funding under 49 U.S.C. 5309.

(3) Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods;

(4) Consideration of the results of the congestion management process in TMAs that meet the requirements of this subpart, including the identification of SOV projects that result from a congestion management process in TMAs that are nonattainment for ozone or carbon monoxide;

(5) Assessment of capital investment and other strategies to preserve the existing and projected future metropolitan transportation

Oct. 3. 2007 11:58AM

No. 1934 P. 5

7276 Federal Register / Vol. 72, No. 30 / Wednesday, February 14, 2007 / Rules and Regulations

infrastructure and provide for multimodal capacity increases based on regional priorities and needs. The metropolitan transportation plan may consider projects and strategies that address areas or corridors where current or projected congestion threatens the efficient functioning of key elements of the metropolitan area's transportation system;

(6) Design concept and design scope descriptions of all existing and proposed transportation facilities in sufficient detail, regardless of funding source, in nonattainment and maintenance areas for conformity determinations under the EPA's transportation conformity rule (40 CFR part 93). In all areas (regardless of air quality designation), all proposed improvements shall be described in sufficient detail to develop cost estimates;

(7) A discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the metropolitan transportation plan. The discussion may focus on policies, programs, or strategies, rather than at the project level. The discussion shall be developed in consultation with Federal, State, and Tribal land management, wildlife, and regulatory agencies. The MPO may establish reasonable timeframes for performing this consultation.

(8) Pedestrian walkway and bicycle transportation facilities in accordance with 23 U.S.C. 217(g);

(9) Transportation and transit enhancement activities, as appropriate; and

(10) A financial plan that demonstrates how the adopted transportation plan can be implemented.

(i) For purposes of transportation system operations and maintenance, the financial plan shall contain system-level estimates of costs and revenue sources that are reasonably expected to be available to adequately operate and maintain Federal-aid highways (as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53).

(ii) For the purpose of developing the metropolitan transportation plan, the MPO, public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under § 450.314(a). All necessary financial resources from public and private sources that are reasonably expected to

be made available to carry out the transportation plan shall be identified.

(iii) The financial plan shall include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new funding sources, strategies for ensuring their availability shall be identified.

(iv) In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Starting December 11, 2007, revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s).

(v) For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/cost bands, as long as the future funding source(s) is reasonably expected to be available to support the projected cost ranges/cost bands.

(vi) For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP.

(vii) For illustrative purposes, the financial plan may (but is not required to) include additional projects that would be included in the adopted transportation plan if additional resources beyond those identified in the financial plan were to become available.

(viii) In cases that the FHWA and the FTA find a metropolitan transportation plan to be fiscally constrained and a revenue source is subsequently removed or substantially reduced (i.e., by legislative or administrative actions), the FHWA and the FTA will not withdraw the original determination of fiscal constraint; however, in such cases, the FHWA and the FTA will not act on an updated or amended metropolitan transportation plan that does not reflect the changed revenue situation.

(g) The MPO shall consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of the transportation plan. The consultation shall involve, as appropriate:

(1) Comparison of transportation plans with State conservation plans or maps, if available; or

(2) Comparison of transportation plans to inventories of natural or historic resources, if available.

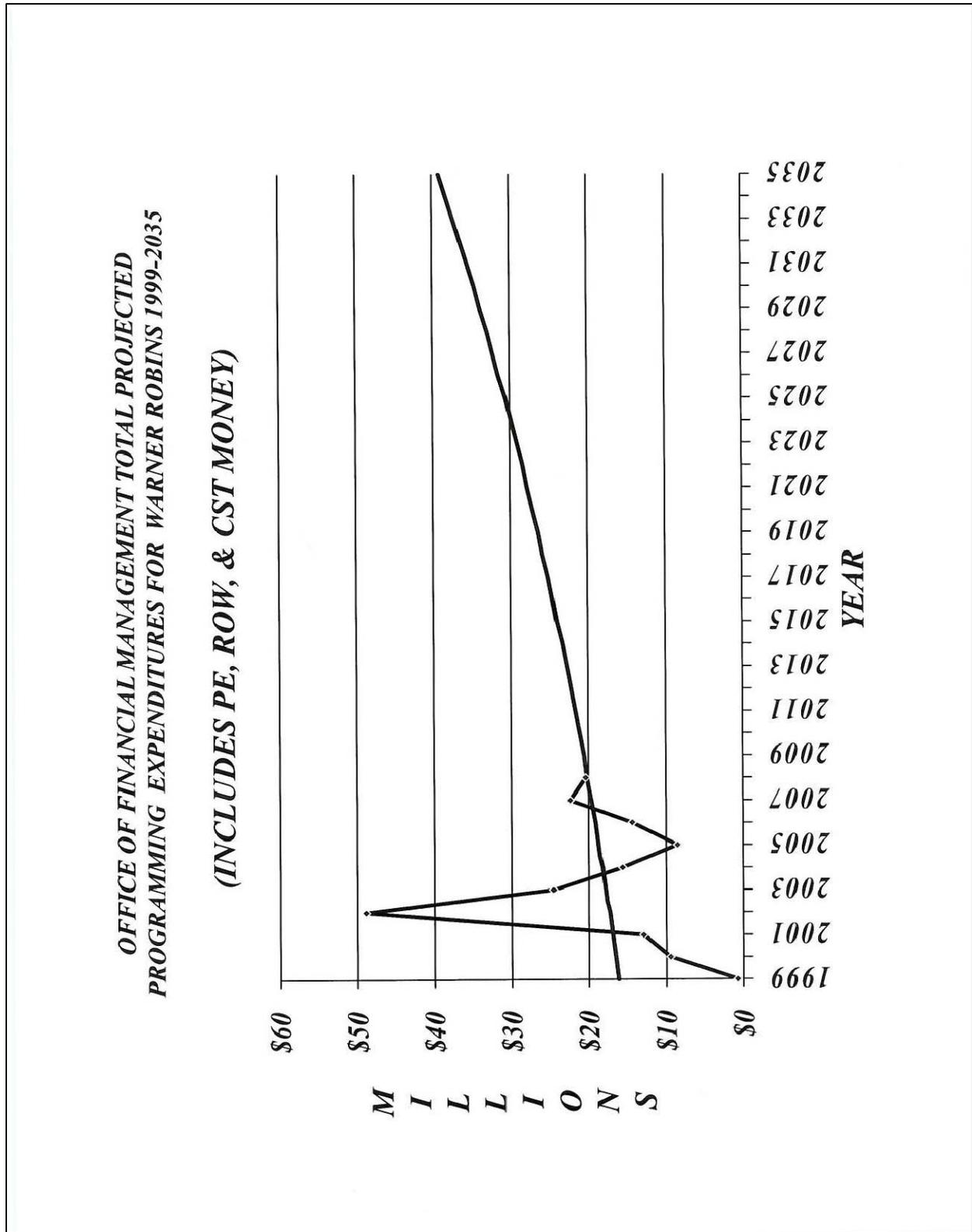
(h) The metropolitan transportation plan should include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPA contained in the Strategic Highway Safety Plan required under 23 U.S.C. 148, as well as (as appropriate) emergency relief and disaster preparedness plans and strategies and policies that support homeland security (as appropriate) and safeguard the personal security of all motorized and non-motorized users.

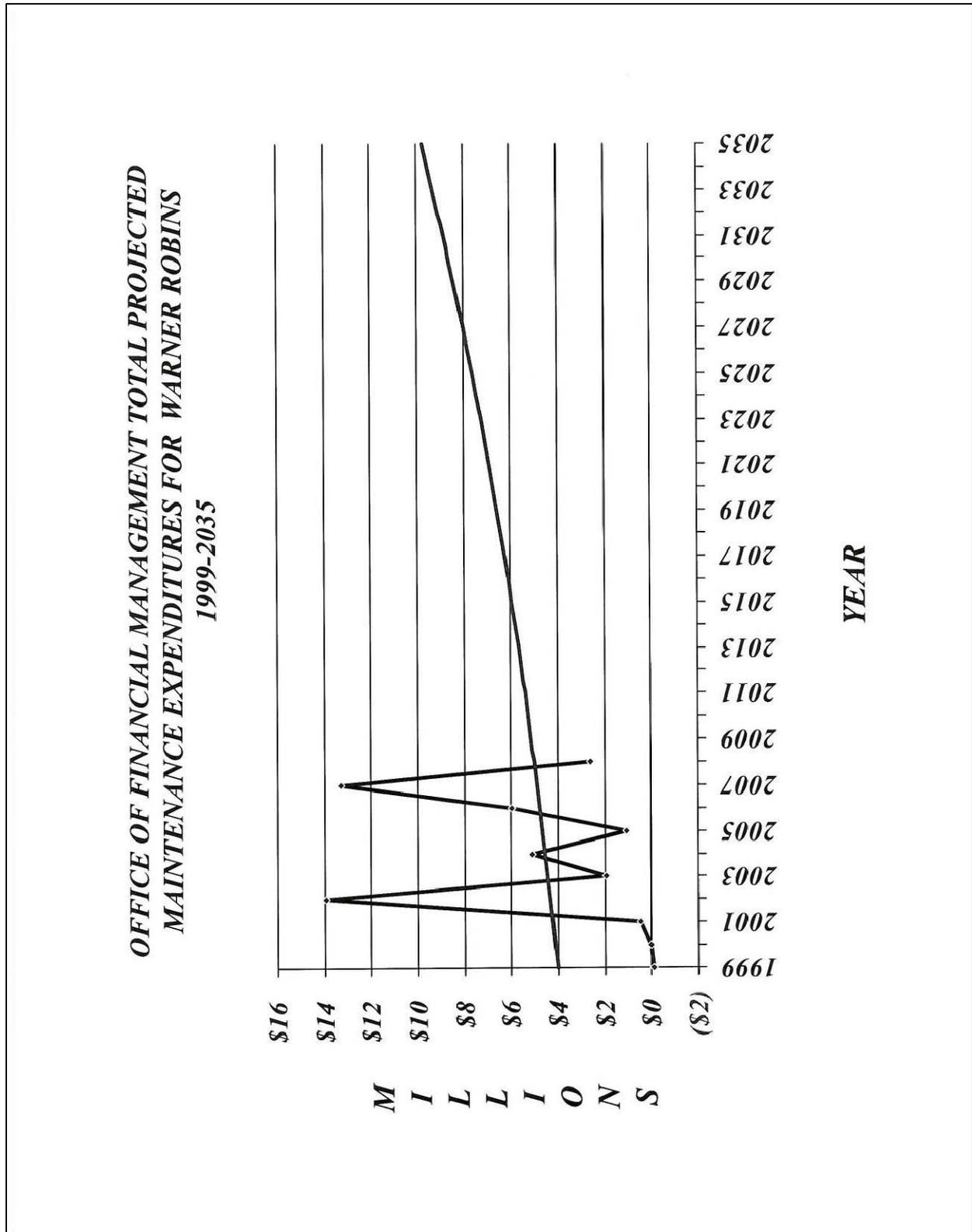
(i) The MPO shall provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties with a reasonable opportunity to comment on the transportation plan using the participation plan developed under § 450.316(a).

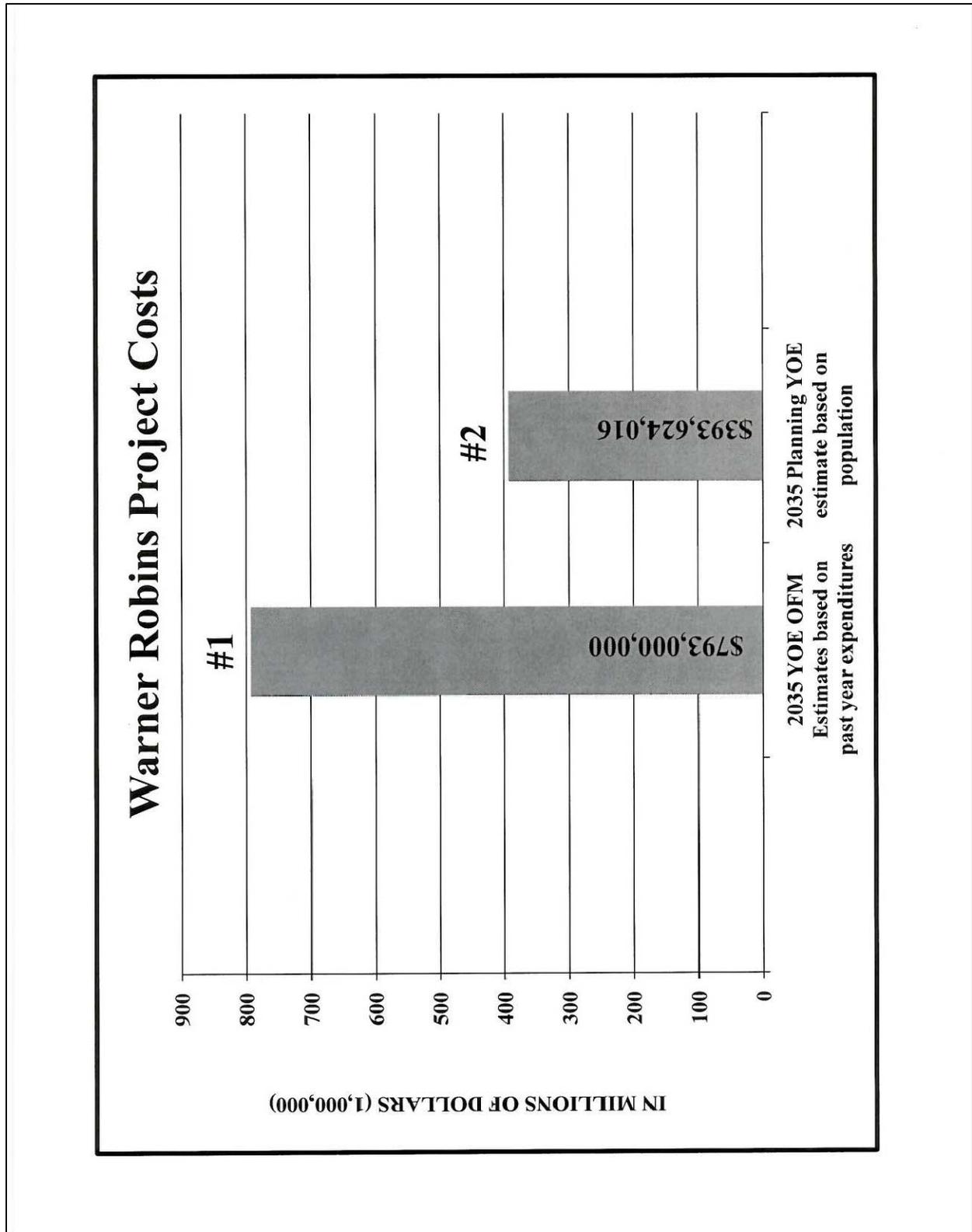
(j) The metropolitan transportation plan shall be published or otherwise made readily available by the MPO for public review, including (to the maximum extent practicable) in electronically accessible formats and means, such as the World Wide Web.

(k) A State or MPO shall not be required to select any project from the illustrative list of additional projects included in the financial plan under paragraph (f)(10) of this section.

(l) In nonattainment and maintenance areas for transportation-related pollutants, the MPO, as well as the FHWA and the FTA, must make a conformity determination on any updated or amended transportation plan in accordance with the Clean Air Act and the EPA transportation conformity regulations (40 CFR part 93). During a conformity lapse, MPOs can prepare an interim metropolitan transportation plan as a basis for advancing projects that are eligible to proceed under a conformity lapse. An interim metropolitan transportation plan consisting of eligible projects from, or consistent with, the most recent conforming transportation plan and TIP may proceed immediately without revisiting the requirements of this section, subject to interagency consultation defined in 40 CFR part 93. An interim metropolitan transportation







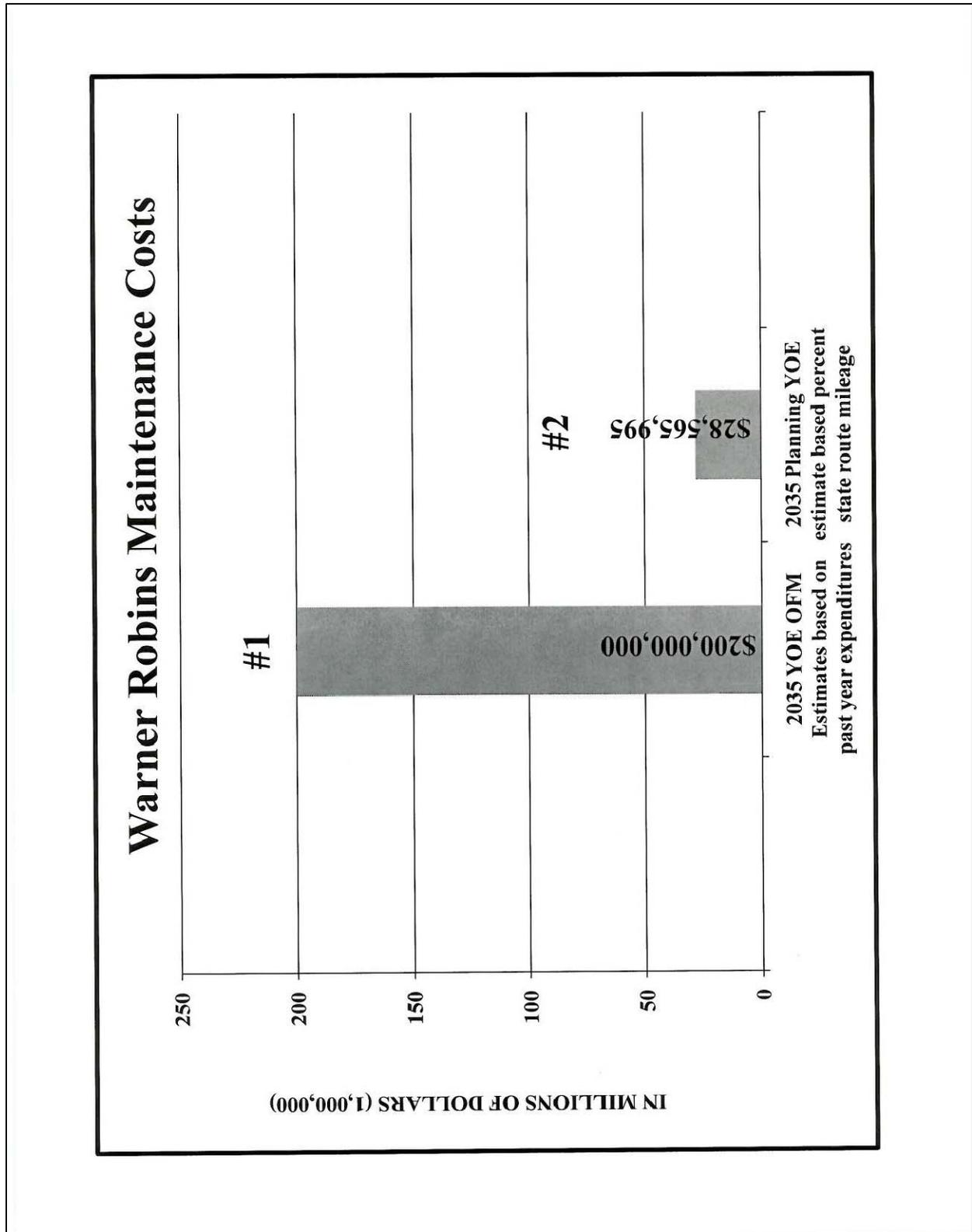
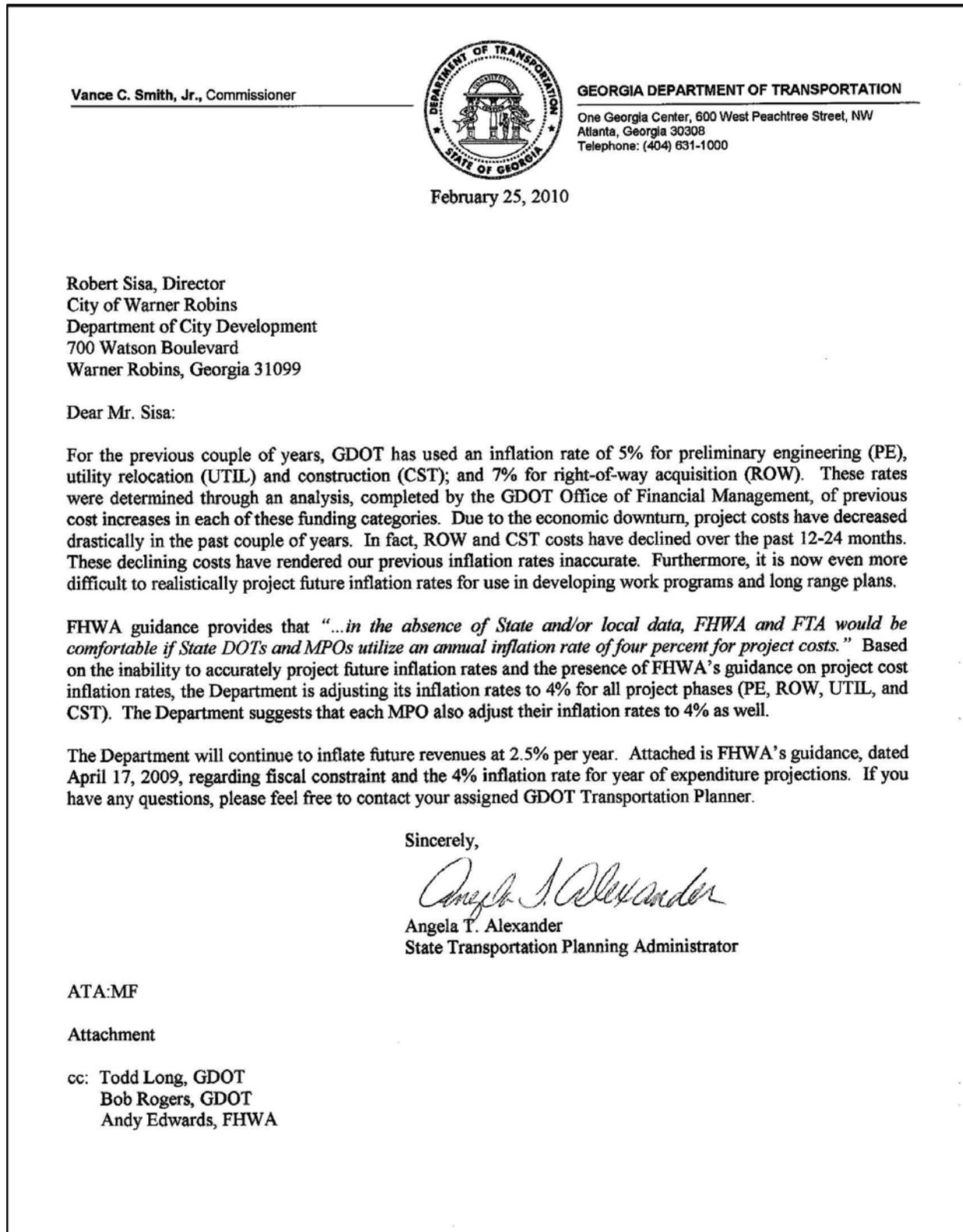


Figure 2 - GDOT Guidance to WRATS on LRTP Project Inflation and Revenue Growth



Appendix F

State Highway Safety Plan (SHSP) Linkage and Environmental Mitigation

1.0 Introduction

In 2007, as a result of SAFETEA LU federal surface transportation legislation, the USDOT Statewide and Metropolitan Planning Regulations required additional considerations within transportation plans. States are required to prepare Strategic Highway Safety Plans (SHSP) while MPO LRTPs are required to include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPO contained in the SHSP. MPOs are required to consult as appropriate with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation, concerning the development of the LRTP.

2.0 State Highway Safety Plan (SHSP) Linkage

Georgia's SHSP identifies problems, strategies, and proposed solutions to reduce motor vehicle crashes and fatalities for the State of Georgia. To decrease highway fatalities in the future, Georgia adopted a goal of 1.0 fatalities per 100 million vehicle miles traveled by 2010. The American Association of State Highway and Transportation Officials (AASHTO) recently changed their goal to reducing highway fatalities by 1,000 per year. In response to this GDOT developed a new goal for the 2009 Georgia State Highway Safety Plan expressed as a fatality reduction number – a goal of 41 fewer fatalities per year which is Georgia's portion of the AASHTO national highway safety goal. For the period covered by the plan this means keeping highway fatalities below 1,498 per year between 2009 and 2012. Table 1, taken from the GDOT 2009 SHSP, shows recent annual highway traffic highway fatality statistics for Georgia.

The statewide fatality rate was 1.49 per 100 vehicle miles traveled in 2006. Georgia's SHSP adopted the "4 E's": engineering, enforcement, education and emergency medical services to reach the 2010 goal. In addition, Georgia's SHSP incorporates strategies from existing highway safety plans developed by other agencies in Georgia.

Table 1

GEORGIA TRAFFIC DEATHS: YEARLY TOTAL & COMPARISON
GDOT Office of Traffic Safety & Design, May 13, 2008

Type of Fatality	TOTAL		Year-To-Date		2008 YTD Change	
	2006	2007 #	2007	2008	#	%
Interstates	238	232	81	67	-14	-17%
Other State Routes	689	672	203	194	-9	-4%
Local Routes	776	744	222	230	8	3%
* Pedestrians	151	157	53	41	-12	-22%
* Car-Trains	5	13	4	1	-3	-75%
* Motorcyclists	150	125	34	30	-4	-11%
* Bicyclists	19	14	6	6	0	0%
Total	1,703	1,648	506	491	-15	-2%

* Included in Total

Source: 2009 Governor's Strategic Highway Safety Plan

Georgia's Strategic Highway Safety Plan focuses on Key Emphasis Areas (KEA) to reduce fatalities. These areas are:

- Occupant Protection
- Serious Crash Type
- Aggressive Driving/Super Speeder
- Impaired Driver
- Age Related Issues
- Non-motorized User
- Vehicle Type
- Trauma System/Increasing EMS Capabilities
- Traffic/Crash Records and Data Analysis
- Traffic Incident Management

Based on the Key Emphasis Areas identified in Georgia's SHSP, the areas most relevant to the Warner Robins MPO are Serious Crash Type and Traffic/Crash Records and Data Analysis. Serious crash types are identified as: intersections, lane departure, head-on and cross median crashes, minimizing consequences of leaving road, and work zones. According to the Georgia SHSP, serious crash types are the most common category of fatal crashes in Georgia. Of all fatal crashes in Georgia, 46.0% involved intersections, 9% involved lane departures, and head-on and cross median crashes made up 12.0% of fatal crash types. Of all run off the road crashes, 57.1% struck a fixed object and approximately 1% occurred in a work zone. Strategies that the SHSP identifies as future opportunities include reducing the frequency and severity of intersection conflicts through geometric design improvements, widening and/or paving shoulders, and applying traffic calming measures to reduce speeds on high-risk sections.

The "Strategic Plan for Traffic Records Improvement" a part of the "State Traffic Safety Information System Improvement Grant" identified over \$9 million of needed system improvements pertaining to data systems automation. Georgia plans to use National Highway Traffic Safety Administration (NHTSA) Section 408 grants to enforce the strategies of the traffic/crash records system. Strategies that the SHSP identifies as future opportunities are local and statewide open roads and quick clearance policies supporting 90-minute clearance goals, improved accident investigation technology, and the continued generation of additional support for traffic incident management enhancement.

The Warner Robins MPO staff undertakes a program to reduce accidents, injuries, and fatalities. Accident reports are received on a monthly basis from the Byron, Centerville, Perry, and Warner Robins Police Departments and Houston County Sheriff's Office. The accident data is recorded on a computerized database, tabulated and organized into an accident data report. The report includes the Top 100 WRATS, County and City accident locations by number and type of accident, property damages, and number of injuries and fatalities. In addition to gathering and analyzing accident data, roadways are examined for low cost traffic operational

improvements. These operational improvements include safety projects within the existing right-of-way. Emphasis is placed upon improving situations and locations, which demonstrate a potential for high risks. The Georgia DOT conducts annual traffic counts on selected roadways and supplies this new data to the MPO for compilation. The MPO Traffic Operations Manager conducts special counts to augment GDOT counts to determine the volume of traffic produced by major generators, to determine needs for various control devices, and to focus on ways to meet transportation needs by using existing transportation facilities more efficiently.

The SHSP is a statewide safety plan that provides a comprehensive framework for all safety-related activities in Georgia. This strategic planning document identifies goals and objectives. Many benefits are realized when the efforts and resources of responsible safety partners and stakeholders come together. The purpose of aligning the Georgia SHSP's goals with the Warner Robins MPO's existing safety planning and programming processes is to ensure that coordination improves the safety of the entire statewide transportation system.

3.0 Environmental Mitigation

The four attached maps illustrate the long-range transportation improvements located in the WRATS urbanized area in conjunction with groundwater recharge, wetland and pollution susceptibility areas, and the location of cultural and historic resources. The MPO consulted the Joint Comprehensive Plan for Houston County and Cities of Centerville, Perry, and Warner Robins in the creation of these maps. Although no areas within the Warner Robins Area Transportation Study (WRATS) are currently identified as potential environmental concerns, future impacts could be possible, especially concerning wetlands and cultural and historic resources. The MPO staff will consult the Potential Planning Level Environmental Impacts & Mitigation Measures discussion provided by the Georgia Department of Transportation's Office of Planning as guidance for screening the urbanized area through the consultation of interested parties. These interested parties include federal, state and tribal land management, wildlife and regulatory agencies. Potential mitigation measures used by the MPO to address impact areas include:

- Adopt air quality element/general plan air quality policies/specific plan policies
- Local alternative fuels program
- Design modifications so that impact on archaeology is avoided
- Develop educational activities to educate public about archeology and prehistory/history
- Design modifications to the project to avoid or complement the historic property
- Landscaping to reduce visual impact
- Creation, restoration, enhancement, and/or preservation of wetlands

Construction is limited in flood prone or unstable soil areas and wetlands are replaced at a ratio determined by the Army Corps of Engineers. The MPO staff also examines alternative transportation routes so as to avoid the disturbance of environmentally sensitive areas. A Land Use Plan element is included in the Long Range Transportation Plan (LRTP), which presents the residential, commercial, industrial, public/institutional, transportation/communication/utilities,

agriculture/forestry, and undeveloped/vacant land use categories through a corridor area perspective.

Figure 1 – Significant Groundwater Recharge Areas

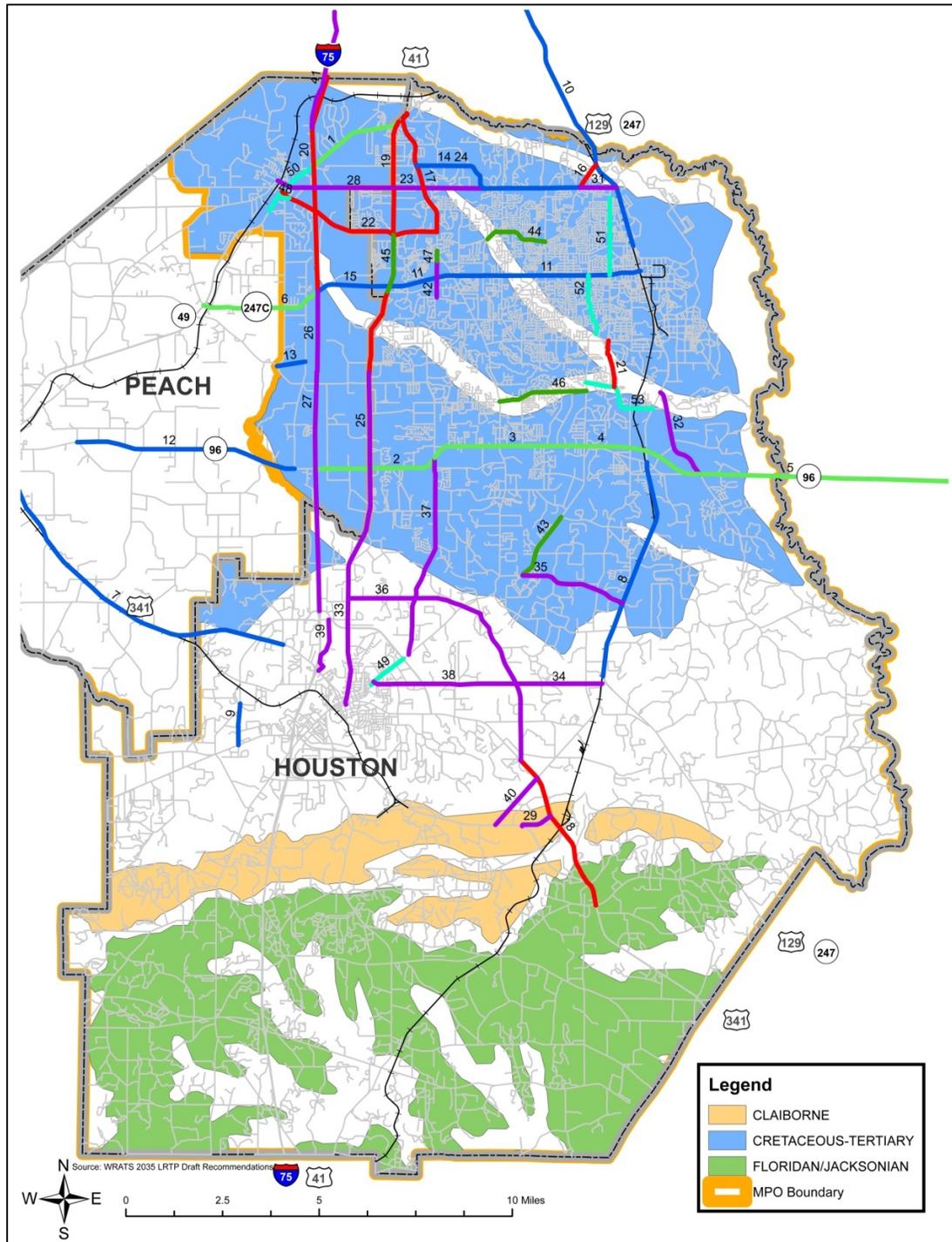


Figure 2 - Wetlands

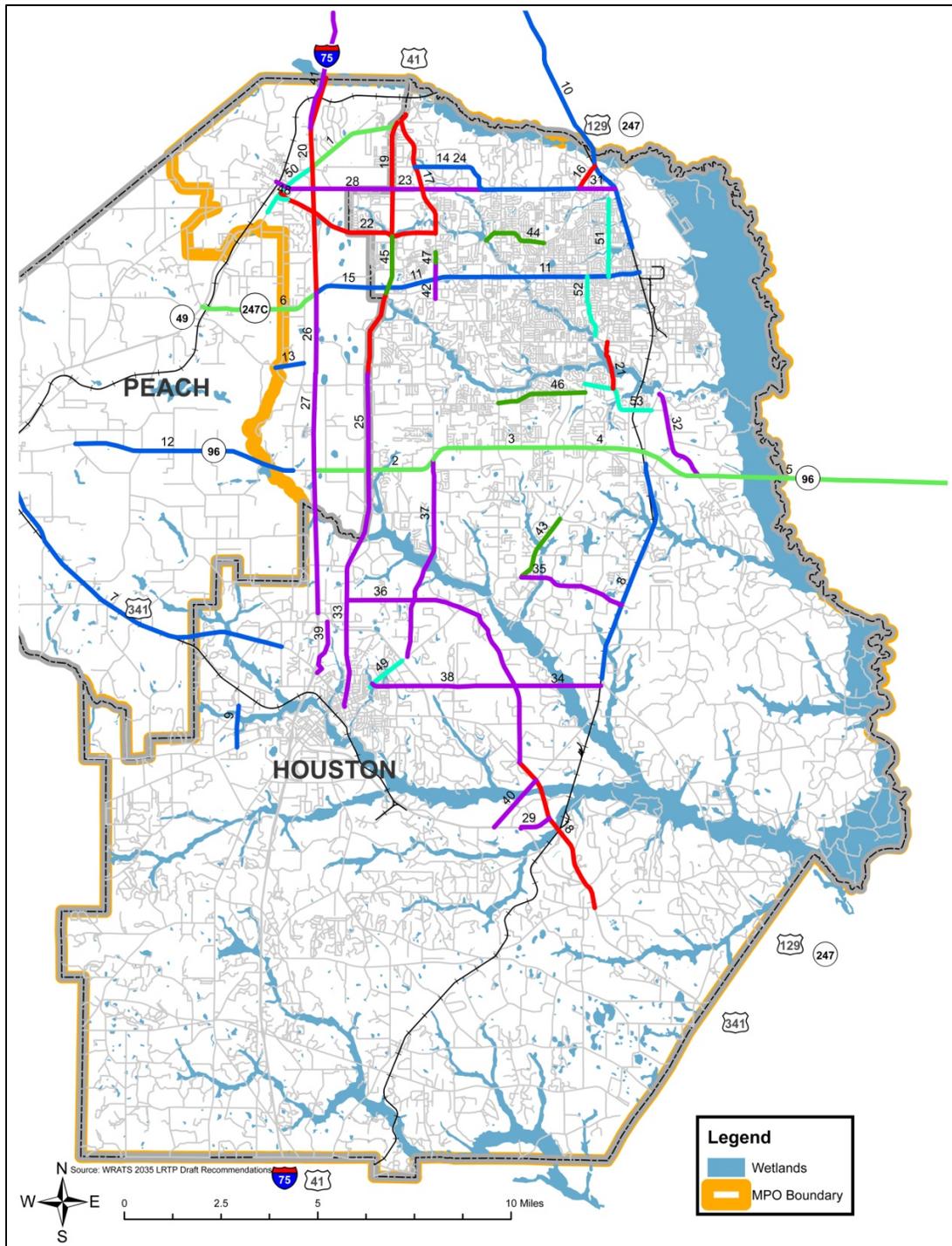


Figure 3 – Pollution Susceptibility

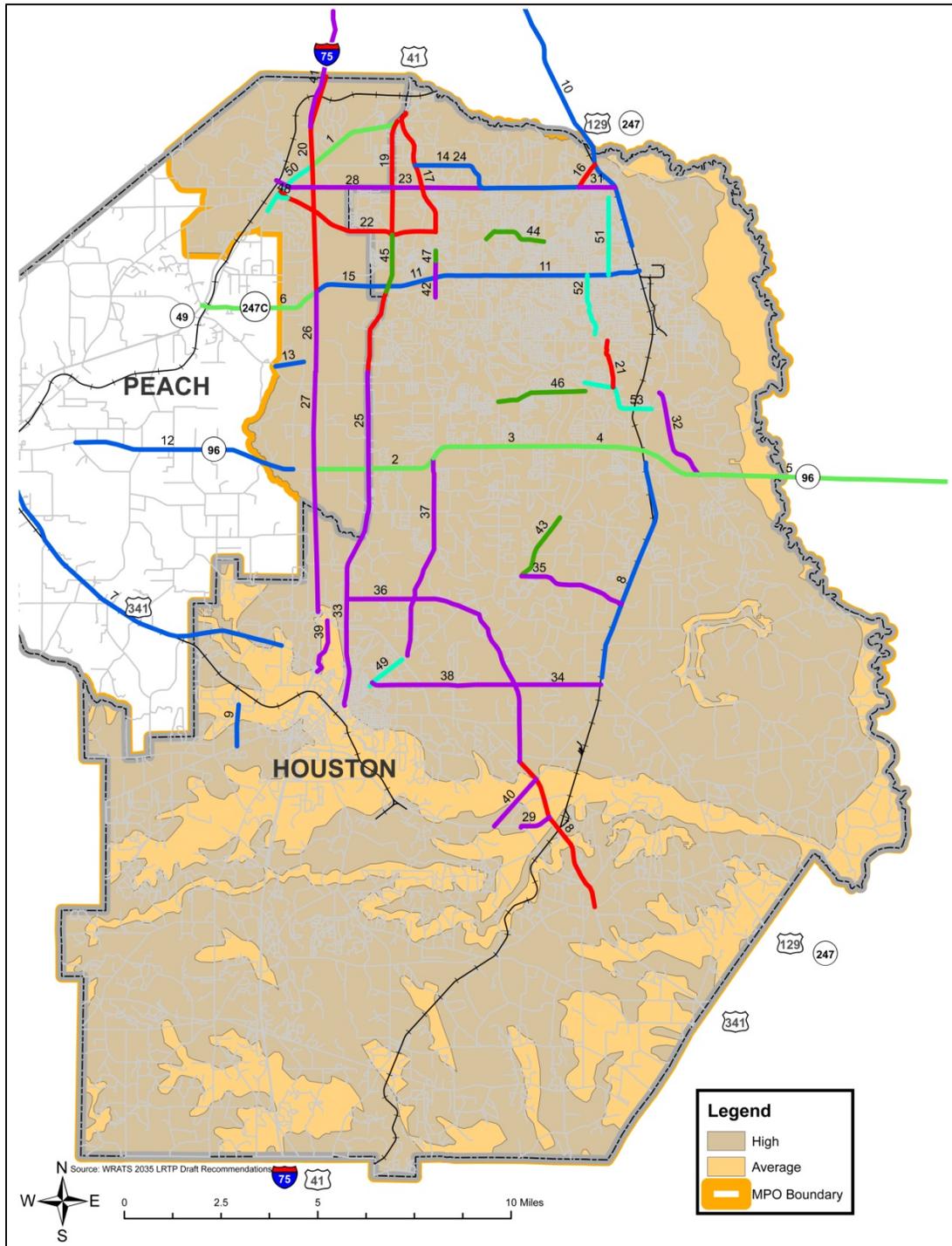


Figure 4 – Cultural and Historic Resources

