Mississippi Gulf Coast Metropolitan Planning Organization

2040

Metropolitan Transportation Plan

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Mississippi Gulf Coast
Metropolitan Planning Organization
Gulf Regional Planning Commission

DRAFT

Mississippi Gulf Coast Area Transportation Study: 2040 Metropolitan Transportation Plan

Gulf Regional Planning Commission

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ACRONYMS AND ABBREVIATIONS

3-C	Continuing, Cooperative and Comprehensive
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	*Americans with Disabilities Act*
BRT	Bus Rapid Transit
CERCLA	*Comprehensive Environmental Response, Compensations, and Liability Act* ("Superfund")
CFR	*Code of Federal Regulations*
CMP	Congestion Management Process (Congestion Management Program)
CMVEH	Commercial Motor-Vehicle (Travel demand model trip purpose)
CO	Carbon Monoxide
CSXT	CSX Transportation
CTA	Coast Transit Authority (Mississippi Coast Transportation Authority)
DOT	Department of Transportation
E+C	Existing-plus-Committed (Network)
EIAUTO	External-Internal Auto (Travel demand model trip purpose)
EIS	Environmental Impact Statement
EITRK	External-Internal Truck (Travel demand model trip purpose)
EPA	U. S. Environmental Protection Agency (Alternatively *USEPA*)
EPDO	Equivalent Property Damage Only
FAA	Federal Aviation Administration
FAS	Federal-Aid System
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GPS	Global Positioning System

GPT	Gulfport-Biloxi International Airport
GRPC	Gulf Regional Planning Commission
HBO	Home-Based Other (Travel demand model trip purpose)
HBW	Home-Based Work (Travel demand model trip purpose)
HUD	U. S. Department of Housing and Urban Development
IECC	International Energy Conservation Code
ITS	Intelligent Transportation Systems
IXO	*Index Online*
KAFB	Keesler Air Force Base
KCS	Kansas City Southern
LED	Light-Emitting Diode
LEP	Limited English Proficiency
LOS	Level of Service
LPA	Local Planning Agency
MAP-21	*Moving Ahead for Progress in the 21st Century Act*
MAX VOC	Maximum (Directional) Volume/Capacity (Travel demand model output)
MDOT	Mississippi Department of Transportation
MDWFP	Mississippi Department of Wildlife, Fisheries and Parks
MGCATS	Mississippi Gulf Coast Area Transportation Study
MIHL	Mississippi Institutions of Higher learning
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MSE	Mississippi Export Railroad
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NCBC	Naval Construction Battalion Center

NFS	National Forest System
NHB	Non-Home-Based (Travel demand model trip purpose)
NHTS	*National Household Travel Survey*
NO&M	New Orleans and Mobile
NOAA	National Oceanic and Atmospheric Administration
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
NPIAS	*National Plan of Integrated Airport Systems*
NPL	National Priorities List
NRHP	*National Register of Historic Places*
O_3	Ozone
O-D	Origin-Destination (Travel demand model matrix)
OSARC	Office of State-Aid Road Construction
PBPP	Performance-Based Planning and Programming
PBVR	Port Bienville Railroad
PPB	Parts Per Billion
PPM	Parts Per Million
PPP	Public Participation Plan
REMI	Regional Economic Models, Inc.
SAMS	Safety Analysis Management System
SIP	State Implementation Plan
SMS	Safety Management System
SO2	Sulfur Dioxide
SPARC	*Scenario Planning Analytical Resources Core*
SSTI	State Smart Transportation Initiative
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TAP	Transportation Alternatives Program

TAZ	Traffic Analysis Zone
TCC	Technical Coordinating Committee
TDM	Transportation Demand Management
TDP	Transit Development Plan
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TOD	Transit-Oriented Development
TPC	Transportation Policy Committee
TRK	Truck (Travel demand model trip purpose)
UA	Urban Area
UC	Urban Cluster
UPWP	Unified Planning Work Program
USC	*United States Code*
USDOT	U. S. Department of Transportation
USEPA	U. S. Environmental Protection Agency (Alternatively *EPA*)
USFWS	U. S. Fish and Wildlife Service
USGCRP	U. S. Global Change Research Program
UZA	Urbanized Area
VHD	Vehicle-Hours of Delay
VHT	Vehicle-Hours Traveled
VMT	Vehicle-Miles Traveled
V/C	Volume/Capacity (Alternatively *VOC*)
VOC	Volatile Organic Compounds
VPSI	Vanpool Services, Inc.
W&P	Woods & Poole Economics, Inc.

1.0 INTRODUCTION

The 2040 Metropolitan Transportation Plan (MTP) presented herein represents the latest update of the Mississippi Gulf Coast Area Transportation Study (MGCATS) initiated more than 35 years ago. Like its predecessors the 2040 MTP is intended to establish a regional vision and course of action for addressing the transportation needs of the Mississippi Gulf Coast Metropolitan Planning Area (MPA) over the next 25 years. Its recommendations are the result of public input, technical analysis, and close coordination among local counties and municipalities, Coast Transit Authority (CTA), the Mississippi Department of Transportation (MDOT), Gulf Regional Planning Commission (GRPC) and other members of the Mississippi Gulf Coast Metropolitan Planning Organization (MPO). The 2040 MTP employs a performance-based approach to metropolitan transportation planning described in detail in Chapter 2 ("Plan Development Process").

1.1 THE METROPOLITAN PLANNING ORGANIZATION (MPO)

The MPO is a legislatively mandated policy-making body and technical support group made up of representatives from local government and transportation agencies with collective responsibility for the coordination of transportation planning and programming in the MPA. The *Federal-Aid Highway Act* (Public Law 87-866), adopted by Congress in 1962, made metropolitan transportation planning a condition for receipt of Federal funds for transportation projects in urban areas with a population of 50,000 or more. That act encouraged a *continuing, cooperative, and comprehensive* (3-C) transportation planning process involving the combined efforts of MPOs, state agencies and public transit providers in metropolitan areas. Laws enacted since the original act, and U. S. Department of Transportation (USDOT) regulations adopted pursuant thereto, have periodically reiterated the commitment to 3-C planning in metropolitan areas.

Purpose and Function of the MPO

According to the Federal Highway Administration (FHWA) report, *The Transportation Planning Process: Key Issues* (FHWA, no date, p. 4), there are five core functions of an MPO:

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

2. Identify and evaluate alternative transportation improvement options: Use data and planning methods to generate and evaluate alternatives. Planning studies and evaluations are included in the Unified Planning Work Program or UPWP.

3. Prepare and maintain a Metropolitan Transportation Plan (MTP): Develop and update a long-range transportation plan for the metropolitan area covering a planning horizon of at least twenty years that fosters (1) mobility and access for people and goods, (2) efficient system performance and preservation, and (3) good quality of life.

4. Develop a Transportation Improvement Program (TIP): Develop a short-range (four-year) program of transportation improvements based on the long-range transportation plan; the TIP should be

designed to achieve the area's goals, using spending, regulating, operating, management, and financial tools.

5. Involve the public: Involve the general public and other affected constituencies in the four essential functions listed above.

The Metropolitan Planning Area

The MPO is designated by the governor of a state to fulfill the responsibilities enumerated above for a metropolitan area incorporating an urban area inhabited by at least 50,000 persons. Urban areas are defined by the U. S. Census Bureau after its decennial population count; non-urban areas are classified as rural. After identifying all of the urban areas in the United States and its territories, the Census Bureau further classifies all urban areas as either *urbanized areas* or *urban clusters*. Urbanized areas are those urban areas with population of at least 50,000; all others are labeled urban clusters, having population ranging from 2,500 to 49,999.

MPO authority within the MPA is formalized by agreements between each of the affected jurisdictions and the governor. Typically the MPA is delineated to include at a minimum a core area, based on a *smoothed* approximation of the urban area boundary, and all adjacent areas expected to become urbanized within the next 20 years. The MPA boundary may also be influenced by jurisdictional lines, physical features of the landscape, or major roadways.

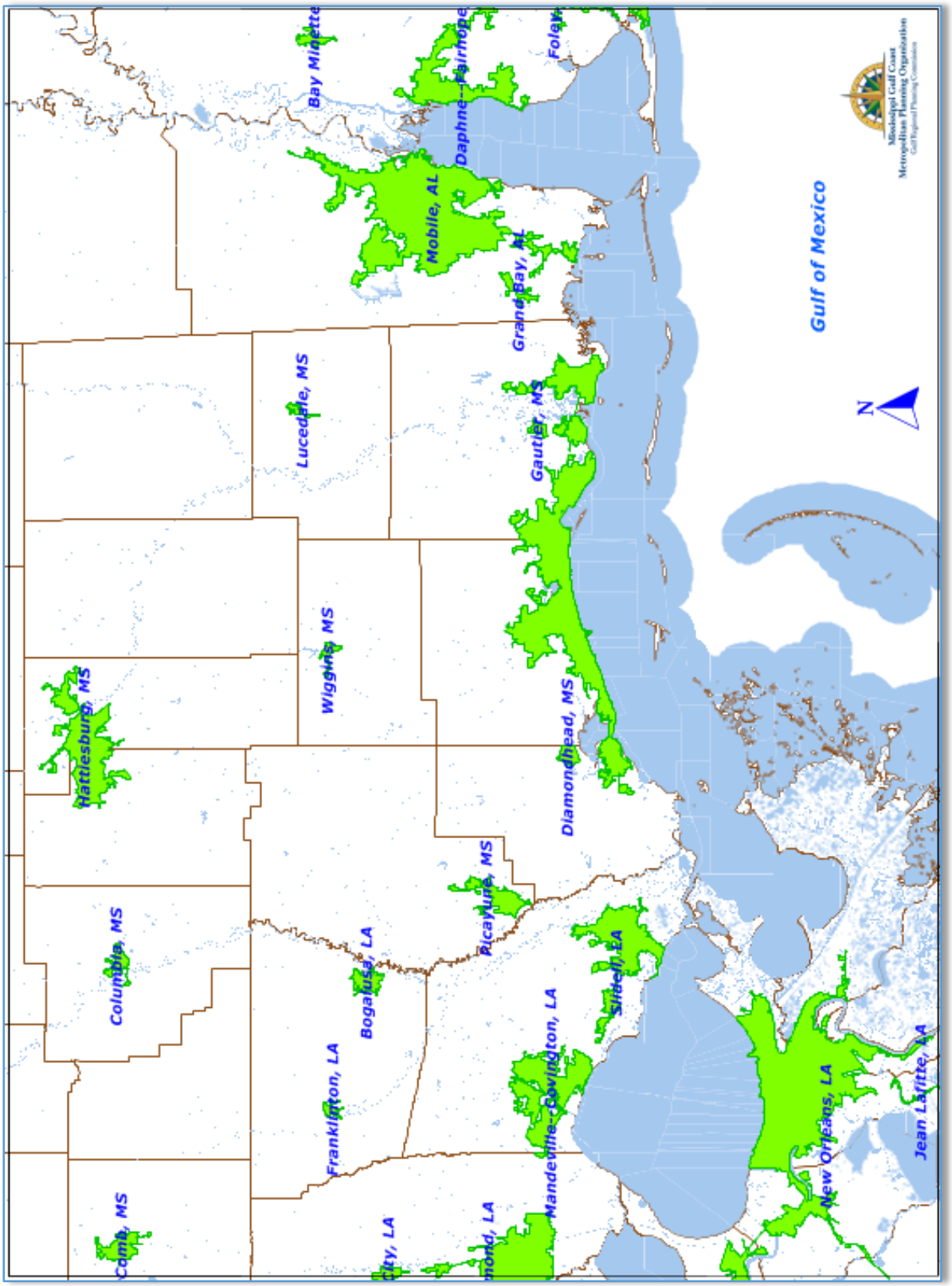
After the 2010 Census, urban areas were defined by identifying a densely settled core of census tracts and/or census blocks meeting minimum population density requirements. Next adjacent territory occupied by non-residential urban land uses was added to the high-density residential core. Finally adjacent low-density areas were included to link outlying high-density territory with the densely settled core. Census Bureau criteria stipulate that to qualify as an urban area, the territory identified must encompass a population of at least 2,500 and 1,500 of those living in the area must reside outside institutional group quarters. This process resulted in the identification of more than 450 urbanized areas in the United States. Those located in the vicinity of the Mississippi Gulf Coast are depicted in Figure 1-1.

Structure of the Mississippi Gulf Coast MPO

Gulf Regional Planning Commission (GRPC) was designated by the governor of Mississippi to serve as the Mississippi Gulf Coast MPO on December 20, 1973. GRPC performs the principal planning and programming functions of the MPO under the direction of a Transportation Policy Committee (TPC) advised by a Technical Coordinating Committee (TCC). The TPC, as the designated policy-making body of the MPO, holds the ultimate responsibility for making decisions regarding the regional transportation system in accordance with federal legislation (23 USC 134(b) and 49 USC 5303(c)). The TCC provides technical input to the decision-making process.

The Mississippi Gulf Coast MPA encompasses three counties in which are located 12 municipalities: Waveland, Bay Saint Louis and Diamondhead in Hancock County; Pass Christian, Long Beach, Gulfport,

Figure 1-1: Urbanized Areas Located in the Vicinity of the Mississippi Gulf Coast



Source: U. S. Census Bureau; Neel-Schaffer, Inc.

Biloxi and D'Iberville in Harrison County; and Ocean Springs, Gautier, Pascagoula and Moss Point in Jackson County. There are actually two distinct urbanized areas within the MPA: the Gulfport Urbanized Area (UZA) which stretches from Bay Saint Louis to Ocean Springs and includes portions of all three coastal counties; and the Pascagoula UZA located in the eastern half of Jackson County. (The consolidated urban planning area is represented in Figure 1-2.) Federal law requires that MPO membership include the "representation of local elected officials, officials of agencies that administer or operate major modes or systems of transportation and appropriate state officials" (23 CFR 450.306). Accordingly members of the TPC for the Mississippi Gulf Coast MPO include the following officials or their designated representatives:

- President of the Board of Supervisors for each of the three counties in the MPA;
- Mayor or city manager for each of the 12 municipalities;
- Gulf Regional Planning Commission chairman;
- Coast Transit Authority chairman;
- Mississippi Department of Transportation executive director;
- Gulfport International Airport executive director; and
- Port directors for each of the three maritime port operators in the MPA: Hancock County Development Commission (Port Bienville), Mississippi State Port Authority (Mississippi State Port at Gulfport) and Jackson County Development Commission (Port of Pascagoula).

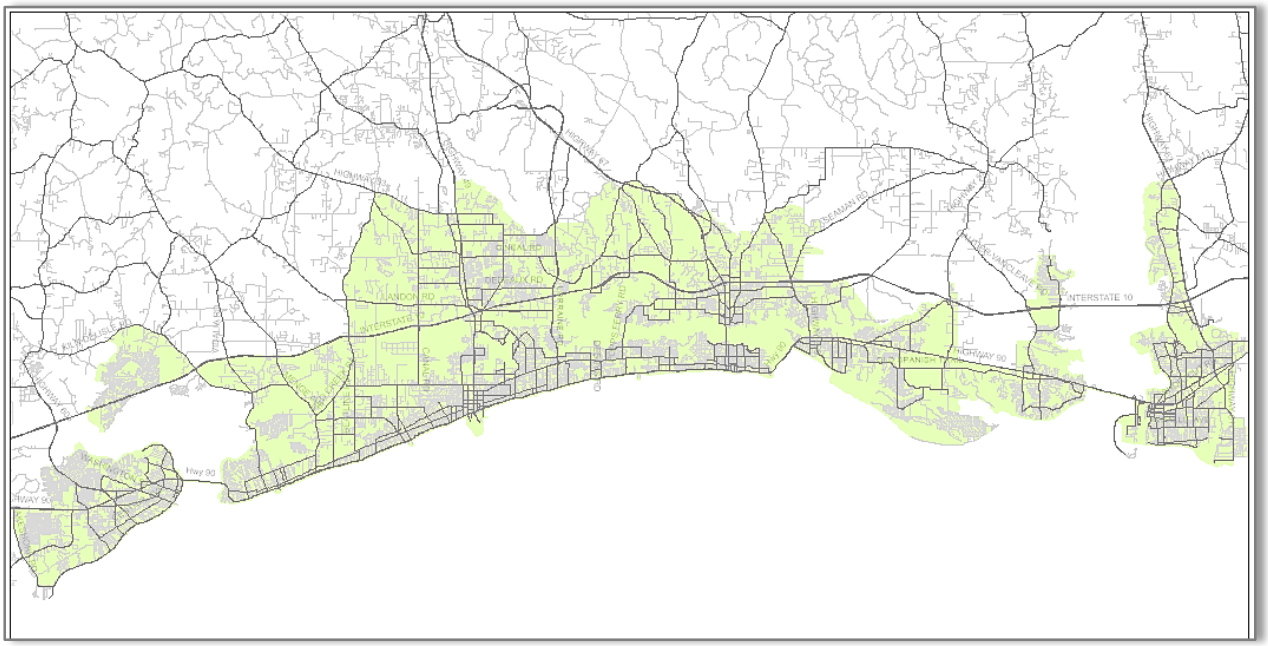
Non-voting members of the TPC include the following:

- Mississippi Trucking Association president;
- Heritage Trails Partnership designee;
- Federal Transit Authority Region IV administrator;
- Federal Highway Administration Mississippi Division administrator; and
- Mississippi Gulf Coast Business Council president.

The TPC is responsible for the periodic adoption of a Unified Planning Work Program (UPWP) and Transportation Improvement Program (TIP), and for the establishment of policies and procedures in compliance with federal regulations. The TPC is guided by recommendations developed and put forth by the TCC. The TPC meets quarterly, on the fourth Thursday of the month in March, June, September and December. The December meeting is a joint meeting with the TCC designated the *MPO Annual Meeting* at which officers are elected for the following calendar year. All TPC meetings are open to the public and include an agenda item offering an opportunity for public input regarding the planning process.

The TCC consists of individuals whose skills, training and professional status qualify them to take an active role in helping to shape and to oversee the transportation planning program for the region. The TCC is responsible for making recommendations to the TPC with respect to the adoption of the UPWP and TIP, as well as policies and procedures to be adopted by the MPO. TCC members also provide guidance to MPO staff regarding ongoing transportation planning activities. Each member entity (city, county, agency or organization) receives one vote on matters coming before a meeting of the TCC, regardless of the number of attendees who may be representing a specific jurisdiction, agency or organization. The TCC meets quarterly, on the fourth Thursday of the month immediately prior to TPC meetings (February, May and August) with the exception of the year-end joint meeting in December. All TCC meetings are open to the public and provide an opportunity for citizen comment on issues related to the ongoing transportation planning process.

Figure 1-2: Mississippi Gulf Coast Urban Planning Area



Source: Gulf Regional Planning Commission.

TCC members include the following:

- Representatives of the 15 city or county governments whose chief officers sit on the TPC;
- Gulf Regional Planning Commission executive director;
- Coast Transit Authority executive director;
- TCC Bike/Walk, Freight, Safety, Sustainability and Transit Sub-Committee chairmen;
- Mississippi Department of Transportation state planning engineer and District 6 engineer;
- Gulfport International Airport operations and planning director;
- Port planning directors for each of the three maritime port operators in the MPA; and
- Mississippi Trucking Association planning director.

Non-voting members of the TCC include the following:

- Federal Transit Authority Region IV representative;
- Federal Highway Administration regional planning engineer;
- Representatives of the U. S. Navy (Naval Construction Battalion Center), U. S. Air Force (Keesler Air Force Base) and National Aeronautics and Space Administration (Stennis Space Center); and
- Representatives of CSX Transportation, Inc., Kansas City Southern Railway Company, and the National Railroad Passenger Corporation (Amtrak).

1.2 THE METROPOLITAN TRANSPORTATION PLAN (MTP)

Beginning with the *Federal-Aid Highway Act* adopted by the U. S Congress in 1962, Federal legislation establishing or renewing highway and transit funding programs has required metropolitan transportation planning. The existence of a current long-range transportation plan, produced and adopted as a result of the ongoing metropolitan planning process, is a condition for the receipt of surface transportation funds appropriated for urban areas with a population of at least 50,000.

Purpose of the Metropolitan Transportation Plan

The primary purpose of metropolitan transportation planning (and hence the MTP) is to ensure that transportation planning in urbanized areas is carried out through a continuing, cooperative, and comprehensive (3-C) planning process. This 3-C process ensures that transportation planning is based on the most current information, reflects regional needs and priorities that are consistent with those of the state, takes into account all modes of transportation, and is consistent with land-use, economic development and other planning activities.

The metropolitan transportation planning process, as outlined in the FHWA publication, *Transportation Planning Process: Key Issues* (FHWA, no date: page 3), requires completion of the following tasks:

- Monitoring existing conditions;
- Forecasting future population and employment growth, including assessing projected land uses in the region and identifying major growth corridors;
- Identifying current and projected future transportation problems and needs and analyzing, through detailed planning studies, various transportation improvement strategies to address those needs;
- Developing long-range plans and short-range programs of alternative capital improvement and operational strategies for moving people and goods;
- Estimating the impact of recommended future improvements to the transportation system on environmental features, including air quality; and
- Developing a financial plan for securing sufficient revenues to cover the costs of implementing strategies.

Adoption of the MTP is the first step towards the implementation of any regionally significant transportation project, whether it is to be accomplished with Federal assistance or funding from other sources. Following formal adoption of the plan, a project can be programmed for design, right-of-way acquisition or construction in the Transportation Improvement Program (TIP), which identifies funding sources, fiscal year(s) of implementation, and the estimated amount of funding required.

Metropolitan Transportation Planning Requirements

Every MPO must prepare and update a transportation plan for its MPA in accordance with requirements set forth in Federal law (23 USC §134) and regulations adopted pursuant thereto (23 CFR §450.322). The MTP must have a planning horizon of at least 20 years; foster mobility and access for both people and goods; facilitate the efficient performance of the transportation system and support its preservation; and seek to better the quality of life enjoyed by people living and working in the area (FHWA, no date: page 4). In addition to ensuring that the metropolitan transportation planning process is continuous, cooperative and comprehensive, the MTP must provide for consideration and implementation of projects, strategies and services that will address the following planning factors originally enumerated in the *Transportation Equity Act for the 21st Century* (Public Law 105-178):

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

The U. S. Department of Transportation (USDOT) metropolitan planning regulations cited above require that, at a minimum, the MTP shall contain the following elements:

- The projected transportation demand of people and goods over the period of the plan (at least 20 years);
- An inventory of existing and proposed transportation facilities, with an emphasis on those having national or regional significance;
- Operational and management strategies that improve the efficiency and safety of the existing transportation system;

- Consideration of the results of the congestion management process (CMP) in any transportation management area (TMA) (i.e., urbanized area with a population of 200,000 or more, as defined by the U. S. Bureau of the Census and designated by the U. S. secretary of transportation);
- Capital investment and other strategies to preserve the existing and future transportation system and improve multimodal capacity based on regional priorities and needs;
- Description of proposed improvements in sufficient detail to allow development of cost estimates;
- Evaluation of environmental impacts and potential mitigation activities;
- Pedestrian and bicycle transportation facilities;
- Transportation and transit enhancement activities;
- A financial plan that demonstrates that the plan is fiscally constrained.

The Federal guidance also requires that there be consultation with state and local agency officials responsible for land use management, natural resources, environmental protection, conservation and historic preservation for the purpose of comparing the transportation plan with State and local conservation plans and maps and natural and historic resource inventories. In addition the plan must contain a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPA contained in the state's Strategic Highway Safety Plan. Prior to its adoption there must be a reasonable opportunity for the public and all relevant parties to review the transportation plan and to provide comments.

Federal law and executive orders prohibit discrimination and/or exclusion from participation in any program or activity receiving Federal financial assistance on the basis of race, color, national origin, disability, income, minority-status or limited-English proficiency. The *Mississippi Gulf Coast Metropolitan Planning Organization Public Participation Plan* (Gulf Regional Planning Commission, 2014)) specifies the manner in which the MPO complies with these non-discrimination requirements. The Public Participation Plan (PPP) is available on the GRPC website (grpc.com) and is discussed further in Chapter 2 ("Plan Development Process").

Title VI of the *Civil Rights Act of 1964* (Public Law 88-352, 78 Stat. 241) ensures that no person is excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving Federal financial assistance on the basis of race, color, or national origin.

The *Rehabilitation Act of 1973* (Public Law 93-112, 87 Stat. 355) and the *Americans with Disabilities Act* of 1990 (Public Law 101-336, 104 Stat. 327) encourage the participation of people with disabilities in the development of transportation and paratransit plans and services.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations"—issued by President William Jefferson Clinton in 1994—advances three fundamental environmental justice (EJ) goals:

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

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency" was issued by President Clinton in 2000 to prohibit discrimination against non-native speakers of the English language. The order requires Federal agencies to examine the services they provide, identify any need for service to those with limited English proficiency (LEP), and develop and implement a system to provide those services so that potentially affected individuals can have meaningful access to them. This requirement applies to all recipients of Federal financial assistance, including MPOs.

The most recent Federal transportation legislation, the *Moving Ahead for Progress in the 21st Century Act* (Public Law 112-141, 126 Stat. 405), adopted by Congress in 2012 and commonly referred to as MAP-21, established a significant new requirement of the metropolitan transportation planning process in mandating *performance-based planning* for all MPOs. While the USDOT is currently still in the rulemaking stage regarding performance-based planning regulations, it is expected that in the future the MTP will have to be developed by means of a performance-driven, outcome-based approach that supports national goals stated in MAP-21. This subject is addressed in greater detail in the first section of Chapter 2 ("Plan Development Process").

Amendment of the Metropolitan Transportation Plan

Between five-year updates the need may arise for modification of the MTP in a way which may significantly alter the scope or budget of the plan as adopted. Typically this situation arises when existing projects are modified or removed or when new projects need to be added. Since federally funded projects included in the short-range TIP must be consistent with the fiscally constrained MTP, these modifications require either a formal amendment or an administrative modification. *Administrative amendment* is defined by the current Federal regulations in the following terms (23 CFR §450.10s4):

> *Administrative modification* means a minor revision to a long-range Statewide or metropolitan transportation plan, Transportation Improvement Program (TIP), or Statewide Transportation Improvement Program (STIP) that includes minor changes to project/project phase costs, minor changes to funding sources of previously-included projects, and minor changes to project/project phase initiation dates. An administrative

modification is a revision that does not require public review and comment, re-demonstration of fiscal constraint, or a conformity determination (in non-attainment and maintenance areas).

GRPC policy identifies administrative modifications as revisions to the long-range plan that do not alter the fiscally constrained character of the MTP and thus do not affect the availability of funds. These modifications usually include, but are not limited to, the following:

- Minor changes in the description or termini of a project which do not have an impact on travel demand modeling or air quality analysis (e.g., the addition of roadway shoulders, bicycle lanes or sidewalks; the modification of intersections; or maintenance of facilities);
- Transfer of funding for a project from one fiscal year to another within an approved TIP, or the shifting of funds allocated for grouped projects within the TIP, provided fiscal constraint is maintained;
- Changing the Federal funding source program (e.g., from Highway Safety Improvement Program to Surface Transportation Program);
- Splitting an entry already made in the TIP, so as to create separate projects from (or phases of) the original, the intent being not to create a new program element but to facilitate development of the one already planned by phasing implementation;
- Removing a project already obligated or even completed;
- Making changes to correct errors or omissions in an approved project provided such modifications do not affect projects in other jurisdictions or the results of travel demand modeling or air quality analysis;
- Altering the amount of Federal funds programmed for a Surface Transportation Program (STP) project provided an increase does not exceed 15 percent.

In order to process administrative amendments, an updated listing of TIP projects is prepared and published on the GRPC website. A formal request is then made to the Mississippi Department of Transportation for incorporation of the modifications in the Statewide Transportation Improvement Program. A summary of administrative modifications is then presented to members of the Transportation Policy Committee at their next quarterly meeting. Administrative modifications do not require formal TPC approval or public review.

A formal amendment is required when a change meets one or more of the following criteria:

- A new project is added or one already programmed is deleted, other than under the conditions specified for administrative amendments;

- Substantial changes are made to the scope of a project (e.g., a change in the number of travel lanes, significant alteration of project termini, or the removal of bicycle/pedestrian elements);
- The amount of Federal funding programmed for a project is to be modified in excess of the amount authorized for an administrative amendment;
- A proposed change will affect the outcome of an approved air quality analysis or travel demand modeling assignment.

A formal amendment proposed for adoption will be evaluated on the basis of the project selection guidelines adopted by the MPO. The amendment will then be presented to the TCC for consideration following a 10-day public review period. All comments and recommendations will be forwarded to the TPC for consideration at a quarterly meeting of the committee. Formal adoption is required. Any amendment that would affect an approved air quality analysis for the region will also be subject to review and approval by interested state and Federal agencies.

1.3 CURRENT TRENDS AFFECTING TRANSPORTATION PLANNING

There are a number of significant social and demographic trends affecting travel demand on a national level, and these are having a predictable impact on transportation in the Mississippi Gulf Coast MPA. Speaking broadly, the U. S. is projected to grow more slowly, age more rapidly, become more ethnically diverse, and experience population increase mainly in central urban areas and suburban areas.

Demographics of Changing Social Conditions

The U.S. Bureau of the Census projects that nationwide population will grow from 310 million in 2010 to 380 million by 2040. While substantial in absolute terms, the anticipated rate of growth during this period will be lower than it has been in recent decades. The declining growth rate is primarily attributed to lower fertility rates among U. S. women and decreasing rates of immigration. While a slackening rate of in-migration is foreseen by the Census Bureau, the majority of population growth over the next 25 years is expected to come from immigrants and their descendants.

At the same time, longer lifespans are creating a population that will continue to see its elderly cohort grow in both absolute and relative terms. This will likely translate to fewer overall trips per capita and especially to fewer automobile trips per capita.

The increase in ethnic diversity in the U.S. population will likely have a short-term effect that increases carpooling, transit ridership, walking and biking, while decreasing vehicle-miles traveled (VMT) per capita. However, as immigrants adapt to American culture, they may be expected to adopt travel patterns similar to native residents, leading to an increase in VMT per capita for immigrants and their descendants in later decades.

The American workforce is also changing, largely mirroring broader demographic changes. As the population ages, a lessening proportion will fall in the prime working-age group; and the overall labor

force participation rate, already falling, will continue to decrease. While some of this decrease in labor force participation may be made up by retirement-age workers seeking part-time employment, it is anticipated that overall employment will fall by 2050 due to the growing impact of robotics and other technological influences. Since commuter trips are the principal factor contributing to peak-period congestion, structural workforce trends will have a major impact on transportation.

Although population and employment growth is anticipated to slow down, the uneven pattern of growth which has prevailed in recent decades will likely persist throughout the United States. Prevailing patterns of migration--from rural to urban areas and from states in the northeastern and midwestern regions to those in the southeastern and western parts of the country—will probably continue. However, growth within metropolitan areas is expected to change slightly. While suburban population and employment growth is anticipated to continue to outpace that of central urban areas, growth in the latter areas is projected to occur at a faster rate than it has in recent decades.

These changes in the patterns of population location have the potential to decrease VMT per capita, as urban residents are more likely than their rural counterparts to use transit, walk or ride a bicycle; and suburban areas have a greater opportunity to develop walkable and transit-oriented areas. At the same time, there is some potential for increases in VMT per capita which would be realized if destinations continue to scatter within metropolitan regions and transit does not effectively serve these areas and provide an attractive alternative to driving.

While some of the projected socio-demographic trends may have conflicting impacts on travel demand, the consensus view is that total VMT will increase in growing areas while VMT per capita will stagnate or decline and more trips will be made by public transit, walking, biking, carpooling, or other means.

Impact of Technological Innovation

The likely impact of technological innovation on transportation is understandably difficult to predict. However, just as science fiction projects current trends into the future and seeks the logical consequences of developing ideas, there is much that can be deduced by examining recent technological developments that are already influencing travel demand. Telecommuting has been around for several decades now. While telecommuting increased at a rapid rate over the past couple of decades, it still represents a small percentage of work performed by the overall workforce. However, continued advances in communications and incentives provided by local governments, supporting *transportation demand management* (TDM) programs such as telecommuting and flexible work-hours, may encourage continued growth of this workplace trend, thereby reducing the demand for peak-period travel.

Technology is also improving the operation of both new and existing transportation infrastructure by facilitating improved *intelligent transportation systems* (ITS). According to the USDOT, ITS technologies "improve transportation safety and mobility, reduce environmental impacts, and enhance productivity through the integration of advanced communications-based information and electronic technologies into the transportation infrastructure and vehicles." ITS technologies that are likely to have a major impact on future transportation include connected vehicles, automated vehicles, and live data collection and

dissemination. These technologies will enable new ITS solutions and improve existing ones such as traffic signal coordination, reversible lane systems, traffic monitoring, demand-based roadway and parking pricing, and real-time travel information.

Bikesharing and *carsharing*, ridesharing initiatives that apply relatively new and still evolving technologies, are already affecting travel demand, especially in urban areas. Both are essentially rental services that enable a traveler to pay for temporary use of a vehicle (bicycle or automobile respectively). There are numerous variants of each, but the common intent is to provide the convenience of a readily available means of transportation when one otherwise would not have access to a private vehicle. In urban areas where many trips can be made by walking, biking or riding public transit, bikesharing and carsharing are helping to meet the demand for transportation by means other than the privately owned and operated motor vehicle. As a result, these innovative rental services are making car-ownership less important for urban residents. If these services become more widespread, VMT per capita, and perhaps overall VMT, might decline in many urban areas.

Ridesharing, according to the Victoria Transport Policy Institute, is a "carpooling or vanpooling service in which the vehicle carries additional passengers when making a trip, with minimal additional mileage." Ridesharing services are offered by various providers, such as public transit agencies, private taxi companies, vanpool operators and carpool-matching services. Continuing advances in the application of global positioning system (GPS) technology and use of mobile communications drive technological improvements in the delivery of ridesharing services. As with bikesharing and carsharing, traditional ridesharing offers an affordable alternative to the use of a privately owned and operated vehicle, especially for the daily journey to work and back.

Perhaps the most significant impact of technology on transportation relates to the change in consumer behavior resulting from commercialization of the internet. The Census Bureau reported on August 17, 2015, that U. S. retail e-commerce sales for the second quarter of 2015 amounted to an estimated $83.9 billion. That represented 7.2 percent of all estimated retail sales in the second quarter of 2015. E-commerce sales were up 4.2 percent over the preceding quarter and exceeded sales in the second quarter of the preceding year by 14.1 percent. Total retail sales in the second quarter of 2015 were up 1.6 percent over the preceding quarter and topped sales in the same quarter of 2014 by only 1.0 percent. That means that approximately 89.4 percent of the increase in second quarter sales from one year to the next was attributable to increased e-commerce activity. Non-internet sales were up by only $1.23 billion compared to increased e-commerce sales of nearly $10.37 billion. This trend has been tracking steadily upward since the Census Bureau began monitoring e-commerce activity at the beginning of 2006, and so far it shows no signs of leveling off.

Total vehicle-miles traveled (VMT) topped three trillion in 2007 and went up again in 2008 as had been the case in every year since 1981. However, in 2009 VMT fell back below the three-trillion-mile mark and remained below that level through 2014. This unprecedented flattening of the VMT curve applied only to total miles, however, as heavy-truck travel continued to rise (from 205 billion miles in 2000 to 288 billion in 2009 according to FHWA estimates). Conversely, travel by passenger car and other light-duty vehicles reached nearly 2.75 trillion vehicle-miles in 2005 but was down to 2.63 trillion miles by 2009. Average

miles traveled per vehicle declined from 11,856 in 2005 to 11,218 in 2009. In a 2014 article entitled, "Per capita VMT drops for ninth straight year; DOTs taking notice," Chris McCahill of the State Smart Transportation Initiative (SSTI) noted, "Evidence suggests that the decline is likely due to changing demographics, saturated highways, and a rising preference for compact, mixed-use neighborhoods which reduce the need for driving. Some key factors that pushed VMT upward for decades—including a growing workforce and rising automobile ownership—have also slowed considerably."

An SSTI white paper published in 2013, Chris McCahill and Chris Spahr made only passing mention of "online shopping" (along with telecommuting and car-sharing) as a potential source of reduced VMT in the future, noting, "[T]he impact of these factors on VMT is not yet fully understood" Nevertheless, it seems reasonable to suggest that the rather dramatic increase in e-commerce in recent years has meant significantly fewer trips to regional shopping malls and downtown retail centers. And the fact that it has coincided with a sudden and unforeseen cessation of growth sustained over decades lends credence to the notion that this change in consumer behavior may be not merely a potential factor in reducing future VMT but a significant contributor to the reduction already observed.

The ability of technological innovation to transform human behavior in sudden and unexpected ways is worth keeping in mind as we contemplate the rapid emergence of car-sharing in large urban areas and the looming advent of what might be called *local airborne delivery systems*.

Increasing Emphasis on Environmental Issues

According to a report prepared for the FHWA in 2008 (*Integrating Climate Change into the Transportation Planning Process*), "There is general scientific consensus that the earth is experiencing a long-term warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are the predominant cause. The combustion of fossil fuels is by far the biggest source of GHG emissions. In the United States, transportation is the largest source of GHG emissions, after electricity generation. Within the transportation sector, cars and trucks account for a majority of emissions" (FHWA, 2008: page 1).[1]

The authors of the report also maintain that, "In addition to contributing to climate change, transportation will likely also be affected by climate change. Transportation infrastructure is vulnerable to predicted changes in sea levels and increases in severe weather and extreme high temperatures. Long-term transportation planning will need to respond to these threats" (FHWA, 2008: page 1). While acknowledging that current law and regulatory guidance do not require consideration of climate change in the preparation of state or metropolitan transportation plans, the authors encourage such a course and

[1] The notion of "general scientific consensus" on the subject of *anthropogenic global warming* (AGW) disregards the widespread dissent, regarding the existence of a long-term warming trend and possible causes rooted in human activity, which actually exists within the scientific community. For an example of thoughtful scientific consideration of the subject from a dissenting perspective, put forth by a trained biologist and noted environmentalist, see the 2015 Annual Global Warming Policy Foundation lecture given by Patrick Moore, PhD, former president of Greenpeace Canada, on October 15, 2015, in London (http://www.thegwpf.org/patrick-moore-should-we-celebrate-carbon-dioxide/).

cite legislation (23 USC 143(a)), regulations (23 CFR 450.200, 206, 208, 214, 306 and 320; 49 CFR 613.100 and 200) and the eight Federal planning factors listed at 23 CFR 450.206a and 23 CFR 450.306(a).

The potential environmental effects of proposed transportation improvements must be considered at the outset if the MPO is to avoid including plan elements that will not meet the requirements of the *National Environmental Policy Act* (Public Law 91-190, 823 Stat. 852 (NEPA)). FHWA strongly encourages linking the transportation planning and environmental analysis processes in ways that facilitate the transition from one to the other as a project advances from planning to active development. This can mean screening the project site or study area for wetlands, floodplains, cultural resources, recreational facilities, hazardous waste or other potential obstacles to the implementation of the contemplated improvement. Alternatively it may mean undertaking what amounts to a preliminary environmental study, setting the stage for a fully developed environmental assessment or impact statement.

The identification of potential neighborhood or community impacts is especially important, because of the requirements associated with environmental justice. As previously noted, Executive Order 12898 directed "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. . . ." Moreover, it required each agency to ensure "that such programs, policies, and activities do not have the effect of excluding persons" from participation, "denying persons" benefits made available, or "subjecting persons" to discrimination because of their race, color, or national origin. Finally, it directed that "each Federal agency, whenever practicable and appropriate, shall collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action." Thus an adverse impact on a particular locale, or a designated portion of the human environment afforded special protection under the executive order, can represent an obstacle to project development that cannot be overcome and needs to be identified as such early in the planning process.

Declining Travel Demand and Transportation Revenues

The recent downturn in the demand for travel, as measured by VMT, has already been discussed. While the reversal of the long-term trend, manifested by seemingly inevitable annual increases in VMT, has had its positive effects—reduced traffic congestion, pollutant emissions and vehicular collisions—it also has its more problematical side. Both state and Federal transportation revenues are largely dependent on the consumption of motor fuels. Reduced travel, combined with improved fuel economy, has resulted in declining tax revenues tied to sales of gasoline and diesel. The Federal Highway User Fee has been fixed at 18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel fuel since 1996. The State of Mississippi taxes both gasoline and diesel at 18.4 cents per gallon. Fuel tax revenues in Mississippi peaked at $469 million in 2004; since then annual revenues have averaged approximately $434 million. Federal fuel tax revenues declined by 18 percent from 1999 to 2013. The result is a looming crisis in funding for transportation programs in the years ahead.

2.0 PLAN DEVELOPMENT PROCESS

The process adopted for development of the 2040 Metropolitan Transportation Plan (MTP) sought to balance objective analysis of existing and projected future conditions with the expressed views and wishes of the public and interested stakeholders elicited through the citizen involvement effort and stakeholder outreach.

2.1 PERFORMANCE-BASED PLANNING APPROACH

The 2040 MTP utilizes a performance-based planning approach that can be expanded in later updates when Federal guidance on national performance measures and monitoring requirements is made available. Performance-based planning and programming (PBPP) is the application of performance management to the long-range planning and programming process. Performance management is a strategic approach to decision-making based on the development, application and monitoring of performance data. PBPP uses data-derived indicators of current and desired transportation system performance to set strategic directions; to analyze how funds are invested and programmed; and to evaluate program outcomes.

The *Moving Ahead for Progress in the 21st Century Act* (Public Law 112-141), signed into law in 2012, introduced requirements for performance-based planning in statewide and metropolitan planning. Commonly known by the acronym *MAP-21*, the law requires the U. S. Department of Transportation (USDOT) to establish performance measures that will enable states and metropolitan planning organizations (MPOs) to track their performance in addressing the national goals set forth in MAP-21. Once these performance measures are mandated by the promulgation of pending regulations, state transportation departments and MPOs will be required to adopt a target to be achieved by the implementation of each measure.

While Federal guidance on MAP-21 performance measures has not yet been issued, Gulf Regional Planning Commission (GRPC) already has extensive experience with outcome-based planning and programming activities related to the *Livability Principles* adopted by the Partnership for Sustainable Communities. The partnership is a joint effort by the U. S. Department of Transportation, U. S. Department of Housing and Urban Development (HUD) and U. S. Environmental Protection Agency (EPA) to spearhead Federal efforts to embed the concept of *sustainability* in state and local decision-making processes. The formulation of performance measures was an integral part of the agency's collaborative involvement in development of the *Plan for Opportunity: Regional Sustainability Plan for the Mississippi Gulf Coast*. The general process outlined below illustrates how the 2040 Long-Range Transportation Plan incorporates an outcome-oriented, performance-based planning approach.

1. **Set Regional Vision** – A regional vision is derived from public and stakeholder input.
2. **Define Goals and Objectives** – Goals are developed that address desired outcomes consistent with the regional vision and national goals set forth in MAP-21. Then objectives that are specific and measurable are established to support achievement of the stated goals.
3. **Establish System Performance Measures** – Performance measures to monitor are selected that are consistent with the stated goals and objectives and with the Livability Principles and indicators. Monitoring these measures over time will allow the MPO to be responsive either to intended or to unforeseen changes.

4. **Assess Baseline System Performance** – Existing conditions of the transportation system were assessed from an asset inventory, applying technical analysis and input received from the public and stakeholders.

5. **Identify Desired System Performance** – Because state performance targets are not yet set and some necessary data are not yet available, the 2040 Metropolitan Transportation Plan (MTP) solely focuses on the preferred overall trend of performance measures (i.e. the direction of results).

6. **Forecast Future Conditions and Needs** – Future growth in population and employment from 2013 to 2040 was forecast. The impacts of the forecast change in land use and demographic patterns were then modeled using the existing transportation system and committed projects. Future projects were then evaluated both individually and as part of larger packages of projects.

7. **Develop Implementation Strategy** – A prioritization methodology was developed for ranking future transportation projects in a manner consistent with stated goals and objectives as well as public and stakeholder input. The projects that most effectively balance future demand with these concerns are then selected to be included in the fiscally constrained project list, so long as there is no preliminary concern of significant environmental impact or disproportionately adverse effects on environmental justice populations.

2.2 PUBLIC INVOLVEMENT PROCESS

As part of its ongoing transportation planning process, GRPC coordinates a public engagement program that is *cooperative, continuous and comprehensive* in accordance with the U. S. Department of Transportation (USDOT) metropolitan planning regulations. The 3 C's are reflected in the long-range plan update process in a number of ways. Both the general public and interested stakeholders were informed of the update process and afforded continuous opportunities to participate in plan development.

Cooperative

Public participation activities throughout plan development were conducted cooperatively with the Mississippi Department of Transportation (MDOT) and other MPO agencies in Mississippi. Outreach messages and timelines were aligned to provide a consistent look for public display and coordinated opportunities for input from the community. GRPC also participated with MDOT and the other MPO agencies in a statewide online outreach effort. Managed by consultant staff, the *MindMixer* website was developed as a new communication tool. It afforded people who were unable or unwilling to attend the scheduled public meetings an equal opportunity to review materials and provide feedback. In addition to positing information for public viewing, the site allowed participants to enter questions, make comments and share their project suggestions with planning staff.

In support of the joint MDOT-MPO *MindMixer* effort, push cards were distributed to MPO membership, e-mails were sent to individuals on the statewide stakeholder list, and printed cards were handed out during the first round of public meetings. These cards "pushed" individuals to continue to follow the planning process and provide their feedback through the *MindMixer* forum. In short, the site afforded an

Media interviews of GRPC staff and members of the community helped get the word out about plan development.

additional opportunity for interested parties to participate in the planning process despite scheduling challenges or other barriers that kept them from attending on-site public meetings. Another example of cooperation during the outreach process involved interaction with the local news media. Their attendance at the public meeting events, and subsequent help in disseminating information about the planning process to the community, had a far-reaching impact. This media coverage supplemented publication of ads in the *Sun Herald* newspaper announcing planning activities and meeting dates and soliciting public participation.

Continuous

From the start of the planning process leading to development of the long-range transportation plan, GRPC staff have been in regular communication with their counterparts at the Federal Highway Administration (FHWA) and MDOT, as well as the other MPO agencies. Throughout each phase of the plan development process, information was posted on the GRPC website for public review and comment. A metropolitan transportation plan (MTP) update was included on the agenda for each Transportation Policy Committee (TPC) or Technical Coordinating Committee (TCC) meeting in order to ensure the MPO membership, their advisors and other stakeholders were aware of and could contribute to the planning effort. This also allowed for discussion of study findings, led to project recommendations and alerted the membership when key milestones were being accomplished.

Midway through the planning process, the GRPC website was updated to a new format, allowing creation of a headline bar on the homepage for attracting attention to hot topics. The MTP had been a standing element of the home page on the old site but became even more visible to visitors following the upgrade. A visitor clicking on the MTP announcement on the new site would be taken to an entire page developed to share MTP planning information and to allow individuals to review materials and provide 'single-click' feedback straight to the GRPC planning staff.

Comprehensive

The public engagement process began soliciting feedback by means of a statewide telephone survey. The information collected contributed to the initial drafting of long-range goals and objectives which were then made available for public comment. The top priority identified by respondents in both urban and rural areas, as well as statewide, was the need to maintain the existing transportation system (see Figure 2-1). Improving safety and reducing traffic congestion both ranked higher in the metropolitan areas than

they did in either the non-urban areas or statewide. Expanding transit options was a higher priority among rural-area respondents than it was for those in urban areas or in the state as a whole.

Public meetings and membership presentations provided attendees with a comprehensive look at the planning process and how they could be involved in it. Informational materials were produced and presented by both MPO and MDOT planning staff at each public meeting. Separate meetings were held at locations in each of the three study area counties between the hours of 4:00 p.m. and 6:00 p.m. The first round of meetings was conducted in February 2015, shortly after the start of the planning process. The second round was scheduled to take place during the 45-day public review period for the draft plan in November 2015 (see schedule below).

	ROUND 1		ROUND 2	
COUNTY	DATE/LOCATION	ATTENDANCE	DATE/LOCATION	ATTENDANCE
Hancock County	2.24.15 - Bay St Louis	32	11.19.15 - Bay St Louis	TBD
Harrison County	2.26.15 – Biloxi	42	11.18.15 – Biloxi	TBD
Jackson County	2.25.15 – Gautier	29	11.17.15 - Pascagoula	TBD

During the first round of meetings, visitors were invited upon arriving to watch a video that featured MDOT Executive Director Melinda McGrath. The MDOT director welcomed guests and briefly explained the purpose of the meeting and its role in the long-range planning process, encouraging participants to continue their involvement in the long-range plan development effort. Following the introductory video, attendees were able to view displays and talk with MDOT staff about the state's overarching priorities for the future transportation system in Mississippi. Then they were invited to view displays and other materials relating to the GRPC plan development process and discuss regional transportation issues with MPO staff.

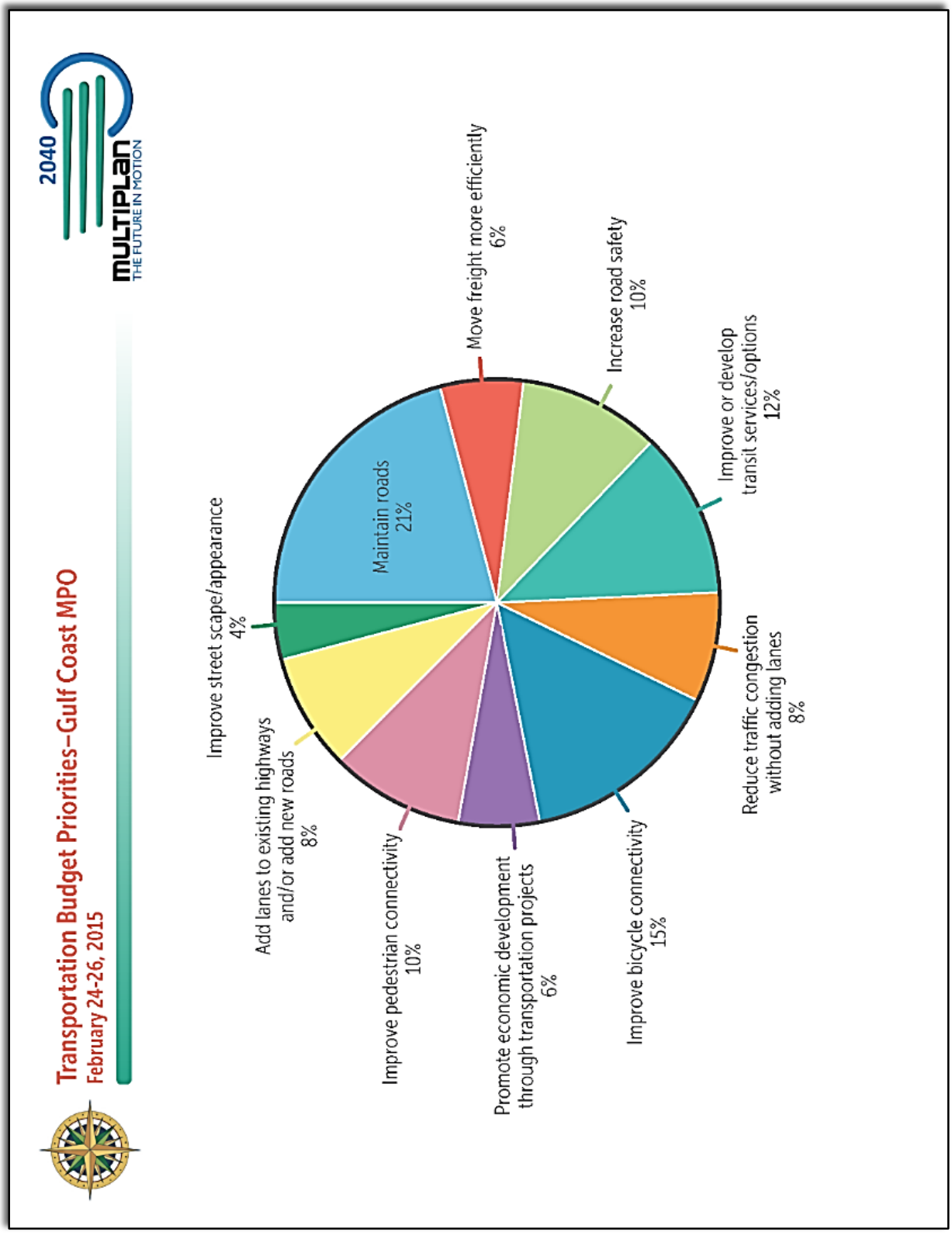
Several feedback-gathering activities were made available to visitors during the public meetings. Maps were laid out for individuals to mark, indicating where they would like to see improvements made in the future. There were also two surveys: The first asked attendees how they would spend available transportation improvement dollars; the second asked participants to rate the performance of the existing transportation system by mode (see figures 2-2 and 2-3). The second round of public meetings was scheduled for mid-November during the 45-day public review period so that the plan could be presented to the Transportation Policy Committee for adoption at the MPO Annual Meeting on December 10, 2015.

MDOT Executive Director Melinda McGrath welcomes public meeting participants via video (left); participants complete survey questionnaires (middle); participant marks map to register input (right).

Figure 2-1: Statewide Telephone Survey Results

Source: Mississippi Department of Transportation, Gulf Regional Planning Commission, Neel-Schaffer, Inc.

Figure 2-2: Public Input Regarding Transportation Spending Priorities



Source: Mississippi Department of Transportation; Gulf Regional Planning Commission, Neel-Schaffer, Inc.

Figure 2-3: Public Input Regarding Performance of Existing Transportation System

Source: Mississippi Department of Transportation; Gulf Regional Planning Commission; Neel-Schaffer, Inc.

2.3 REGULATORY REQUIREMENTS

The GRPC *Public Participation Plan* (PPP) is consistent with the requirements set forth in Chapter 23 of the *Code of Federal Regulations* (CFR) Section 450.316 ("Interested parties, participation, and consultation"). The plan defines how the agency ensures that ordinary citizens, affected parties, transportation providers and their employees, advocates and other interested individuals have access to the regional planning process. The PPP places emphasis on identifying, for the stakeholder communication roster, those individuals who belong to or represent traditionally underserved populations located in the Mississippi Gulf Coast Metropolitan Planning Area (MPA). The plan applies to all activities, services and programs implemented by the MPO and is available for review at www.grpc.com.

In compliance with the cited regulation, GRPC staff have ensured that timely notice was provided at key decision-points throughout the long-range planning process leading to adoption of the MTP. Information was provided in written and visual formats, viewable by means of various mediums; and public feedback was collected through a variety of strategies, including electronic submission. To ensure that the requirement that meetings be scheduled at convenient times and locations was met, three public meetings were held, one in each coastal county, between the hours of 4:00 p.m. and 6:00 p.m. The first round of meetings helped to identify community priorities and helped to define regional goals and objectives and spending priorities for future transportation investment. The second round of meetings was scheduled to allow all interested parties the opportunity to review the draft plan and provide comments prior to publication. The 45-day review period was scheduled from October 26th to December 10th, 2015.

The regulation cited above (23 CFR §450.316) defines the core components of MPO compliance in conducting its planning and outreach programs, but there are several additional rules and regulations that also apply. The PPP is also compliant with 23 CFR §450.322 ("Development and content of the metropolitan transportation plan") which reiterates the MPO's responsibility to involve the public in the decision-making process and stipulates that the draft and final documents must be made available in electronically accessible formats. Title II §35.149 ("Discrimination Prohibited") of the *Americans with Disabilities Act* (Public Law 101-336, 104 Stat. 327) states that "no qualified individual with a disability shall, because a public entity's facilities are inaccessible to or unusable by individuals with disabilities, be excluded from participation in, or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any public entity." In addition, 23 CFR §450.210 ("Interested Parties, Public Involvement and Consultation") requires an agency to "ensure that public meetings are held at convenient and accessible locations and times." In order to be fully compliant with the regulation, GRPC public meetings are routinely held at locations that are fully accessible, with at least one in every three meetings located on a fixed-route transit line.

Other legislation--such as 23 USC 128 ("Public Hearings") and 23 USC 139 ("Efficient Environmental Reviews for Project Decisionmaking")--and regulations such as 23 CFR 771.111 ("Early coordination, public involvement, and project development")--add to the core components of participation outlined above. They require that the participation process be established early and be carried on continuously throughout the plan development process. This was accomplished by building a comprehensive stakeholder e-mail list early in the process for distribution of all plan announcements and updates. It was also satisfied by means of ongoing communication channeled through the *MindMixer* website and www.grpc.com.

In providing access to planning materials, the MPO offered translations of the draft plan for distribution to the Spanish-speaking community through advocacy organizations. This was done to comply with Executive Order #13166 (“Improving Access to Services for Persons with Limited English Proficiency”), which requires agencies to ensure a meaningful opportunity for individuals with *limited English proficiency* (LEP) to participate in the planning process. Translated documents were prepared for distribution at public meetings as well as on the agency website.

Title VI of the *Civil Rights Act* of 1964 “prohibits exclusion from participation in, denial of benefits of, and discrimination under federally assisted programs on grounds of race, color, or national origin." Other non-discrimination statutes include Section 162 (a) of the *Federal-Aid Highway Act* of 1973 (23 USC 324) which bars discrimination on the basis of sex; the *Age Discrimination Act* of 1975 (42 USC 6101-6107) which bans discrimination on the basis of age; and Section 504 of the *Rehabilitation Act* of 1973 (Public Law 93-112, 87 Stat. 355) and the previously cited *Americans with Disabilities Act* of 1990 which ban discrimination on the basis of disability. Taken altogether, these requirements define an overarching Title VI-based nondiscrimination program incorporated within the GRPC PPP.

Executive Order 12898 (“Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”) provides guidance on how the MPO is to achieve the equitable distribution of both costs and benefits associated with transportation improvements, programs and services. This policy establishes the intent to ". . . make achieving environmental justice part of our mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. . . .” These considerations were included in the outreach process as we selected meeting locations and made planning materials available in multiple formats, but also in development of the plan itself as a core factor in project selection and the prioritization process for future transportation improvements.

3.0 GOALS, OBJECTIVES AND PERFORMANCE MEASURES

The passage of the *Moving Ahead for Progress in the 21st Century Act* (MAP-21), the transportation bill adopted by Congress in 2012, strengthened the long-range planning focus on the use of performance measures by state departments of transportation (DOTs) and metropolitan planning organizations (MPOs). The performance measures listed in this document are used to analyze and evaluate goals and objectives established by the Mississippi Gulf Coast MPO. They help to measure progress and serve as a basis for comparing alternative improvement strategies and for tracking performance over time. Both state and MPO targets are identified in relation to the following set of national performance goals:

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

The MPO set its performance measures keeping in mind that a lesser number of well-thought-out indicators would be better than an abundance of measures of questionable utility. The MPO must consider its resources for data collection to determine which measures are best for each goal and objective. Too many measures would overwhelm the ability of the MPO to collect the data needed to evaluate system components and would also overwhelm decision-makers faced with having both to understand and act on the data. The measures must be clearly understandable for decision-makers, stakeholders and the general public. The following definitions of key terms provide insight into what is required in order to achieve the necessary clarity of thought and expression:

Goal – An expressly desired outcome or purpose of a plan or program, broadly defined in scope and generally unlimited in duration.

Objective – A specific and preferably measurable outcome of a plan or program that may serve as a milestone marking progress toward the fulfillment of a goal.

Strategy – A long-term widely applicable approach adopted for the purpose of advancing the realization of a particular goal or complex of interrelated goals.

Policy – A prescribed course of action intended to promote or facilitate the coordination of effort required to achieve an objective.

Performance Measure –A quantifiable indicator used for evaluating the performance of a given program element.

Standard – A measure of minimally acceptable performance established with regard to an objective for the purpose of determining the relative effectiveness of a program or policy.

3.1 GOALS AND OBJECTIVES

The following are the goals and objectives adopted by the Transportation Policy Committee (TPC) for the Mississippi Gulf Coast MPO:

Goal 1.0: Strategically enhance corridors

Objective 1.1: *Maximize transportation system efficiency by promoting alternatives to adding general-purpose traffic lanes.*

Strategy/Policy: Adopt a "fix-it-first" mentality that maximizes all operational measures on roadways before adding capacity.

MPO policy or recommendations for capacity addition.

Develop and assign a high priority to projects that improve traffic flow with operational measures.

Consider measures that put more people into fewer vehicles and reduce the need to travel.

Objective 1.2: *Reduce roadway congestion*.

Strategy/Policy: Identify and develop projects for existing and future traffic congestion.

Develop and assign a high priority to projects that mitigate congestion and/or reduce travel time.

Objective 1.3: *Improve the mobility of freight trucks.*

Strategy/Policy: Develop and assign a high priority to projects that mitigate congestion on heavily-traveled truck routes.

Objective 1.4: *Enhance mobility by improving the connectivity of the existing transportation network.*

Strategy/Policy: Develop and assign a high priority to closing gaps and providing links on major mobility corridors.

Support street patterns that encourage safe pedestrian, bicycle and vehicular travel by ensuring connectivity.

Objective 1.5: *Improve the form and function of transportation corridors in order to contribute to the sense of place.*

Strategy/Policy: Consider an area's context when developing roadway projects.

Lower travel speeds to be sensitive to the context of areas.

Objective 1.6: *Improve economic vitality of the region with transportation decisions.*

Strategy/Policy: Prioritize projects that impact business travel cost savings, business market effects and quality of life effects.

Goal 2.0: Improve and expand transportation choices

Objective 2.1: *Make public transportation a choice mode of transportation on the Mississippi Gulf Coast.*

Strategy/Policy: Enhance the efficiency of transit.

Enhance accessibility to transit.

Enhance the availability of transit.

Enhance the attractiveness of transit.

Objective 2.2: *Improve marketing and promotion of transportation options to increase awareness on the Mississippi Gulf Coast.*

Strategy/Policy: Promote, through public education, the economic, environmental, and health benefits of walking and biking as practical modes of transportation.

Educate the public about proper bicycle safety and applicable laws.

Promote available transportation options through marketing campaigns.

Objective 2.3: *Promote rail transportation opportunities.*

Strategy/Policy: Pursue meaningful regional passenger rail through the Mississippi Gulf Coast.

Goal 3.0: Increase safe transportation

Objective 3.1: *Make all Mississippi Gulf Coast urban area roadways suitable for bicycles, pedestrians and transit.*

Strategy/Policy: Adopt and implement Complete Streets policies that ensure that new or reconstructed roadways are designed to include sidewalks, be made suitable for bicycles and consider transit.

Develop and assign a high priority to roadway projects that include strategic measures for improving bicycle and pedestrian mobility and safety.

Promote the use of roadway cross sections that ensure all modes are accommodated.

Develop road diet projects to retrofit streets with accommodations for bicycles and pedestrians.

Objective 3.2: *Improve safety at intersections.*

Strategy/Policy: Consider proven innovative safety measures at intersections, such as roundabouts, first.

Identify intersections with safety concerns for safety audits and project development.

Develop and assign a high priority to projects that improve intersections or roadways with safety concerns.

Address dangerous railroad crossings.

Provide adequate refuge for pedestrians crossing wide roads.

Use measures to improve pedestrian and bicyclist safety such as raised intersections, signals and highly visible crosswalks

Objective 3.3: *Promote safety through public education, enforcement and engineering.*

Strategy/Policy: Provide transportation workforce programs and other outreach.

Goal 4.0: Manage the relationship between transportation, community and environment.

Objective 4.1:	*Promote land use patterns and development policies that support transportation mobility.*
Strategy/Policy:	Promote local policies to locate key community facilities on transit routes to maximize the efficiency of transit buses.
	Maximize the economic development potential of transit by encouraging infill and development in around transit hubs, activity districts and Transit Oriented Development (TOD).
	Identify land use patterns that support lower VMT.
Objective 4.2:	*Consider climate variability when making transportation project d*ecisions.
Strategy/Policy:	Facilitate evacuation with adequate north-south mobility.
	Develop and assign a high priority to roadway projects that improve roadways at-risk for flooding.
Objective 4.3:	*Coordinate transportation decisions to preserve existing communities.*
Strategy/Policy:	Evaluate potentially disparate impacts of transportation projects on environmental justice target areas.
	Consider the effects of bypass highways on existing communities.
Objective 4.4:	*Provide public involvement processes to engage the general public, minority and low-income populations in transportation decision-making.*
Strategy/Policy:	Use surveys and public meetings to gather community input.
Objective 4.5:	*Promote the development of a transportation system and programs that maintain or improve air quality and reduce greenhouse gases, ozone, particulate matter and other pollutants.*
Strategy/Policy:	Develop and assign a high priority to projects and programs that reduce vehicle idling.
	Support regional ozone action committees.

3.2 PERFORMANCE MEASURES

The following are performance measures identified in conjunction with the goals and objectives enumerated above.

Goal 1.0: Strategically enhance corridors

Reduce miles of congested roadways on designated truck routes. MPO planners will identify miles of congested roadway segments, as indicated by the Congestion Management Plan, which are on truck routes identified by the Mississippi Statewide Freight Plan.

Goal 2: Improve and expand transportation choices

Reduce pedestrian and bicycle crash rates (per capita) in Gulf Coast counties. This measure will be calculated with accident data provided by the Mississippi Department of Transportation (MDOT).

Increase the number of miles of roadways considered "suitable" for bikes. MPO planners will maintain an inventory of bicycle facilities and suitable roadways based on the criteria in the MPO's adopted Complete Streets Policy.

Increase the percent of major employers within walking distance (.4 mile) of a fixed route transit. MPO planners will evaluate this performance measure using geographic information system (GIS) software and major employers identified by the Harrison County Development Commission (HCDC) with over 50 employees.

Increase the percent of the population served within walking distance (.4 mile) of a fixed route transit. MPO planners will evaluate this performance measure using geographic information system (GIS) software and U.S. Census data.

Goal 3: Increase safe transportation

Reduce lane departure and intersection crashes in the three coastal counties.

Reduce the number of un-signalized or under-signalized at-grade rail crossings.

Goal 4: Manage the relationship between transportation, community and environment

Decrease the VMT traveled in congested conditions.

Reduce the number of intersections with level of service C and less.

Reduce average transit headways.

Increase fixed route transit service area.

4.0 ENVIRONMENTAL CONTEXT

Planning for the transportation system must take into account the impacts that improvements are likely to have on both the natural environment and the environmental context of human activity. By providing appropriate consideration of environmental impacts early on in the planning process, the metropolitan transportation plan (MTP) increases opportunities for inter-agency coordination, enables expedited project delivery, and promotes outcomes that are more environmentally sustainable than they might otherwise have been.

4.1 ENVIRONMENTAL ASPECTS OF THE METROPOLITAN PLAN

Legislative Mandates and Regulatory Requirements

Federal regulations require the MTP to address environmental concerns in two primary ways: (1) By engaging in a process of consultation during development of the plan; and (2) By providing a discussion of potential mitigation measures that may be necessary to offset environmental impacts related to implementation of the plan.

> 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 (23 CFR 450.322(g)).

The requisite consultation must involve ("as appropriate") a comparison of the MTP with conservation plans or maps adopted by the state ("if available") and comparison of the transportation plan with inventories of natural or historic resources (again "if available"). Regarding mitigatory measures that may be necessary to comply with environmental law or regulatory guidance, the metropolitan planning regulations stipulate that the long-range plan shall include the following:

> 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 (23 CFR 450.322(f)(7)).

It is not necessary for this discussion to address the mitigation that may be associated with implementation of specific projects. It is sufficient to focus attention on "policies, programs, or strategies." There is also an expectation that the discussion will reflect "consultation with Federal, State, and Tribal land management, wildlife, and regulatory agencies." However, the MPO is allowed to set reasonable time limits for the conduct of this consultative process.

The *National Environmental Policy Act of 1969* (NEPA) established the basic framework for integrating environmental considerations into Federal decision-making. Federal regulations relating to NEPA define five possible types of mitigation (40 CFR 1508.20):

- Avoiding the impact altogether by not taking a certain action or parts of an action.

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Section 4(f) of the *U. S. Department of Transportation Act* of 1966 (49 U.S.C. §303) mandates special protection for property in publicly owned parks, recreational areas, wildlife and waterfowl refuges, and historic sites. The law states that such property cannot be used for transportation purposes unless there is no *feasible and prudent* alternative, the action includes all possible planning to minimize harm to the property, or a *de minimis* impact determination is made.

Special protection is also afforded designated population groups under Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* signed by President Clinton in 1994. It seeks to reaffirm the intent of Title VI of the *Civil Rights Act* of 1964, NEPA and other federal laws, regulations and policies by establishing the following *Environmental Justice* (EJ) principles for all federal agencies and agencies receiving federal funds (including MPOs):

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

Environmental Screening of Proposed MTP Projects

Detailed project-specific environmental impact evaluations are beyond the scope of a long-range regional transportation plan that identifies scores of improvements for implementation over a quarter of a century. However, in developing the 2040 MTP, an environmental screening process was used to assess the relative likelihood of significant environmental impacts resulting from each of the projects considered. This process made use of available inventories, previously assembled for relevant natural and cultural resources, as well as socioeconomic and demographic data generated by the U. S. Census Bureau. Studies

undertaken to identify potential impacts associated with a proposed project generally address all of the following areas of environmental concern:

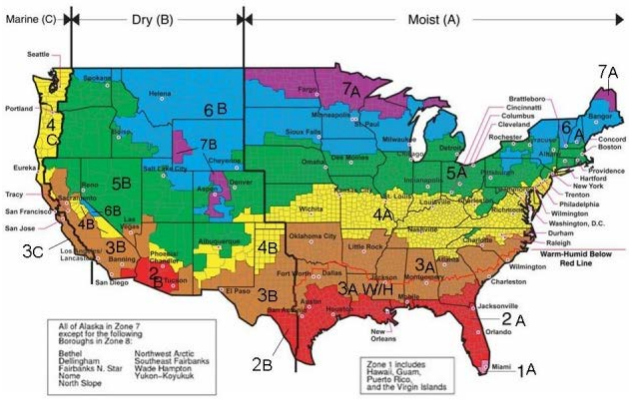
- Hazardous materials
- Air quality
- Noise
- Wetlands and jurisdictional waters of the United States
- Threatened and endangered plant and animal species habitat
- Floodplains
- Farmlands
- Parks and other recreational areas
- Historic sites and structures
- Archaeological sites
- Neighborhoods and community resources
- Areas with high concentrations of low-income households or individuals classified as belonging to minority racial or ethnic groups.

The environmental screening process used to evaluate projects considered for inclusion in the 2040 MTP will be described in detail later in this chapter (see Section 4.4).

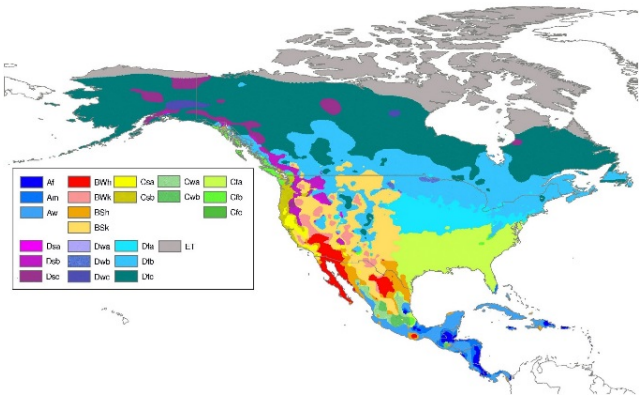
4.2 REGIONAL ENVIRONMENTAL CONTEXT

Climate, Topography, Land and Water Resources

According to the International Energy Conservation Code (IECC) classification of climate regions in the United States, the three Mississippi Gulf Coast counties—Hancock, Harrison and Jackson—are located in Zone 2 (see figure at left). The IECC zones are numerically coded from 1 to 8, with the lowest number corresponding to the highest temperatures and the highest number corresponding to the lowest temperatures. Within the continental United States, only the southernmost tip of the Florida peninsula falls within Zone 1. Zone 2 includes portions of all five states bordered by the Gulf of Mexico—Texas, Louisiana, Mississippi, Alabama and Florida—as well as part of Georgia and portions of two western states, Arizona and California. Only the most southerly counties in Mississippi and Alabama fall within the Zone 2 boundary; the overwhelming majority of counties in both states are located in Zone 3. Each zone is further subdivided into wet and dry



sections indicated by the respective suffixes, "A" and "B". The Mississippi Gulf Coast lies in the wet section of Zone 2: Only the limited areas located west of a line bisecting Texas fall in the section designated 2B.



In the Koppen Climate Classification System, all of Mississippi and most of the southern United States falls in a region designated Cfa characterized by *humid, subtropical* conditions (see figure at left). According to data provided by the National Oceanic and Atmospheric Administration (NOAA), the annual average daily high temperature recorded at Gulfport, during the five-year period from 2010 through 2014, was 77.8 degrees Fahrenheit; the average low was 59.1 degrees. The overall average temperature during the same period was 68.4 degrees (see Table 4-1). August is the warmest month for the Mississippi Gulf Coast, with an average high temperature of approximately 91 degrees. The average low temperature in the midsummer months is around 75 degrees. January is the coldest month, with an average high temperature just above 60 degrees and an average low below 40. Average annual precipitation in the area between 2010 and 2014 was 60 inches (all rainfall). August is generally the wettest month, averaging close to nine inches of rain; October is the driest, averaging about one-and-a-half inches. Average rainfall amounts exceed five inches per month from February through September; during the relatively dry period from October through January, rainfall is generally one to three inches each month.

There are seven distinct physiographic regions in Mississippi, reflecting the varying topographic conditions in different parts of the state. Most of the southern part of the state is located in what has been denominated the Pine Hills Region (labeled 4 in the figure below right). The Coastal Flatwoods Region falls between the Pine Hills Region and the Gulf of Mexico, occupying an area that extends from 15 to 20 miles inland along most of its length. Geologically it is a relatively young area formed by deposits of clay, silt, sand and gravel. The topography is almost uniformly flat, rising gradually from the shoreline towards the interior. Soils are generally acidic with boggy soils having a high organic content. Low, sandy bluffs five-to-ten feet above sea level support live oak, southern magnolia and saw palmetto. Saline and brackish marshes along the shoreline feature black needlerush and cordgrasses. Slash pine and various grasses, sedges and carnivorous plants, such as pitcher plants and sundews, thrive on fire-dependent savannas in the region (*Stewart, R. A., 2003: Physiographic Regions of Mississippi Handout, Department of Biological Sciences, Delta State University, with addenda by S. P. Faulkner, 2005).* The Coastal Flatwoods Region is characterized by wet lowlands and depressions interspersed with higher, well-drained areas. Geologically the chief determinant of landform in the region is the impermanence of the coastline. The principal landform features are the coastline, estuaries, flatwoods and marshland.

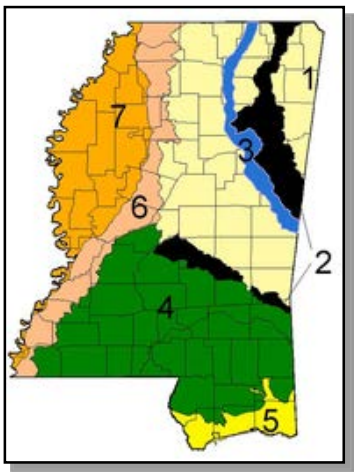


Table 4-1:
CLIMATOLOGICAL SUMMARY DATA FOR SELECTED MISSISSIPPI GULF COAST LOCATIONS (2010-2014)

COUNTY	CITY (1)	MAXIMUM MEAN MONTHLY TEMP		MINIMUM MEAN MONTHLY TEMP		MEAN ANNUAL TEMP	MAXIMUM MEAN MONTHLY PRECIP		MINIMUM MEAN MONTHLY PRECIP		MEAN ANNUAL PRECIP
		MON	° (F)	MON	° (F)		MON	INCHES	MON	INCHES	
Hancock	Waveland	Aug	89.1	Jan	40.9	67.3	Feb	9.43	Oct	1.56	62.44
Harrison	Gulfport	Aug	91.9	Jan	39.7	68.4	Aug	7.92	Oct	1.74	59.27
Jackson	Pascagoula	Aug	91.1	Jan	37.6	66.7	Aug	9.43	Oct	1.43	58.31
	Average	--	90.7	--	39.4	67.5	--	8.93	--	1.58	60.01

(1) Location: Waveland - Latitude 30.295°N Longitude 89.383°W (Elevation 8 feet); Gulfport – Latitude 30.412°N Longitude 89.081°W (Elevation 42 feet); Pascagoula - Latitude 30.464°N Longitude 88.532°W (Elevation 18 feet).

Source: U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service (2015).

Hancock, Harrison and Jackson counties are located in a unique coastal environment that features extensive underground aquifers, diverse biological ecosystems and barrier islands strung along the coast between the Mississippi Sound and the Gulf of Mexico. Fresh water flowing into the sound has its source in three basins: the Lower Pearl River, the Coastal Streams Basin and the Pascagoula River. The Lower Pearl River Basin occupies 24 counties in all in Mississippi as well as several parishes in Louisiana. The Pearl River itself is almost 500 miles long and drains an area encompassing 8,760 square miles. At its southern end the Pearl forms the western boundary of Hancock County (as well as the State of Mississippi). However, only about one-quarter of the county is actually located within the Lower Pearl River Basin.

Most of Hancock County is located in the Coastal Streams Basin which also encompasses all of Harrison County and part of Jackson County. The basin drains an area measuring 1,545 square miles and differs from the other two basins in significant ways: It includes a number of offshore features—the Mississippi Sound and barrier islands (Cat, Ship Deer, Horn, Round and Petit Bois)—and several smaller watersheds. For example, the Wolf and Jourdan rivers, and Bayou la Croix, flow independently into the Bay of Saint Louis; other streams pursue separate paths to the Mississippi Sound or Bay of Biloxi. The last of the three basins, the Pascagoula River Basin, is exceeded in size among Mississippi drainage-ways only by the one associated with the Yazoo River. The Pascagoula River has the distinction of being the sole stream of sizable carrying capacity in the continental United States that remains in an essentially unaltered natural state. The Pascagoula Basin drains 22 counties in the southeastern quadrant of Mississippi and adjacent portions of Alabama, transporting water from an area encompassing 9,600 square miles to the Mississippi Sound, where it flows into the sea between the Jackson County municipalities of Gautier and Pascagoula (*Mississippi Gulf Coast Water Assessment*, 2012).

Agriculture, Forestry and Urban Development

Of the three Mississippi Gulf Coast counties, Hancock County is the least urbanized and has the lowest population density. There are three incorporated municipalities—Bay Saint Louis, Waveland and

Diamondhead—with a combined population of 25,987 (U. S. Census Bureau 2014 estimated). The estimated population of the county as a whole is 45,949. With total land area of 476.88 square miles, population density is approximately 96 persons per square mile for the county as a whole.

According to the 2007 Census of Agriculture, there were 286 farms with total acreage of 42,256 (148 acres per farm). The principal uses of agricultural land were for raising cattle, horses, sheep, goats and chickens and for cultivating crops necessary for forage. A 2010 assessment of forestry resources in Mississippi, undertaken by the Mississippi Forestry Commission, determined that there were 225,411 forested acres in Hancock County. That represented more than 70 percent of total land cover in the county. Much of that forested land is located in the 125,000-acre acoustical buffer zone surrounding the National Aeronautics and Space Administration (NASA) Mississippi Test Facility at the Stennis Space Center.

While the Gulfport Urban Area, as defined by the U. S. Census Bureau, includes portions of all three Mississippi Gulf Coast counties, most of the urban area lies within the middle county. Harrison County is the most urbanized of the three counties, having five incorporated municipalities—Pass Christian, Long Beach, Gulfport, Biloxi and D'Iberville--with a combined population of 150,466 (U. S. Census Bureau 2014 estimated), up 5.4 percent from the 2010 census figure of 142,748. That represents more than three-quarters of all persons living in Harrison County: An estimated 199,058 in 2014, up from 187,105 at the time of the 2010 census. However, more than half of the estimated growth during that four-year period occurred in the unincorporated portion of the county, suggesting that urbanization continues to spread northward from the cities along the coast. With land area of 573.99 square miles, the estimated population density of the county as a whole is 346.8 persons per square mile, up from 326.0 in 2010.

The unincorporated portion of Harrison County accounts for 82.8 percent of total land area, most of which is dedicated to agriculture or forestry. The 2007 Census of Agriculture enumerated 367 farms in the county, having total acreage of 21,458 for an average of 58 acres per farm. Nearly half of the farms were dedicated to raising cattle. The Mississippi Forestry Commission assessment of the state's forestry resources determined there were 269,290 forested acres in Harrison County, representing approximately 70 percent of land coverage in the county. Much of that forested land is located in the DeSoto National Forest which occupies a substantial portion of unincorporated Harrison County as well as portions of nine other counties in southeastern Mississippi. The national forest boundary encompasses some 802,944 acres in all, 518,587 of which are actually incorporated in the National Forest System (NFS). (Non-NFS acreage within the limits of the forest remains under other, i.e. non-Federal, ownership.)

The *2030 Harrison County Comprehensive Plan* noted that only four percent of land in the unincorporated county is occupied by residential uses and only one percent by commercial or industrial uses. The county's zoning ordinance classifies almost 75 percent of the unincorporated area as agricultural, just under 20 percent as residential and two percent as commercial or industrial. It is only since 2010 that population in Harrison County has regained and exceeded the level reached prior to Hurricane Katrina. In the decade since Katrina, there has been growing demand for developable property in the unincorporated area north of Interstate 10, well inland from the low-lying coastal areas inundated by tidal surge in 2005.

Jackson County has the greatest concentration of industrial activities among the Mississippi Gulf Coast counties, but its population falls between those of the other two jurisdictions. There are four incorporated municipalities in the county—Ocean Springs, Gautier, Pascagoula and Moss Point—with combined population of 74,203 (U. S. Census Bureau 2014 estimated), almost unchanged from the 2010 Census

count of 74,022. That represents about 52.5 percent of all persons living in the county, 141,137 according to the most recent Census Bureau estimate. With total land area of 722.75 square miles, population density is approximately 195 persons per square mile for the county as a whole.

According to the 2007 Census of Agriculture, there were 454 farms in Jackson County, but that number was down by more than a hundred from the previous agricultural census in 2002. The 20 percent decline was due primarily to consolidation, since total acreage in farming fell by only three percent to 42, 890. Average farm size increased from 76 to 91 acres during the five-year intercensal period, and sales of crops and livestock increased by 25 percent. Gross revenue per farm went up 56 percent. The principal uses of agricultural land were for raising cattle, goats and horses and for cultivating the crops required to feed them. The 2010 assessment of forestry resources in Mississippi, undertaken by the Mississippi Forestry Commission, determined that there were 330,011 forested acres in Jackson County, more than in either of the other two counties on the coast. As with the other two counties, that represented approximately 70 percent of total land cover in the county.

A significant portion of Jackson County has been preserved in its natural condition: The Pascagoula River watershed contains the largest unimpeded water course in the 48 contiguous states of the Union. Forty years ago, The Nature Conservancy and other conservation groups and individual conservationists made common cause in bringing 35,000 acres of the watershed under public protection. The river corridor, traversing Jackson County from the George County line on the north to the Mississippi Sound on the south, is now buffered by almost 70,000 acres of public and private lands whose owners are committed to preserving them in a state of nature.

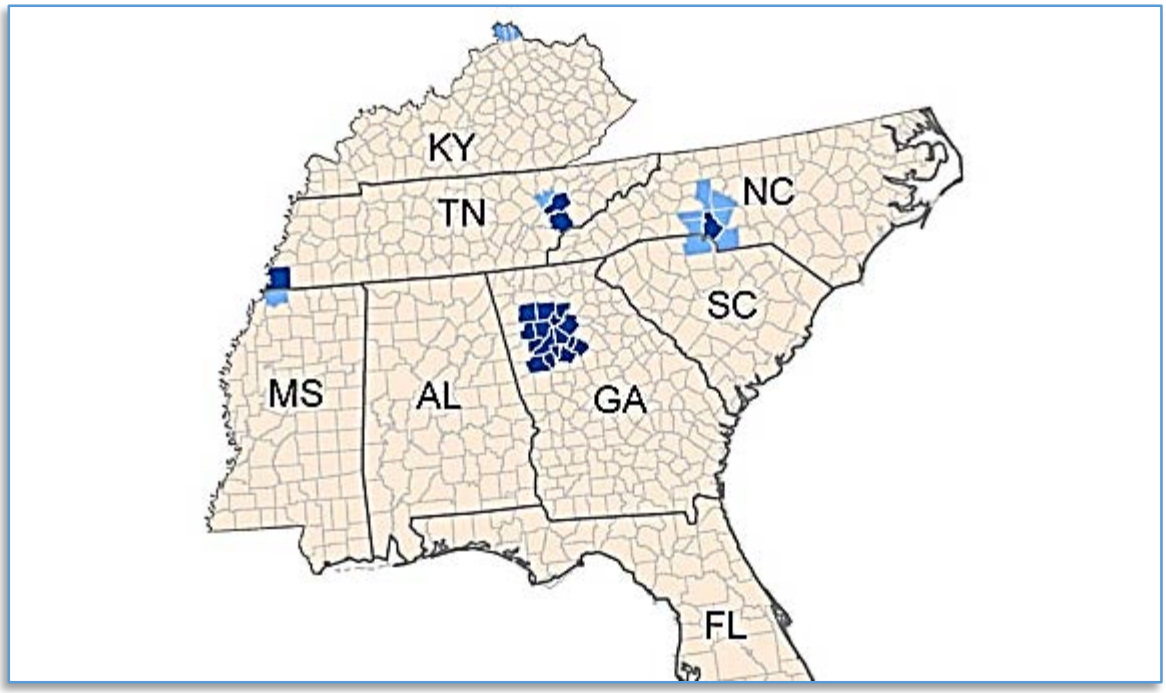
4.3 AIR QUALITY AND CLIMATE CHANGE

Air Quality and Mobile-Source Emissions

The *Clean Air Amendments of 1970* (Public law 91-604, 84 Stat. 1676), signed into law by President Richard M. Nixon in 1970, directed the newly established U. S. Environmental Protection Agency (USEPA) to develop and enforce regulations for the purpose of improving and maintaining air quality throughout the United States. Pursuant to the act, USEPA promulgated National Ambient Air Quality Standards (NAAQS) for airborne pollutants considered harmful to public health and/or the environment. There are two sets of standards: Primary standards address the need to protect the public – especially children, the elderly and individuals who suffer from respiratory diseases and conditions – against harmful pollutants. Secondary standards address the broader need to secure human welfare by protecting animals, plants and other components of the natural environment, including the aesthetic quality and visibility of the landscape, as well as man-made features such as buildings and monuments.

The NAAQS apply to six common contaminants: Ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides and lead. Each state with designated nonattainment areas within its borders is required to develop a state implementation plan (SIP) for controlling these contaminants and meeting national air quality standards within its area of jurisdiction. Continuous monitoring at designated locations is used to determine compliance with the NAAQS on an annual county-by-county basis. Areas in which air quality is found to meet all applicable standards are identified as *attainment* areas. Those which fail to meet one or more of the standards are designated *nonattainment* areas (see Figure 4-1).

Figure 4-1: EPA Region 4 Ground-Level Ozone Nonattainment Areas (2008 Standard)



Nonattainment Final Designations: Light Blue – Partial County / Dark Blue – Whole County

Source: U. S. Environmental Protection Agency (2015)

A nonattainment area which succeeds in improving its air quality to meet the applicable standards becomes a *maintenance* area.

The classification of an area as either a nonattainment or maintenance area has ramifications for transportation planning in the region. Transportation projects have the potential to affect air quality by changing the number of vehicles at a given location or on a particular route. In particular *mobile-source emissions* discharged by vehicles may increase ambient concentrations of ozone or carbon monoxide in the vicinity of a project. Ozone (O_3) is found both at ground level and in the upper atmosphere. Both have the same chemical composition, but while upper atmospheric ozone protects the earth from harmful solar radiation, ground-level ozone is the main component of smog.

Ground-level ozone is not emitted directly into the air but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC). Ozone is likely to reach unhealthy levels on hot sunny days in urban environments. Ozone can also be transported long distances by wind. For this reason, even rural areas can experience high ozone levels. Even relatively low levels of ozone can affect human health. People with lung disease, children, older adults, and individuals who are active outdoors may be particularly vulnerable to the effects of ozone inhalation. The current standard for ozone promulgated by the USEPA is .075 parts per million (ppm). That standard is applied to the annual fourth highest daily maximum eight-hour concentration averaged over three years (see Table 4-2). Carbon monoxide (CO) is a colorless, odorless gas that interferes with the delivery of oxygen to a person's organs

and tissues. The health effects of CO exposure depend on the duration and intensity of exposure as well as a person's health. Concentrations are typically higher during the winter months because internal combustion engines emit more CO at lower temperatures. The standard for CO concentration over a one-hour period is 35 ppm; the eight-hour standard is 9 ppm.

Metropolitan transportation planning regulations require that the long-range transportation plan for a nonattainment or maintenance area demonstrate conformity with the SIP. The MPO must show that proposed programs and projects included in the plan are consistent with the goals, objectives and strategies established for the purpose of achieving acceptable air quality. This process of documenting *transportation conformity* with air quality objectives includes modeling future emissions in order to quantify the probable effects of new or improved facilities.

None of the Mississippi Gulf Coast counties have been designated to be in a status of nonattainment with regard to the NAAQS. However, the EPA is currently proposing to update both the primary and secondary ozone standards, citing public health and welfare concerns. According to agency data for 2014, highway vehicles accounted for 36.2 percent of NOx emissions and 12.6 percent of VOC emissions, the pollutants that combine to form ozone. Those shares have been reduced from 47.0 and 48.8 percent respectively since the adoption of the *Clean Air Act* in 1970. Moreover, the total amount of each pollutant emitted into the atmosphere by all sources has been reduced by more than half since 1970, due largely to dramatic decreases in mobile-source emissions. Cleaner fuels and cleaner burning automobile and truck engines have been largely responsible for lowering the actual amount of NOx emitted by highway vehicles from 12,624,000 tons in 1970 to 4,489,000 tons in 2014, a reduction of 64.4 percent. Highway vehicle emissions of VOC have been lowered from 16,910,000 tons in 1970 to 2,159,000 tons in 2014, a reduction of 87.2 percent. Nevertheless, in a final rule published on October 1, 2015, EPA Administrator Gina McCarthy announced the promulgation of new standards:

> Based on its review of the air quality criteria for ozone (O3) and related photochemical oxidants and national ambient air quality standards (NAAQS) for O3, the Environmental Protection Agency (EPA) is revising the primary and secondary NAAQS for O3 to provide requisite protection of public health and welfare, respectively. The EPA is revising the levels of both standards to 0.070 parts per million (ppm), and retaining their indicators (O3), forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours).

The more stringent standards will likely result in a significant increase in the number of designated nonattainment areas. Annual reports published by the Mississippi Department of Environmental Quality, Air Quality Division, show that ozone monitoring stations in both Harrison and Jackson counties recorded levels resulting in design values exceeding 70 ppb from 2010 through 2012. The highest value—76 ppb--was registered for the Gulfport station in 2010 when the ozone standard was still 84ppb. However, the Harrison County count has since come down to 69 ppb. If it can be maintained at or below that level, the county may avoid designation as a nonattainment area. On the other hand, while ozone measurements at Pascagoula have come down since 2010, the 2014 design value of 71ppb puts Jackson County in jeopardy of being designated a nonattainment area under the new standards.

Table 4-2: National Ambient Air Quality Standards (U. S. Environmental Protection Agency)

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012	$PM_{2.5}$	Primary	Annual	12 µg/m^3	annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Transportation conformity is a process required of MPOs pursuant to the *Clean Air Act Amendments* of 1990 (Public Law 101-549, 104 Stat. 2468) to ensure that Federal funding only goes to those transportation activities that are consistent with air quality goals. The legislation requires that transportation plans, programs and projects funded or approved by the Federal Highway Administration (FHWA) in nonattainment or maintenance areas be in conformity with the SIP. The SIP outlines a state's program for achieving or maintaining compliance with the NAAQS for a particular pollutant.

Should any of the Mississippi Gulf Coast counties be designated a nonattainment area, the MTP will be subject to transportation-air quality conformity analysis. Under such circumstances, the travel demand forecasting model, which currently provides input to the transportation planning process, could provide quantitative data required for the requisite regional air quality modeling effort.

Climate Change

It is the position of the Federal Highway Administration (FHWA), as expressed in Integrating *Climate Change into the Transportation Planning Process*, ". . . that the earth is experiencing a long-term warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are the predominant cause." Greenhouse gases are primarily produced by the combustion of fossil fuels, and the biggest producers are (1) electric power generation and (2) transportation. A majority of transportation-related emissions are generated by cars and trucks.

The FHWA report notes that greenhouse gas (GHG) emissions related to transportation might be reduced by ". . . switching to alternative fuels, using more fuel efficient vehicles, and reducing the total number of miles driven." Each of these would require a combination of governmental and non-governmental effort supported by properly oriented transportation planning activities.

While making a substantial contribution to the long-term trend in global warming, the report also notes that ". . . transportation will likely also be affected by climate change. Transportation infrastructure is vulnerable to predicted changes in sea levels and increases in severe weather and extreme high temperatures. Long-term transportation planning will need to respond to these threats."

The 2009 U. S. Global Change Research Program (USGCRP) report, *Global Climate Change Impacts in the United States*, predicts the following effects of climate change the southeastern region:

- Average annual temperatures in the region are projected to increase by four to nine degrees Fahrenheit by the year 2080.

- Climate models suggest that rainfall will arrive in heavier downpours with increased dry periods between storms, changes that would increase the risk of both flooding and drought.

- Because higher temperatures increase evaporation and water loss from plants. Rising temperatures will likely increase the frequency, duration and intensity of droughts in the area.

- If the region increases groundwater pumping to offset water shortfalls, aquifers will be further depleted, placing additional strain on surface water resources.

- Growing demand due to population increase will also likely strain water resources, although decreased water availability will challenge future growth and the quality of life of residents in the region.

The report further states that climate change is expected to affect public health and biological ecosystems in the following ways:

- Higher temperatures and more frequent heat waves will likely increase heat stress, respiratory illnesses, and heat-related deaths in the Southeast. High temperatures also correlate with poor air quality and pose a risk to people with respiratory problems. While the number of cold-related deaths is projected to decrease, net climate-related mortality will likely increase.
- The spread of some types of bacteria has been linked to warmer temperatures. For example, food poisoning from eating shellfish infected with *Vibrio parahaemolyticus* bacteria has
- increased by 41% from 1996 to 2006 in the United States. As temperatures increase, the frequency of these types of shellfish-borne disease outbreaks in coastal waters is likely to increase.
- Warmer temperatures could increase the number of wildfires and outbreaks of pests such as the southern pine beetle.
- Declining soil moisture, water scarcity and increasing temperatures will likely stress agricultural crops.
- Sustained temperatures between 90 and 100°F can significantly affect cattle. Severe droughts, such as the water shortage that affected Texas in 2011, may lead to the premature slaughtering of cattle.
- Sea level rise and increased storms will likely raise the salinity level in estuaries, coastal wetlands and tidal rivers. Rapid sea level rise could even eliminate some barrier islands that currently protect inland habitats.

The EPA further notes that Increased flooding and hurricanes could present extreme public health and emergency management challenges.

4.4 PUBLIC HEALTH

A growing number of local and state governments are performing health impact assessments for transportation projects and programs in order to address the foreseeable public health outcomes.

Transportation can affect public health in many ways, but the most commonly discussed include the following:

- **Safety**: Roadway design can affect the risk of traffic-related injuries and fatalities. Between 2011 and 2013, there were 154 fatal accidents in the Mississippi Gulf Coast counties. That corresponds to very nearly one per week. There were also 8,475 crashes involving injuries, representing more than 50 per week.

- **Air Quality**: Air pollution from vehicle emissions exacerbates the symptoms of chronic respiratory diseases such as asthma.

- **Noise Pollution**: Noise pollution can lead to hearing loss, stress-related illness, high blood pressure, speech interference and sleep disruption.

- **Physical Activity**: A lack of sufficient bicycle and pedestrian infrastructure can limit opportunities for physical activity.

- **Accessibility**: Lack of transportation can limit access to healthy food, recreational opportunities, and healthcare facilities.

While transportation planning has typically addressed safety, air quality, noise pollution and accessibility in the past, only recently has the planning process begun to consider the impact of transportation on physical activity. Of particular interest is the impact of the built environment on walking and biking. Walking and biking are important physical activities because they provide regular light-to-moderate physical activities which can significantly decrease a person's risk for cardiovascular disease, colon cancer, Type 2 diabetes, obesity, osteoporosis and depression. Walking and biking can also improve psychological well-being and quality of life. Therefore, providing convenient and attractive pedestrian and bicycle infrastructure, and encouraging walking and biking, can improve public health outcomes for a community.

4.5 PROJECT DEVELOPMENT CONSIDERATIONS

While detailed analysis of potential environmental impacts is beyond the scope of a long-range transportation plan, it was necessary to give due consideration to the possible effects of projects that might present a significant barrier to their implementation. The project evaluation and prioritization process employed for MTP development gave special attention to the following: Wetlands, waterways and flood zones; protected plant and animal species; historical and archaeological resources; hazardous materials; neighborhoods and community facilities; and environmental justice.

Wetlands, Waterways and Floodplains

Wetlands have many environmental benefits, most notably water purification, flood protection, shoreline stabilization, groundwater recharge and streamflow maintenance, and fish and wildlife habitat. Wetlands

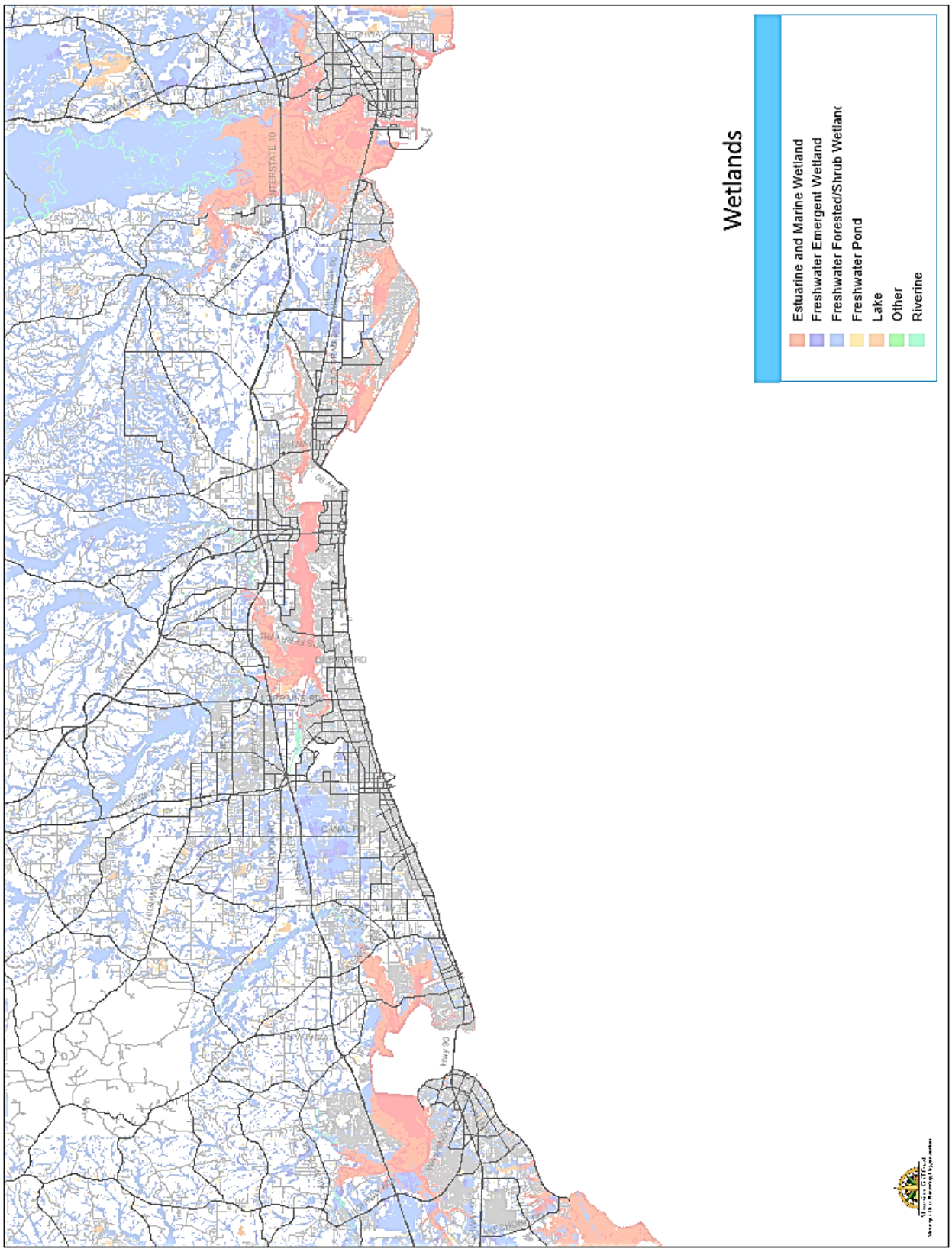
are afforded special protection under the terms of the *Clean Water Act* (33 USC Sections 1311, 1362, 1344). Due to their prevalence in the Mississippi Gulf Coast area, it is virtually impossible to undertake construction of a new road without encroaching on designated wetland areas (see Figure 4-2). Even the widening or realignment of an existing roadway involves a significant likelihood of encroachment. In most cases, the assumption is that it will be necessary to mitigate the loss of wetlands resulting from a project by establishing compensatory wetlands off-site in accordance with state and Federal policy. However, there is a cost associated with mitigation; and if it cannot be avoided it can at least be minimized. In evaluating proposed projects, a determination was made as to whether a proposed improvement would be likely to have no impact on wetlands, some impact or a substantial impact. Preference was assigned to those which would have more limited impacts.

Encroaching on or changing the natural floodplain of a water course can result in disastrous flooding of developed areas. The Mississippi Gulf Coast is bounded on the south by the Mississippi Sound and Gulf of Mexico and is subject to potentially catastrophic tidal inundation associated with tropical storm activity. This was demonstrated in 2005 when waters driven inland by Hurricane Katrina destroyed thousands of homes and businesses and caused devastating damage to roadways and other infrastructure. The bridges over the Bay of Saint Louis and Bay of Biloxi were demolished by the surging waters and had to be replaced. The total cost for those two new bridges alone was well over half a billion dollars. In the wake of the 2005 calamity, the emphasis has been on rebuilding for resiliency: Planning systems and facilities that will be more likely to withstand the ravages of a potentially cataclysmic natural event. In evaluating projects for inclusion in the long-range plan, preference was given to those that were less likely to traverse low-lying areas subject to flooding (see Figure 4-3). Roadways located in floodways are both more likely to suffer the damaging effects of inundation and more likely to affect the natural flow of water in times of flooding.

The long-range planning process is concerned with needs analysis and project identification rather than development. It is not possible at this early stage to assess project-level impacts on wetlands, waterways or floodplains in any detail. Nevertheless, it is assumed that as projects proceed to environmental analysis and eventual development, sponsors will undertake the following to avoid, minimize or mitigate potential impacts:

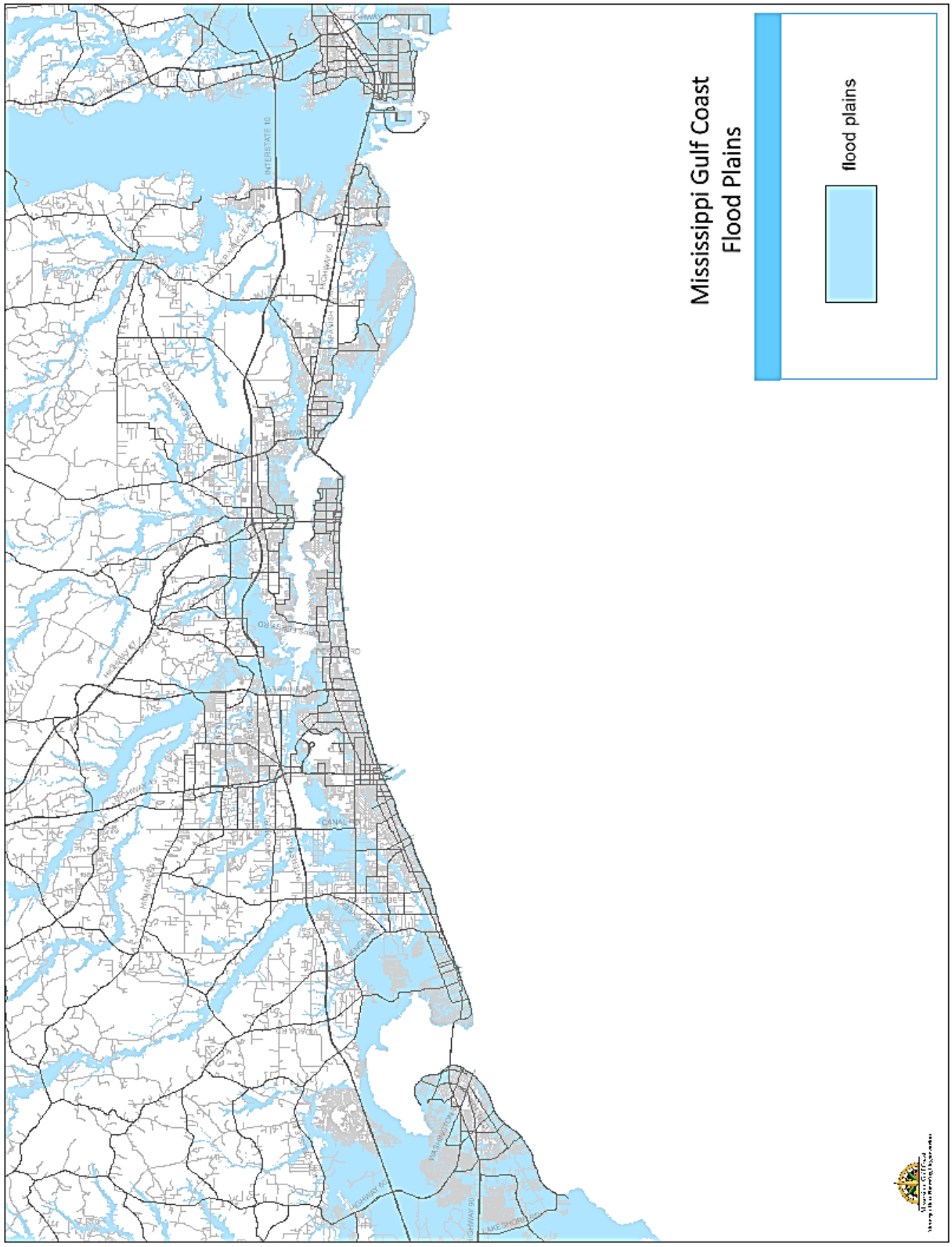
- Take steps to avoid wetland and flood zone impacts where practicable
- Ensure that transportation facilities constructed in floodways will not increase flood heights
- Consider strategies which minimize potential impacts to wetlands and flood zones
- Provide compensation for any remaining unavoidable impacts through activities to restore or create wetlands.

Figure 4.2 Mississippi Gulf Coast Wetlands



Source: Gulf Regional Planning Commission.

Figure 4-3: Mississippi Gulf Coast Floodplains



Source: Gulf Regional Planning Commission.

Protected Plant and Animal Species

There are 20 plant and animal species, known to occur within the three Mississippi Gulf Coast counties, which are listed by the U. S. Fish and Wildlife Service (USFWS) as being either threatened or endangered in accordance with the *Endangered Species Conservation Act* of 1973 (Public Law 93-205, 87 Stat. 884) (see Table 4-3). Twelve are listed as *threatened*, the other eight *endangered*. Of the 20 USFWS-listed species, nine occur in all three counties, four in Harrison and Jackson (but not Hancock), one in Hancock and Harrison (but not Jackson), two only in Hancock County, and four only in Jackson County. There also three species that have been identified as candidates for Federal listing, one of which is also on the state list maintained by the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) and the Mississippi Museum of Natural Science in accordance with the *Nongame and Endangered Species Act* adopted by the Mississippi Legislature in 1974.

The state list of threatened and endangered animals and plants includes 11 species occurring in the three coastal counties that are not listed by the USFWS. Six of these are known to exist in all three counties, one has been observed in Hancock and Jackson counties (but not Harrison), three are found only in Hancock County, and one is restricted to Jackson County.

While the bald eagle has been removed from the Federal list of threatened and endangered species, it is still afforded special protection under the *Bald and Golden Eagle Protection Act* (16 USC 668-668d) adopted to preserve the national symbol of the United States.

A number of the protected species are fish or sea turtles, such as the *gulf sturgeon* and *Kemp's ridley*, that live in the Mississippi Sound and other coastal waters of the state. Others, such as the piping plover, are shorebirds that live on the barrier islands and mainland beaches. There are several small species of fish listed by the state that have their habitat in either the Pearl River or Pascagoula River. Of more concern with regard to transportation projects are the inland species—such as the gopher tortoise, Mississippi gopher frog and Louisiana quillwort—that may pop up in or around proposed new right-of-way. Possible impacts must be evaluated on a case-by-case basis as proposed improvements are subjected to environmental assessment. At the level of long-range planning, it is only possible to evaluate projects in terms of their proximity to known habitat or areas considered more or less likely to be habitable by protected species.

Historical and Archaeological Resources

There are 130 sites within the Mississippi Gulf Coast area listed in the *National Register of Historic Places* (NRHP): 68 in Jackson County (35 in Pascagoula), 46 in Harrison County (32 in Biloxi) and 16 in Hancock County (eight in Bay Saint Louis). Because they are well-known, these are easily avoided in planning transportation improvements. Of greater concern are potentially historic sites and structures that must be evaluated in order to determine their eligibility for listing on the NRHP. Even more challenging are the as yet unidentified sites, having archaeological significance, that remain concealed within the earth. Due diligence during the environmental phase of project development will seek to find any artifacts that should be preserved before ground-breaking can disturb a site that merits further research. At the long-range planning level, it is only necessary to note the need to avoid locations where cultural resources of previously established historical or archaeological significance are known to exist.

Table 4-3:
MISSISSIPPI GULF COAST THREATENED AND ENDANGERED SPECIES BY COUNTY

PROTECTED SPECIES		COUNTY STATUS		
SPECIES NAME	COMMON NAME	HANCOCK	HARRISON	JACKSON
Ursus americanus luteolus	Louisiana black bear	T	T	T
Alligator mississippiensis	American alligator	T	T	T
Gopherus polyphemus	Gopher tortoise	T	T	T
Chelonia mydas	Green turtle	T	T	T
Caretta caretta	Loggerhead turtle	T	T	T
Acipenser oxyrhynchus desotoi	Gulf sturgeon	T	T	T
Potamilus inflatus	Inflated heelsplitter	T	N	N
Charadrius melodus	Piping plover	T	T	T
Graptemys oculifera	Ringed sawback	T	N	N
Drymarchon corais couperi	Eastern indigo snake	N	T	T
Graptemys flavimaculata	Yellow-blotched map turtle	N	N	T
Trichechus manatus	West Indian manatee	E	E	E
Lepidochelys kempii	Kemp's ridley	E	E	E
Isoetes louisianensis	Louisiana quillwort	E	E	N
Schwalbea americana	American chaffseed	N	N	E
Picoides borealis	Red-cockaded woodpecker	N	E	E
Rana sevosa	Mississippi (Dusky) gopher frog	N	E	E
Pseudemys alabamensis	Alabama red-bellied turtle	N	E	E
Grus canadensis pulla	Mississippi sandhill crane	N	N	E
Pituophis melanoleucus lodingi	Black pine snake	N	C/S	C/S
Mycteria americana	Wood stork	C	C	C
Percina aurora	Pearl darter	S	N	C/S
Haliaeetus leucocephalus	Bald eagle	*	*	*
Notropis chalybaeus	Ironcolor shiner	S	S	S
Noturus munitus	Frecklebelly madtom	S	N	N
Crystallaria asprella	Crystal darter	S	N	N
Amphiuma pholeter	One-toed amphiuma	N	N	S
Farancia erytrogramma	Rainbow snake	S	N	S
Pelecanus occidentalis	Brown pelican	S	S	S
Elanoides forficatus	Swallow-tailed kite	S	S	S
Charadrius nivosus	Snowy plover	S	S	S
Falco peregrinus	Peregrine falcon	S	S	S
Thryomanes bewickii	Bewick's wren	S	S	S

T - Federally listed Threatened E - Federally listed Endangered C - Candidate for Federal listing
*S - State-listed Endangered N - Non-occurring * No longer listed but protected under the* Bald and Golden Eagle Protection Act

Source: Mississippi Department of Wildlife, Fisheries and Parks and Mississippi Museum of Natural Science (2015), Endangered Species of Mississippi.

Hazardous Materials

Potentially hazardous materials exist in great abundance in any urban setting. In planning new transportation facilities, it is easy to avoid the larger concentrations of such materials associated with industrial activity, waste disposal, the distribution of public utilities or other undertakings necessary to promote or ensure human welfare. More challenging is the need to avoid smaller contaminated sites that may not have been cleaned up well enough to permit human use. The EPA maintains a number of databases containing information about potentially hazardous material locations, toxic waste spills, clean-up and decontamination efforts, and related subjects with public health implications. These include the *Comprehensive Environmental Response, Compensations, and Liability Act* (Public Law 96-510, 94 Stat. 2767) (CERCLA or "Superfund") database and the National Priorities List (NPL).

Enacted in 1980 CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for the liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for clean-up efforts when no responsible party can be identified. CERCLA also authorized revision of the National Contingency Plan, which established the National Priorities List. The NPL prioritizes known or threatened releases of hazardous substances, pollutants and contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation and/or action.

Addressing the possible presence of hazardous materials early on in the project development process can reduce costs, delays and liabilities. However, the in-depth investigation of all available databases is only appropriate or feasible for a given project when it has advanced to the identification of alternatives for environmental study. At the long-range planning level, what is called for is the avoidance of known hazards or threats that render a particular location undesirable for development.

Neighborhoods and Community Facilities

The integrity of existing neighborhoods is an important consideration which must always be given its due weight in locating new transportation facilities. The bifurcation of established neighborhoods should be avoided whenever possible. Similarly, access to existing neighborhoods must not be impeded by the construction of new roads. If a road cannot be constructed without causing undue hardship for residents coming from or going or to the neighborhood in which they live, then the road ought to be built elsewhere. In any event it must be designed so as to guarantee unimpeded access.

In the same regard, the location of transportation improvements should not damage or displace cemeteries, schools, churches, parks, playgrounds, other recreational facilities or significant community resources. In fact it is expressly forbidden by law to disturb such properties unless no "reasonable or prudent alternative" for implementation of a necessary public project can be found.

Community Impacts and Environmental Justice

The metropolitan planning regulations require MPO compliance with the *Civil Rights Act* of 1964 (Public Law 88-352, 78 Stat. 241) and other Federal legislation, executive orders and regulatory guidance enacted, issued or promulgated in furtherance of the objectives in the law. The requirements they impose apply to all MPO activities, programs and services, including the development of the long-range plan.

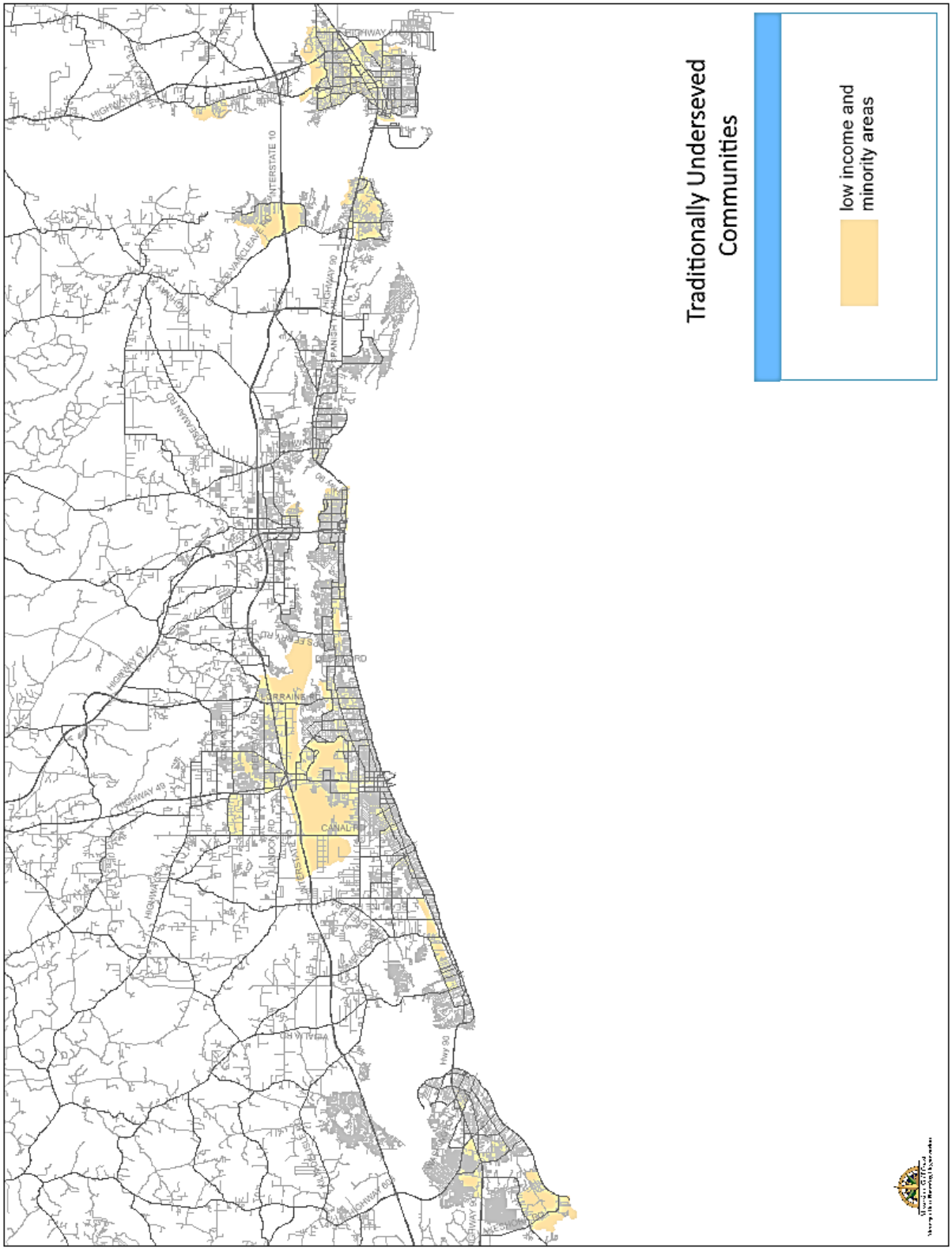
Traditionally underserved populations are those groups afforded special protection under the non-discrimination policies codified in law and regulation. They include racial and ethnic minorities, low-income individuals, the elderly and the young, those who are not proficient speakers of the English language and the disabled. It is GRPC policy to ensure equal access to the transportation planning process, to minimize or alleviate any foreseen burdens imposed by transportation projects, and to share the benefits realized from transportation investment equitably among all community members.

There are several terms used to describe negative impacts which may be incurred by protected populations: *Adverse effect*, *adverse impact*, *disparate impact* and *disproportionate burden* are the most common. With regard to the development of the Mississippi Gulf Coast Metropolitan Transportation Pan (MTP), there are two main areas that require evaluation for potential adverse impacts. The first obligation is to ensure that the plan development process is made available to all interested citizens. Efforts to meet this compliance goal (described in more detail in Section 2.2) included working in cooperation with MDOT and other Mississippi MPOs to mount a public involvement program that was consistent and convenient and offered various options for individuals and groups to participate in the planning process.

The second core element requiring particular consideration lay in the selection of improvement projects to meet long-range goals and objectives. The evaluation process was conducted on a project-by-project basis and gave special attention to proposed improvements that would be constructed in areas identified as meriting protection (see Figure 4-4). In each case a project impact worksheet was completed, identifying which population groups, if any, might be affected by the proposed improvement. If the worksheet review identified a protected group as being vulnerable to an impact, an appropriate strategy was suggested for conducting targeted outreach in the potentially affected community. The spreadsheet program lists the anticipated positive impacts of the project, any negative impacts likely to occur during the construction process, and any foreseeable adverse effects of project implementation. It also provides space for the analyst to enter comments regarding how unwanted impacts might be avoided altogether, minimized or mitigated if necessary.

Impact areas addressed through this process include topics such as air, noise and water pollution; toxic waste and other hazardous materials; aesthetic considerations; neighborhood integrity and community cohesion; economic vitality and employment effects; displacement of persons or businesses; farmland conversion; accessibility of transportation facilities and services for disabled individuals; traffic congestion; safety; and temporary impacts resulting from construction. In short, the MPO is required to assess the impact of proposed projects on protected populations within the metropolitan area. If a disproportionate burden will be borne by members of a traditionally underserved group or if they will not receive an equitable share of the project benefits, it is necessary either to forego the project of to identify appropriate mitigation measures. The goal for every MPO-funded project is the fair distribution of both the beneficial and adverse effects attributable to the improvement.

Figure 4.4: Mississippi Gulf Coast Traditionally Underserved Communities



Source: Gulf Regional Planning Commission

As previously noted, Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*) sought to reaffirm the intent of Title VI of the *Civil Rights Act* of 1964 with regard to NEPA, by forbidding the inequitable distribution of either the environmental burdens or public benefits of a transportation project in a manner prejudicial to the interests of racial or ethnic minority groups or economically disadvantaged individuals. The MPO seeks to avoid such undesirable impacts of transportation improvement projects proposed for inclusion in the long-range plan by giving careful consideration to the question of how an action will likely affect residents of "environmental justice" areas defined on the basis of U. S. Census and other available data.

The executive order specifies actions to be taken on a range of issues that are intended to promote nondiscrimination in Federal actions; provide minority and low-income communities equal access to public information regarding a Federal action; and provide opportunities for public participation in the evaluation of a Federal action in matters relating to human health and the environment. In particular, the order stipulates the following:

> To the greatest extent practicable and permitted by law . . . each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations . . . (Order Section I-101).
>
> Each Federal Agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons . . . from participation in, denying persons the benefits of, or subjecting persons . . . to discrimination under such programs, policies, and activities, because of their race, color, or national origin (Order Section 2-2).

In an attempt to prevent disproportionately high and adverse effects on minority or low-income populations early in the planning process, the MPO determined the relative likelihood of impacts for all transportation projects, using its previously adopted environmental justice map.

5.0 POPULATION AND ECONOMY

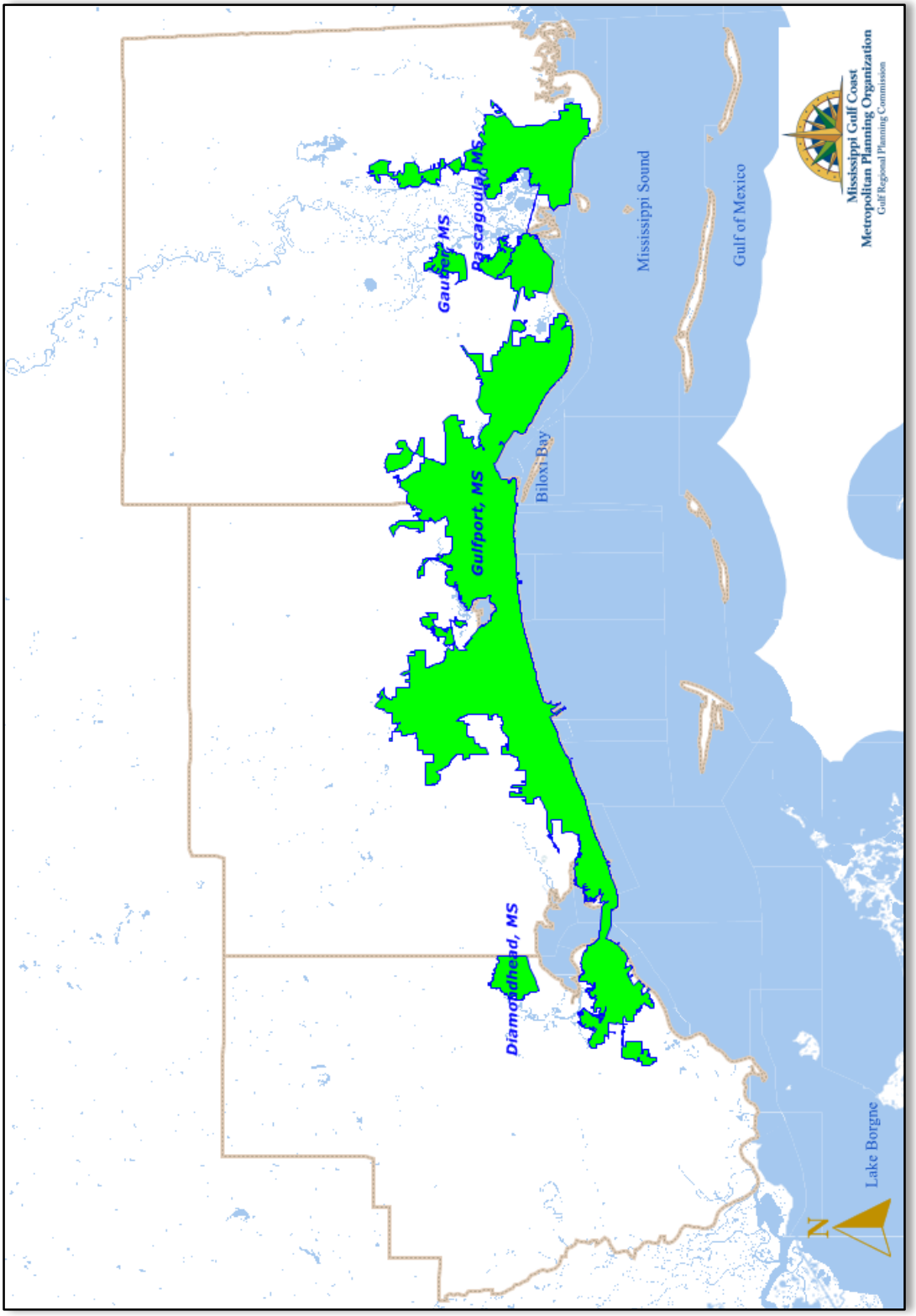
The Mississippi Gulf Coast is a unique geographical slice of planet earth, populated by people who are proud to call "the Coast" home; survivors who did not merely survive but endured, rebuilt and rose to meet the special challenges—and to embrace the truly special opportunities—that come with life on the Mississippi Gulf Coast. The Coast is both the land--and the water--and the people; and the people move about on the land--and on the water--in ways and for purposes that sustain their common life and perpetuate their way of life. It is a way of life that has evolved over centuries. When Pierre le Moyne Sieur d'Iberville and the first French settlers arrived in the area 316 years ago, it was sparsely inhabited by the remnants of the Biloxi tribe who had survived a smallpox epidemic. When exactly the tribe arrived in the vicinity of what would eventually come to be known as the city of Biloxi is unknown. But they must have migrated southward from the interior of the North American continent, because they spoke a Siouan language unfamiliar to the other scattered inhabitants of the region and lived on a kind of linguistic island surrounded by speakers of Muskogean languages. The French brought another foreign tongue. Others who came later in large numbers to settle on the Mississippi Gulf Coast and change it in their own ways would speak Spanish, English, Croatian, Vietnamese and other languages. And yet somehow the Coast absorbed wave after wave of new people and new languages and remained what it was and always had been—an irreplaceable strip of inhabitable earth precariously perched between land and sea, populated by people who have come from near and far to live in this place and experience the best and worst that nature and the passage of time can send their way.

5.1 REGIONAL SETTING OF THE MISSISSIPPI GULF COAST

The Mississippi Gulf Coast is located on the northern shore of the Gulf of Mexico approximately 88.40 to 89.70 degrees west of the prime meridian and roughly 30.17 to 30.74 degrees north of the equator. The metropolitan planning area (MPA) defined for long-range planning purposes is the Gulfport-Biloxi-Pascagoula Metropolitan Statistical Area (MSA). The Gulfport-Biloxi-Pascagoula MSA includes the three southernmost counties in Mississippi: Hancock, Harrison and Jackson. Adjacent to the MSA on the west is the New Orleans-Metairie LA MSA; the Mobile AL MSA lies adjacent on the east. The Gulfport-Biloxi-Pascagoula MSA had a population of 370,702 in 2010, according to the decennial census. The U. S. Census Bureau estimate for 2014 showed an increase of more than four percent to 386,144. The 2014 estimate for the New Orleans MSA--1,251,849--was up more than five percent over the 2010 count of 1,189,866. The estimated population of the Mobile MSA was up only slightly from 412,992 in 2010 to 415,123 in 2014. The combined population of the three adjacent Gulf Coast MSAs was 1,973,560 in 2010 but now exceeds two million: 2,053,116, according to the Census Bureau's most recent estimates.

There are actually two distinct Census-designated urban areas within the Biloxi-Gulfport-Pascagoula MSA: The Gulfport Urban Area (UA) includes portions of all three Mississippi coastal counties; the Pascagoula UA lies wholly within Jackson County (see Figure 5-1). The Gulfport UA encompasses the cities of Bay Saint Louis and Waveland in Hancock County; Pass Christian, Long Beach, Gulfport, Biloxi and D'Iberville in Harrison County; and Ocean Springs in Jackson County; as well as adjacent unincorporated portions of all three counties. The Pascagoula UA encompasses the cities of Pascagoula and Moss Point, most of Gautier and adjacent unincorporated portions of Jackson County. The newer northern portion of the last-named city was designated a separate entity, the Gautier Urban Cluster (UC), by the U. S. Census Bureau.

Figure 5-1: Location of the Gulfport and Pascagoula Urbanized Areas



Source: U. S. Census Bureau; Neel-Schaffer, Inc.

Similarly the newly incorporated City of Diamondhead in Hancock County was designated an urban cluster separate from the Gulfport UA. Other nearby urban areas include the Slidell and New Orleans urbanized areas to the west; the Hattiesburg UA to the north; and the Mobile UA to the east. (*Urbanized area* is an older term which has been subsumed under the broader nomenclature of *urban area* by the Census Bureau.)

5.2 LAND USE PATTERNS AND NOTABLE FEATURES

In May 2013, Gulf Regional Planning Commission (GRPC) staff, as part of the development of a regional sustainability plan titled *Plan for Opportunity*, completed a coast-wide land-use assessment of existing conditions and then formulated future land-use predictions (see Figure 5-2). The full report can be read at www.gulfcoastplan.org or requested by calling 228-864-1167 or emailing contactus@grpc.com. An excerpt is included here as part of the Mississippi Gulf Coast Metropolitan Transportation Plan (MTP).

Land-use is the utilization of land for a specific activity, such as residential use that applies to a parcel with a home, or commercial use that describes property with a business. Land-use begins as similar individual parcels combine to become residential neighborhoods and commercial districts. These then turn into community-wide patterns of land-use that extend across jurisdictions, and ultimately the entire region. For the purposes of analysis, land-use is categorized in three ways:

Existing use: This is the activity currently present on property, e.g., residential, commercial, or industrial. In addition to the primary activity, other important existing characteristics include ownership type and land cover, e.g., crops on an agriculture use.

Planned use: This is the future use designated for properties in a jurisdiction's comprehensive plan. Future land-uses are normally generalized and applied to large geographic areas. These designations maintain existing uses in established neighborhoods, protect conservation areas, and guide growth in areas suitable for development and redevelopment.

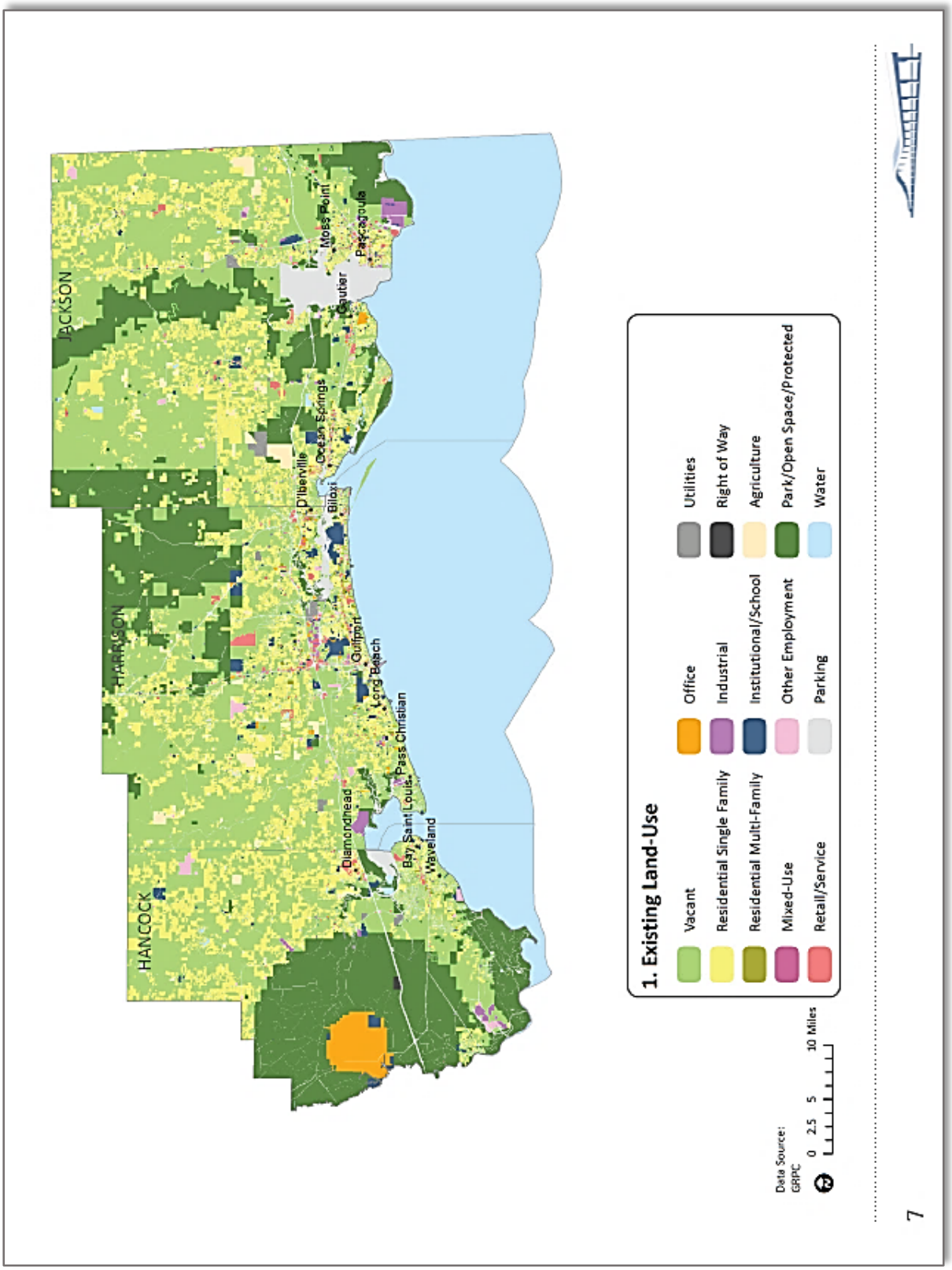
Zoned use: This is the use currently allowed on property under a jurisdiction's zoning ordinance. Where a comprehensive plan may designate several blocks as residential, in the same area a zoning ordinance may designate certain blocks as single-family and other blocks as multi-family.

The Mississippi Gulf Coast region, including Hancock, Harrison and Jackson counties, encompasses approximately 2,300 square miles (see Table 5-1). Coastal land-use patterns radiate from town centers along U. S. Highway 90 (US 90) and its north-south connector routes.

After a comprehensive evaluation of the region's land use three core findings emerged.

1. Park, protected and vacant land accounts for about 70 percent of the region's land area.
2. Single-family residential property accounts for about 20 percent of the land.
3. Seven percent of the land is utilized by commercial entities for commerce and employment.

Figure 5-2: Mississippi Gulf Coast Existing Land Use



Source: Plan for Opportunity: Regional Sustainability Plan for the Mississippi Gulf Coast *(2013).*

Table 5-1:
MISSISSIPPI GULF COAST EXISTING LAND USE

LAND USE	NUMBER OF PARCELS	PERCENT OF TOTAL PARCELS	NUMBER OF ACRES	PERCENT OF TOTAL ACRES	ACRES PER PARCEL
Vacant	85,623	36.86	662,782	45.19	7.74
Agriculture	706	0.30	25,699	1.75	36.40
Park/Open Space	5,860	2.52	379,602	25.88	64.78
Residential Single-Family	125,489	54.02	301,397	20.55	2.40
Residential Multi-Family	2,837	1.22	3,589	0.24	1.27
Institutional/School	2,465	1.06	25,268	1.72	10.25
Office	1,513	0.65	21,256	1.45	14.05
Retail/Service	4,796	2.06	16,666	1.14	3.47
Other Employment	1,122	0.48	9,171	0.63	8.17
Industrial	326	0.14	8,217	0.56	25.21
Utilities	735	0.32	8,228	0.56	11.19
Water	188	0.08	3,448	0.24	18.34
Parking	556	0.24	698	0.05	1.26
Right-of-Way	67	0.03	640	0.04	9.55
TOTAL	232,283	100.00	1,466,661	100.00	6.31

Source: Plan for Opportunity: Regional Sustainability Plan for the Mississippi Gulf Coast *(2013).*

Relation to Other Regional Sustainability Goals

Land-use and transportation are inextricably linked: Land uses generate vehicle-trips; land-use locations determine trip-lengths; land-use character at trip-ends influences mode selection; and together these create trip-times by mode. In addition to motor vehicle travel, the region's surface transportation system includes 194 miles of designated bike routes, 92 miles of fixed transit routes, and 247 square-miles of walkable areas (i.e., those with more than 125 intersections per square-mile). Almost all of these alternative mode systems are located along the coastline of the Mississippi Sound.

Strengthening established residential neighborhoods and providing land suitable for future housing needs are two fundamental roles of land-use planning. The region has about 160,000 dwelling units, approximately 81 percent of which are single-family dwellings. The region's single-family dwelling shares by daily household vehicle-miles traveled (VMT)—grouped into low, moderate and high-mileage areal categories--are 26 percent in the low-mileage areas, 44 percent in the moderate areas, and 30 percent in the high-mileage areas.

This rural orientation is reflected in the fact that 88 percent of all dwellings are within one mile of a park, recreational facility, or open space. The region's multi-family dwellings are arranged with a stronger urban/suburban orientation at 54 percent in low-VMT areas, 41 percent in moderate areas, and only five percent in high-VMT areas. Region-wide, only 16 percent of all dwellings are within one-quarter-mile of a transit route.

Enhancing areas of current economic activity, and providing sufficient land for future employment growth, are also key functions of land-use planning. These economic areas fall into two broad categories: First, industries that require large sites with major infrastructure and buffers that ensure their compatibility with adjacent land-uses while providing room for growth; and second, the non-residential realm of retail, service, office and tourism sectors that interact closely with one other, along with housing and infrastructure. From a transportation mode-choice perspective, approximately 42 percent of all jobs in the region are within one-quarter mile of a transit route.

The land base has a variety of farm types, including cropland, pasture, and woodland. Land-based food production also includes poultry, cattle, and pork farms; and sites for the region's large marine food processing industry. At present, approximately 45 percent of the region's dwellings are within one mile of a full-service grocery or farmers' market.

Future Land Use Modeling

Land-use scenario planning is a method of conceptualizing alternative land-use schemes, along with other plan elements, to create desired futures. Within the software system, planning staff can gauge future outcomes at the regional, community and parcel-based levels of analysis. The analytical process occurs in four steps:

1. Benchmarking of existing conditions to identify strengths and weaknesses, and prioritize action.
2. Goal-setting to protect strengths and correct weaknesses. The Gulf Coast Plan has five goals focused on lowering household and businesses costs, valuing the environment, and insuring a healthy populace and economy.
3. Establishing a regional approach for goal achievement. The review of comprehensive plans, utility plans, economic development strategies, historic and environmental conservation plans, federal installation plans, state park development programs, natural resource protection plans, as well as the region's long-range transportation plan, established the desire to focus jobs and multimodal transportation growth in established areas near housing and other amenities.
4. Focusing on the strongest locations for goal achievement, including high-priority natural resource areas deserving protection, and areas most suitable for growth based on compactness, completeness, and connectivity (see Figure 5-3).

The last component is geographic and poses the question: Which candidate areas will be protected as non-developable; and of the developable areas, where will growth be focused? The first question was thoroughly investigated in the November 2011 Conservation Legacy Plan which produced detailed recommendations for protection prioritized by local stakeholders. The second question, having to do with where to focus growth, is answered by the following set of regional place-types that adhere to the conservation plan's land-use objectives of compactness, completeness, and connectivity:

> *Activity center*: Areas with housing, amenities and walkability or employment, where social and economic activities are presently concentrated.

Corridors: Taken from the transportation element of the sustainability plan, these are major routes used by households and businesses between activity centers. While currently auto-oriented, some possess long-term potential for multimodal travel between centers.

Planned activity centers: These are designated locations taken from local comprehensive plans for concentrated housing and/or employment at levels of mix and intensity comparable to current centers, and warranting corridor linkage.

Economic development areas: Locations in activity centers or corridors, or other suitable sites, where employment is concentrated in accordance with local comprehensive plans.

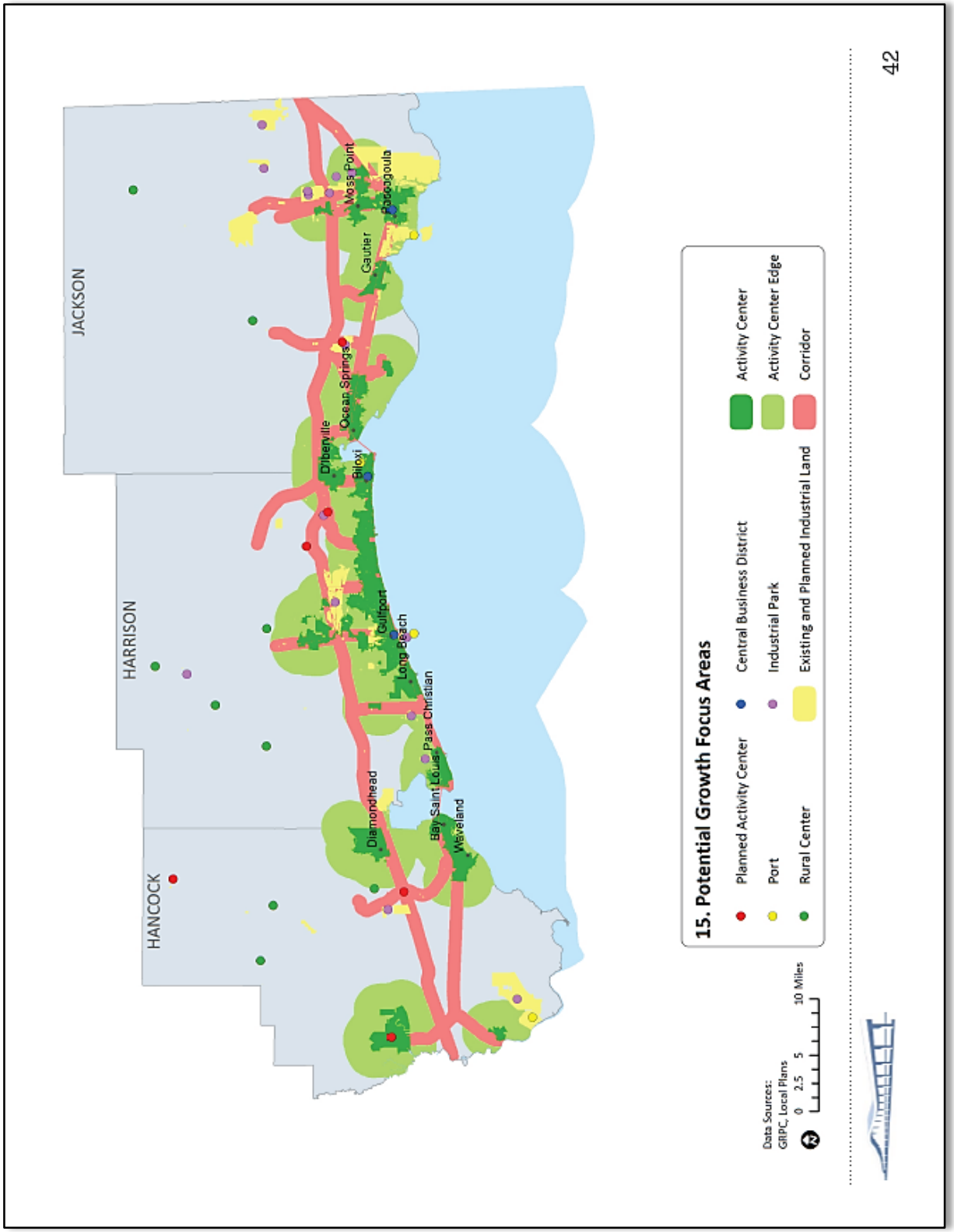
Rural centers: Unincorporated hamlets, community centers and schools, and other local plan-designated concentrations of housing or employment in rural areas.

In general, the region has a large and widely dispersed supply of land to accommodate expected growth. Even when constraints are taken into account, there is more than ample land for siting expected housing and jobs. Assuming 90 percent of vacant and redevelopable acreage is designated residential, of the roughly 10,000 acres needed for new housing, the focus areas offer a total of 150,000 vacant and redevelopable acres. Of the approximately 4,000 acres needed for new jobs, the focus areas collectively possess about 16,000 acres for non-residential uses. The region's industrial parks alone have about 4,400 vacant acres. This large supply tends to keep land prices relatively low, which in the past has translated into greater suburban and exurban housing affordability, but at the expense of higher household transportation costs for travel to jobs and amenities in communities.

As transportation costs continue to rise, the advantage of inexpensive land will diminish. A clear change in location preference can be seen in the rising infill rate for new housing in the Gulfport-Biloxi-Pascagoula metropolitan area, where nearly one-fifth of new units built during the *aughts* (2000-2009) were on infill sites. Part of this was rebuilding after Katrina, but a share is undoubtedly due to householders seeking community amenities, convenience, and location affordability.

GRPC used the *Scenario Planning Analytical Resources Core* (SPARC) and *INDEX ONLINE* (IXO) to complete the traffic analysis zone (TAZ) update for the long-range transportation plan. The process involves the production of land-use scenarios that allocate population and employment among TAZs, culminating in the selection of a final population-and-employment scenario meeting regional growth control total targets. This final TAZ allocation scenario was exported and modified post-SPARC/IXO by GRPC staff. The modified version was then delivered to the Mississippi Department of Transportation (MDOT) for inclusion in the long-range transportation model. GRPC used the regional future land-use allocation from the *Plan for Opportunity* to underpin the vacant parcels and use as an accuracy guide for scenario modeling. The regional allocation was created by digitizing all of the city and county future land-use maps that were created from the comprehensive plans and updated after Hurricane Katrina. Most of these future land use plans were created between 2008 and 2012. GRPC then re-classified local land-use categories into several broader classes in order to account for the jurisdictions' different decisions on future land use.

Figure 5-3: Mississippi Gulf Coast Potential Growth Focus Areas



Source: Plan for Opportunity: Regional Sustainability Plan for the Mississippi Gulf Coast *(2013).*

Two scenarios were modeled for use in connection with long-range transportation plan development. The first scenario extended existing growth patterns over the next 25 years to 2040. This scenario shows conservative growth throughout the region and utilized recommended future land-use patterns (see Figure 5-4). The second scenario was based on the concept of Transit-Oriented-Development (TOD) or *concentrated development* patterns (see Figure 5-5). This scenario was a recommendation from the Regional Sustainability Plan and provides the greatest reduction in vehicle-miles traveled throughout the region.

The two outcomes were compared by overlaying the dot-density layers generated by each scenario. Scenario 1 produced a wider distribution of population-dots outside the urban area, representing a greater concentration of future population in areas that are still rural. The Scenario 2 dots were heavily concentrated south of I-10, representing a denser urban population. In this scenario the future population would be more reliant on existing infrastructure and domiciled in areas adjacent to employment centers and retail areas. This pattern of growth is considered more sustainable and creates less sprawl.

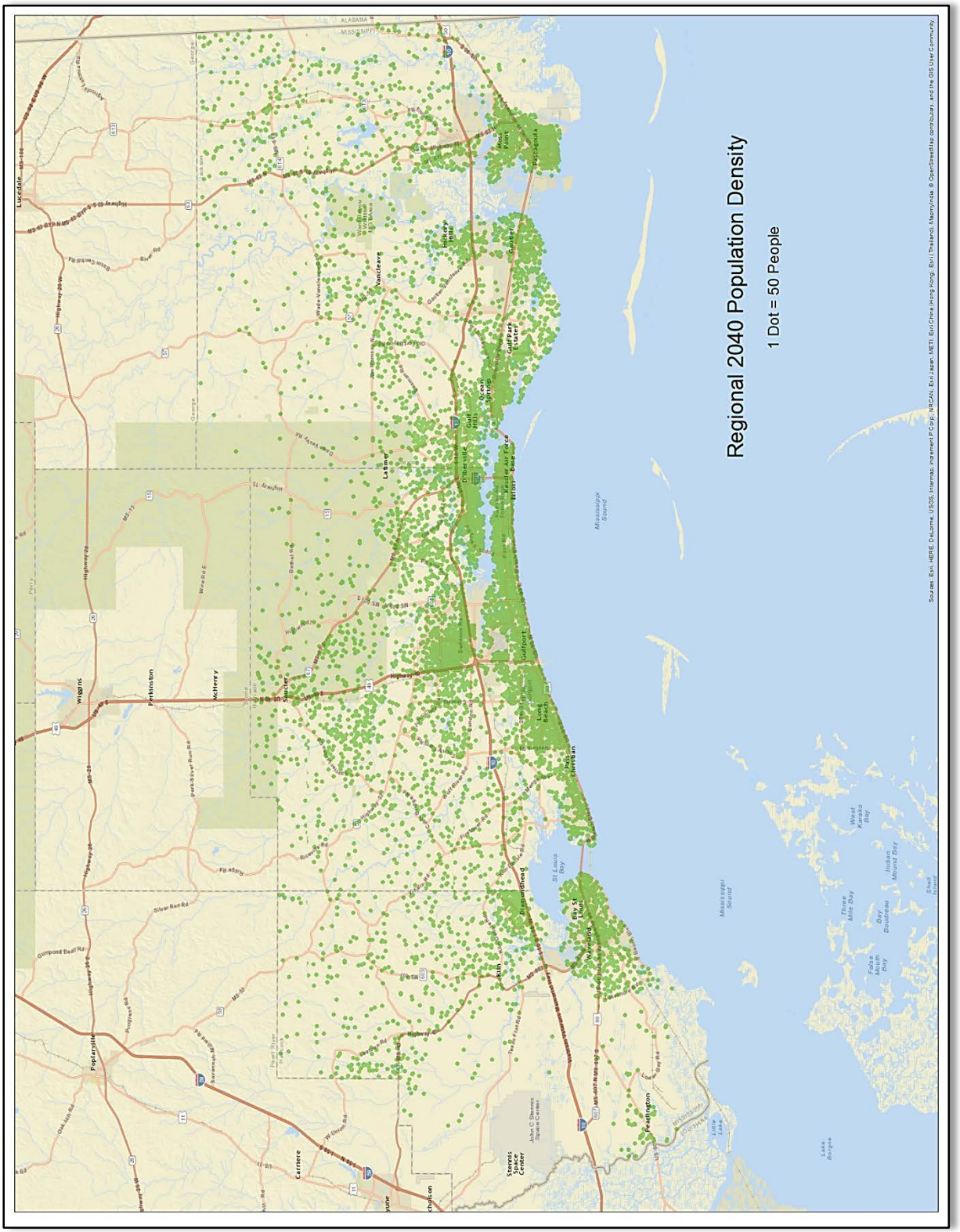
5.3 POPULATION CHANGE AND ECONOMIC TRENDS

The combined population of Hancock, Harrison and Jackson counties was only 82,728 in 1940, according to the decennial census taken that year. But the number of people living in the three coastal counties increased by more than half in the next 10 years; by nearly half in the intercensal period following that (1950 to 1960); and by more than one-quarter in each of the next two decades, pushing the population of the area to 300,000. The 1980s were a period of relative stagnation: Population growth was limited to four percent. However, the in-migration associated with the arrival of casino gambling in the 1990s literally brought new life to the Mississippi Gulf Coast: More than 50,000 new residents were counted in the 2000 census. Then disaster struck. On August 29, 2005 Hurricane Katrina came ashore pushing the Mississippi Sound up onto the land. Suddenly thousands of people had no homes and had no choice but to move away in order to find shelter elsewhere. Some never came back. Nevertheless, by the time of the 2010 Census—less than five years after the storm—the recovery had advanced far enough that the area was able to register a slight gain in population (topping 370,000) compared to the 2000 Census count.

Over the 70 years from 1940 to 2010 the population of the Mississippi Gulf Coast grew at an annual rate in excess of two percent (see Table 5-2). The 2014 estimates published by the Census Bureau indicate renewed growth has continued unabated since 2010. If the long-term rate of more than two percent per annum were to continue for another decade there would be half a million people living on the Mississippi Gulf Coast by 2024. Harrison remains the most populous county in the study area, and has led the way in absolute growth, but the population of Jackson County has increased at a rate closer to three percent than two. The number of people living in each of the other two counties expanded at an annual rate just under two percent over the 70 years prior to the 2010 Census.

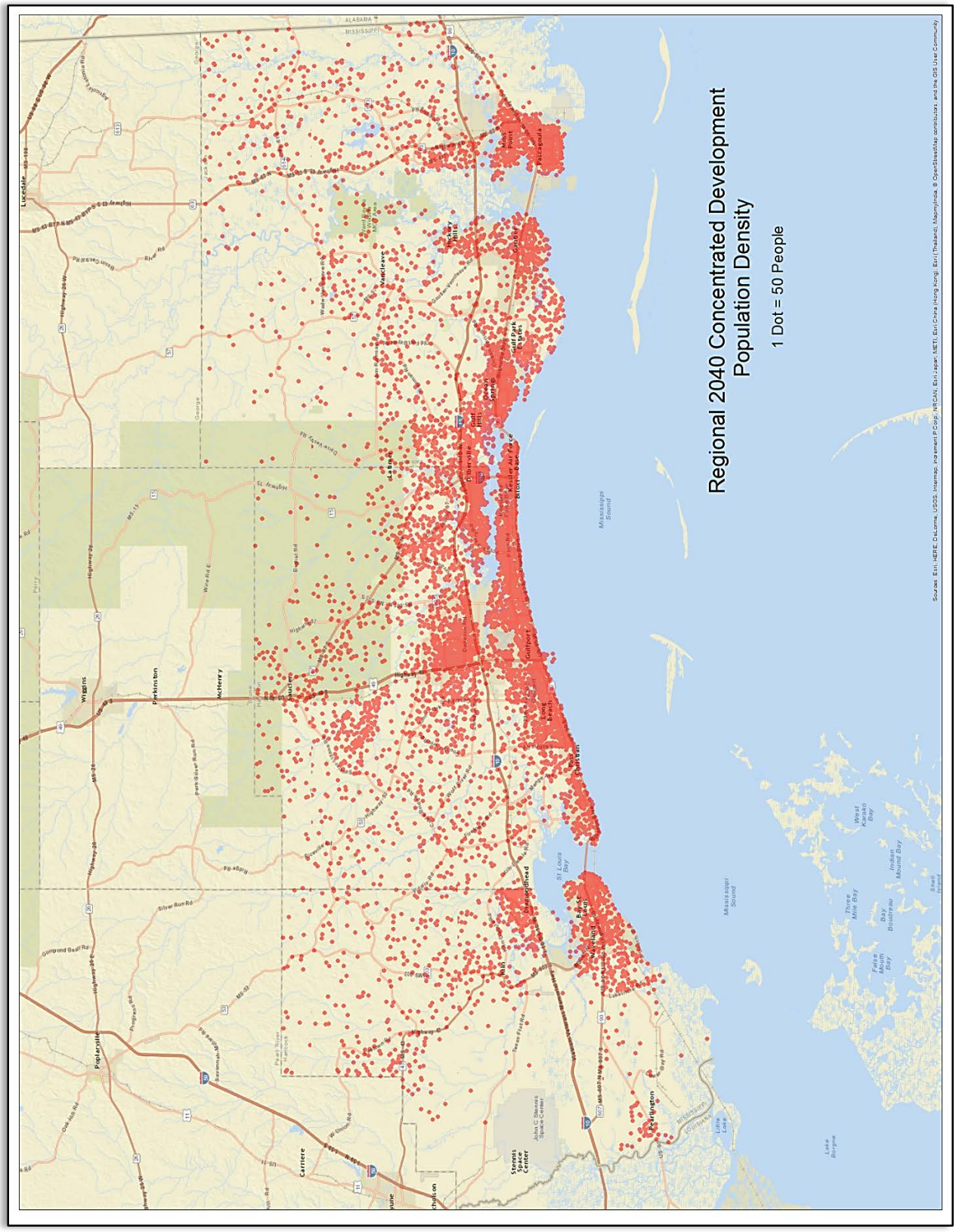
While population in the area more than quadrupled from 1940 to 2010, housing increased sevenfold. This resulted in a rather dramatic decrease in the ratio of persons to dwelling units (not to be confused with average household size which is based on occupied units, not total housing). This ratio has always been

Figure 5-4: Scenario 1 Distribution of Future Population



Source: Gulf Regional Planning Commission (2015).

Figure 5-5: Scenario 2 Distribution of Future Population



Source: Gulf Regional Planning Commission (2015).

lowest in Hancock County where there are a significant number of summer or weekend residences owned by people whose full-time domicile is located in the New Orleans area or elsewhere. The ratio of people counted in Hancock County to housing units in the county actually fell below two-to-one in the 1980 and 1990 censuses and, even after the great destruction that occurred in 2005, was barely above that level in the 2010 Census.

The number of people employed by establishments in the Mississippi Gulf Coast study area has increased by a little more than 30 percent in a little less than 25 years, according to the Mississippi Department of Employment Security (see Table 5-3). However, all of that growth occurred during the decade of the1990s when casino gambling was legalized and new gaming establishments were opened in Hancock and Harrison counties. Establishment-based employment peaked at more than 164,000 in 2000 but has since

Table 5-2:
MISSISSIPPI GULF COAST POPULATION AND HOUSING BY COUNTY: 1940-2010

	POPULATION							
COUNTY	2010	2000	1990	1980	1970	1960	1950	1940
Hancock	43,929	42,967	31,760	24,496	17,387	14,039	11,891	11,328
Harrison	187,105	189,601	165,365	157,665	134,582	119,489	84,073	50,799
Jackson	139,668	131,420	115,243	118,015	87,975	55,522	31,401	20,601
TOTAL	370,702	363,988	312,368	300,176	239,944	189,050	127,365	82,728
	PERCENT POPULATION CHANGE							
COUNTY	2000-2010	1990-2000	1980-1990	1970-1980	1960-1970	1950-1960	1940-1950	Annual Percent
Hancock	2.24	35.29	29.65	40.89	23.85	18.06	4.97	1.96
Harrison	-1.32	14.66	4.88	17.15	12.63	42.13	65.50	1.88
Jackson	6.28	14.04	-2.35	34.15	58.45	76.82	52.42	2.77
TOTAL	1.84	16.53	4.06	25.10	26.92	48.43	53.96	2.17
	TOTAL HOUSING UNITS							
COUNTY	2010	2000	1990	1980	1970	1960	1950	1940
Hancock	21,840	21,072	16,561	12,517	7,330	6,413	4,505	3,620
Harrison	85,181	79,636	67,813	57,954	41,541	35,227	23,164	14,062
Jackson	60,067	51,678	45,542	42,635	27,584	16,226	9,838	5,451
TOTAL	167,088	152,386	129,916	113,106	76,455	57,866	37,507	23,133
	POPULATION/HOUSING UNIT							
COUNTY	2010	2000	1990	1980	1970	1960	1950	1940
Hancock	2.01	2.04	1.92	1.96	2.37	2.19	2.64	3.13
Harrison	2.20	2.38	2.44	2.72	3.24	3.39	3.63	3.61
Jackson	2.33	2.54	2.53	2.77	3.19	3.42	3.19	3.78
TOTAL	2.22	2.39	2.40	2.65	3.14	3.27	3.40	3.58

Source: U. S. Census Bureau; calculations by Neel-Schaffer, Inc.

Table 5-3:
MISSISSIPPI GULF COAST ESTABLISHMENT-BASED EMPLOYMENT BY COUNTY: 1990-2014

	NUMBER OF EMPLOYEES							
COUNTY	2014	2010	2005	2000	1995	1990	Change	Percent
Hancock	13,840	14,500	13,580	14,080	12,320	10,630	3,210	30.20
Harrison	87,880	87,170	91,670	96,420	80,740	61,420	26,460	43.08
Jackson	52,430	54,050	50,470	53,970	51,160	45,120	7,310	16.20
TOTAL	154,150	155,720	155,720	164,470	144,220	117,170	36,980	31.56

Source: Mississippi Department of Employment Security (2005-2015).

fallen off to approximately 154,000. The drop-off in the number of people employed in the area actually occurred in the five-year period immediately prior to Hurricane Katrina. Surprisingly, estimated employment in 2010 was exactly the same as it had been in 2005 before the storm and was only slightly lower in 2014, according to the Mississippi Department of Employment Security. This probably says as much about continuing weakness in the national economy as it does about local economic conditions.

6.0 EXISTING TRANSPORTATION SYSTEM

Planning for the future transportation system begins with an evaluation of existing facilities and services. This chapter identifies the conditions and characteristics of the existing transportation system, including roadways and bridges, bicycle and pedestrian facilities, public transit, freight transportation, aviation safety and security.

6.1 ROADWAYS AND BRIDGES

Major Roadways

The region's roadways and bridges are used by almost everyone: Drivers and passengers in (or on) personal motor vehicles, public and private transportation providers, local and long-distance freight movers and bicyclists. The importance of a region's roadways and bridges can hardly be overestimated.

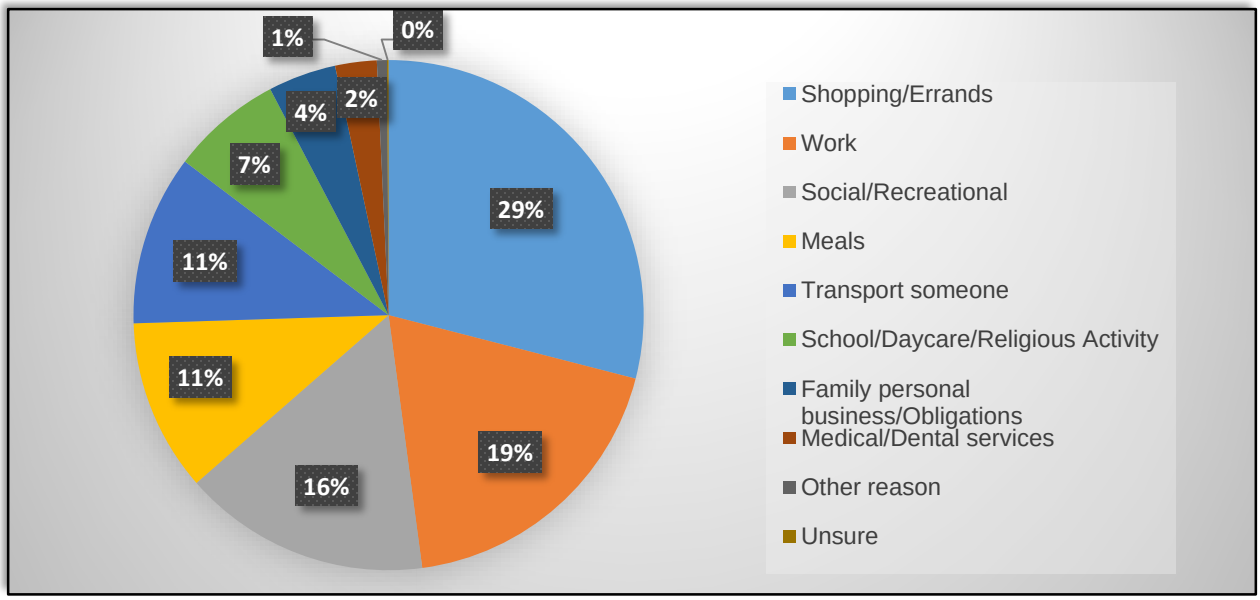
Travel by motor vehicle is the primary means of transportation. According to the 2009 National Household Travel Survey (NHTS), approximately 83.4 percent of all person-trips were made in a private vehicle. While that represented an overwhelming majority of all person-trips, the personal-vehicle share of total travel was down from an NHTS estimated high of 89.3 percent in 1995. While transit was up slightly—from 1.8 percent in 1995 to 1.9 percent in 2009--the combined shares of the *walk* and *other* categories increased significantly, from 8.6 to 14.6 percent, during the same period. Nevertheless, the condition of roadways and bridges in the metropolitan area remains the most important factor affecting travel in the region.

While long-range planning typically focuses on the work trip, because of its central role in creating peak-period traffic congestion, work-related trips actually account for only about 19 percent of all household travel made by personal motor vehicle (see Figure 6-1). The NHTS data indicated shopping and running errands accounted for 29 percent of all household trips, the largest share registered for any trip purpose. The majority of trips--about 52 percent of the total--were distributed among seven other survey responses (including *unsure*). More than half of these (27 percent) were related to either social or recreational activities or eating out.

The functional classification of roadways adopted by the Mississippi Department of Transportation (MDOT) recognizes six urban and six rural classes:

URBAN CLASSES	*RURAL CLASSES*
INTERSTATE	INTERSTATE
EXPRESSWAY	—
PRINCIPAL ARTERIAL	PRINCIPAL ARTERIAL
MINOR ARTERIAL	MINOR ARTERIAL
COLLECTOR	MAJOR COLLECTOR
--	MINOR COLLECTOR
LOCAL	LOCAL

Figure 6-1: Distribution of Household Travel by Trip Purpose



Note: Personal motor vehicles include the following: Car, Van, SUV, Pickup Truck and Motorcycle.
Source: 2009 National Household Travel Survey.

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

Freeways are divided highways, such as interstates, with full control of access and grade separation at all intersections. The controlled-access character of freeways results in high vehicular lane capacities--typically three times greater than the individual lane capacities of urban arterial streets.

Expressways provide for the movement of large volumes of traffic at relatively high speed and are primarily intended to serve long trips. Expressways have some grade-separated intersections while the majority of the intersections are widely spaced and signalized.

Arterials are important components of the overall transportation system. They serve both as feeders to freeways and expressways and as principal travel ways between major land use concentrations within the study area. Arterials are typically divided facilities (but may be undivided where right-of-way limitations exist) that carry relatively high traffic volumes. Intersections with other major streets are generally signalized. The primary function of arterials is to move traffic; they are the main means of local travel. A secondary function of arterials is to provide access to land, especially where intensive development has already taken place or is likely to occur.

Collectors provide both access and mobility, serving as intermediate feeders between arterials and local streets, but primarily accommodating short-distance trips. Since collector streets are not intended to accommodate long through trips, they are generally not continuous for any great distance.

Local Streets have the sole function of providing access to immediately adjacent land. Within the local street classification, three subclasses indicate the type of area served: residential, industrial, and commercial. These streets are not included in networks developed for the regional travel demand forecasting model. Instead a limited number of *centroid connectors* are used to link the major streets represented in the network to *centroids* that serve as points of origin or destination for trips between *traffic analysis zones*.

The base-year network, constructed for use in calibrating the regional travel demand model for the Mississippi Gulf Coast, is a georeferenced representation of the 2,666 miles of major roads which were in service in 2013 (see Figure 6-2). The network includes interstate highways, major and minor arterials, collectors and a limited number of local streets needed to provide continuity or maintain the integrity of the network.

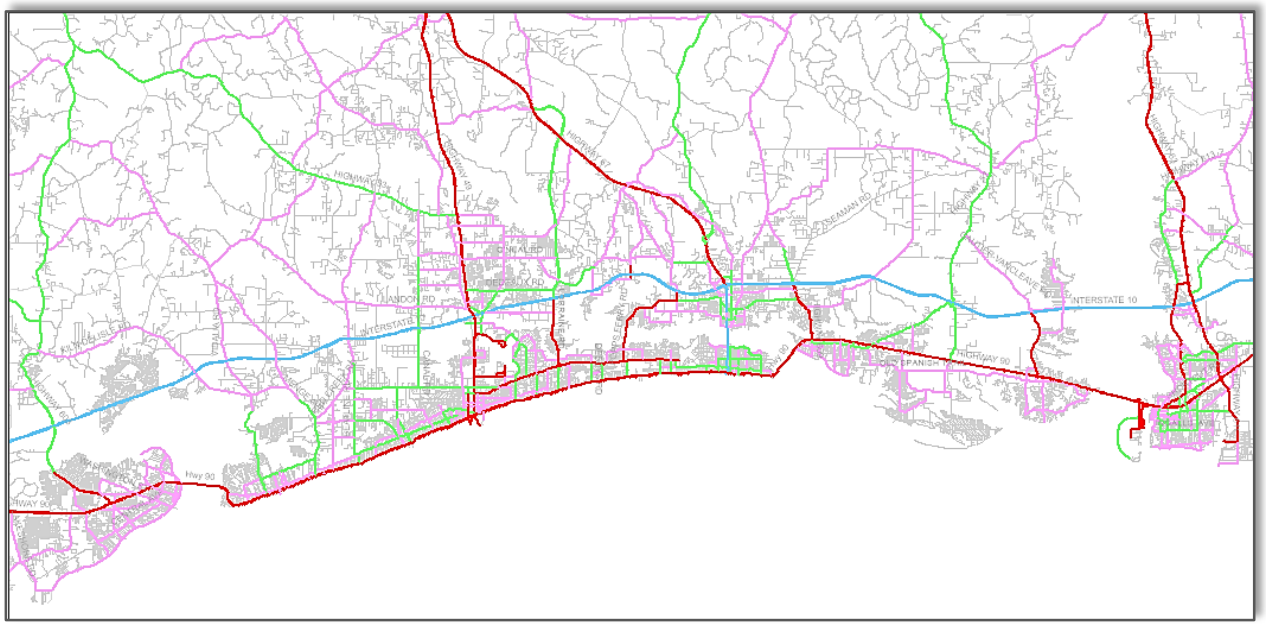
Interstate highways in the area include Interstate 10 (I-10) and Interstate 110 (I-110). I-10 is a major transcontinental route running east and west across the southern tier of states between California and Florida. It traverses the Mississippi Gulf Coast area between the Louisiana state line (Pearl River) on the west and the Alabama state line on the east. I-110 is a north-south spur connecting I-10 to U. S. Highway 90 (Beach Boulevard) in downtown Biloxi. The route includes a high-rise bridge spanning the Back Bay of Biloxi between D'Iberville on the north side of the bay and Biloxi on the south. The total length of the interstate system within the study area is 81.62 miles (see Table 6-1). Some sections include four lanes (two each way), others six or eight, yielding total lane-mileage in the base year (2013) of 377.73. While carrying the heaviest volume of traffic, the interstate system represents only a little more than three percent of total major roadway mileage in the Mississippi Gulf Coast Area.

Principal arterials carry the highest volumes, and typically the longest trips, after the interstates. They extend approximately 211 miles in total length, accounting for slightly less than eight percent of all major roadway mileage in the area. This class includes important travel routes like US Highway 90 (US 90) and US Highway 49 (US 49). The former traverses the study area along an east-west axis in the southerly portions of all three counties, hugging the Mississippi Sound shoreline from one end of Harrison County to the other. Beyond Hancock County to the west, the highway leads to New Orleans; beyond Jackson County to the east, it leads to Mobile. Highway 49 connects to US 90 in downtown Gulfport and goes north from there to Saucier, just south of the Stone County line, and then on to Hattiesburg and Jackson. As there is no north-south interstate highway in the study area, US 49 is the principal transportation link between the Mississippi Gulf Coast and the state capital, as well as other destinations further north of Jackson.

Other important principal arterials include Mississippi Highway 43 (MS 43) and State Route 607 (SR 607) in Hancock County; MS 67, Pass Road, Airport Road, Popp's Ferry Road and Lorraine Road (SR 605) in Harrison County; and MS 63, SR 609, SR 611, SR 613, Telephone Road and Gautier-Vancleave Road in Jackson County.

Minor arterials collectively account for about 246 route-miles or just over nine percent of total mileage in the major roadway network which encompasses all arterials, collectors and interstate system highways.

Figure 6-2: Functional Classification of Mississippi Gulf Coast Roadways



Blue – Interstate *Red – Principal Arterial* *Green – Minor Arterial* *Purple - Collector*

Source: Gulf Regional Planning Commission

Table 6-1: MISSISSIPPI GULF COAST MAJOR ROAD MILEAGE BY FUNCTIONAL CLASS AND COUNTY

CLASSIFICATION	COUNTY	LENGTH (MILES)	PERCENT OF TOTAL
Interstate (Urban and Rural)	Hancock	19.0	0.7
	Harrison	32.9	1.2
	Jackson	29.7	1.1
	Interstate Total	*81.6*	*3.1*
Principal Arterial (Urban and Rural)	Hancock	31.8	1.2
	Harrison	102.8	3.9
	Jackson	76.5	2.9
	Principal Arterial Total	*211.1*	*7.9*
Minor Arterial (Urban and Rural)	Hancock	47.1	1.8
	Harrison	129.6	4.9
	Jackson	70.0	2.6
	Minor Arterial Total	*246.6*	*9.2*
Collector (Urban and Rural, Major and Minor)	Hancock	708.1	26.6
	Harrison	707.8	26.5
	Jackson	711.3	26.7
	Collector Total	*2127.2*	*79.8*
GRAND TOTAL		2666.5	100.0

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

The numerous routes classified as minor arterials include portions of US 90 and MS 43, along with MS 53 and SR 603, in Hancock County; MS 15, MS 53, SR 605 and a sizable number of city and county streets in Harrison County; and MS 57, a portion of SR 613 and numerous city and county streets in Jackson County.

Collectors carry the lowest volumes of traffic among the functionally classified major streets. Their primary purpose is to provide a connection between local streets and the arterial network, facilitating access to one or the other, depending on the direction of travel. There are more than 700 miles of collector roads in each of the three Mississippi Gulf Coast area counties. Collectively they account for 2,127 route-miles or very nearly 80 percent of the overall total. In all, there are 2,666.5 miles of major roads in the study area.

A majority of roadway mileage in the study area (about 55 percent) is actually to be found in local streets that provide direct access to homes, places of work or recreation, grocery stores, small shops and many other places of origin or destination. There are more than 3,300 miles of local streets in the study area (see Table 6-2). Adding those to the major roadway total of 2,666 yields an overall total for all streets and highways of 5,968.8 miles and reduces the interstate system to 1.4 percent of the systemwide total. The recalculated principal arterial share is 3.5 percent; the minor arterial share 4.1; and the collector share 35.6 percent.

As all local streets, the vast majority of collectors, and a significant number of arterial routes fall under the jurisdiction of local government, city and county authorities have maintenance responsibility for well over 90 percent of all street and highway mileage in the region. Nevertheless, the State of Mississippi bears responsibility for maintaining most of the more heavily traveled routes, such as I-10, I-110, US 90, US 49 and all of the roadways on the state highway system: MS 43, MS 53, MS 57, MS 67 and the other numbered state routes. In a 2013 report on *Mississippi's Transportation Infrastructure*, MDOT assessed the anticipated maintenance needs for roads and bridges over the next 20 years on a county-by-county basis. The assessment projected the amount of funding that would be required to maintain state highways, bridges under MDOT jurisdiction and *State-Aid* bridges built by counties with assistance from the Office of State-Aid Road Construction (OSARC).

The report identified a total of $53,382,798 in maintenance needs in Hancock County. Roadway inspection yielded unsatisfactory pavement ratings for SR 607 between I-10 and US 90, and for US 90 in Waveland and Bay Saint Louis. Projected rehabilitation costs for Harrison County roads and bridges were double those for Hancock County: $107,327,540. Unsatisfactory pavement ratings were recorded for I-10 in the vicinity of US 49, for US 49 between Airport Road and 28th Street, for I-10 from the Woolmarket interchange to the Jackson County line, and for all of I-110. The projected total cost for maintenance in Jackson County fell between the figures for the other two counties: $88,340,062. Pavement inspection resulted in unsatisfactory ratings for I-10 from SR 609 to SR 613, MS 57 between I-10 and US 90, US 90 between Gautier and Pascagoula and a portion of the same route in Pascagoula, MS 63 between I-10 and US 90, and US 90 from Old Stage Road to the Alabama state line.

Table 6-2:
MISSISSIPPI GULF COAST TOTAL ROAD MILEAGE BY FUNCTIONAL CLASS AND COUNTY

CLASSIFICATION	COUNTY	LENGTH (MILES)	PERCENT OF TOTAL
Interstate	Hancock	19.0	0.3
(Urban and Rural)	Harrison	32.9	0.6
	Jackson	29.7	0.5
	Interstate Total	*81.6*	*1.4*
Principal Arterial	Hancock	31.8	0.5
(Urban and Rural)	Harrison	102.8	1.7
	Jackson	76.5	1.3
	Principal Arterial Total	*211.1*	*3.5*
Minor Arterial	Hancock	47.1	0.8
(Urban and Rural)	Harrison	129.6	2.2
	Jackson	70.0	1.2
	Minor Arterial Total	*246.6*	*4.1*
Collector	Hancock	708.1	11.9
(Urban and Rural,	Harrison	707.8	11.9
Major and Minor)	Jackson	711.3	11.9
	Collector Total	*2127.2*	*35.6*
Local	Hancock	621.8	10.4
(Estimated)	Harrison	1577.5	26.4
	Jackson	1103.0	18.5
	Local Total	*3302.3*	*55.3*
GRAND TOTAL		5968.8	100.0

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

Daily Traffic and Roadway Congestion

The total number of trips made daily within the Mississippi Gulf coast area was estimated by the regional travel demand model to be 1,560,537 (see Table 6-3). The base-year model assignment indicated 60 percent of all trips had one end (or both) at the place of residence. Approximately 22 percent had both origin and destination somewhere other than the place of residence. An estimated 8.3 percent of all trips were made by trucks or other commercial vehicles. And nine percent of all trips were estimated to have either origin or destination (or both) outside the metropolitan area. While the interstate system accounts for only 3.1 percent of all centerline route-miles on the major street and highway network, it carries nearly 37 percent of all traffic, registering 4.54 million vehicle-miles daily of the 12.34 million traveled in the study area (see Table 6-4). Principal arterials account for another 4.14 million or more than 33 percent.

Of the remaining 30 percent, about 13 percent of vehicle-miles are travelled on minor arterials and 17 percent on collectors.

Vehicle delay is the difference between the actual time required to make a trip and the time that would be required if one were able to travel at free-flow speed. Model output indicated 55,657 hours of delay daily due to suppressed operating speeds resulting from traffic congestion. That means that approximately 18 percent of all time spent travelling is attributable to non-optimal traffic conditions. Nearly 45 percent of delay was associated with interstate highway congestion (including congested conditions on off-ramps).

One common measure of congestion is the ratio of traffic volume to roadway capacity. The actual capacity of a given roadway depends on a number of factors, including the number of travel lanes, type of access, operating speed, lane width and so forth. The model assumes a range of vehicular lane capacities associated with the functional classification of a road and whether it is undivided or divided. Put simplistically, bigger, faster roads have higher capacities. The volume-over-capacity ratio indicates congestion when it exceeds 1.00, since the higher numerator suggests that the daily volume of traffic has surpassed the theoretical capacity of the roadway.

The regional travel demand model generates a statistic representing the *maximum VOC* for each link in the network. MAX VOC is the higher V/C when directional values are compared for a two-way street or highway. A limited number of links had MAX VOC in excess of 1.0 for the base-year network. The most significant instances reflected congested traffic conditions in the immediate vicinity of major retail shopping outlets. V/C ratios as high as 1.20 were recorded on US 49 between Crossroads Parkway and Creosote Road, streets providing direct access to Crossroads Mall in the northeast quadrant of the I-10 interchange and Prime Outlets in the southwest quadrant. However, the highest V/C ratios were registered for Promenade Parkway (1.26) and Indian River Road (1.25), two short routes which connect to MS 15 at the northern terminus of I-110 immediately north of its interchange with I-10. Promenade Parkway provides direct access to the Promenade mall; Indian River Road provides direct access to Sangani Boulevard and the Lakeview Village shopping district.

Table 6-3:
2013 MISSISSIPPI GULF COAST ESTIMATED DAILY TRIPS BY TRAVEL PURPOSE

PURPOSE	NUMBER	PERCENT OF TOTAL
Home-Based Work	281,119	18.0
Home-Based Other	664,928	42.6
Non-Home-Based	341,447	21.9
Gaming	3,717	0.2
Commercial Motor Vehicle	114,766	7.4
Truck	14,099	0.9
External Auto	105,004	6.7
External Truck	35,457	2.3
TOTAL	1,560,537	100.0

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

Table 6-4:
2013 MISSISSIPPI GULF COAST ESTIMATED DAILY VEHICLE-MILES AND HOURS TRAVELED AND VEHICLE-HOURS OF DELAY BY FUNCTIONAL CLASS

FUNCTIONAL CLASS	DAILY VEHICLE-MILES TRAVELED (VMT)		DAILY VEHICLE-HOURS TRAVELED (VHT)		DAILY VEHICLE-HOURS OF DELAY (VHD)	
	NUMBER	PCT OF TOTAL	NUMBER	PCT OF TOTAL	NUMBER	PCT OF TOTAL
Interstate	4,544,997	36.8	97,006	31.6	24,891	44.7
Principal Arterial	4,144,750	33.6	102,175	33.3	17,407	31.3
Minor Arterial	1,573,663	12.8	43,799	14.3	6,164	11.1
Collector	2,077,122	16.8	63,694	20.8	7,195	12.9
TOTAL	12,340,532	100.0	306,674	100.0	55,657	100.0
Average Speed (VMT/VHT)		40.2		Percent Delay (VHD/VHT)		18.1

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

6.2 BICYCLE AND PEDESTRIAN

The availability of quality bicycle and pedestrian facilities is an important indicator of how well an area provides for the mobility of residents and visitors. People who live or work in the metropolitan area may be more likely to walk to a bus stop, or walk to work, or ride a bicycle home or to the store, if the facilities that make non-motorized travel safe and convenient are there for them to use. The health benefits of walking or riding a bicycle for the individual do not need to be emphasized. The environmental benefits for the area as a whole—reduced vehicular emissions, less time lost due to delays resulting from traffic congestion, fewer vehicular collisions--may be less apparent, but they are also worth noting and promoting by planning for needed improvements.

Within the Mississippi Gulf Coast Metropolitan Planning Area (MPA) there are approximately 48 miles of designated shared-use roadways (i.e., signed bike routes), four times the number of signed miles (12) in 2010. There are 20 miles of shared-use (multiuse) pathways, more than doubling the number (8.5) available in 2010. There are 36 miles of bike lanes, up slightly from the 2010 total (33). The local communities around the region are embracing opportunities to expand their bicycle networks. The MPO supports the local jurisdictions by providing funding to plan for projects and to support the construction when funding is available.

The Mississippi Gulf Coast MPO has demonstrated a consistent effort to improve and expand non-motorized travel options across the region. Ideally every roadway in the urban planning area would be made suitable for biking and walking. In an effort to progress toward this goal, GRPC has set two long-range bicycle and pedestrian priorities:

- The first priority is to ensure that every new and improved roadway constructed on the Mississippi Gulf Coast will accommodate non-motorized traffic in an appropriate way. The MPO hopes to accomplish this through the implementation of its Complete Streets Policy. Adopted in August of 2015, the policy requires that all federally funded projects in the urban planning area be made suitable for bicycles and pedestrians unless there are unavoidable and insurmountable

impediments to doing so. The policy requires the local planning agency (LPA) to consider a variety of factors including traffic volume, speed and surrounding land use, in order to identify the best way in which bicyclists and pedestrians can be accommodated. (The Complete Streets Policy may be viewed at http://www.grpc.com/wp-content/uploads/2015/10/2015-MPO-Complete-Streets-Policy.pdf).

- The second priority relates to how the MPO allocates available transportation improvement funds across the region. The MPO sets aside 10 percent of the region's annual Surface Transportation Program (STP) funding allocation to support continued improvement and expansion of the bicycle and pedestrian travel network. With this in mind, the focus is on filling gaps in the existing bicycle and pedestrian network by identifying independent projects for implementation. These projects are not associated with planned roadway improvements but simply seek to add sidewalks or bicycle facilities to existing roads.

GRPC staff will participate in educational activities necessary to maintain professional awareness of best practices, funding opportunities and other relevant information in support of system development, evaluating the effectiveness and comprehensiveness of the Complete Streets Policy on a periodic basis and monitoring the MPO's bicycle and pedestrian performance measures. The Complete Streets Policy will serve to promote the development of adequate bicycle facilities by affording preferential consideration to proposed projects that include bicycle lanes, dedicated bike paths or multiuse pathways suitable for use by both pedestrians and bicyclists. The *John Paul Frerer Bicycle Safety Act*, adopted by the Mississippi Legislature in 2010, put the state on record in favor of safe bicycle facilities by guaranteeing the equal rights of bicyclists with regard to the use of transportation facilities. Bicycle and pedestrian accommodations have become standard on new facilities built by the state: MS 67 and SR 605 include dedicated bike lanes, and the new bridges built across the Bay of Saint Louis and Bay of Biloxi feature separated pathways that have proven to be immensely popular with walkers and bicycle riders. At the east end of the bridge spanning the Bay of Biloxi, the City of Ocean Springs connected the bridge path to the city's beachfront and downtown with a shared-use path and sidewalks. Another encouraging sign is the growing presence of bicycle racks in downtown areas and other commercial activity centers.

CTA has also done its part to make cycling a realistic travel option through the transit operator's highly successful Bike 'n Bus Program. The installation of front-mounted bicycle racks on CTA vehicles enables an individual to make a trip by both modes, racking his bike when he boards a bus, taking it down when he disembarks. The ability to transfer easily from one mode to another benefits both by enhancing the accessibility of each for the individual traveler.

The Transportation Assessment prepared in 2013 for *The Plan for Opportunity*, a collaborative planning project funded by a grant from the U. S. Department of Housing and Urban Development, indicated there are 149 miles of roadways in the Mississippi Gulf Coast area that "may be considered suitable for some form of bicycle access. . . ." According to the report, there were at the time seven miles of bike lanes and 11 miles of multiuse paths in the urbanized area. Adapting the suitable roadways for use by bicyclists would create an extensive and well-connected regional network that would both facilitate and encourage expanded bicycle travel in the area.

Sidewalks are currently not prevalent outside the downtown districts and older residential neighborhoods in the incorporated municipalities, although they are increasingly included in newer developments. Nevertheless, efforts to upgrade bicycle and pedestrian facilities in the area are steadily gaining momentum. The MPO Complete Streets Policy will encourage local jurisdictions to include sidewalks in their plans for new streets or roadway improvements. The City of Pascagoula has had a similar policy in place for several years. The City of Long Beach has a sidewalk ordinance requiring that new projects, whether public or private, include pedestrian pathways. Other cities located along the coastline committed to improved pedestrian facilities in rebuilding after Hurricane Katrina. Today the reconstructed central business districts in Bay Saint Louis, Pass Christian, Gulfport, Biloxi, Ocean Springs, Gautier and Moss Point feature wide sidewalks and pedestrian amenities such as benches, crosswalks and signals enabling those on foot to cross streets safely. The beachfront boardwalk in Harrison County was also rebuilt following the storm. The new MPO Complete Streets Policy establishes a formal preference, in the project evaluation process leading to adoption of the Transportation Improvement Program, for proposed improvements that include sidewalks. This is an important inducement that should help make sidewalks and other pedestrian facilities more widely available as new streets are built and old ones are widened.

6.3 PUBLIC TRANSIT

Existing Transit Service and Operating Characteristics

The Mississippi Coast Transportation Authority has been providing public transit service in the study area since 1974, operating under the name *Coast Transit Authority* (CTA) since 1992. CTA currently operates buses on nine regularly scheduled routes and provides demand-response paratransit service for qualified individuals who live in the area. The CTA offices, bus storage and maintenance facilities are centrally located on DeBuys Road in Gulfport immediately west of the Biloxi city limit. Transit centers in Gulfport and Biloxi provide parking and passenger accommodations and serve as the principal transfer points for routes radiating outward from those centrally located facilities. A third transit center built in D'Iberville opened for business early in 2015, and Edgewater Mall in Biloxi continues to operate as a major transfer point. CTA scheduled operations extend into all three Mississippi Gulf Coast counties and five different cities: Gulfport, Biloxi and D'Iberville in Harrison County; Ocean Springs in Jackson County; and Bay Saint Louis in Hancock County.

Biloxi Transit Center on Dr. M. L. King Jr. Boulevard

The regular adult fare for a single ride is $1.50. An individual with a Medicare card pays half-fare, as do senior citizens (60 years of age or older) and disabled individuals with identification cards provided by CTA

at a cost of $2.00 each. Anyone over 90 with a CTA identification card can ride free of charge; the same applies to children five or under. Discounts are also available for older children and public school students. Discounted monthly passes are available for senior citizens and disabled individuals for $32.00; others can purchase a 31-day pass, allowing an unlimited number of rides, for $50.00. Daily passes, good for an unrestricted number of rides, can be purchased for $6.00; and three-day passes cost $14.00. The ADA Paratransit fare is $2.00. CTA operates on a zone fare system: No free or reduced-fare transfers are allowed. Customers pay the appropriate fare when boarding and must pay an additional fare when crossing a zone boundary. Zone boundaries are located at the eastern ends of the Ocean Springs (Route 7) and Gulfport (Route 37) lines; at the Gulfport and Biloxi transit centers, and at Edgewater Mall. CTA fixed-route bus lines (shown in Figure 6-3) include the following:

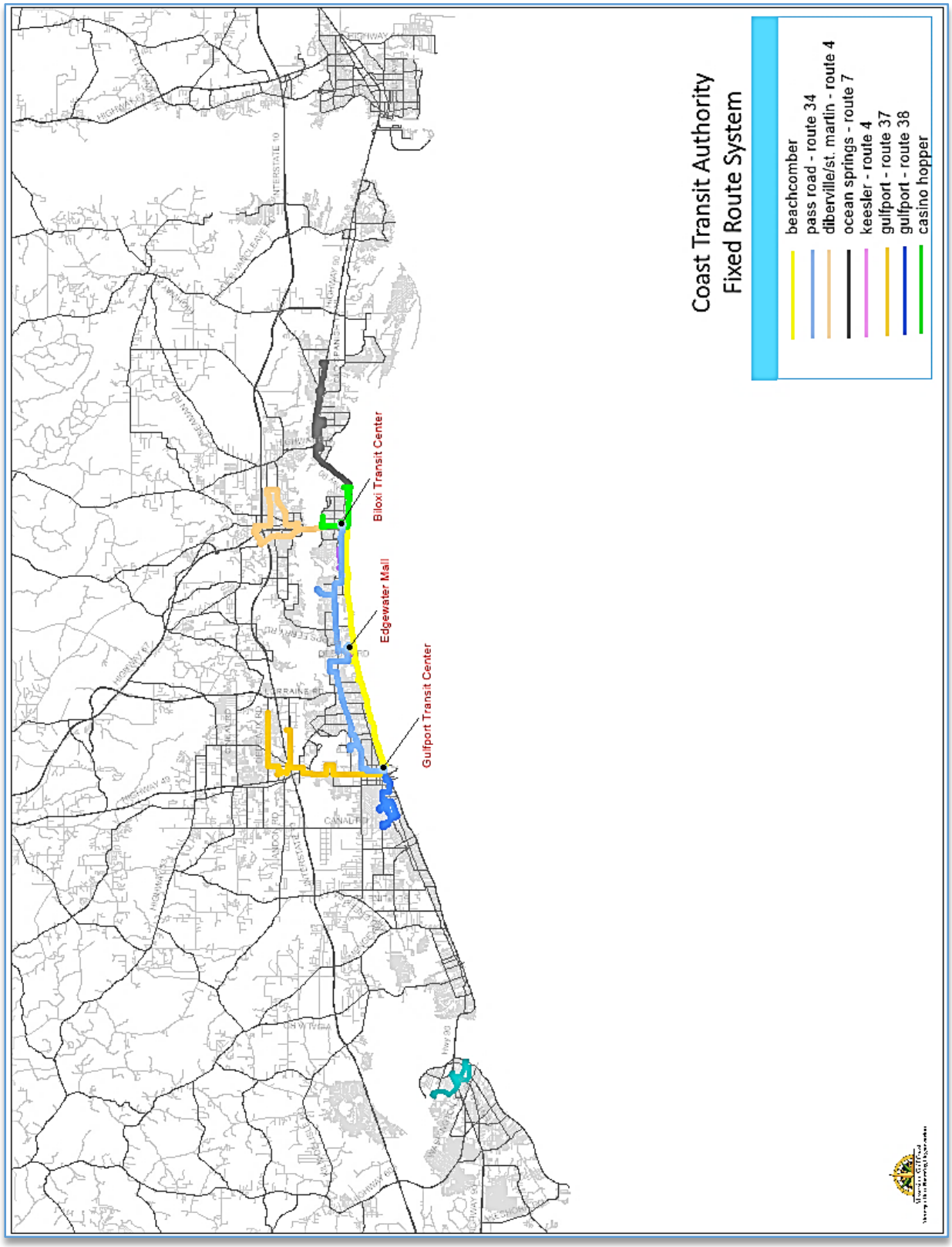
The Beachcomber is a beachfront bus line that attracts ridership among both visitors to the area and residents who live or work near the waterfront. Replica vintage trolleys travel on Beach Boulevard (Highway 90) between the Gulfport Transit Center on 15th Street at 21st Avenue and the Biloxi Transit Center on Dr. Martin Luther King Jr. Boulevard at Reynoir Street. The distance between transit centers is just over 12 miles, but the Beachcomber route also includes an intervening loop in the vicinity of the Edgewater Mall, approximately midway between the start and end-points. Edgewater is a principal hub of the CTA system. Passengers can transfer from The Beachcomber to any one of six other CTA routes linked to one of the transit centers or the hub at Edgewater Mall. The Beachcomber operates on a 45-minute headway six days a week (Monday-Saturday) between the hours of 5:30 a.m. and 8:49 p.m.

D'Iberville Transit Center on Central Avenue

The Casino Hopper is a two-way loop route located at the east end of peninsular Biloxi between I-110 and the Bay of Biloxi. As its name implies, the line primarily serves visitors to the area and Mississippi Gulf Coast residents patronizing casinos located along the route. Buses circulate around the periphery of the peninsula, beginning at the Biloxi Transit Center and proceeding in both clockwise and counter-clockwise directions along opposing six-mile paths that bring them back to where they began.

The principal streets traveled by the Casino Hopper are Caillavet Street, Bayview Avenue, Back Bay Boulevard, Oak Street and Beach Boulevard. Stop locations include casinos located on the Mississippi Sound, Bay of Biloxi and Back Bay; Point Cadet Senior Village near the east end of the route; the Maritime and Seafood Museum; and the Ohr-O'Keefe Museum. Passengers have the opportunity to transfer from The Casino Hopper to any one of the other four routes connecting to the Biloxi Transit Center. Buses run on 45-minute headways six days a week (Monday-Saturday) between the hours of 5:30 a.m. and 9:10 p.m.

Figure 6-3: Coast Transit Authority Fixed-Route Bus Lines



Source: Gulf Regional Planning Commission.

D'Iberville Route 4 operates between the Biloxi Transit Center and the Promenade shopping center at the north end of D'Iberville. The route is somewhat circuitous north of the Back Bay of Biloxi, including two looping extensions, one within the limits of D'Iberville and the other diverging into the unincorporated St. Martin area in neighboring Jackson County. The principal north-south roadways traveled by Route 4 buses include Caillavet Street in Biloxi; I-110 crossing the Back Bay to D'Iberville; Central Avenue, Lamey Bridge Road and Auto Mall Parkway in D'Iberville; and McCann Road in St. Martin. The principal east-west streets are LeMoyne Boulevard and Big Ridge Road in D'Iberville and St. Martin; and Sangani Boulevard, Promenade Parkway and Rodriquez Street in D'Iberville. Passengers can transfer at the Biloxi Transit Center to any one of the four other bus routes linked to the same facility. Route 4 buses operate six days a week (Monday-Saturday) between 5:30 a.m. and 6:50 p.m. and on Sundays between 7:00 a.m. and 5:20 p.m. The lengthy route requires a 90-minute headway between scheduled bus departures.

Ocean Springs Route 7 buses travel between the Biloxi Transit Center and the WalMart on Bienville Boulevard (US 90) in Ocean Springs, a distance of approximately nine miles. The eastbound route is predominantly located along Highway 90 but diverges at Washington Avenue in Ocean Springs to make a loop around the central business district. Proceeding in an easterly direction along Government Street, the route returns to Bienville Boulevard at Bechtel Boulevard. Westbound buses diverge from Bienville Boulevard at Vermont Avenue, turning west again at Government Street and reversing the loop around downtown Ocean Springs before continuing to Biloxi. Passengers can transfer at the west end of the route to any one of the four other bus lines terminating at the Biloxi Transit Center. Route 7 buses operate six days a week, providing service between 5:30 a.m. and 8:20 p.m. on weekdays and between 8:30 a.m. and 8:20 p.m. on Saturdays. Buses do not run on Sunday. The headway between scheduled departures at each end of the route is 90 minutes.

Keesler Route 24 provides targeted service between Keesler Air Force Base (KAFB) and Edgewater Mall six days a week, not including Saturday. The route is located primarily on Beach Boulevard. Buses operate on two different schedules: On Fridays the first trip leaves Keesler at 5:30 p.m., and the last arrives at the base at 9:25 p.m. On the other five days buses run from 10:30 a.m. until 9:25 p.m., departing from Keesler every hour on the half-hour, and from Edgewater every hour on the hour.

Gulfport-Biloxi Pass Road Route 34 buses operate between the Gulfport and Biloxi transit centers, traveling primarily on Pass Road, with diversions to Mississippi Gulf Coast Community College, Edgewater Mall and the Veterans Administration Hospital in Biloxi. At the east end of Pass Road, the route circumvents Keesler AFB by jogging to the south (for eastbound tips, north for westbound) on Rodenberg Avenue, continuing along Irish Hill Drive and Howard Avenue into downtown Biloxi. As the total length of the route is about 16 miles, and a trip from one end to the other takes an hour and 20 minutes, four buses are required to provide service on 45-minute headways from Monday through Saturday. On those days service begins at 4:45 a.m. and continues until 8:20 p.m. Reduced service on Sundays operates on a split route with two buses running between the Edgewater Mall and the Gulfport Transit Center on 45-minute headways and one bus running between the mall and the Biloxi Transit Center every 90 minutes. Operating hours on the Gulfport leg run from 6:15 a.m. until 6:50 p.m. Service on the Biloxi leg is available from 6:15 a.m. until 6:05 p.m. On weekdays passenger can transfer to the Beachcomber or either one of two Gulfport lines (described below) at the transit center in that city. At the Biloxi end of the line they can transfer to either the Beachcomber or any one of the other three lines terminating at the transit

center in that city (described above). On Sunday transfer opportunities are limited to two other routes operating on that day: Gulfport Route 37 on one end and D'Iberville Route 4 on the other.

Gulfport Route 37 runs between the Gulfport Transit Center and the Orange Grove area north of I-10, operating primarily on US 49 south of the interstate. At Creosote Road the route diverges from the main north-south axis and travels north on Three Rivers Road, then east on Seaway Road as far as Larkin Smith Drive. Returning to Three Rivers Road, the route passes under I-10 and turns onto Crossroads Parkway, proceeding from the shopping center to Community Road and via Klein Road to Dedeaux Road, continuing eastward on that well-traveled route for some distance. The total distance traveled is about 14 miles. Service is provided six days a week, on 90-minute headways, between the hours of 5:30 a.m. and 6:50 p.m. Connecting routes include The Beachcomber and two other routes (34 and 38).

Gulfport Route 38 features two distinct legs served by a single bus, in alternating fashion, six days a week (Monday-Saturday). Both legs have one end at the Gulfport Transit Center and the other at a point on the western periphery of the city. The northern (Red Line) leg operates mainly on 33rd Avenue and 28th Street, terminating at the Ladnier Homes located immediately north of the Naval Construction Battalion Center (NCBC) and just west of Canal Road. The southern (Blue Line) leg follows a more complicated path ending at the William Bell Apartments on Commission Road south of the NCBC. Intervening streets include 15th Street, Old Pass Road, Lewis Avenue and West Railroad Street, among others. Each leg operates on a 90-minute headway. Service begins on the Blue Line at 5:30 a.m. and terminates on the Red Line at 6:55 p.m. Passengers can transfer to The Beachcomber, Route 34 or Route 37 at the transit center.

The Bay Trolley Line, the newest CTA route, was initiated on a free-trial basis on July 4, 2015. A single replica trolley bus circulates between Beach Boulevard in downtown Bay Saint Louis and the Hollywood Casino on the north side of the city. Buses run on Blue Meadow Road and Hollywood Boulevard north of US 90 and on Main Street, Dunbar Avenue, Bookter Street and others in the area south of the highway. Service is provided four days a week (Thursday-Sunday), between 11:00 a.m. and 10:10 p.m., with each trip on the loop route commencing 45 minutes after the one preceding it.

Paratransit service is also provided by CTA in compliance with the *Americans with Disabilities Act* (Public Law 101-336, 104 Stat. 327) (ADA). ADA Paratransit offers qualified individuals demand-response curb-to-curb service within three-quarters of a mile of any established fixed-route transit line. The target population includes disabled individuals unable to use the regular handicapped-accessible fixed-route service. ADA Paratransit-Plus provides demand-response curb-to-curb service outside the three-quarter-mile buffer, throughout all three counties in the study area. Service was extended to Hancock County shortly before the initiation of regular fixed-route operations on the Bay Trolley line. The Hancock County Handy Ride transportation service is available on Tuesdays and Thursdays for senior citizens and disabled individuals alike. Pick-ups for all paratransit operations are scheduled by appointment on a space-available basis. Customers must be certified for the regular ADA program. As already noted, the standard fare for paratransit service is $2.00, with an additional charge of $2.00 imposed upon crossing from one zone into another.

Vanpool service is provided by CTA on a *purchased transportation* basis. The *Coast Commuter* program offers commuter carpool and vanpool services to all interested employers located in the study area. The service has been of particular benefit in areas of very high employment concentration such as Ingalls Shipyards in Jackson County and the Stennis Space Center in Hancock County. There are now more than 40 vanpools, serving workers from four different states travelling to work sites on the Mississippi Gulf Coast.

Recent Historical Ridership by Type of Service and Route

CTA ridership declined drastically in the aftermath of Hurricane Katrina which devastated not only homes and businesses but transportation infrastructure as well. The center of the storm made landfall at the west end of the study area on August 29, 2005, one month prior to the end of the 2005 operating year. The ensuing interruption of service resulted in an immediate and lasting loss of ridership and operating revenue. In the preceding operating year (2004) CTA had carried more than 51,000 passengers per month for a year-end total of 615,255 (see Table 6-5). The lost month at the end of Fiscal Year (FY) 2005 caused an immediate decline of 51,593 in total ridership for the operating year. In the following fiscal year (2006) ridership fell off another 159,000—an additional 28.2 percent—as the Mississippi Gulf Coast struggled to regain some semblance of normality. CTA leaped to the forefront of relief efforts, getting buses back out on the streets as fast as they could be rebuilt or repaired, and providing free transportation to all in the time of need. A year after the hurricane recovery efforts were well underway; and CTA ridership recovered rapidly, rebounding by more than 26 percent in FY 2007. New service in Biloxi (the Casino

Table 6-5:
COAST TRANSIT AUTHORITY TOTAL RIDERSHIP BY TYPE OF SERVICE: 2004-2015

	OPERATING YEAR					
TYPE OF SERVICE	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Bus Transit	533,522	490,705	363,010	451,630	617,741	690,886
Demand-Response	81,733	72,957	41,636	42,780	43,319	47,222
Vanpool	--	--	--	17,010	61,447	105,574
TOTAL	**615,255**	**563,662**	**404,646**	**511,420**	**722,507**	**843,682**
Year-to-Year Change	--	-51,593	-159,016	106,774	211,087	121,175
Percent Change	--	-8.4	-28.2	26.4	41.3	16.8

	OPERATING YEAR					
TYPE OF SERVICE	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Bus Transit	759,456	781,364	843,678	914,782	819,734	662,756
Demand-Response	53,862	54,575	63,132	52,029	51,262	NA
Vanpool	133,017	177,080	174,907	172,491	156,440	NA
TOTAL	**946,335**	**1,013,019**	**1,081,717**	**1,139,302**	**1,029,450**	**874,893**
Year-to-Year Change	102,653	66,684	68,698	57,585	-109,852	-154,557
Percent Change	12.2	7.0	6.8	5.3	-9.6	-15.0

Source: National Transit Database (2015).

Hopper) and Gulfport (Route 38), along with the initiation of Coast Commuter vanpool operations, pushed the total number of unlinked passenger-trips back over the half-million mark. CTA experienced phenomenal growth in ridership (over 41 percent) in the 2008 operating year as the nation sank into recession. Major infrastructure repairs were completed, including the construction of new US 90 bridges across the Bay of Biloxi and Bay of Saint Louis; and in 2009 service on the beachfront highway finally resumed. Despite service cutbacks necessitated by strained finances the following year, the number of riders on CTA buses, complementary paratransit vehicles and commuter service vans continued to climb steadily, exceeding one million in 2011 and each of the succeeding three years. However, ridership began to decline in FY 2014 and then fell off drastically in FY 2015 as the price of gasoline collapsed. Analysis has shown there is a strong correlation between transit ridership and the price of gasoline on the Mississippi Gulf Coast, and CTA ridership is likely to remain depressed until the price private vehicle drivers pay at the pump recovers somewhat.

Over the past two years the loss in total ridership exceeded 260,000 passengers, falling more than 23 percent from a little less than 1,140,000 to fewer than 875,000 riders. Regular bus service was hit hardest, accounting for more than 250,000 of the lost passengers or 95 percent of the overall loss. Demand-response patronage topped 60,000 customers in 2012, and vanpool ridership was more than 177,000 in 2011; but both have suffered only moderate losses since then. It is reasonable to infer that the demand for paratransit and vanpool service is less elastic than demand for fixed-route transit for various reasons: Many paratransit users are likely not to have the option of operating a private vehicle due to their disabilities; others may simply prefer not to drive because of age. Vanpool riders typically travel longer distances commuting to work and already pay less than they would driving their own vehicles. Generally speaking vanpool commuters have made a commitment to ridesharing because they prefer to let someone else do the driving and appreciate the advantages of simply being a passenger. In addition to the benefits associated with the ride itself, vanpoolers do not have to worry about parking. Not having to find a good place to park every day can be a significant factor for someone choosing to rideshare who would otherwise have to compete with hundreds or even thousands of other workers for coveted space on a daily basis.

Monthly data for the eight regularly scheduled bus lines that have been operating continuously since 2010 indicate that, at the end of FY 2015, almost all had been steadily declining in ridership for nearly two years (see Table 6-6). The system's strongest line, Pass Road Route 34, attracted fewer riders in each of the last 15 months (and 21 of the last 22) than were carried in the same month one year before. Annual ridership peaked at over 280,000 passengers in 2013 but has since fallen off to less than 245,000, the lowest total since 2010. The second-most productive route, the Casino Hopper, has experienced year-to-year monthly declines in each of the last 20 months. Service cutbacks in March of 2014, necessary due to reduced public funding, were certainly a contributing factor. Annual patronage was nearly halved from 260,000 in 2013 to 137,000 in 2015. The Beachcomber, also affected by service cuts in 2014, has registered year-to-year monthly losses in 22 of the last 23 months. Annual ridership exceeded 140,000 in 2013, but in 2015 dropped off—less drastically than in the case of the Casino Hopper--to less than 110,000 passengers. The other route included in the March 2014 service reductions, Keesler Route 24, was already in decline but lost the lion's share of its patronage in the month following the cuts. Annual ridership, which had already fallen from 33,000 in 2012 to 24,000 in 2013, fell by half in 2014 and was halved again in 2015.

Table 6-6:
COAST TRANSIT AUTHORITY FIXED-ROUTE RIDERSHIP BY ROUTE AND MONTH FOR FY 2010 THROUGH 2015

FISCAL YEAR	MONTH (UNLINKED PASSENGER-TRIPS)												TOTAL
	October	November	December	January	February	March	April	May	June	July	August	September	
Beachcomber												*Note: CTA reduced service on March 9, 2014.*	
2010	9,615	8,897	7,960	8,300	8,318	10,750	11,300	10,556	11,061	11,944	12,206	11,760	122,667
2011	11,246	10,344	9,267	9,238	8,044	7,413	8,542	9,367	10,093	9,662	10,478	9,345	113,039
2012	8,827	8,775	8,850	9,078	9,523	10,361	10,909	11,321	11,246	10,773	10,222	11,017	120,902
2013	11,919	11,429	11,354	11,542	11,674	12,681	12,314	12,589	11,870	12,591	12,064	11,183	143,210
2014	11,941	10,742	10,536	10,451	10,890	10,059	9,713	9,454	9,277	10,342	10,194	9,341	122,940
2015	9,522	8,821	8,664	8,546	7,688	8,192	9,147	9,385	10,419	9,836	9,476	8,305	108,001
Casino Hopper												*Note: CTA reduced service on March 9, 2014.*	
2010	20,692	17,975	13,433	14,380	15,373	19,722	20,689	19,000	19,208	21,333	20,231	19,536	221,572
2011	20,856	16,481	11,760	14,272	17,038	20,486	19,499	22,192	19,750	21,443	22,618	20,500	226,895
2012	21,654	18,459	16,078	17,985	18,712	22,796	22,134	22,560	23,894	23,532	18,908	20,746	247,458
2013	23,625	19,058	17,475	17,300	20,576	23,969	23,812	24,675	21,764	22,650	22,358	23,249	260,511
2014	26,840	20,240	16,103	17,353	19,705	21,376	19,027	19,514	18,316	14,866	17,693	18,270	229,303
2015	18,096	14,235	12,828	12,117	8,435	11,440	10,328	9,941	9,791	10,119	10,002	9,972	137,304
D'Iberville Route 4													
2010	2,946	2,615	2,704	2,666	2,484	2,728	2,631	2,478	2,694	2,716	2,961	2,975	32,598
2011	3,107	3,052	2,999	2,554	2,958	3,068	3,210	3,528	3,521	3,165	3,307	2,996	37,465
2012	3,418	3,326	3,612	3,345	3,279	2,868	3,190	3,250	3,111	2,980	3,079	3,184	38,642
2013	3,455	3,577	3,973	4,699	3,458	4,086	3,372	3,365	3,996	3,428	3,645	3,349	44,403
2014	3,611	3,630	4,072	4,186	3,281	3,096	3,083	2,573	2,308	2,561	2,811	2,517	37,729
2015	2,558	2,601	2,719	3,417	3,085	2,572	2,484	2,778	2,697	2,509	2,710	2,431	32,561
Ocean Springs Route 7													
2010	2,691	2,647	2,381	2,021	2,129	2,546	2,610	2,367	2,986	2,673	2,901	2,829	30,781
2011	2,780	2,445	2,483	2,462	2,453	2,859	3,065	2,965	3,135	2,794	3,156	2,905	33,502
2012	2,854	2,903	3,054	2,863	2,688	3,177	2,797	2,870	3,193	3,081	3,343	3,165	35,988
2013	3,840	3,361	3,211	3,310	3,072	3,469	3,403	3,203	3,181	2,897	3,173	2,756	38,876
2014	3,097	5,013	2,656	2,574	2,512	2,372	2,575	2,540	2,639	2,872	3,106	2,730	34,686
2015	2,857	2,343	2,471	2,378	2,584	2,650	2,691	2,848	2,902	2,822	2,859	2,753	32,158
Keesler Route 24												*Note: CTA reduced service on March 9, 2014.*	
2010	3,913	2,851	1,080	1,438	3,302	3,521	3,708	2,887	2,647	3,278	2,651	2,820	34,096
2011	2,237	1,931	1,281	1,071	2,608	5,897	3,341	3,024	2,992	3,186	2,876	3,375	33,819
2012	2,769	2,652	2,362	1,758	2,840	4,292	3,216	3,373	2,471	1,723	2,561	3,362	33,379
2013	2,593	2,775	1,948	1,599	2,279	2,778	1,934	1,501	1,759	1,579	2,002	1,414	24,161
2014	1,191	1,954	1,279	1,279	1,512	1,165	748	540	608	393	879	521	12,069
2015	763	819	386	325	469	300	434	659	499	428	679	420	6,181

Table 6-6 (*Continued*):
COAST TRANSIT AUTHORITY FIXED-ROUTE RIDERSHIP BY ROUTE AND MONTH FOR FY 2010 THROUGH 2015

FISCAL YEAR	MONTH (UNLINKED PASSENGER-TRIPS)												TOTAL
	October	November	December	January	February	March	April	May	June	July	August	September	
Pass Road Route 34													
2010	22,742	20,021	19,014	19,141	17,351	19,315	18,049	17,895	17,999	17,383	18,096	18,981	225,987
2011	19,542	18,490	19,269	19,519	18,604	21,882	22,009	21,669	21,691	20,053	22,903	21,402	247,033
2012	22,280	20,832	21,339	22,314	21,106	22,238	20,212	20,914	21,809	21,819	21,245	21,668	257,776
2013	24,527	23,266	21,883	24,594	22,507	23,449	22,425	23,187	22,115	23,325	25,284	23,637	280,199
2014	25,547	23,817	22,215	22,171	22,152	22,359	21,556	20,793	22,531	22,453	22,709	21,728	270,031
2015	23,857	20,362	20,693	20,605	19,031	19,082	19,759	20,235	20,135	20,569	19,959	20,369	244,656
Gulfport Route 37													
2010	2,689	2,178	2,366	2,826	2,403	2,608	2,598	2,570	2,900	2,976	2,884	3,115	32,113
2011	2,884	2,581	2,585	2,358	2,489	2,922	3,054	2,808	3,050	2,629	3,454	2,985	33,799
2012	2,791	2,927	3,047	2,863	2,973	2,862	2,779	2,879	3,265	2,781	2,939	3,196	35,302
2013	3,363	3,255	3,201	3,426	2,934	3,285	3,296	3,564	3,081	3,179	3,680	3,120	39,384
2014	3,604	2,956	2,753	2,891	3,091	3,030	2,926	2,853	3,114	3,529	3,837	3,389	37,973
2015	3,510	2,959	3,197	3,522	3,682	3,622	3,964	4,207	4,162	4,392	4,169	3,987	45,373
Gulfport (Red/Blue) Route 38													
2010	1,530	1,320	1,307	1,277	1,321	1,356	1,195	1,236	1,488	1,370	1,341	1,352	16,093
2011	1,474	1,466	1,472	1,327	1,587	1,928	2,142	2,937	2,655	2,555	2,985	2,699	25,227
2012	2,728	2,491	2,619	2,506	2,357	2,477	2,555	2,596	2,865	2,659	3,072	2,982	31,907
2013	3,363	3,338	2,929	3,341	3,042	3,070	3,278	3,548	3,187	3,737	3,907	3,505	40,245
2014	3,833	3,286	3,135	3,309	3,231	3,310	3,448	3,301	3,189	3,485	3,617	3,576	40,720
2015	3,847	2,804	2,950	3,452	2,854	2,819	2,893	3,149	3,642	3,672	3,700	3,669	39,451
Totals for Existing Routes													
2010	66,818	58,504	50,245	52,049	52,681	62,546	62,780	58,989	60,983	63,673	63,271	63,368	715,907
2011	64,126	56,790	51,116	52,801	55,781	66,455	64,862	68,490	66,887	65,487	71,777	66,207	750,779
2012	67,321	62,365	60,961	62,712	63,478	71,071	67,792	69,763	71,854	69,348	65,369	69,320	801,354
2013	76,685	70,059	65,974	69,811	69,542	76,787	73,834	75,632	70,953	73,386	76,113	72,213	870,989
2014	79,664	71,638	62,749	64,214	66,374	66,767	63,076	61,568	61,982	60,501	64,846	62,072	785,451
2015	65,010	54,944	53,908	54,362	47,828	50,677	51,700	53,202	54,247	54,347	53,554	51,906	645,685
Percent Change from Preceding Year													
2010	--	--	--	--	--	--	--	--	--	--	--	--	--
2011	-4.0	-2.9	1.7	1.4	5.9	6.2	3.3	16.1	9.7	2.8	13.4	4.5	4.9
2012	5.0	9.8	19.3	18.8	13.8	6.9	4.5	1.9	7.4	5.9	-8.9	4.7	6.7
2013	13.9	12.3	8.2	11.3	9.6	8.0	8.9	8.4	-1.3	5.8	16.4	4.2	8.7
2014	3.9	2.3	-4.9	-8.0	-4.6	-13.0	-14.6	-18.6	-12.6	-17.6	-14.8	-14.0	-9.8
2015	-18.4	-23.3	-14.1	-15.3	-27.9	-24.1	-18.0	-13.6	-12.5	-10.2	-17.4	-16.4	-17.8

Source: Coast Transit Authority for monthly route ridership; calculations by Neel-Schaffer.

Two routes connecting Biloxi to other nearby cities have not fared as badly as those in Biloxi proper. D'Iberville Route 4 has suffered year-to-year monthly losses in 19 of the last 21 months, but they have mostly been fairly modest in size. FY 2015 ridership was nearly 12,000 below the peak annual figure of 44,000-plus in 2013. Ocean Springs Route 7 actually showed gains in six of the last eight months in 2015, but annual ridership continued to fall, from not quite 39,000 in 2013 to 32,000-plus two years later.

Bucking the downward trend, the Gulfport lines fared surprisingly well in the 24 months from October 1, 2013 through September 30, 2015. Gulfport Route 37 actually showed increases over the previous year in 15 of the last 16 months during that period. Moreover, annual ridership hit a new peak in 2015, topping 45,000 passengers compared to less than 38,000 the previous year and 39,000-plus the year before that.

Gulfport (Red/Blue) Route 38 recorded increases in six of the 12 months in FY 2015, and for seven of the 12 months in FY 2014. Annual ridership, which passed 40,000 in 2013, was slightly higher in 2014 but only slightly lower in 2015.

Overall ridership for the eight routes totaled almost 871,000 in 2013, fell off to 785,000 in 2014, then dropped even more precipitously to 645,000 in 2015. Aggregate fixed-route ridership was down from year to year in each of the 22 months from December of 2013 through September of 2015. The number of passengers carried on regularly scheduled buses fell by roughly 10 percent in 2014 and by approximately 18 percent in 2015. Data for the operating years from 2010 through 2013 show that during this growth period, as ridership was increasing steadily and fare revenues were rising, operating expenses remained relatively unchanged (see Table 6-7). The operating cost in 2012 was actually lower than in 2010 and 2011, and operating expenses in 2013 exceeded those in 2010 by only one-half of one percent. This was directly attributable to judicious paring of the system itself as well as daily operations: Route-miles were reduced by 13.3 percent, revenue-miles by 12.9 percent, and revenue-hours by 9.2 percent. Significantly, while fare revenue per passenger-trip actually declined slightly (two cents), the operating cost per trip went down every year--89 cents in all from 2010 to 2013—and the farebox recovery of cost increased from 16.2 percent to 18.7 percent. No doubt these numbers have been adversely affected by the decline in ridership since 2013, but data for 2014 and 2015 are not yet available from the National Transit Database.

As one might expect, operating data for the CTA paratransit service vary considerably from year to year. For example, while the average trip-length for regularly scheduled bus service remained essentially unchanged from FY 2010 to FY 2013, the average trip by a paratransit passenger increased from 20 miles in 2010 to 32 miles in 2013 (see Table 6-8). Operating revenues and expenses varied similarly. The demand-response service generates about 50 percent more in fare revenue per passenger-trip than does the regularly scheduled fixed-route bus service. However, the operating cost per passenger-trip is typically several times higher. The operating cost per mile for paratransit vehicles is a little higher than the corresponding cost for buses running scheduled routes, but the cost per vehicle-hour is significantly lower. Presumably this is because paratransit vehicles spend less time actually underway (i.e., burning fuel) and more time boarding and disembarking passengers than do regular transit service coaches. Although the average fare collected from paratransit passengers was as much as 50 percent higher during the period studied, the annual farebox recovery-of-cost rate was more than 50 percent lower every year.

Table 6-7:
CTA BUS TRANSIT OPERATING DATA FOR FISCAL YEARS 2010 THROUGH 2013

DATA ITEM/STATISTIC	2010	2011	2012	2013
Passenger-Trips	759,456	781,364	843,678	914,782
Passenger-Miles	5,445,300	5,602,380	6,049,171	6,648,720
Fare Revenue	$656,415	$672,503	$705,517	$765,203
Operating Expenses	$4,060,350	$4,061,917	$3,989,879	$4,082,184
Directional Route Miles	205.4	174.5	178.0	178.0
Average Trip Length (Miles)	7.17	7.17	7.17	7.27
Fare Revenue per Trip	$0.86	$0.86	$0.84	$0.84
Operating Cost per Trip	$5.35	$5.20	$4.73	$4.46
Revenue/Cost (Percent)	16.2	16.6	17.7	18.7
Revenue/Route-Mile	$3,195.79	$3,853.89	$3,963.58	$4,298.89
Vehicle Revenue Miles	1,177,622	1,042,940	1,035,742	1,025,716
Vehicle Revenue Hours	81,094	68,677	74,105	73,603
Peak Vehicles in Service	18	15	17	17
Passengers/Vehicle Mile	0.64	0.75	0.81	0.89
Passengers/Vehicle Hour	9.37	11.38	11.38	12.43
Fare Revenue/Vehicle Mile	$0.56	$0.64	$0.68	$0.75
Fare Revenue/Vehicle Hour	$8.09	$9.79	$9.52	$10.40
Operating Cost/Vehicle Mile	$3.45	$3.89	$3.85	$3.98
Operating Cost/Vehicle Hour	$50.07	$59.15	$53.84	$55.46
Revenue Vehicle Miles/Hour	14.52	15.19	13.98	13.94

Source: National Transit Database (2015) for data; calculations by Neel-Schaffer, Inc.

Both fare revenues and operating expenses associated with the Coast Commuter vanpool service fluctuated considerably in the operating years from 2010 through 2013. While average trip length varied only about 15 percent between the low in 2010 (43.73 miles) and the high in 2012 (50.53 miles), the average fare was less than $1.00 in 2010 and more than $4.00 in 2012 (see Table 6-9). Similarly, the operating cost per passenger-trip was $3.05 in 2010 and $5.68 in 2012. Fare revenues and operating expenses per vehicle-mile and vehicle-hour also varied widely from year to year. Vehicle revenue miles and hours peaked in 2011 when 48 vehicles were in service daily. Average ridership increased from a little less than eight passengers per vehicle-hour in 2010 to nearly nine in 2013.

Table 6-8:
CTA DEMAND-RESPONSE TRANSIT OPERATING DATA FOR FISCAL YEARS 2010 THROUGH 2013

DATA ITEM/STATISTIC	2010	2011	2012	2013
Passenger-Trips	61,222	67,138	63,763	52,029
Passenger-Miles	1,276,529	1,763,864	2,040,426	1,681,577
Fare Revenue	$84,500	$83,676	$78,226	$42,470
Operating Expenses	$1,176,298	$1,347,592	$1,257,494	$1,145,046
Average Trip Length (Miles)	20.85	26.27	32.00	32.32
Fare Revenue per Trip	$1.38	$1.25	$1.23	$0.82
Operating Cost per Trip	$19.21	$20.07	$19.72	$22.01
Fare Revenue/Cost (Percent)	7.2	6.2	6.2	3.7
Vehicle Revenue Miles	316,711	336,101	266,373	270,527
Vehicle Revenue Hours	27,900	30,125	26,175	24,739
Peak Vehicles in Service	14	15	13	14
Passengers/Vehicle Mile	0.19	0.20	0.24	0.19
Passengers/Vehicle Hour	2.19	2.23	2.44	2.10
Fare Revenue/Vehicle Mile	$0.27	$0.25	$0.29	$0.16
Fare Revenue/Vehicle Hour	$3.03	$2.78	$2.99	$1.72
Operating Cost/Vehicle Mile	$3.71	$4.01	$4.72	$4.23
Operating Cost/Vehicle Hour	$42.16	$44.73	$48.04	$46.29
Revenue Vehicle Miles/Hour	11.35	11.16	10.18	10.94

Source: National Transit Database (2015) for data; calculations by Neel-Schaffer, Inc.

6.4 FREIGHT

The safe, reliable and efficient movement of freight, both within and through the metropolitan area, is essential for the maintenance and growth of regional, state and national economies alike. Shippers, carriers and receivers of freight all depend on the availability of a transportation system with sufficient capacity for the volumes of goods that must be moved. Highways, railroads, airports and maritime ports are all vital components of the Mississippi Gulf Coast freight transportation system. All of these components must accommodate the need to move people as well. Trucks share the road with passenger vehicles; railroads coexist with streets and highways that cross their lines; airports exist largely to serve passenger air travel; and maritime ports depend on landside access provided by other modes. Whether goods movement is made possible by the use of infrastructure accessible to all, or by the cooperative interaction of users operating on separate but overlaid or interconnected networks, it represents a very considerable portion of the overall demand for travel in the region and must be accorded due consideration.

Table 6-9:
COAST COMMUTER OPERATING DATA FOR FISCAL YEARS 2010 THROUGH 2013

DATA ITEM/STATISTIC	2010	2011	2012	2013
Passenger-Trips	135,846	178,085	174,935	172,491
Passenger-Miles	5,940,483	7,857,440	8,840,108	7,902,991
Fare Revenue	$127,747	$383,984	$774,676	$473,951
Operating Expenses	$414,423	$576,881	$994,307	$780,198
Average Trip Length (Miles)	43.73	44.12	50.53	45.82
Fare Revenue per Trip	$0.94	$2.16	$4.43	$2.75
Operating Cost per Trip	$3.05	$3.24	$5.68	$4.52
Fare Revenue/Cost (Percent)	30.8	66.6	77.9	60.7
Vehicle Revenue Miles	1,095,268	1,117,859	1,034,590	983,463
Vehicle Revenue Hours	17,337	20,613	20,377	19,582
Peak Vehicles in Service	42	48	47	46
Passengers/Vehicle Mile	0.12	0.16	0.17	0.18
Passengers/Vehicle Hour	7.84	8.64	8.58	8.81
Fare Revenue/Vehicle Mile	0.12	0.34	0.75	0.48
Fare Revenue/Vehicle Hour	7.37	18.63	38.02	24.20
Operating Cost/Vehicle Mile	0.38	0.52	0.96	0.79
Operating Cost/Vehicle Hour	23.90	27.99	48.80	39.84
Vehicle Revenue Miles/Hour	63.18	54.23	50.77	50.22

Source: National Transit Database (2015) for data; calculations by Neel-Schaffer, Inc.

Freight and Trade

Transportation infrastructure used for the movement of freight includes roadways, rail lines, airports, waterways and maritime ports, as well as subsurface components such as oil and gas pipelines. The present discussion is concerned with surface elements that have the potential to convey both people and goods, rather than buried infrastructure reserved for freight alone, operating largely unseen and unaffected by other modes (and having little or no effect on other means of transport).

There are two major freight corridors in the Mississippi Gulf Coast Metropolitan Planning Area (MPA) for shipping goods by truck; two Class I railroads for moving goods by rail; three airports that accommodate both airborne shipping and passenger air travel; three maritime ports providing access to the Gulf of Mexico; and a waterway for movement between the gulf and inland industrial facilities. All of these contribute to the efficient movement of goods within the MPA; between the Mississippi Gulf Coast and other parts of the state or other states; and overseas to or from foreign buyers or suppliers. Business

Roundtable research and U. S. Census Bureau Foreign Trade Division data, cited in the *Mississippi Statewide Freight Plan* (Mississippi Department of Transportation, 2015), show the following:

- Mississippi exports have grown at four times the rate at which the state's gross domestic product (GDP) has expanded since 2002.
- International trade supports an estimated 320,000 jobs in Mississippi, including 60,000 directly related to export activities.
- The number of trade-related jobs in Mississippi increased eight times faster than total employment between 2004 and 2011.

Trade data for 2012 show that petroleum and coal products led the way in Mississippi exports based on aggregate sales value ($4 billion). The following products were also among the top five export categories: Basic chemicals ($1.1 billion), oil seeds and grains ($756 million), pulp paper and paperboard ($732 million) and motor vehicles ($504 million). Mississippi ranked fourth in the nation among all states in the export of ships and boats, primarily due to the ship and boat building industry located on the Mississippi Gulf Coast.

Freight Goals

MAP-21 called for strategic investment in freight transportation infrastructure and operational improvements designed to achieve improved performance of the system. The law directs the USDOT to establish a National Freight Network divided between *primary* and *rural* components. The Primary Freight Network will include 27,000 centerline miles of existing roadways that are considered essential for the movement of goods. The following is a summary of goals established for the National Freight Policy by the legislation:

- Improve the contribution of the National Freight Network towards enhancing the nation's economic efficiency, productivity, and competitiveness.
- Reduce congestion on the freight transportation system.
- Improve the safety, security, and resilience of the freight transportation system.
- Improve the state of good repair of the nation's freight transportation system.
- Use advanced technology, performance management, innovation, competition, and accountability in operating and maintaining the freight transportation system.
- Reduce adverse environmental and community impacts of the freight transportation system.

The following goals were identified by MDOT in the *2035 Mississippi Statewide Transportation Plan*:

- Improve accessibility and mobility for Mississippi's people, commerce and industry.
- Ensure high standards of safety in the transportation system.
- Maintain and preserve Mississippi's transportation system.
- Ensure that transportation system development is sensitive to human and natural environmental concerns.
- Provide a transportation system that encourages and supports Mississippi's economic development.
- Create effective transportation partnerships and cooperative processes that enhance awareness of the needs and benefits of an intermodal system.
- Provide a sound financial basis for the transportation system.

Freight Flows

The volume of goods shipped via Mississippi transportation facilities in 2011 amounted to 421 million tons valued at $531 billion (MDOT 2015). The majority of shipments, 59 percent measured by volume, passed through the state; 19 percent came into the state; 14 percent went from Mississippi to other states or foreign destinations; and only eight percent were intrastate shipments. The dominant mode for shipping goods is trucking which accounted for 64 percent of the total volume of freight moved in 2011. Rail transportation accounted for 28 percent, waterborne shipping eight percent. Freight transport by air amounted to less than one-half of one percent.

Freight Infrastructure

Highways--There are two principal highway freight corridors connecting the Mississippi Gulf Coast to the rest of Mississippi and the rest of the nation. Interstate 10 (I-10) is a vital national freight corridor linking points as far west as southern California to points as far east as Jacksonville and other cities in northern Florida. U. S. Highway 49 (US 49) is the principal route between the Gulfport Urbanized Area (UZA) and points north, connecting to Interstate 59 (I-59) at Hattiesburg and both Interstate 20 (I-20) and Interstate 55 (I-55) in Jackson.

I-10 carries the heaviest volume of traffic in the MPA with volumes in the vicinity of Interstate 110 (I-110) exceeding 80,000 vehicles per day. Daily traffic on US 49 in the vicinity of I-10 is estimated to be more than 60,000 vehicles. These are both major corridors for moving goods. I-10 carries the largest share of goods moving through the area; US 49 provides the principal route for transporting freight to and from

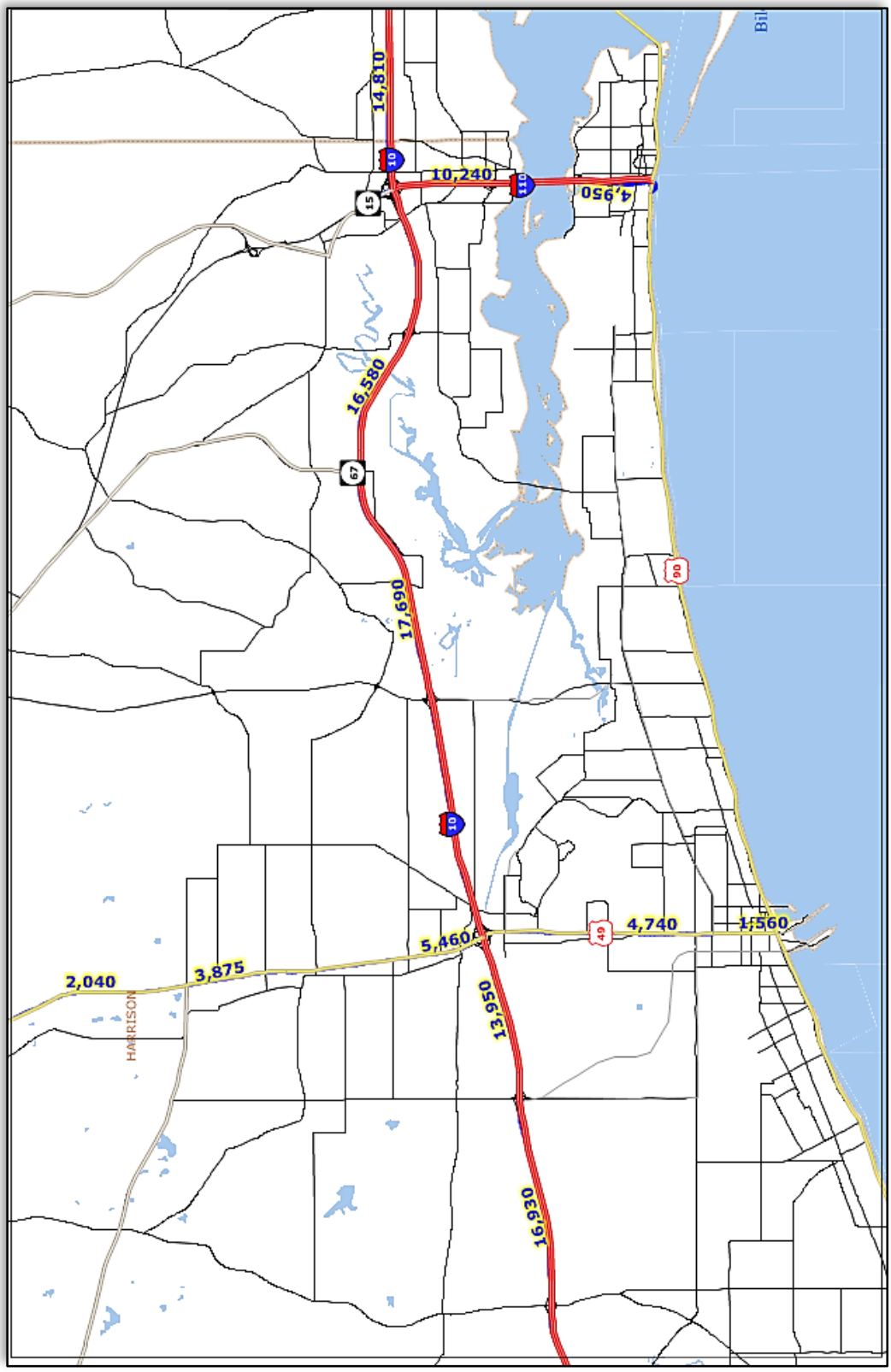
other parts of the state. In addition, Highway 49 provides direct access to the Mississippi State Port at Gulfport, the principal maritime port for commercial shipping in the metropolitan area and in the state. A third key corridor, Interstate 110 (I-110), connects I-10 to US 90 in downtown Biloxi. An estimated 63,000 vehicles cross the Back Bay of Biloxi on I-110 daily.

The estimated number of heavy trucks traveling on I-10 is highest between US 49 and I-110, peaking at more than 17,000 per day (see Figure 6-4). More than 5,000 trucks are estimated to operate on US 49 daily in the vicinity of I-10, with as many as 1,500 passing through downtown Gulfport to reach the Mississippi State Port. In Jackson County, the volume of truck traffic is greatest between MS 57 and the Pascagoula River where it is estimated to be more than 16,000 per day (see Figure 6-5). While MS 63 is not designated a major freight corridor, it carries a significant number of heavy vehicles between I-10 and US 90. The estimated volume in the industrial area immediately south of I-10 is roughly 6,500 trucks, with more than 2,700 estimated to travel as far as US 90. At that point some continue southward on Highway 611 which provides access to heavy industry in the vicinity of Bayou Casotte. Others turn west on US 90 towards the Port of Pascagoula and shipyards operated by Huntington Ingalls Industries, the largest employer in the state with more than 13,000 employees. In Hancock County, the highest volume of truck traffic on I-10 occurs east of MS 43 where more than 12,000 heavy vehicles are estimated to pass daily (see Figure 6-6). Trucks headed to or from Port Bienville, near the mouth of the Pearl River, travel on Highway 607 and US 90. The volume of truck traffic on Highway 607 between I-10 and US 90 is estimated to be more than 2,900 vehicles per day.

The *Mississippi Statewide Freight Plan* listed two significant highway bottlenecks in Mississippi Gulf Coast corridors identified in a survey of freight transportation infrastructure users. One was US 49 between I-10 and US 90. The other was the section of I-10 between Gautier and Moss Point which features a four-mile-long four-lane bridge across the Pascagoula River Basin.

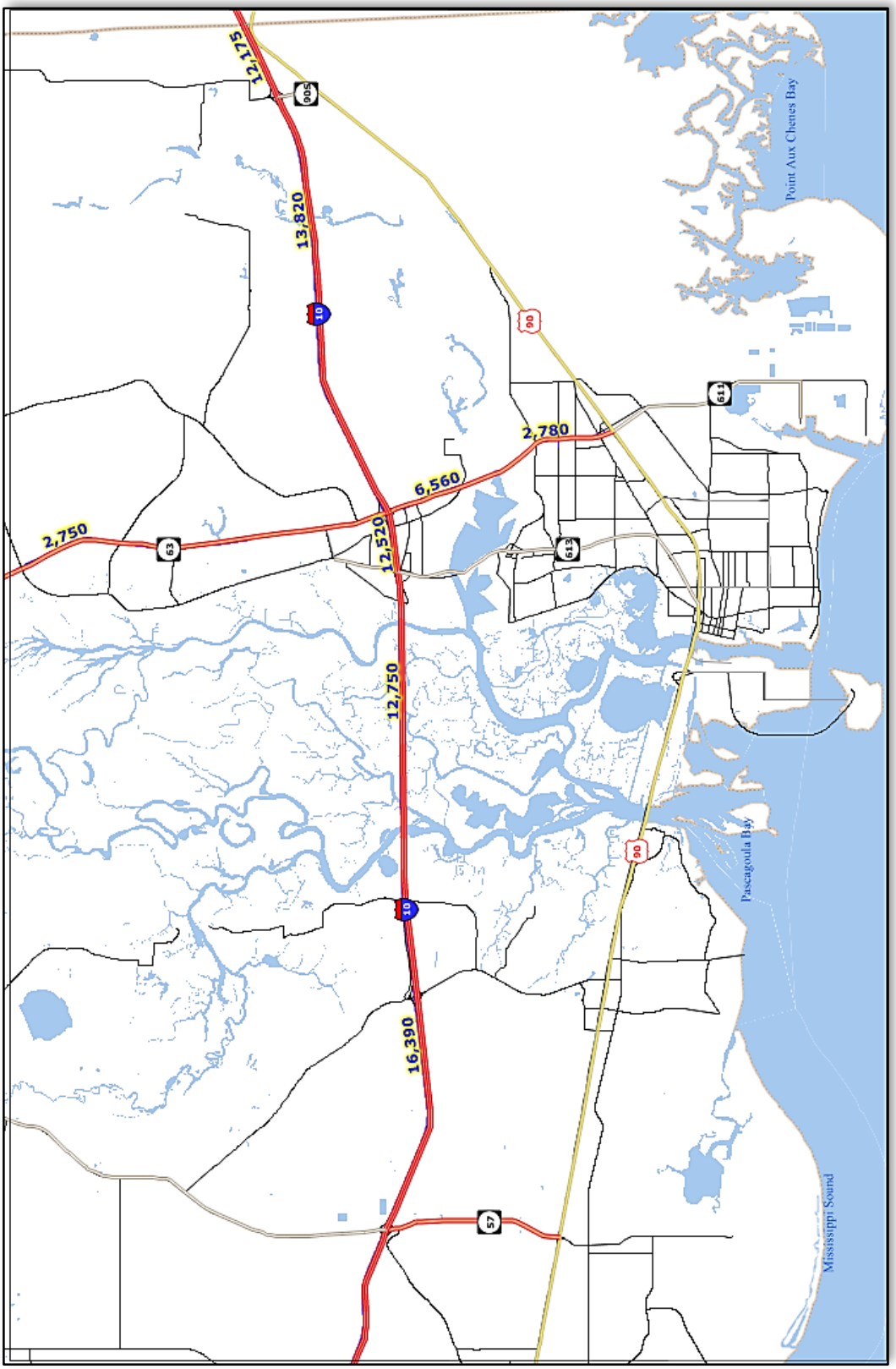
An assessment of *Mississippi's Transportation Infrastructure* prepared by MDOT in 2013 resulted in unsatisfactory pavement condition ratings on I-10 in the vicinity of US 49 and from Cedar Lake Road to I-110 in Harrison County; and from Highway 609 to Highway 613 in Jackson County. An unsatisfactory pavement rating was also recorded for US 49 from south of Airport Road to 28th Street in Gulfport and for the entire length of I-110 in D'Iberville and Biloxi. In Hancock County, the segment of Highway 607 connecting I-10 to US 90 was rated unsatisfactory, as was US 90 throughout Waveland and Bay Saint Louis. Much of I-10 in Jackson County—from Highway 609 to Highway 613—drew an unsatisfactory pavement rating, as did MS 63 from I-10 to US 90. Another roadway segment especially important for the movement of freight, US 90 from the west bank of the Pascagoula River to Highway 613, was rated unsatisfactory. This route provides access to Huntington Ingalls Industries and carries the largest daily concentration of commuters in the region. Highway 90 was also accorded an unsatisfactory pavement rating from Moss Point eastward to the Alabama state line.

Figure 6-4: Average Daily Truck Traffic -- Harrison County Freight Corridors



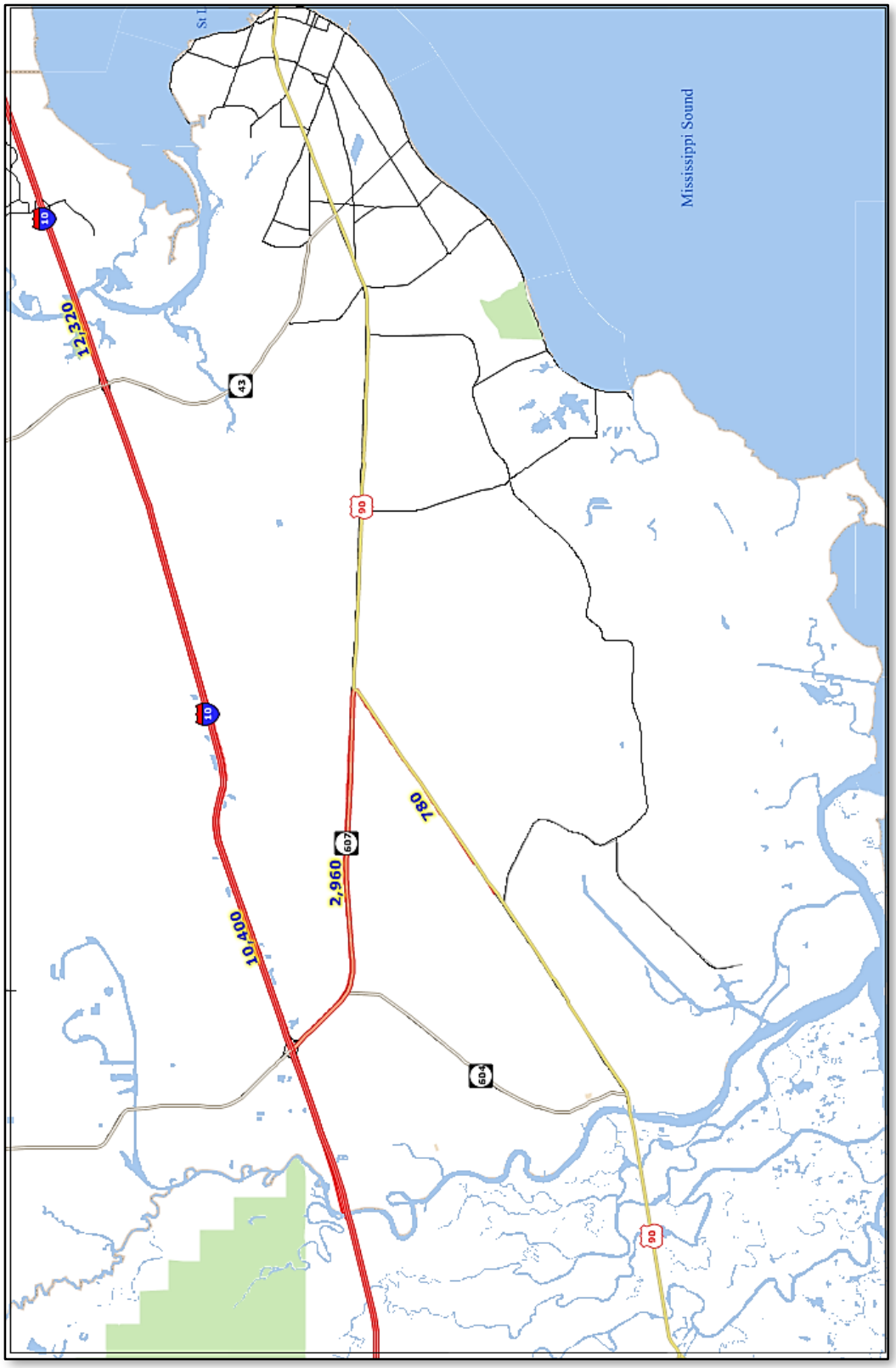
Source: Neel-Schaffer, Inc.

Figure 6-5: Average Daily Truck Traffic -- Jackson County Freight Corridors



Source: Neel-Schaffer, Inc.

Figure 6-6: Average Daily Truck Traffic -- Hancock County Freight Corridors



Source: Neel-Schaffer, Inc.

Railroads—There are four railroads moving freight on lines located in the Mississippi Gulf Coast MPA: CSX Transportation (CSXT), Kansas City Southern Railway (KCS), Mississippi Export Railroad (MSE) and Port Bienville Railroad (PBVR). CSXT and KCS are Class I railroads; MSE and PBVR are Class III shortline railroads. The CSXT line runs east and west along the Mississippi coast, connecting New Orleans and Mobile. The company's New Orleans and Mobile (NO&M) subdivision encompasses over 130 linear miles of railroad right-of-way, more than half of which lies within the Mississippi Gulf Coast MPA. There are 131 highway-railroad grade crossings on the CSXT line in Mississippi, including 16 in Hancock County, 83 in Harrison County and 32 in Jackson County (Federal Railroad Administration - Office of System Analysis, 2015: *National Highway-Rail Crossing Inventory*).

The total centerline length of the CSXT main track in Mississippi, from the Louisiana state line on the west to the Alabama state line on the east, is 73.8 miles: 15.8 in Hancock County, 28.4 in Harrison County and 29.6 in Jackson County. That includes a two-mile bridge across the Bay of Saint Louis and a shorter span (approximately 1.15 mile) bridging the Bay of Biloxi. Both bridges were built following Hurricane Katrina to replace the spans destroyed by the storm in 2005. During the period of several weeks required to build the new bridges, no goods were moved on the CSXT line across Mississippi. The gap in the system caused by Hurricane Katrina required the rerouting of shipments around the Mississippi Gulf Coast area, on tracks belonging to other railroads, a detour that added more than 50 miles to every trip. The loss of rail service, for as long as it took to build new bridges, dealt another blow to the battered Mississippi Gulf Coast area. It also served to demonstrate how indispensable well-maintained and properly functioning transportation infrastructure is for the economy of the region.

KCS, the other Class I railroad in the area, operates on a rail line that has its southern terminus in the Mississippi State Port at Gulfport. The line runs in a northerly direction from there, bisecting the study area before crossing into Stone County and continuing on to Hattiesburg and Jackson. A plan contemplated over a number of years came to fruition in 2015 and culminated in an agreement between KCS and the Mississippi State Port Authority to make a joint investment in upgrading the line. Pending improvements will render the KCS rail line capable of carrying standard 286,000-pound cars and double-stack trains. This represents a very significant enhancement of the regional freight transportation system, one which has long been considered essential for maintaining and expanding the capacity of the Mississippi State Port at Gulfport to move goods in or out of the port efficiently and with expedition.

There are 22 centerline miles of KCS mainline track between the northern edge of State Port property at US 90 and the northern limit of Harrison County north of Saucier. There are also a number of auxiliary tracks associated with the KCS mainline. East and west leads located immediately south of US 90 connect the main track to portside facilities where goods can be transferred to or from ships. A wye-track located in the middle of downtown Gulfport allows the occasional transfer of cars between the KCS north-south line, coming out of the port, and the CSXT line running east and west. The east-west *Seabee Lead* links the main line to the Naval Construction Battalion Center (NCBC) on the west side of Gulfport. The *DuPont Lead* allows rail transport of raw materials, arriving by sea, from the State Port to the Chemours Company (formerly DuPont) facility at DeLisle; and the transport of titanium dioxide pigment produced at the plant back to the port. Finally, the *Seaway Lead* provides essential rail service to the Bayou Bernard Industrial

District located between I-10 and the Industrial Seaway east of US 49. There are 34 highway-rail grade crossings on the KCS main track in Harrison County, 12 on the Seaway Lead, seven on the DuPont Lead and another seven on other leads and spurs, for an overall total of 60.

Mississippi Export Railroad is a 42-mile Class III shortline railroad operating between the Port of Pascagoula and Evanston in George County where it connects to the Canadian National Railways line between Hattiesburg and Mobile. At its southern end the MSE rail line connects to the CSXT railroad in Pascagoula. The company maintains five working locomotives operating on tracks capable of accommodating unit trains with loads of up to 315,000 pounds per car. With headquarters in Moss Point, MSE owns and operates its own railcar and locomotive repair shop and maintenance facility and has excess track space for railcar storage and team tracks available for the transfer of freight. There are 59 at-grade highway-rail crossings on MSE tracks, a majority of them within the Pascagoula Urbanized Area.

Port Bienville Railroad is a 7.5-mile shortline providing service between the port operated by the Hancock County Port and Harbor Commission and the CSXT mainline rail junction in the vicinity of Ansley. PBVR has 286,000-pound gross-weight-on-rail carrying capacity and storage for more than 400 railcars. There are 12 at-grade highway-rail crossings on the line.

Airports—Gulfport-Biloxi International Airport features a 40,000-square-foot cargo facility with 20,000 square feet of chiller space and 20,000 square feet of cargo sorting and distribution space. Airside access from the runway system can accommodate two MD11s, DC10s or B747s. The existing cargo area is also expandable with 120 acres reserved for air cargo on airport property.

6.5 AVIATION

Commercial Airports and General Aviation Facilities

The region's aviation facilities play a vital role in the overall transportation system, offering services that efficiently move both people and goods into and out of the area. Airports also make significant contributions to corporate recruitment and economic development; provide military support; offer assistance to first-responders during emergencies; and provide recreational and tourism opportunities.

There are three publicly owned commercial and general aviation airports in the Mississippi Gulf Coast MPA, one in each of the three counties. The principal location for commercial airline service is Gulfport-Biloxi International Airport in Harrison County. Stennis International Airport in Hancock County provides general aviation facilities and services in proximity to the National Aeronautics and Space Administration's Stennis Space Center. Trent Lott International Airport provides the same services in Jackson County for the benefit of the general public and corporations engaged in heavy industry in and around Pascagoula.

Centrally located just east of US 49 and south of I-10, approximately three miles north of downtown Gulfport, Gulfport-Biloxi International Airport (GPT) is a joint civil-military public-use airport owned and operated by the Gulfport-Biloxi Regional Airport Authority. GPT offers regularly scheduled passenger air

service provided by four commercial airlines: American Airlines, Delta Airlines, United Airlines and Sun Country Airlines. American offers service to Charlotte and Dallas-Fort Worth; Delta flights travel between GPT and Atlanta; United flies to Houston-Intercontinental; and Sun Country provides seasonal flights to and from Minneapolis-St. Paul. GPT is classified in the National Plan of Integrated Airport Systems (NPIAS) as a *primary commercial service airport*. According to Federal Aviation Administration (FAA) records, nearly half a million passengers (487,907) boarded flights at the airport in 2008. The figure for 2014 was a somewhat less imposing 325,437.

Originally constructed by the U. S. Army Air Forces as a training base during World War II, it remains a joint-use airport and Air National Guard base. There are no military aircraft permanently housed at the airport, but it continues to serve as headquarters of the Gulfport Combat Readiness Training Center. GPT encompasses 1,400 acres and features two runways, one 9,002 feet long by 150 feet wide and a second 4,935 feet long by 150 feet wide. During the 12-month reporting period that ended January 31, 2012, there were 63,052 aircraft operations for an average of 172 per day: 43 percent were military, 31 percent were general aviation, 20 percent were air taxi takeoffs or landings, and six percent were scheduled commercial flights. There were 34 aircraft based at the airport: 17 single-engine planes, seven jets, six multi-engine planes, two helicopters and two military aircraft. GPT also offers a 40,000-square-foot cargo facility that includes 20,000 square feet of chiller space and 20,000 square feet of cargo sorting and distribution space, as well as 6,000 square-feet of office space. General aviation services at GPT are provided by Million Air and Apollo Aviation.

Owned and operated by the Hancock County Port and Harbor Commission, Stennis International Airport is located just north of I-10 and west of MS 43 (SR 603) between Bay Saint Louis and Kiln. The airport is also located just east of the noise buffer zone for the NASA rocket testing facility at John C. Stennis Space Center. Stennis International is a public use airport listed in the NPIAS as a general aviation facility. Originally established as an auxiliary military training airfield during World War II, it was eventually opened for civil use in 1970, following the location of the NASA space center in Hancock County.

The airport itself encompasses 591 acres and has a single runway 8,497 feet long and 150 feet wide. During the 12-month period ended January 31, 2012, the airport recorded 63,600 aircraft operations, averaging 174 per day. Of that total, 90 percent were general aviation takeoffs or landings and 10 percent were military operations. At that time there were 34 aircraft based at the airport: 25 single-engine planes, five multi-engine aircraft, two jets and two ultralight aircraft. Million Air serves as the fixed-base operator (FBO) for Stennis International Airport, providing aircraft fueling, air charter, hangar space and aircraft tie-down service. Adjoining the airport, the 1,800-acre Stennis International Airpark houses a variety of local and international businesses, including Lazy Magnolia Brewery and Optech, a leading developer and manufacturer of advanced lidar remote-sensing and photographic survey instruments for airborne mobile and terrestrial mapping.

Trent Lott International Airport is a public-use airport owned by Jackson County located immediately north of I-10 and east of MS 63 in the vicinity of Moss Point. Trent Lott international provides charter service, flight training and testing facilities for both manned and unmanned airplanes and helicopters.

Corporate clients include Northrop Grumman, Chevron, Omega Protein and ERA Helicopters. The airport encompasses 906 acres and features a 6,500-foot runway 100 feet wide. A 500-acre industrial/business park adjoins the airport property. During a 12-month period in 2006-2007, the airport recorded 50,205 aircraft operations, averaging 137 per day. Of that total, 87 percent were general aviation, 10 percent were air taxi and four percent were military operations. At that time there were 53 aircraft based at the airport: 35 single-engine, eight multi-engine, seven jets and three helicopters.

6.6 SAFETY

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

In recent years, on average, 35,600 fatalities occur on roadways in the United States each year. Every crash, regardless of its severity, entails a cost that must be borne by the public. It may be only the expense incurred in dispatching a police officer to write up an accident report; there may be damage to public property such as light standards, fences, curbs or median barriers; or there may be more significant costs associated with emergency services, traffic congestion and travel delay resulting from lane closures, removal of damaged vehicles and other debris, including potentially toxic material. Despite the downward trend in the incidence of fatal accidents, there remains a need to address the frequency of vehicular collisions and the continuing quest for enhanced roadway safety. One purpose of this plan is to advance that quest and contribute in some small way to the greater safety of motorists, bicyclists and pedestrians on the streets and highways of the Mississippi Gulf Coast.

Safety Management System (SMS)

Traffic safety programs are relatively uniform from state to state in their approach to making the highway system safer for their users. The typical traffic safety program combines several different features from an SMS, which all states were mandated to have following enactment of the *Intermodal Surface Transportation Efficiency Act* of 1991 (Public Law 102-240). Commonly known as ISTEA, the act required the SMS to address the following:

- Coordinating and integrating safety features for the various modes of travel;
- Identifying hazardous locations, investigating them, and establishing countermeasures to increase safety;
- Early consideration for safety in all highway projects and programs;
- Identifying safety needs of special user groups (handicapped, elderly, etc.);
- Routinely maintaining and upgrading the safety features on the roadways;

- Marketing safety programs to encourage community involvement.

The SMS mandate was later withdrawn due to the 1995 *National Highway System Designation Act* (Public Law 104-59, 109 Stat. 568). However, Section 1203 of the *Moving Ahead for Progress in the 21st Century Act* (Public Law 112-141), adopted in 2012, required that each state and MPO have a planning process that addresses the safety performance measure to "achieve a significant reduction in traffic fatalities and serious injuries on all public roads." Commonly known as MAP-21, the act also retains the requirement previously imposed by the *Safe, Accountable, Flexible, Transportation Equity Act: A Legacy for Users* (Public Law 109-59) that the planning process address the need to "increase the safety of the transportation system for motorized and non-motorized users." A traffic safety program involves several steps, and programs are relatively uniform throughout the United States. The typical traffic safety program includes the following elements:

- A crash record system;
- Identification of hazardous locations;
- Engineering studies;
- Selection of countermeasures;
- Prioritization of improvement projects;
- Planning and implementation of improvement projects;
- Evaluation of the implemented projects.

The crash record system should contain data on individual crashes that occur in the area. The crash data should include the following information: Time, date, weather, pavement condition, driver and roadway. The primary source for this data is usually police reports from local jurisdictions. In order for this record system to be useful, the data has to be processed and available on a timely basis so that it can be analyzed.

The identification of hazardous locations is based on actual crashes that have occurred and/or the perceived potential of an area to have a high number of crashes. The severity of these crashes must also be considered in order to prioritize the locations and develop solutions for problems associated with each. Once the hazardous locations are identified, engineering studies can be conducted using the crash record system data. An analyst can make use of crash frequency data, Equivalent Property Damage Only (EPDO) rates and other statistical approaches. Supplemental data from police comments and citizen complaints can also be used in the analytical process in attempting to identify the causes of crashes.

Once cause has been determined, countermeasures can be proposed and evaluated. Improvement projects can then be selected on the basis of benefits they would provide compared to the cost required to implement them. Sometimes, enforcement and education may be all that is necessary in order to reduce the number of crashes. In other cases multiple projects may be needed to mitigate conditions at a particular problem area.

Once projects have been selected, they need to be prioritized based on previously identified benefits and costs. Funding limitations may rule out any possibility of implementing certain projects. Once those that are considered feasible have been prioritized, a plan should be developed for their implementation. An implementation plan will help ensure that the necessary financial and other are available to complete the selected projects in a timely manner. Implementation of the projects should occur as soon as possible to avoid cost increases and prevent potential crashes that may occur without the project in place.

Projects must be evaluated to determine whether they are effective or can be used to address similar problems in the future. This is typically done in a before-and-after analysis by observing the frequency and severity of the crashes several years before the implementation of the project, and then for several years after the project has been completed. Two issues can arise in this method of analysis. First, if enforcement and/or education change from *before* to *after* conditions, it can affect the number of crashes at that location. Second, *regression to the mean*, a statistical phenomenon that can make natural variation in repeated data look like real change, must be taken into account to ensure that a change in crash patterns and/or frequency is actually attributable to the improvements made. In order to correct for these two issues, the methodology employed for the analysis should include the establishment of control sites similar to the study locations that have not had any changes made to them.

The safety element of the Mississippi Gulf Coast 2040 MTP focuses on gathering and analyzing available crash data and then identifying hazardous locations. Due to the limited scope of this study, it does not identify location-specific recommendations for the identified hazardous locations. However, potential countermeasures which could be used to mitigate various crash types have been included in Section 8.1.

Study Area Crash Data Analysis

Safety Analysis Management System (SAMS) data, provided by the Mississippi Department of Transportation (MDOT), were used to georeference crash locations by linking latitude and longitude coordinates to the reports. Crash reports from Hancock, Harrison and Jackson counties, for the period from 2011 through 2013, were used to conduct a safety analysis of the study area. The crash records included the time and location of the accident, its severity, and the crash location conditions. A total of 27,592 crashes occurred within the study area (see Table 6-10). There were in excess of 9,000 crashes in each of the three years, and in each year more than half of all crashes occurred in Harrison County.

Table 6-10:
CRASHES BY YEAR BY COUNTY (2011 - 2013)

CRASH YEAR	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER
2011	697	4,603	3,812	9,112
2012	730	4,640	3,640	9,010
2013	845	4,839	3,786	9,470
TOTAL	2,272	14,082	11,238	27,592

Source: Safety Analysis Management System (SAMS), 2011-2013.

Crash Trends

The first step in improving travel safety is determining the causes of crashes. This study analyzed time, surface condition, lighting, severity, collision type, bicycle or heavy vehicle involvement, and whether or not alcohol was a factor. The first factor on which the study focused was the time at which the crash

under investigation occurred (see Table 6-11). Approximately 75 percent of all crashes occurred between 8 a.m. and 8 p.m., hours in which people were traveling to work, school, shopping and other activities. The largest number of crashes occurred between 3 p.m. and 6 p.m., when traffic tends to be the heavies

Another factor to consider is the condition of the roadway surface at the time of the crash. While most crashes occurred on dry roads, a significant number--4,685 or 17.0 percent of the total--occurred on wet roads (see Table 6-12). Wet roadway surface conditions might have been a factor in some instances, but the overwhelming majority of crashes happened when rain was not falling and wet conditions did not exist.

Table 6-11:
CRASHES BY TIME OF DAY BY COUNTY (2011-2013)

HOUR BEGINNING	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Midnight	31	182	150	363	1.32%
1:00 AM	26	138	126	290	1.05%
2:00 AM	29	134	110	273	0.99%
3:00 AM	23	133	101	257	0.93%
4:00 AM	32	138	149	319	1.16%
5:00 AM	49	145	302	496	1.80%
6:00 AM	59	308	318	685	2.48%
7:00 AM	136	729	551	1,416	5.13%
8:00 AM	81	517	462	1,060	3.84%
9:00 AM	75	544	384	1,003	3.64%
10:00 AM	90	653	488	1,231	4.46%
11:00 AM	130	894	614	1,638	5.94%
12:00 PM	126	1,033	665	1,824	6.61%
1:00 PM	174	982	692	1,848	6.70%
2:00 PM	135	1,095	854	2,084	7.55%
3:00 PM	183	1,252	1,057	2,492	9.03%
4:00 PM	216	1,175	991	2,382	8.63%
5:00 PM	196	1,296	1,059	2,551	9.25%
6:00 PM	144	769	629	1,542	5.59%
7:00 PM	96	588	430	1,114	4.04%
8:00 PM	83	464	376	923	3.35%
9:00 PM	62	359	317	738	2.67%
10:00 PM	61	318	221	600	2.17%
11:00 PM	35	236	192	463	1.68%
Unlisted	0	0	0	0	0.00%
TOTAL	2,272	14,082	11,238	27,592	100.00%

Source: Mississippi Department of Transportation Safety Analysis Management System *(SAMS), 2011-2013 Crash Records for Hancock, Harrison, and Jackson counties.*

Lighting conditions at the time of a crash may or may not have been a factor. Over 73 percent of all crashes occurred during daylight (see Table 6-13). About 14 percent of crashes occurred when it was dark outside but there were street lights in the area; another 10 percent occurred at night but in areas that were not illuminated by street lights.

The type of collision is also an important factor in determining the cause of crashes. Rear-end collisions were far and away the most frequently recorded type of crash during the study period (see Table 6-14). Nearly as many rear-end crashes occurred (10,266) as were recorded for the next two most frequent categories combined. The system recognizes 21 different types of crashes, but the four most commonly occurring—Rear-end (37.2 percent), Angle (19.9 percent), Run off road (18.3 percent) and Sideswipe (10.1 percent)—collectively accounted for 85.5 percent of all accidents. Rear-end crashes are typically concentrated at or near signalized intersections.

Unlike roadway surface or lighting conditions, or the type of collision, crash severity is not a cause or contributing factor but a way to measure the outcome of the accident. Of the 27,592 crashes that occurred in the Mississippi Gulf Coast area during the three-year period from 2011 through 2013, 154 resulted in fatalities and 8,475 involved injuries (see Table 6-15). Only 1.2 percent of the total were crashes that resulted in either a fatality or severe injury; about 69 percent had no injuries reported.

Between 2011 and 2013, pedestrians were involved in 246 traffic accidents in the study area (see Table 6-16). That represented less than one percent of all vehicular crashes. However, 22 of those accidents involving pedestrians resulted in fatalities, accounting for 14.3 percent of all fatal crashes in the study area. Bicyclists were involved in 98 crashes--less than one-half of one percent of the study area total--including two fatal accidents (see Table 6-17). Heavy vehicles were involved in 445 accidents or 1.6 percent of all crashes in the study area between 2011 and 2013 (see Table 6-18). Four resulted in fatalities.

The last characteristic examined in this analysis was the possible involvement of alcohol in a vehicular mishap. The data indicated that in 5.8 percent of all crashes the accident report noted the consumption of alcohol as a factor (see Table 6-19). Moreover, alcohol as a factor in fatal crashes was twice as prevalent. Of the 154 fatal crashes that occurred in the three-county metropolitan area over the three-year period studied, 18 were alcohol-related. That represents a disproportionately high 11.7-percent share of all fatal crashes in the area.

Crash Locations

There were 10,148 intersection crashes in the study area in the three years from 2011 through 2013. The total number of crashes at each intersection was computed by summing accidents located on one road within 100 feet of the road intersecting it, then doing the same for crashes on the other road and combining the results.

Table 6-12:
CRASHES BY ROADWAY SURFACE CONDITION BY COUNTY (2011-2013)

ROADWAY SURFACE CONDITION	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Dry	1,783	11,576	9,322	22,681	82.2%
Wet	459	2,380	1,846	4,685	17.0%
Water	10	66	29	105	0.4%
Ice	0	1	0	1	0.0%
Sand/Mud/Dirt/Oil/Gravel	7	35	10	52	0.2%
Unlisted	13	24	31	68	0.2%
TOTAL	2,272	14,082	11,238	27,592	100.0%

Source: Mississippi Department of Transportation Safety Analysis Management System *(SAMS), 2011-2013 Crash Records for Hancock, Harrison, and Jackson counties.*

Table 6-13:
CRASHES BY ROADWAY LIGHTING BY COUNTY (2011-2013)

LIGHTING CONDITION	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Daylight	1,637	10,478	8,089	20,204	73.2%
Dark – Lit	280	2,157	1,436	3,873	14.0%
Dark – Unlit	306	1,162	1,382	2,850	10.3%
Dawn	26	92	143	261	0.9%
Dusk	23	193	188	404	1.5%
TOTAL	2,272	14,082	11,238	27,592	100.0%

The intersection with the highest incidence of accidents in each county was located on one of the two high-volume U. S. highways in the region: US 49 in Harrison County and US 90 in Hancock and Jackson counties (see Table 6-20). Not surprisingly, US 49 at Creosote Road in Gulfport, the most heavily traveled intersection in the region with a composite daily approach volume of approximately 72,000 vehicles, experienced the greatest number of accidents—289. The only other intersection that came close, Pass Road at Cowan Road in Gulfport, had 277 crashes and posted a close second in spite of the fact that there are at least 20,000 fewer vehicles approaching the intersection daily than there are at the first intersection.

The most notable difference between the two intersections is that traffic is distributed more evenly at the second with heavy volumes on three of the four approaches compared to only two at the top-ranked intersection. There is a greater preponderance of turning movements and hence greater potential for conflict. Other differences relate to intersection geometry and signalization. The Highway 49 intersection has dedicated left-turn lanes for all approaches plus a left-or-through lane for the eastbound approach from Creosote Road to US 49. At the intersection of Pass Road and Cowan Road there are dual dedicated

Table 6-14:
CRASHES BY TYPE OF COLLISION BY COUNTY (2011-2013)

TYPE OF COLLISION	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Run off road	624	2,345	2,080	5,049	18.3%
Vehicle overturn	5	21	17	43	0.2%
Object fell from vehicle	12	52	54	118	0.4%
Other object in road	14	44	50	108	0.4%
Roadside Object	2	133	57	192	0.7%
Pedestrian	6	160	80	246	0.9%
Bicycle	9	67	22	98	0.4%
Parked vehicle	37	308	407	752	2.7%
Train	3	16	13	32	0.1%
Rear End	706	5,350	4,210	10,266	37.2%
Left turn same roadway	127	996	611	1,734	6.3%
Left turn cross traffic	0	9	8	17	0.1%
Right turn cross traffic	0	2	1	3	0.0%
Head on	19	123	83	225	0.8%
Sideswipe	232	1,419	1,131	2,782	10.1%
Angle	419	2,866	2,204	5,489	19.9%
Hit and Run	2	40	28	70	0.3%
Jackknife	0	1	5	6	0.0%
Animal	52	121	159	332	1.2%
Other	3	8	16	27	0.1%
Unknown	0	1	2	3	0.0%
Total	2,272	14,082	11,238	27,592	100.0%

Table 6-15:
CRASHES BY SEVERITY BY COUNTY (2011-2013)

SEVERITY	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Fatal	25	79	50	154	0.6%
Severe	33	67	74	174	0.6%
Moderate	215	840	666	1,721	6.2%
Complaint	491	3,755	2,334	6,580	23.8%
No Injury	1,508	9,341	8,114	18,963	68.7%
Unlisted	0	0	0	0	0.0%
Total	2,272	14,082	11,238	27,592	100.0%

Source: Mississippi Department of Transportation Safety Analysis Management System (SAMS), 2011-2013 Crash Records for Hancock, Harrison, and Jackson counties.

Table 6-16:
CRASHES INVOLVING PEDESTRIANS BY COUNTY (2011-2013)

PEDESTRIAN INVOLVED/NOT INVOLVED	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Pedestrian involved	6	160	80	246	0.89%
Pedestrian not involved	2,266	13,922	11,158	27,346	99.11%
Total	2,272	14,082	11,238	27,592	100.00%

Table 6-17:
CRASHES INVOLVING BICYCLES BY COUNTY (2011-2013)

BICYCLE INVOLVED/ NOT INVOLVED	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Bicycle involved	9	67	22	98	0.36%
Bicycle not involved	2,263	14,015	11,216	27,494	99.64%
Total	2,272	14,082	11,238	27,592	100.00%

Table 6-18:
CRASHES INVOLVING HEAVY VEHICLES BY COUNTY (2011-2013)

HEAVY VEHICLE INVOLVED/NOT INVOLVED	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Heavy vehicle involved	73	177	195	445	1.61%
Heavy vehicle not involved	2,199	13,905	11,043	27,147	98.39%
Total	2,272	14,082	11,238	27,592	100.00%

Source: Mississippi Department of Transportation Safety Analysis Management System (SAMS), 2011-2013 Crash Records for Hancock, Harrison, and Jackson counties.

left-turn lanes for all four approaches. Perhaps more significantly, while left turns from or to US 49 are permitted only on the green arrow, left turns from Pass Road to Cowan Road are protected on the green arrow and allowed on the green.

The top five intersection accident locations in Hancock County are all on US 90. Of the top 10 seven are on US 90 and the other three are on MS 43. Four of the top five--and seven of the top 10--intersection crash locations in Harrison County are on US 49. Two of the other three are on Highway 605 (Cowan Road and Lorraine Road). In Jackson County the top five intersection accident locations are on US 90: Two on Denny Avenue in Pascagoula and three on Bienville Boulevard in Ocean Springs. The top 10 include three on Denny Avenue and five on Bienville Boulevard. Very few of the crashes occurring at the intersections with a high frequency of accidents resulted in fatalities or serious injuries. Data for the 20 intersections with the most accidents show that only four of 2,721 crashes involved death (three) or severe injury (one) (see Table 6-21). Moderate injuries were associated with 60 crashes; another 616 involved complaints. That leaves 2,041, or 75 percent, that were recorded as no-injury accidents.

Table 6-19:
CRASHES INVOLVING ALCOHOL CONSUMPTION BY COUNTY (2011-2013)

ALCOHOL CONSUMPTION INVOLVED/NOT INVOLVED	HANCOCK COUNTY	HARRISON COUNTY	JACKSON COUNTY	TOTAL NUMBER	PERCENT OF TOTAL
Alcohol consumption	141	851	614	1,606	5.82%
Alcohol consumption not involved	2,131	13,231	10,624	25,986	94.18%
Total	2,272	14,082	11,238	27,592	100.00%

Source: Mississippi Department of Transportation Safety Analysis Management System (SAMS), 2011- 2013 Crash Records for Hancock, Harrison, and Jackson counties.

Table 6-20:
TOP 10 INTERSECTIONS WITH HIGH INCIDENCE OF CRASHES BY COUNTY (2011-2013)

HANCOCK COUNTY		HARRISON COUNTY		JACKSON COUNTY	
Intersection	Crashes	Intersection	Crashes	Intersection	Crashes
US 90 @ MS 43/603 (Nicholson Ave)	76	US 49 @ Creosote Rd	289	Denny Ave (US 90) @ Hospital Rd	175
US 90 @ Waveland Ave	50	Cowan Rd (Hwy 605) @ E Pass Rd	277	Denny Ave (US 90) @ Chicot St	173
US 90 @ Blue Meadow Rd/Main St	38	US 49 @ Dedeaux Rd	221	Bienville Blvd (US 90) @ Washington Ave (Hwy 609)	113
US 90 @ McLaurin Rd	38	US 49 @ Crossroads Pkwy/Landon Rd	215	Bienville Blvd (US 90) @ Hanshaw Rd	99
US 90 @ Washington St	31	US 49 @ Community Rd	126	Bienville Blvd (US 90) @ Ocean Springs Rd	90
MS 43/603 @ I-10 EB Off Ramp	28	Lorraine Rd (Hwy 605) @ Seaway Rd	110	Hwy 609 @ Old Fort Bayou Rd	90
US 90 @ Drinkwater Blvd	26	US 49 @ Airport Rd/Poole St	106	Bienville Blvd (US 90) @ Hanley Rd	85
US 90 @ Lower Bay Rd	24	US 49 @ Pass Rd	105	Bienville Blvd (US 90) @ Martin Luther King Jr Ave/Vermont Ave	85
MS 43/603 @ Kiln-DeLisle Rd	24	Dedeaux Rd @ Three Rivers Rd	98	Denny Ave (US 90) @ Market St	81
MS 43/603 @ I-10 WB Off Ramp	23	US 49 @ 28th St	90	MS 63 @ Amoco Rd	71

Safety Analysis Conclusions

Within the study area a total of 27,592 crashes occurred between 2011 and 2013. The majority of these crashes took place between the hours of 8 a.m. and 8 p.m., with most occurring from 3 p.m. to 6 p.m. These peak-hour crashes are likely the result of intersections and/or roadways not being designed to operate efficiently when presented with large traffic volumes. Safety can probably be improved and collisions reduced by adjusting signal timing, making intersection improvements and/or adding lane(s).

Table 6-21:
TOP 20 INTERSECTIONS WITH HIGH CRASH FREQUENCY BY SEVERITY (2011-2013)

RANK	INTERSECTION LOCATION	TOTAL	FATAL	SEVERE	MODERATE	COMPLAINT	NO INJURY
1	US 49 @ Creosote Rd	289	0	0	4	64	221
2	Cowan Rd (Hwy 605) @ E Pass Rd	277	0	0	4	64	209
3	US 49 @ Dedeaux Rd	221	0	0	2	33	186
4	US 49 @ Crossroads Pkwy/Landon Rd	215	0	0	1	40	174
5	Denny Ave (US 90) @ Chicot St	175	1	0	3	53	118
6	Bienville Blvd (US 90) @ Washington Ave (Hwy	173	0	0	4	33	136
7	US 49 @ Community Rd	126	0	0	1	31	94
8	Denny Ave (US 90) @ Hospital Rd	113	0	0	4	28	81
9	Lorraine Rd (HWY 605) @ Seaway Rd	110	0	0	0	27	83
10	US 49 @ Airport Rd/Poole St	106	0	0	1	23	82
11	US 49 @ Pass Rd	105	0	1	5	24	75
12	Bienville Blvd (US 90) @ Hanshaw Rd	99	0	0	8	33	58
13	Dedeaux Rd @ Three Rivers Rd	98	0	0	1	21	76
14	Bienville Blvd (US 90) @ Ocean Springs Rd	90	0	0	3	19	68
15	Washington Ave (Hwy 609) @ Old Fort Bayou Rd	90	1	0	0	15	74
16	US 49 @ 28th St	90	0	0	2	21	67
17	US 49 @ MS 53/N Swan	88	1	0	5	27	55
18	Lorraine Rd (Hwy 605) @ I-10 WB Off Ramp	86	0	0	4	20	62
19	Bienville Blvd (US 90) @	85	0	0	2	21	62
20	Bienville Blvd (US 90) @ M L King Jr/Vermont Ave	85	0	0	6	19	60
TOTAL		2,721	3	1	60	616	2,041

Source: Mississippi Department of Transportation Safety Analysis Management System (SAMS), 2011-2013 Crash Records for Hancock, Harrison, and Jackson counties.

Approximately 82 percent of crashes in the study area occurred during dry roadway surface conditions; therefore, roadway surface conditions do not play a significant role in the majority of crashes. About 73 percent of crashes occurred during the daylight, with 24.5 percent of crashes occurring near a traffic signal or at locations with no street lights when it was dark. The crashes that occurred under these conditions are likely the result of poor lighting and can be reduced by providing proper lighting at intersections. Within the study area there were 154 fatal crashes and 8,475 injury crashes during the period analyzed. About five percent of all crashes involved alcohol, but 11.6 percent of fatal accidents were alcohol-related.

The four most prevalent types of collisions, collectively making up nearly 86 percent of all crashes in the study area, were the following:

- Rear-end collisions;
- Angle collisions;
- Run off road collisions; and
- Side-swipe collisions.

Recommendations for reducing these types of crashes are outlined in Chapter 8.0: Future Transportation Needs.

7.0 FUTURE TRAVEL FORECAST

The practice of using computer-driven travel demand forecasting models to project future transportation needs began in the 1960s and achieved widespread use in the 1970s. The advent of travel demand forecasting software for personal computers in the 1980s led to almost universal adoption of transportation modeling by metropolitan planning organizations. The updated Mississippi Gulf Coast Area Regional Travel Demand Forecasting Model developed for the 2040 Metropolitan Transportation Plan (MTP) was constructed on Caliper Corporation's *TransCAD 6.0* software platform. The transportation model is driven by a land use and demographic database developed by Gulf Regional Planning Commission (GRPC). GRPC assembled base-year population, housing, employment, hotel and motel, school and casino data used to calibrate the model to actual traffic conditions in 2013 based on annualized average daily traffic (AADT) estimates for hundreds of count locations in the region. Data for the model variables provided the inputs used to estimate the number of trips produced and attracted within individual traffic analysis zones. There are 797 such zones in the study area: 268 in Jackson County, 438 in Harrison County and 91 in Hancock County. In addition there are 16 external stations located on the study area boundary at points where major roadways carry traffic in or out of the three coastal counties from or to other counties in Mississippi or adjacent states. GRPC developed a long-range forecast of future conditions for the years from 2020 to 2040. The forecast data were used to generate trips for the short-term (2020), intermediate (2030) and long-range (2040) planning years. Projected future travel was then assigned to the existing network (including committed improvements already programmed for implementation) in order to identify potential deficiencies likely to occur in the absence of additional improvements.

7.1 GENERALIZED APPROACH TO TRAVEL DEMAND FORECASTING

The Mississippi Gulf Coast Regional Travel Demand Model adheres to the conventional trip-based four-step modeling approach. The principal model components fall within the following four categories:

- ***Trip Generation*** is the process used to estimate the number of person-trips produced within—and attracted to--each traffic analysis zone (TAZ).
- ***Trip Distribution*** is the process by which trip productions and attractions are paired in order to yield zonal interchanges, linking trip origins and destinations across all TAZs.
- ***Mode Choice*** is the process by which person-trips are distributed among available modes represented in the model.
- ***Trip Assignment*** is the process used to assign vehicular trips to specific paths connecting TAZs linked in the trip distribution phase.

Trip Generation

Trip generation is used to determine the number of trips that either begin or end in a given traffic zone. The linking of trips-ends takes place in the trip distribution step following trip generation. The Mississippi Gulf Coast model generates trip productions and attractions for six internal trip purposes:

- Home-Based Work (HBW)
- Home-Based Other (HBO)
- Non-Home-Based (NHB)
- Gaming (GAME)
- Commercial Motor-Vehicle (CMVEH)
- Truck (TRK)

The model also generates trip attractions within the study area for two purposes involving trips with one end outside the metropolitan area:

- External-Internal Auto (EIAUTO)
- External-Internal Truck (EITRK)

For home-based trips, *production* refers to the home end of the trip, and *attraction* applies to the non-home end. This is true for both the trip from home to work (or other location) and the trip from work (or other location) to home: Both are *produced* in the zone of residence. For non-home-based, commercial motor-vehicle, gaming and truck trips, productions and attractions correspond to actual zones of origination and destination. The trip generation model uses cross-classification tables for the both home-based trip purposes and non-home-based travel purpose in order to stratify demand by household size and vehicle availability. For the gaming purpose the model applies linear regression equations that relate productions to occupied housing units and hotel or motel rooms; attractions are based on casino operating data (gaming area and number of gaming positions). For the commercial motor vehicle and truck trip purposes the model applies equations that relate trip productions and attractions to zonal employment and residency. The remaining trip attraction models utilize linear regression equations that relate zonal employment, households and school enrollment to trip attractions.

Trip Distribution

The trip distribution process determines where the trips produced in the trip generation go and, conversely, from where the attracted trips come. The mathematical tool used for this effort is called a gravity model because it makes use of the concepts of mass and impedance (i.e., distance) to quantify the relative attraction of each pair of zones for one another. The model employs the following relational assumptions:

- The number of trips made from zone *i* to zone *j* is inversely related to the distance from *i* to *j* expressed in terms of travel time.

- The number of trips made from zone *i* to zone *j* is directly related to the number of trips produced in *i* and the number of trips attracted to *j*.

Productions and attractions are balanced areawide for all trip purposes in order to ensure that every trip will have two ends, one of which can be identified as the origin, the other being designated the destination. For all purposes except gaming, attractions are balanced to productions; for gaming, attractions are held constant. The trip distribution model converts productions and attractions into

origins and destinations so that every individual trip will have both a beginning and an end. The result is a zonal matrix or trip table representing the number of trips from every zone (*i*) to every other zone (*j*).

Mode Choice

A mode choice model provides a process for estimating the number of trips made by each individual mode for all zonal interchanges. Because transit, pedestrian and bicycle trips represent a very small percentage of all travel in the study area, mode choice is frequently excluded from the model sets developed for smaller urban areas. This has been the approach adopted for the Mississippi Gulf Coast model in the past, and in the current model set the mode-choice step is used to convert person-trips into vehicle-trips based on assumed rates of vehicle occupancy. However, while a formal mode choice component is not included in the updated model, a post-processing transit application is under development and will be available for projecting transit vehicle ridership in the future.

Traffic Assignment

Traffic assignment models are used to estimate link-to-link flows on a streets network. The input to the traffic assignment model consists of flow matrices representing the volume of traffic by travel purpose between origin-and-destination (O-D) pairs. Other inputs include the network topology, link characteristics and link performance functions. The flow between each pair of TAZs is loaded on the network in a manner determined by the relative travel-time impedance of the alternative paths available for each trip. The User Equilibrium approach incorporated in the Mississippi Gulf Coast model utilizes an iterative process, converging on an optimum distribution of traffic which minimizes individual delay such that, in the end, no hypothetical driver can reduce the time required to complete his trip by shifting to another travel path.

7.2 LAND USE AND DEMOGRAPHIC FORECAST

Population and employment forecasts were developed for the years 2020, 2030 and 2040 for all Mississippi counties in order to update the long-range transportation plans and travel demand models for the Mississippi Department of Transportation (MDOT) and the Jackson, Hattiesburg and Mississippi Gulf Coast metropolitan planning organizations (MPOs). This concurrent update of the statewide and metropolitan travel demand models was undertaken by Neel-Schaffer, Inc. and Cambridge Systematics for the MULTIPLAN 2040 consolidated Mississippi planning effort.

The county-level socioeconomic forecasts developed for MULTIPLAN 2040 served as control totals for the individual counties when assigning future population and employment within a county to traffic analysis zones. As noted in the preceding section, these socioeconomic data at the TAZ level are used to generate future trip origins and destinations in the travel demand models.

A variety of data sources were utilized to forecast future population and employment control totals for Mississippi counties in 2020, 2030 and 2040 (see Table 7-1).

Table 7-1:
SOCIOECONOMIC FORECAST DATA SOURCES

SOURCE	DATA	GEOGRAPHIC AVAILABILITY	YEARS
Decennial Census	Population	All Counties	2000, 2010
Annual Population Estimate Program from Census Bureau	Population	All Counties	2013
Mississippi Institutions of Higher Learning (MIHL)	Population	All Counties	2015, 2020, 2025
Woods & Poole Economics, Inc. (W&P)	Population and Employment	All Counties	2020, 2030, 2040
Regional Economic Models, Inc. (REMI)	Population and Employment	17 Counties and aggregate regions	2020, 2030, 2040

Population Forecasts

Population forecasts, or control totals, are a modified average of historical and current trend projections and projections from the Mississippi Institutions of Higher Learning (MIHL), Woods & Poole Economics, Inc. (W&P), and Regional Economic Models, Inc. (REMI). The methodology used to generate forecast values for each plan stage year is described below.

2020 Population Control Totals

County population control totals for 2020 were calculated as an average of the following: W&P 2020 projection for the county, MIHL 2020 projection for the county, an extrapolation of the Census Bureau's estimated growth rate for the county between 2010 and 2013, and an extrapolation of the actual growth rate of the county from 2000 to 2010. The last of these projections, the historical growth rate, was assigned half the weight of the other inputs.

The resulting population control totals were utilized absent any one of the following circumstances:

(1) The resulting average was lower than 2013 Census estimate. In this case, growth is occurring more rapidly than anticipated by the control total and the extrapolation of the 2013 population estimate is utilized.

(2) The resulting average projected a decline of greater than five percent from the 2013 Census estimate. In these cases, population decline was limited to 5 percent because it is assumed that rapid decline in the past is not sustainable. Nine counties were affected by this.

(3) The county was one of the 17 counties where REMI projections are available. For these counties, REMI 2020 projections were averaged with the other projections.

2030 Population Control Totals

In order to account for the 2020 forecast resulting from the methodology described above, the 2030 projections from outside sources (W&P, MIHL and REMI) were adjusted upward or downward depending on whether or not the forecast was higher or lower than the projection from a given source. For instance,

if the forecast methodology resulted in a 2020 population forecast that was lower than an outside source projected, the 2030 numbers for that source's projections were lowered proportionately.

After doing this, county population control totals for 2030 were calculated as an average of the adjusted W&P 2030 projection for the county, an extrapolation of the adjusted MIHL 2025 projection for the county, and the adjusted REMI 2030 projections for the 17 available counties. For counties aggregated into regions in the REMI projections, each county's share of the region's adjusted 2020-2030 growth was estimated based on historical growth and other projections.

In counties where 2030 population control totals were projected to decline from 2020, decline was limited to seven percent from the 2020 control total. Three counties were affected by this.

2040 Population Control Totals

In order to account for the 2030 forecast resulting from the methodology described above, the 2040 projections from outside sources (W&P, MIHL and REMI) were adjusted upward or downward depending on whether or not the forecast was higher or lower than the projection from a given source. For instance, if the forecast methodology resulted in a 2030 population forecast that was lower than an outside source projected, the 2040 numbers for that source's projections were lowered proportionately.

After doing this, county population control totals for 2040 were calculated as an average of the adjusted W&P 2040 projection for the county and the adjusted REMI 2030 projections for the 17 available counties. For counties aggregated into regions in the REMI projections, each county's share of the region's adjusted 2020-2030 growth was estimated based on historical growth and other projections.

Because the MIHL data projects high growth for Jackson County but was not available beyond 2025, the methodology above resulted in a 2040 population control total for Jackson County that was unrealistically low. Therefore, an adjustment was made for Jackson County.

Also, in counties where 2040 population control totals were projected to decline from 2030, decline was limited to seven percent from the 2030 control total. Two counties were affected by this.

Employment Forecasts

Employment control totals for 2020, 2030 and 2040 were acquired from W&P and REMI, but these sources were not utilized for all counties because it was determined that the W&P projections resulted in unrealistic jobs to housing balances and the REMI projections were too difficult to disaggregate to the county level. Therefore, employment control totals for Mississippi counties were based on the population forecasts described above. It is assumed that employment will change at approximately the same rate as population change. However, in order to account for the higher employment growth projected by W&P and REMI, employment growth was increased by an additional two percent over each 10-year period.

For the 17 counties where REMI projections were provided at the county level, an additional step was taken. REMI 2020 projections were compared with the 2010 base estimates (W&P). This rate of increase was then averaged (at a 25-percent weight) with the employment control totals resulting from the methodology outlined above (i.e., indexed to population growth). The reason that greater weight was

not given is that the expected population growth according to REMI had already been factored into the population projections.

While the W&P and REMI data did not factor heavily into the development of employment control totals, their breakdown of employment by industry was utilized later in breaking down employment growth by industry.

Forecast Results

The forecast described above projected total population in the Mississippi Gulf Coast metropolitan planning area (MPA) would increase by a little less than 22 percent between the 2013 base year and the long-range target year of 2040 (see Table 7-2). The number of people living in the three-county area was forecast to grow by 80,000 to over 450,000. The largest share of that increase was allocated to Harrison County, which is expected to add 50,000 residents. But Hancock County was forecast to record the largest relative gain at 33 percent. Jackson County lagged behind the other two, with a projected population increase of only 11 percent.

Establishment-based employment was projected to increase by nearly 27 percent from a little more than 196,000 to more than 249,000 employees. Retail employment is expected to make an especially strong showing, growing by 38 percent, adding nearly 15,000 workers to the ranks of the employed. As with population, projected employment growth was concentrated largely in Harrison County, more than two-thirds of the 52,000 new employees. But Hancock County was forecast to record the largest relative gain—44 percent. As with population, Jackson County lagged well behind the other two counties with regard to relative employment growth, recording a projected gain of only 13 percent.

7.3 FUTURE TRANSPORTATION SYSTEM

The Mississippi Gulf Coast Travel Demand Forecasting Model was calibrated to actual traffic conditions in the base year of 2013. The base-year street and highway network included all major roads—interstate highways, principal arterials and minor arterials, major and minor collectors--that were existing and in service in 2013, as well as some local streets required for system continuity. An Existing-Plus-Committed (E+C) network was subsequently developed to represent the baseline case for testing future network alternatives. The E+C network includes all major roads (and some local streets) still in service in 2015 and incorporates changes to base-year streets and highways made since 2013. It also includes committed improvements, including new facilities and modifications to existing streets and highways, programmed for implementation during the next 5-10 years (see Table 7-3).

Improvements completed since 2013 include the new D'Iberville Boulevard overpass and diverging diamond interchange at I-10, the new I-110 interchange at Big Ridge Road, and the new four-lane overpass on Big Ridge Road spanning I-110 (all in D'Iberville); the widening of Creosote Road in Gulfport; and intersection improvements on Highway 613 and US Highway 90 in Jackson County. Other improvements currently under construction include the widening of Highway 607 in Hancock County and Popp's Ferry Road in Biloxi.

Table 7-2:
MISSISSIPPI GULF COAST LAND USE AND DEMOGRAPHIC DATA FORECAST TO THE YEAR 2040

	2013					
COUNTY	TOTAL POPULATION	DWELLING UNITS	HOUSEHOLDS	RETAIL EMPLOYMENT	NON-RETAIL EMPLOYMENT	TOTAL EMPLOYMENT
Hancock	43,929	21,840	17,380	3,089	16,458	19,547
Harrison	187,104	85,180	71,475	24,350	93,400	117,750
Jackson	139,668	60,067	52,205	11,347	48,025	59,372
TOTAL	370,701	167,087	141,060	38,786	157,883	196,669
	2020					
COUNTY	TOTAL POPULATION	DWELLING UNITS	HOUSEHOLDS	RETAIL EMPLOYMENT	NON-RETAIL EMPLOYMENT	TOTAL EMPLOYMENT
Hancock	50,186	25,007	19,865	3,775	20,111	23,886
Harrison	213,275	96,674	81,264	28,450	109,126	137,576
Jackson	146,294	62,780	54,578	11,852	50,157	62,009
TOTAL	409,755	184,461	155,707	44,077	179,394	223,471
	2030					
COUNTY	TOTAL POPULATION	DWELLING UNITS	HOUSEHOLDS	RETAIL EMPLOYMENT	NON-RETAIL EMPLOYMENT	TOTAL EMPLOYMENT
Hancock	54,353	27,137	21,520	4,296	21,693	25,989
Harrison	230,514	104,282	87,903	31,707	115,342	147,049
Jackson	149,758	64,236	55,843	12,765	51,466	64,231
TOTAL	434,625	195,655	165,266	48,768	188,501	237,269
	2040					
COUNTY	TOTAL POPULATION	DWELLING UNITS	HOUSEHOLDS	RETAIL EMPLOYMENT	NON-RETAIL EMPLOYMENT	TOTAL EMPLOYMENT
Hancock	58,531	29,278	23,185	4,882	23,300	28,182
Harrison	237,607	108,515	90,464	34,707	119,397	154,104
Jackson	155,082	66,494	57,807	13,934	53,253	67,187
TOTAL	451,220	204,287	171,456	53,523	195,950	249,473
	2013 TO 2040 PERCENTAGE CHANGE					
COUNTY	TOTAL POPULATION	DWELLING UNITS	HOUSEHOLDS	RETAIL EMPLOYMENT	NON-RETAIL EMPLOYMENT	TOTAL EMPLOYMENT
Hancock	33.2	34.1	33.4	58.0	41.6	44.2
Harrison	27.0	27.4	26.6	42.5	27.8	30.9
Jackson	11.0	10.7	10.7	22.8	10.9	13.2
TOTAL	21.7	22.3	21.5	38.0	24.1	26.8

Source: Neel-Schaffer, Inc.

Table 7-3: MISSISSIPPI GULF COAST AREA TRANSPORTATION IMPROVEMENTS INCLUDED IN THE EXISTING-PLUS-COMMITTED NETWORK

COUNTY	JURISDICTION	ROUTE/LOCATION	FROM (N/W)	TO (S/E)	DESCRIPTION	STATUS
Hancock	MDOT	Hwy 607	I-59	Stennis Space Center	Widen to 4-lane divided road	Under Construction
Harrison	Biloxi	Popp's Ferry Rd	Cedar Lake Rd	Gay Rd/Lamey St	Widen to 4-lane divided road	Under Construction
Harrison	Biloxi	Popp's Ferry Rd	Pass Rd	Beach Blvd (US 90)	Construct new 4-lane divided road	Environmental Review
Harrison	D'Iberville	Big Ridge Rd	D'Iberville Blvd	New SB I-110 On-Ramp	Widen to 4-lane divided road	FONSI 4-25-2014
Harrison	D'Iberville	D'Iberville Blvd	New EB I-10 Off-Ramp	Popp's Ferry Road	Widen to 4-lane divided road	FONSI 4-25-2014
Harrison	D'Iberville	D'Iberville Blvd	Popp's Ferry Rd	Auto Mall Pkwy	Widen to 4-lane divided road	FONSI 4-25-2014
Harrison	D'Iberville	Lamey Bridge Rd	Highland Ave	600' south of Big Ridge Rd	Reconstruct as 4-lane divided road	FONSI 4-25-2014
Harrison	D'Iberville	Popp's Ferry Rd	Belle St	D'Iberville Blvd @ Big Ridge Rd	Widen to 4-lane divided road and realign	FONSI 4-25-2014
Harrison	Gulfport	Creosote Rd	US 49	Three Rivers Rd	Reconstruct as 4-lane divided road	Completed
Harrison	Gulfport	Dedeaux Rd	Three Rivers Rd	Stewart Rd	Widen to 4-lane divided road with bike path	Right-of-Way Acquistion
Harrison	MDOT	Big Ridge Rd	New SB I-110 On-Ramp	Lamey Bridge Rd	Widen to 4 lanes with new I-110 bridge	Under Construction
Harrison	MDOT	D'Iberville Blvd	Promenade Pkwy	New EB I-10 Off-Ramp	Widen to 4 lanes with new I-10 bridge	Completed
Harrison	MDOT	I-10	D'Iberville Blvd	--	Construct new half-interchange	Completed
Harrison	MDOT	I-10	I-110	--	Reconstruct interchange	Under Construction
Harrison	MDOT	I-10	Lamey Bridge Rd	--	Construct new half-interchange	Under Construction
Harrison	MDOT	I-110	Big Ridge Rd	--	Construct new half-interchange	Completed
Harrison	MDOT	Lamey Bridge Rd	I-10 bridge	Highland Ave	Reconstruct as 4-lane divided road	FONSI 4-25-2014
Harrison	MDOT	MS 15	Lamey Bridge Rd	--	Construct roundabout	Planned
Jackson	County	Hwy 609	Old Fort Bayou Rd	--	Intersection improvements	Planned
Jackson	County	Hwy 613	MS 63	Big Point railroad crossing	Intersection improvements	Completed
Jackson	County	LeMoyne Blvd	Brittany Ave	--	Intersection improvements	Planned
Jackson	Gautier	Martin Bluff Rd	Gautier-Vancleave Rd	I-10 Frontage Rd	Widen road and improve intersections	Environmental Review
Jackson	MDOT	I-10	Hwy 609	MS 57	Widen to 6 lanes	Planned
Jackson	Ocean Springs	Ocean Springs Rd	US 90	--	Reconstruct intersection	Completed
Jackson	OSARC	I-10 Connector Rd	Daisy Vestry Rd	Seaman Rd	Construct new/realigned 4-lane road	Right-of-Way Acquistion
Jackson	Pascagoula	Hospital Rd	Old Mobile Hwy	US 90	Add turn lane, sidewalks, bike lanes, lighting	Right-of-Way Acquistion

Source: Gulf Regional Planning Commission (2015).

Committed projects either programmed or actively under development include the widening and realignment of Popp's Ferry Road in D'Iberville, the extension of Popp's Ferry Road in Biloxi, construction of the I-10 Connector Road in Jackson County, and reconstruction of the I-10/I-110 interchange, among others.

Model output data for the E+C network assignment generated with 2040 input data were compared with 2013 base network results in order to derive an overall picture of how system performance was likely to be affected if no improvements other than those already underway or programmed for implementation were made. The comparison indicated that a projected population increase exceeding 21 percent would likely result in 25 percent more trips (see Table 7-4). The average trip would probably be slightly longer--about eight-tenths of a mile—and require a little more time (two minutes). This would lead to increases in vehicle miles traveled (over 36 percent), vehicle hours traveled (45 percent) and vehicle hours of delay (over 90 percent). The delay share of total travel time would expand from less than 15 percent to almost 20 percent. The added traffic congestion associated with increased delay would reduce average operating speed by more than 1.5 miles per hour. This potential decline in system performance is what the long-range transportation plan seeks to avert by recommending the measures most likely to prevent the increased traffic congestion that will occur in the absence of additional improvements. The projected needs which the plan seeks to address are discussed in the following chapter.

Table 7-4:
MODEL OUTPUT FOR 2040 EXISTING-PLUS-COMMITTED NETWORK COMPARED TO 2013 BASE NETWORK ASSIGNMENT

ITEM	2013 BASE-YEAR NETWORK	2040 E+C NETWORK	2013 TO 2040 DIFFERENCE	PERCENT DIFFERENCE
Population	363,413	442,172	78,759	21.67
Trip Productions/Attractions	1,557,268	1,949,724	392,456	25.20
Vehicle Miles Traveled	13,550,938.23	18,517,811.45	4,966,873	36.65
Vehicle Hours Traveled	381,906.15	546,442.25	164,536	43.08
Vehicle Hours of Delay	56,452.75	108,976.62	52,524	93.04
Trips per Capita	4.29	4.41	0.12	2.90
Average Trip Length (Miles)	8.70	9.50	0.80	9.15
Average Trip Duration (Minutes)	14.71	16.82	2.10	14.28
Average Travel Speed	35.48	33.89	-1.59	-4.49
Percent Delay	14.78	19.94	5.16	--

Source: Mississippi Gulf Coast Area Travel Demand Forecasting Model (2015). Calculations by Neel-Schaffer, Inc.

8.0 FUTURE TRANSPORTATION NEEDS

The transportation system of the future will likely need to provide for an increasing demand for travel. It is anticipated that it will also need to be responsive to an increasing diversity of needs arising from evolving patterns of land use and development, economic activity and social interaction. Development of the 2040 Metropolitan Transportation Plan for the Mississippi Gulf Coast region has been guided by an analysis of both existing conditions and the long-range travel demand forecast. At the same time, other current local and regional plans, input from the public involvement process, and the expressed views of stakeholders have played an invaluable role in shaping the vision of future transportation in the region presented herein.

8.1 ROADS AND BRIDGES

As noted at the end of the previous chapter, the number of people living in the study area is projected to increase by more than 20 percent over the next 25 years; and the demand for travel is forecast to grow by 25 percent (see Table 8-1). It is expected that nearly 80,000 additional residents will be making almost 400,000 trips daily. Based on output from the regional travel demand forecasting model, aggregate daily travel should be approaching two million trips in 2040. The demand for travel categorized as home-based should be consistent with the projected increase in population and households (21.67 and 21.55 percent respectively). Casino-bound trips are expected to grow at a significantly lower rate. However, it should be noted that the gaming purpose includes only those trips generated within the study area. Many trips to casinos come from outside the three-county area and are included in the external-internal trip purpose: The number of trips in this category, with one end outside the three-county area, is expected to expand by more than half during the long-range planning period. Significant growth is also expected to occur in the commercial motor-vehicle categories.

The analysis briefly described in the preceding chapter indicated that the distance traveled and time spent traveling by motorists are both projected to increase by relative amounts exceeding the overall rate of increase in the demand for travel, assuming no additional transportation system improvements are made beyond those already underway or programmed for implementation. This conclusion was reached by comparing 2040 model output for the Existing-plus-Committed (E+C) network with the 2013 assignment results for the base network calibrated to replicate existing conditions as nearly as possible. The E+C network includes 26 roadway improvements (previously listed in Table 7-3), more than half of which (15) involve the widening or reconstruction of existing streets and highways. Only two represent new roadway construction, and in each case the additional right-of-way required extends for only about one mile. Other new construction includes three half-interchanges on the interstate system and major improvements to the interchange between I-10 and I-110. The remaining five projects relate to intersection improvements.

Based on output from the regional travel demand model, the number of vehicle miles traveled (VMT) on the E+C network in 2040 is projected to exceed VMT on the base network in 2013 by approximately 4.45 million or 36 percent (see Table 8-2). The largest share of the increase—1.72 million miles or 40 percent of total growth--will fall on the interstate highway class. However, the largest relative increase—44 percent--is expected on collectors.

Table 8-1:
PROJECTED CHANGE IN DAILY TRAVEL BY TRIP PURPOSE FROM 2013 TO 2040

TRIP PURPOSE	NUMBER OF TRIPS 2013	NUMBER OF TRIPS 2040	CHANGE	PERCENT CHANGE
Home-Based Work	281,110	342,149	61,040	21.71
Home-Based Other	664,928	809,274	144,345	21.71
Non-Home-Based	341,447	415,455	74,009	21.68
Gaming	3,717	4,216	499	13.42
Commercial Motor-Vehicle	114,766	151,738	36,972	32.22
Truck	14,099	19,070	4,970	35.25
External-Internal	137,201	207,822	70,621	51.47
External-External	3,259	4,315	1,056	32.40
TOTAL	1,562,540	1,956,079	393,512	25.18

Note: The Commercial Motor-Vehicle *category includes light trucks, taxis, vans and other commercially operated four-wheeled vehicles. The* Truck *category includes heavy trucks and other commercially operated vehicles with more than four wheels. The* External-Internal *category represents trips having one end outside the area and the other end inside. This includes through-trips that involve a stop in the area for any reason. The External-External category represents only those through-trips that do not involve a stop for any reason.*

Source: Mississippi Gulf Coast Area Travel Demand Forecasting Model (2015). Calculations by Neel-Schaffer, Inc.

The projected change in vehicle-hours traveled (VHT) is spread somewhat more evenly across major roadway classes. While the interstate system accounts for the largest number of additional hours—approximately 44,000—that only represents a third of the system total (about 132,000). Again, collectors show the largest relative increase—almost 50 percent—with minor arterials close behind (nearly 49 percent). The largest increase in vehicle-hours of delay (VHD) is projected to occur on the interstate system: Roughly 23,000 out of 52,000 total hours of additional delay. That represents an increase of more than 93 percent in delay occurring on the interstate system, a relative change about equal with the overall change projected for the street and highway network as a whole. On the other hand, delay time on minor arterials and collectors is expected to more than double by 2040.

This sizable increase in anticipated delay time indicates that in the absence of any additional improvements to the transportation system, beyond those already funded, the added travel demand resulting from fairly moderate population growth in the area will result in significantly greater traffic congestion in the area and reduced operating speeds. The analysis projected that the portion of overall travel time attributable to delay resulting from congested conditions would increase from 18 percent under existing conditions to almost 25 percent in 2040, barring additional improvements to the system. Average operating speed would decrease by about two miles per hour system-wide.

A useful measure of traffic congestion is the ratio of daily traffic volume to daily roadway capacity. A volume-over-capacity (V/C) ratio exceeding 1.00 indicates that the number of vehicles traversing a particular network link has exceeded the theoretical capacity of the roadway. The base-year network

Table 8-2:
PROJECTED CHANGE IN VEHICLE-MILES TRAVELED, VEHICLE-HOURS TRAVELED AND VEHICLE-HOURS OF DELAY BY MAJOR ROADWAY FUNCTIONAL CLASS FROM 2013 TO 2040

	VEHICLE-MILES TRAVELED (VMT)			
FUNCTIONAL CLASS	2013	2040	CHANGE	PERCENT
Interstate	4,544,997	6,337,155	1,792,158	39.43
Principal Arterial	4,144,750	5,309,504	1,164,754	28.10
Minor Arterial	1,573,683	2,155,742	582,059	36.99
Collector	2,077,122	2,992,083	914,961	44.05
TOTAL	12,340,552	16,794,483	4,453,931	36.09

	VEHICLE-HOURS TRAVELED (VHT)			
FUNCTIONAL CLASS	2013	2040	CHANGE	PERCENT
Interstate	97,007	141,103	44,096	45.46
Principal Arterial	102,175	137,106	34,931	34.19
Minor Arterial	43,800	65,145	21,345	48.73
Collector	63,694	95,494	31,800	49.93
TOTAL	306,675	438,847	132,173	43.10

	VEHICLE-HOURS OF DELAY (VHD)			
FUNCTIONAL CLASS	2013	2040	CHANGE	PERCENT
Interstate	24,891	48,185	23,294	93.59
Principal Arterial	17,407	29,869	12,463	71.60
Minor Arterial	6,164	14,566	8,402	136.31
Collector	7,195	14,981	7,787	108.23
TOTAL	55,656	107,602	51,946	93.33
Percent Delay (VHD/VHT)	18.15	24.52	6.37	--
Average Operating Speed (VMT/VHT)	40.24	38.27	-1.97	--

Note: Higher totals in Table 7-2 are due to the inclusion of local streets not represented here.

Source: Mississippi Gulf Coast Travel Demand Forecasting Model (2015). Calculations by Neel-Schaffer, Inc.

assignment showed a fairly limited number of generally short street or highway segments with V/C greater than 1.00. Several of these were route segments limited to locations in the immediate vicinity of interchanges with Interstate 10. They included County Farm Road, Canal Road, U. S. Highway 49 (US 49) and Lorraine Road, all in Harrison County. Other roads with V/C over 1.00 on segments in close proximity to the interstate were Promenade Parkway-Sangani Boulevard in D'Iberville, Bayview Avenue in Biloxi and MS 53 immediately west of US 49. The ratios for almost all of these locations were in the range of 1.01 to 1.05. A very few were higher: US 49 (1.20), Promenade Parkway (1.26) and Sangani Boulevard (1.25).

The number of roadway segments with V/C greater than 1.00 is expected to triple (to 21) by 2040 if improvements other than those already committed are not made. They would include two roadway segments in Hancock County, 14 in Harrison County and five in Jackson County (see Figure 8-1). Projected volume-to-capacity ratios range from 1.01 to 1.62, with a third being higher than 1.25 (see Table 8-3). Some of these anticipated roadway capacity deficiencies may need to be addressed by widening the existing roadways; others may not be soluble except by providing new route alternatives. Nevertheless, it is important to note that in some cases it may be more appropriate to apply Intelligent Transportation Systems (ITS) solutions such as interconnected traffic signals or reversible travel lanes; or the situation may call for employing Transportation Demand Management (TDM) strategies and/or improved bicycle, pedestrian and transit facilities and services to encourage the use of alternative means of transportation.

Congestion Management

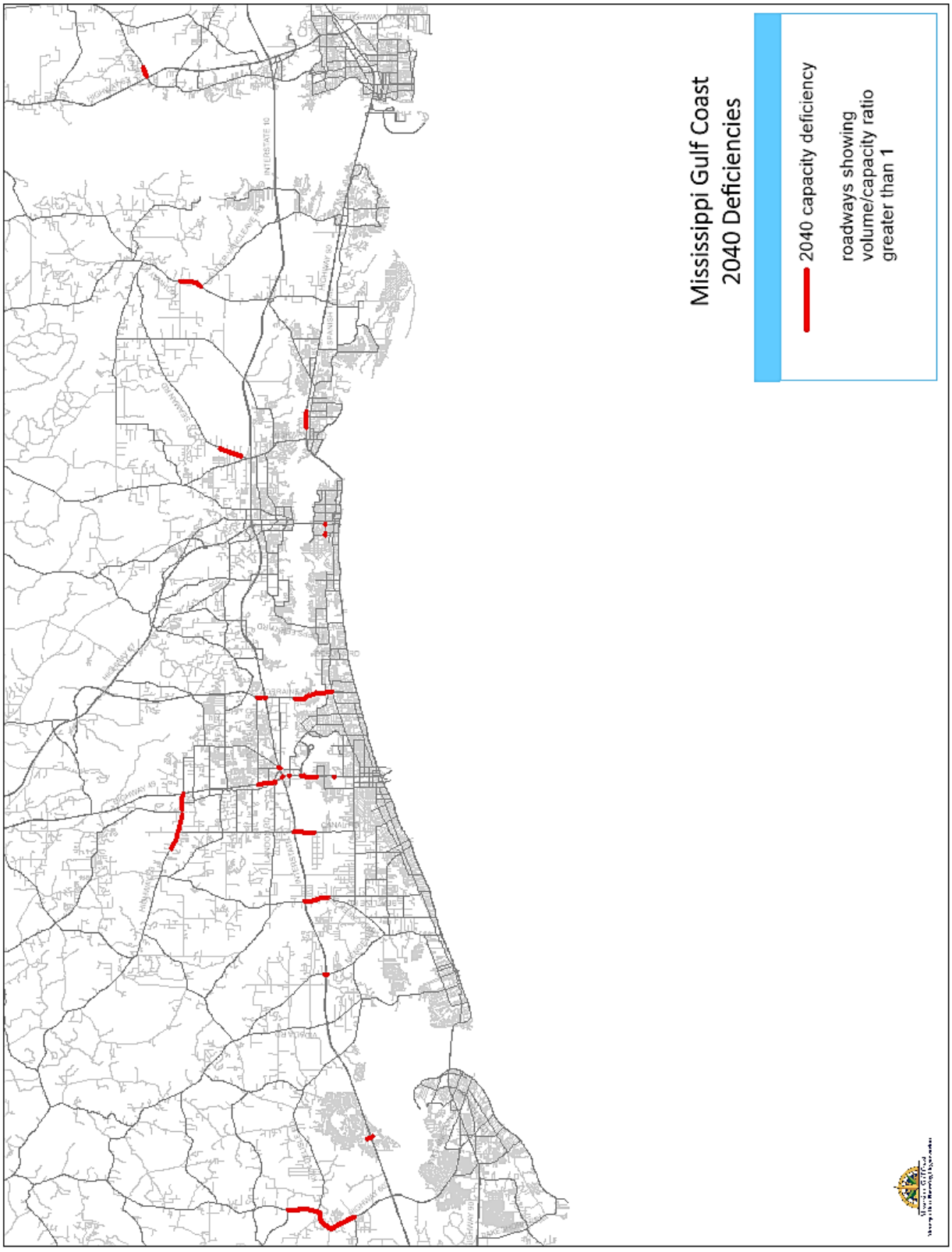
Although major capital investments are still needed to meet growing travel demand, large-scale projects involving new roadway construction or lane additions are few and far between primarily because of the costs involved. In the absence of the unlimited funding required to build more roads than there are cars to fill them, there is a need to investigate more affordable ways to mitigate congestion. The GRPC Congestion Management Process (CMP) undertook the task of identifying congested roadways by analyzing travel-time data collected for the long-range planning base year of 2013. The results were used to help identify roadway improvement needs and potential projects for addressing congested traffic conditions where they exist.

The CMP undertook the task of identifying congested roadways. . . . The results were used to help identify roadway improvement needs and potential projects for addressing congested traffic conditions.

The Transportation Research Board defines traffic congestion as "travel time of delay in excess of that normally incurred under free-flow travel conditions." The CMP process generates a *level of service* (LOS) measure for roadway segments and intersections based on travel-time data. This information provides decision-makers with a profile of existing traffic flow conditions that can be easily grasped and readily understood.

A travel rate index is used to identify areas of concern for recurring congestion. This index measures the amount of extra time it takes to travel from one point to another on a given route during the peak period. The travel rate index is derived from the average speed (in miles per hour) in the afternoon peak period divided by the free-flow speed (85th percentile). The index provides a percentage indicating the degree to which the vehicular travel rate is negatively affected by congested traffic conditions. Each percentage falls within a range associated with a given level of service (LOS) measure. LOS measures are commonly expressed as letter-grades with A corresponding to free-flow conditions and F representing an operational failure in which traffic is stalled or hardly moving at all. The Transportation Research Board's *Highway Capacity Manual* describes LOS measures in the following terms:

Figure 8-1: Projected 2040 Roadway Capacity Deficiencies



Source: Gulf Regional Planning Commission.

Table 8-3:
PROJECTED 2040 ROADWAY CAPACITY DEFICIENCIES
(EXISTING-PLUS-COMMITTED NETWORK)

ROADWAY	FROM (N/W)	TO (S/E)	LENGTH (MI)	LANES	PEAK 2-WAY VOL	MAX 1-WAY V/C
Hancock County						
MS 43	Hwy 603	Texas Flat Rd	3.75	2	24,394	1.29
Gex Dr-Yacht Club Dr	Kapalama Dr	I-10 EB Off-Ramp	0.33	2	20,822	1.06
Harrison County						
Firetower Rd-Menge Ave	I-10 WB Off-Ramp	I-10 EB Off-Ramp	0.19	2	11,697	1.12
MS 53	County Farm Road	Canal Rd	2.22	2	20,706	1.10
MS 53	Old Hwy 49	US 49	0.78	2	26,630	1.40
County Farm Rd	I-10 WB Off-Ramp	Red Creek Rd	1.21	2	20,875	1.62
Canal Road	I-10 WB Off-Ramp	28th St	2.57	2	22,169	1.33
US 49	Airport Rd	North Carolina Ave	0.77	6	65,140	1.05
US 49	Old Hwy 49	34th Street	0.46	6	62,168	1.01
US 49	I-10 WB Off-Ramp	Creosote Rd	0.40	6	100,841	1.65
US 49	Dedeaux Rd	Landon Rd	0.84	6	70,826	1.14
Landon Rd	Old Hwy 49	US 49	0.08	2	21,499	1.43
Three Rivers Rd	Crossroads Pkwy	Seaway Rd	0.10	2	22,180	1.13
Hwy 605	Dedeaux Rd	I-10 EB Off-Ramp	0.53	4	48,834	1.30
Lorraine Rd	Industrial Waterway	Pass Rd	1.83	4	48,432	1.18
Division St	Forrest Ave	I-10 NB On-Ramp	0.56	2	15,623	1.14
Jackson County						
Seaman Rd	Jordan Rd	I-10 Connector Rd	1.87	2	17,770	1.18
Bienville Blvd	M L King Jr Ave	Bechtel Blvd	0.78	4	45,179	1.12
MS 57	Humphrey Rd	Gautier-Vancleave Rd	1.08	2	20,964	1.10
Hwy 613	MS 63	Saracennia Rd	3.00	2	14,776	1.01
Hwy 614	MS 63	HWY 613	4.70	2	15,535	1.04

Notes: Termini for deficient segments are the nearest major streets (or bridges) east and west, or north and south, of links having V/C greater than 1.00. Peak two-way volume and maximum one-way volume/capacity may apply to separate links due to differences in vehicular capacity or the directional distribution of traffic.
Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model *(2015)*.

- LOS A describes primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

- LOS B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

- LOS C represents stable operations; however, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS "B", and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

- LOS D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS "D" may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

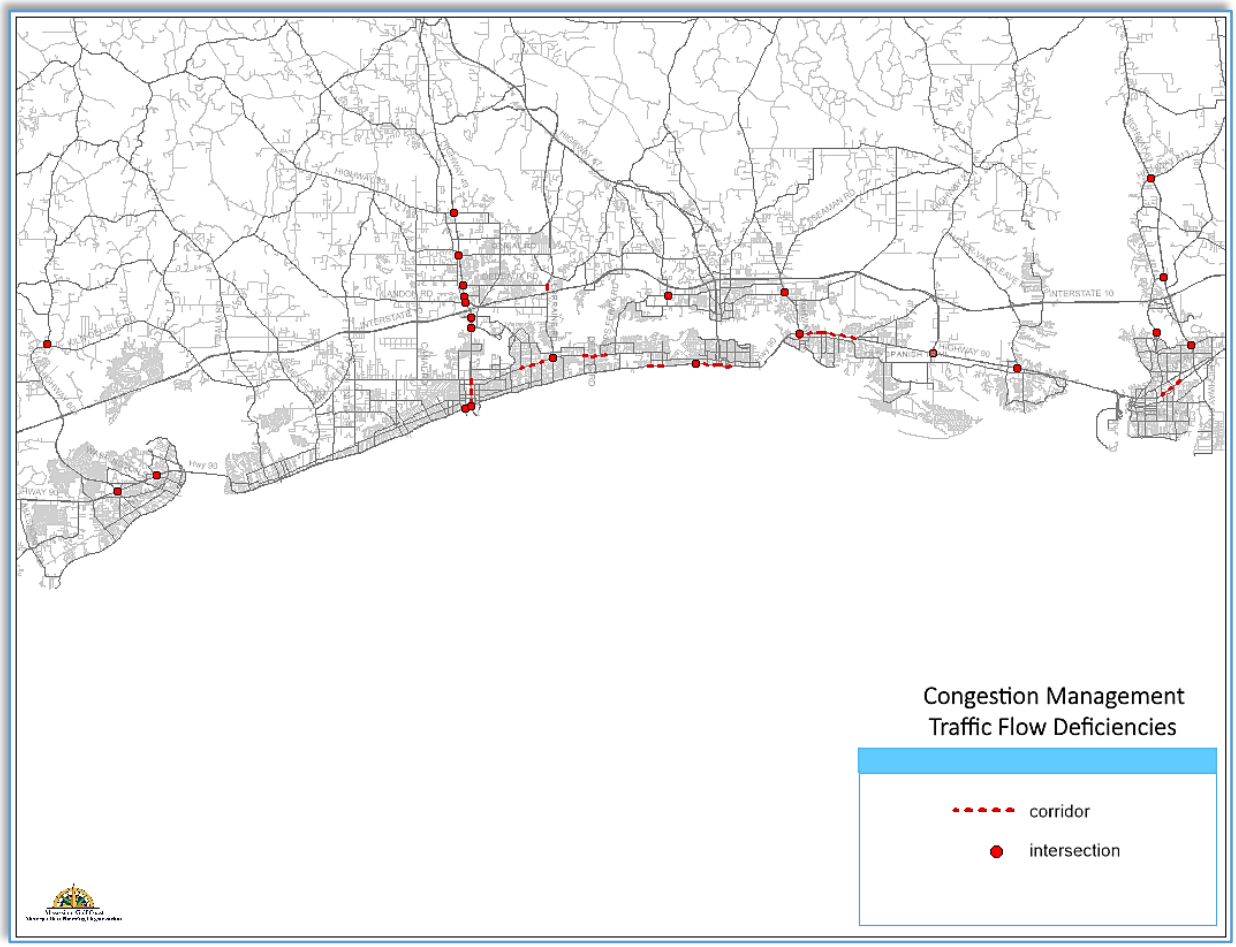
- LOS E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

- LOS F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

The CMP identifies congestion caused by either operational problems or lack of capacity (or both). Once congested areas have been identified, the causes must be determined. Before a decision is made to add base capacity to a roadway, alternative strategies for mitigating congested conditions should be investigated. Operational strategies have been used increasingly in recent years to squeeze greater efficiency out of existing facilities. These strategies often can be implemented at a fraction of the cost of added roadway capacity.

The travel-time analysis showed that significant delay resulting from congestion exists on Highway 49 and Pass Road in Gulfport, and on Highway 90 in Biloxi, Ocean Springs and Pascagoula (see Figure 8-2). In addition, the analysis indicated there are 23 intersections in the region at which motorists experience excessive delay. These findings provided valuable input to the project development process.

Figure 8-2: Deficient Road Segments and Intersections Identified by Congestion Management Process



Source: Gulf Regional Planning Commission

Mobility and Connectivity

Due to the linearity of urban development in the Mississippi Gulf Coast region, north-south mobility is very important to provide movement between the two major travel corridors—Interstate 10 and US Highway 90--spanning the three coastal counties from Alabama to Louisiana. Mobility is essential for many reasons including, but not limited to, hurricane evacuation and daily work commutes. When major storms approach the region from the Gulf of Mexico, north-south connectors are used by Gulf Coast residents to reach I-10. Commuters use the north-south connectors daily as they make long commutes to major employment sites such as Stennis, Ingalls and Chevron.

The Mississippi Gulf Coast mobility corridors facilitate the flow of traffic throughout the region. The corridors establish generalized travel patterns which form the primary routes of choice used by the population for the majority of their travel needs. Most relatively long-distance trips being made within the region are a combination of major arterial and interstate movements. These corridors have higher design standards and provide more direct and higher speed travel between locations. They facilitate mobility in the region in the following ways:

- Serve major activity centers, the highest volume corridors, and longest trip demands;
- Carry a high proportion of total urban travel on limited route mileage;
- Interconnect and provide continuity for major rural corridors to accommodate trips entering and leaving the urban area and movements through the urban area;
- Serve demand for intra-area travel between central business districts and outlying residential areas.

The concept of proper spacing between major corridors is an important consideration in providing for the mobility of people and goods. Ideally, regular and logical spacing between corridors should exist; but in actuality the distance between corridors varies considerably. In densely populated urban areas, spacing of all route types is tighter and generally more consistent than the spacing in sparsely developed rural areas. An evaluation of the Mississippi Gulf Coast mobility corridors reveals a number of coverage gaps in the street and highway network. The analysis applied a three-mile buffer to the north-south corridors, representing the desirable maximum distance between them, and identified gaps where this criterion was not met. The evaluation applied the following criteria to define an adequate corridor:

- The corridor should provide a continuous route connecting to I-10 on the north and US 90 on the south.
- The roadway should be a functionally classified arterial or interstate highway.

Four gaps in the coverage provided by north-south mobility corridors were revealed using this approach (see Figure 8-3):

West Harrison County (Gap 1) – This area desperately needs an adequate connection between I-10 and US 90. There are several routes that could be considered for the necessary improvement: Among them are Menge Avenue, Red Creek Road, Espy Avenue and Beatline Road. Beatline Road would appear to be the best option, but it would require that a connection be made between its current terminus at Railroad Street and US 90.

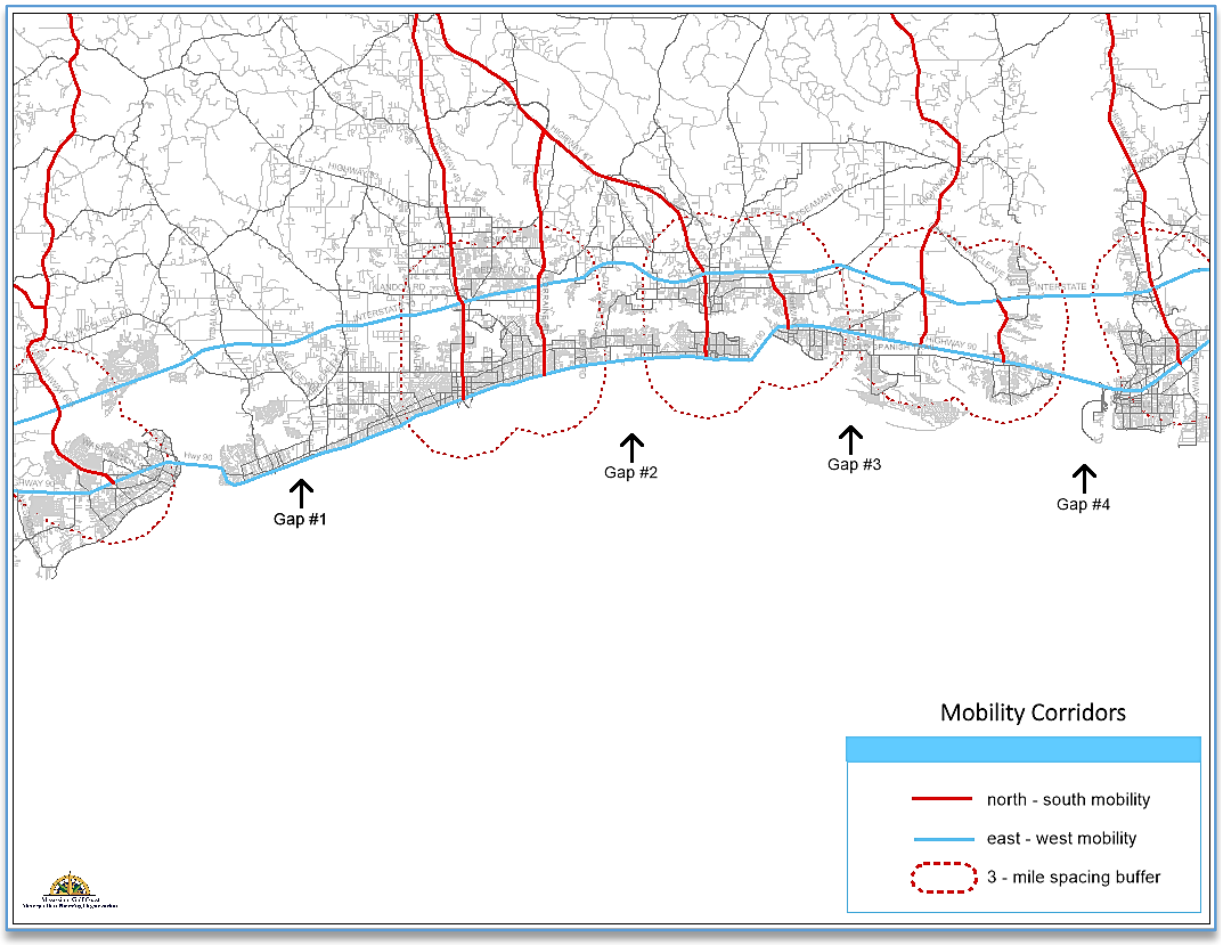
Central Harrison County (Gap 2) – The best connector in this gap appears to be Popp's Ferry Road. Improvements necessary to make this corridor an adequate north-south connector would include a new bridge across the Back Bay of Biloxi, widening of the three-lane section, an extension from Pass Road to US 90 and a connection to the I-10 Woolmarket interchange.

Ocean Springs (Gap 3) – While this gap appears to be fairly narrow, a connector here would have a very beneficial effect on the accessibility of Ocean Springs and would help to reduce traffic on the congested section of US 90 in that city.

Pascagoula River Basin (Gap 4) – This is a natural gap, and there is nothing to be done here.

It should also be noted that the distance between I-10 and US 90 exceeds three miles almost from one end of the study area to the other, and there is clearly a need for another east-west mobility corridor south of the interstate. North of the interstate there does not yet appear to be a well-defined need for enhanced east-west mobility, but as development pushes further inland in the years ahead the need for a continuous route connecting major north-south corridors is likely to become more apparent.

Figure 8-3: North-South Mobility Corridors between Interstate 10 and U. S. Highway 90

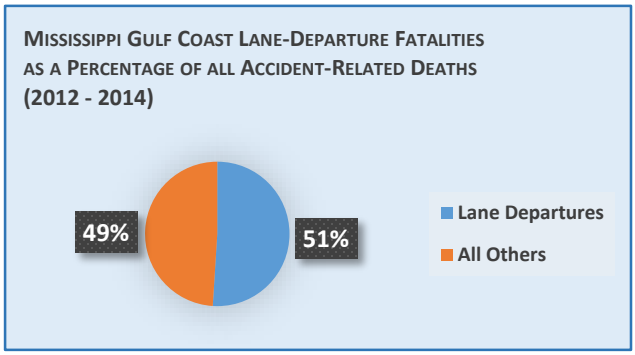


Source: Gulf Regional Planning Commission

8.2 ROADWAY SAFETY NEEDS

Reducing risk on area roadways has been a long-time priority of Gulf Regional Planning Commission and the Mississippi Gulf Coast MPO. *Get To B*, a regional transportation safety improvement program, was developed by GRPC to benefit all street and highway users. The program complies with MAP-21 Section 1203, which requires each MPO to have a planning process that addresses the safety performance measures: To "achieve significant reduction in traffic fatalities and serious injuries on all public roads" and to "increase the safety of the transportation system for motorized and non-motorized users." The program promotes three core strategies to reduce crash occurrences and save lives:

Strategy #1: Infrastructure Improvements is the heart of the safety program. Projects are identified using a combined analysis process that employs both data-driven and systemic evaluation techniques. GRPC staff take an active role in the project selection process, then work closely with local jurisdictions and their consultants throughout the design and construction phases. The intention is to fund improvements that are quickly implementable and low-cost but have high risk-reduction probabilities. The majority of roadway deaths on Mississippi Gulf Coast roadways result from vehicle lane-departures. Therefore, the first priority of the program was to reduce lane-departure incidents in curved segments of rural roadways. Once locations of concern were identified, recommendations were developed for addressing the problem. These included adding signs, increasing reflectivity through the curve, adding and replacing striping, and constructing various shoulder improvements. The program also focuses on addressing safety concerns at railroad crossings and promoting bicycle and pedestrian safety. It is important to note that, although the program is intended to facilitate the installation of lower-cost countermeasures, it is expected that over the next 25 years the MPO will support several larger projects that address safety concerns identified as priorities by members and stakeholders. This may include realignment of intersections, repairs and improvements to bridges, the development of new roadways based on best practice safety strategies, adoption of congestion-relief techniques, reworking roadways within existing rights-of-way and other types of projects.



Strategy #2: Public Education and Awareness is being promoted through a variety of GRPC programs and activities. In 2015, the *Get to B* program got its own web address (*get2b-ms.com*), and a site was built to provide transportation safety information on a wide variety of topics. This safety improvement strategy is expected to be fully realized over the next five years. It will be aided by the formation of a committed stakeholder committee that will develop and implement a variety of educational initiatives and activities designed to stimulate safety awareness among all sections of the community. Groups targeted for initial messaging and program activities include aging drivers, young drivers, parents with young children, rural drivers and professional drivers. It is the goal of the program to develop *Get to B* as a regionally recognizable reminder to be safe, alert and aware on the road, which will result in fewer crashes and fewer casualties.

Strategy #3: Workforce Development is an active component of the safety improvement program. The "*Get to B* Safety Series" engages a wide variety of transportation professionals and safety stakeholders in training workshops that increase awareness of safety techniques and encourage greater consideration of safety in the planning, project design and reporting processes.

This ongoing effort will ensure that when existing roadways are being improved, or new roadways are being designed, there will be a concerted effort made to give due consideration for the safety of all roadway users. Enhancing the transportation infrastructure through the adoption of roadway-safety best

practices will put the Mississippi Gulf Coast region in a position to reduce significantly the overall number of traffic crashes and the severity of injuries sustained in vehicular accidents.

Topic selection for the workforce development sessions is determined by two primary sources: 1) Crash data analysis, and 2) Priority concerns expressed and related subjects requested by MPO membership. In response GRPC provides training events addressing intersection safety techniques, strategies to reduce lane departure events and ways in which the roadside can be altered to reduce injury. Future workshops will focus on incorporating access management techniques, reducing red-light running, making intersection turning safer and accommodating roadway users traveling by non-motorized modes.

Recommendations for reducing the most common types of crashes in the Mississippi Gulf Coast Metropolitan Planning Area are outlined below.

Rear-End Collisions

In the study area, rear-end collisions account for the largest number of crashes. These crashes can be attributed to numerous factors. One main cause of rear-end accidents is driver inattention. Other potential causes include large turning volumes, slippery pavement, inadequate roadway lighting, crossing pedestrians, poor visibility of a traffic signal, congestion, inadequate signal timing, and/or an unwarranted signal.

The crash data show high concentrations of rear-end crashes at intersections. Correlating the crash data with field conditions and observation reveals that many of these rear-end crashes may be influenced by intersection geometry and traffic operations. Rear-end crash frequency may be reduced by adjusting the yellow clearance intervals in compliance with the *Institute of Transportation Engineers (ITE)* recommended clearance interval practices. The number of crashes may further be reduced by reconfiguring the travel and turning lanes. This can be accomplished by a variety of methods, including converting two-way frontage roads to one-way frontage roads, providing exclusive right-turn lanes, providing advanced warning signs, providing indirect left-turns, or by displacing left-turn movements.

In general, the recommendations for reducing rear end crashes include the following:

- Analyze turning volumes to determine if a right-turn lane or left-turn lane is warranted. Providing a turning lane separates the turning vehicles from the through vehicles, preventing through vehicles from rear-ending turning vehicles. If a large right-turn volume exists, increasing the corner radius for right turns is an option.

- Check the pavement conditions. Rear-end collisions caused by slippery pavement can be reduced by lowering the speed limit with enforcement; providing overlay pavement, adequate drainage, and/or grooved pavement; or with the posting of a “Slippery When Wet” sign.

- Ensure roadway lighting is sufficient for drivers to see the roadway and surroundings.

- Determine if there is a large amount of pedestrian traffic. Pedestrians crossing the roads may impede traffic and force drivers to stop suddenly. If crossing pedestrians are an issue, options include installing or improving crosswalk devices and providing pedestrian signal indications.

- Check the visibility of the traffic signals at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal heads, installing 12-inch signal lenses, visors and back plates, or relocating/adding signal heads.
- Verify that the signal timing is adequate to serve the traffic volumes at the trouble intersections. Options include adjusting the phase-change interval, providing a red-clearance interval, providing progression, and utilizing signal actuation with dilemma-zone protection.
- Verify that a signal is warranted at the given intersection.

Single-Vehicle Crashes

Single-vehicle crashes (*Run off road*) are the second most prevalent crash type in the study area. A number of factors could be the cause for single-vehicle crashes, including speeding, pavement surface conditions, lighting and markings, roadway geometry, and signal timing.

In general, the recommendations for reducing single vehicle crashes include:

- Conduct speed studies to determine whether or not speed was a contributing factor.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surroundings during dark hours.
- Ensure proper application of traffic control devices.
- Verify proper signal-head alignments as well as condition of signal-head indications (i.e. lens burn-through, L.E.D. usage, etc.)
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be safely maneuvered by drivers.
- Provide shoulders or increase shoulder width.
- Relocate fixed objects that are close to travel lanes.
- Improve the visibility of fixed objects during night hours.

Side-Impact Collisions

Side-impact collisions (*angle*) were the third most prevalent collision type in the study area between 2011 and 2013. They can be caused by a number of factors, including restricted sight distance, excessive speed, inadequate roadway lighting, poor visibility of a traffic signal, inadequate signal timing, inadequate advance warning signs, large traffic volumes, or simply the driver failing to stop for a red light. In general, recommendations for reducing side impact collisions include the following:

- Verify that the sight distance at all intersection approaches is not restricted. Options to alleviate restricted sight distance include removing sight obstructions and/or installing or improving warning signs.
- Conduct speed studies to determine whether or not speed is a contributing factor. In order to reduce crashes caused by excessive speeding, the speed limit can be lowered with enforcement, the phase change interval can be adjusted, or rumble strips can be installed.
- Ensure roadway lighting is sufficient for drivers to see roadway and surroundings.
- Check the visibility of the traffic signal at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal-heads, installing 12-inch signal lenses, visors, back plates, and/or relocating or adding signal-heads.
- Verify that the signal timing is adequate to serve existing traffic volumes. Options include adjusting the phase change interval, providing a red-clearance interval, providing progression, and/or utilizing signal actuation with dilemma-zone protection.
- Verify that the intersection is designed to handle the observed traffic volume. If the traffic volumes are too high for an intersection's capacity, options include adding a lane(s) or retiming the signal.

Other Collision Types

Within the study area, there are a number of other collision types that are prevalent, including *sideswipe*, *left turn same roadway*, *parked vehicle*, *animal*, *pedestrian* and *head-on*. In general, the recommendations for increasing safety and reducing the number of crashes on all the study segments and intersections include the following:

- Determine if the speed limit is too high or if vehicles in the area are traveling over the speed limit. Reducing the speed can reduce the severity of crashes and make drivers more attentive to their surroundings.
- Verify the clearance intervals for all signalized intersection approaches and ensure that there is an all-red clearance. For larger intersections, it is particularly important to have a long enough clearance interval for vehicles to safely make it through the intersection before the light turns red.
- Check for proper intersection signage, especially if the roadway geometry may be confusing for the driver. Verify that all one-way streets are marked "One-Way" and "No Turn" signs are placed at appropriate locations.
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be maneuvered easily by drivers.

- Evaluate left and right turning volumes to determine if a right-turn and/or left-turn lane is warranted.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surroundings.
- Check the visibility of traffic signals from all approaches.
- Verify that lanes are marked properly and provide turning and through movement directions, as well as signage that indicates lane configurations. This will prevent cars from dangerously switching lanes at the last minute and reduce crash potential.

Development of a Safety Management System (SMS)

Traffic safety programs are relatively uniform from state to state in their approach to making the highway system safer for their users. The typical traffic safety program combines several different features from a Safety Management System (SMS) which all states were mandated to develop in accordance with the *Intermodal Surface Transportation Efficiency Act* of 1991 (ISTEA). Under ISTEA and ensuing regulations, the SMS was required to address the following needs:

- Coordinating and integrating safety features for the various modes of travel;
- Identifying hazardous locations, investigating them, and establishing countermeasures to increase safety;
- Early consideration for safety in all highway projects and programs;
- Identifying safety needs of special user groups (handicapped, elderly, etc.);
- Routinely maintaining and upgrading the safety features on the roadways;
- Marketing safety programs to encourage community involvement;

The SMS mandate was later withdrawn due to the 1995 *National Highway System Designation Act*. However, MAP-21 Section 1203 requires that each state and MPO have a planning process that addresses the safety performance measure to "achieve a significant reduction in traffic fatalities and serious injuries on all public roads." MAP-21 also retains the SAFETEA-LU requirement that the planning process address the need to "increase the safety of the transportation system for motorized and non-motorized users."

Safety programs are relatively uniform throughout the United States. The typical traffic safety program includes the following elements:

- A crash record system
- Identification of hazardous locations
- Engineering studies
- Selection of countermeasures

- Prioritization of improvement projects
- Planning and implementation of improvement projects
- Evaluation of the implemented projects

The crash record system should contain data on individual crashes that occur in the area. The crash data should include the following information: time, date, weather condition, pavement condition, driver, and roadway. The primary source for this data is usually police reports from local jurisdictions. In order for this record system to be useful, the data have to be processed and available on a timely basis so that they can be analyzed without undue delay.

The identification of hazardous locations is based on actual crashes that have occurred and/or the recognized potential of an area to have a high number of crashes. The severity of these crashes must also be considered in order to prioritize the locations and develop solutions for them. Once the hazardous locations are identified, engineering studies can be conducted using the crash record system data. An analysis can use crash frequency, crash rate, Equivalent Property Damage Only (EPDO) rates, and other methods. Supplemental data from police comments and citizen complaints can also be used in the analytical process in order to identify the cause of crashes.

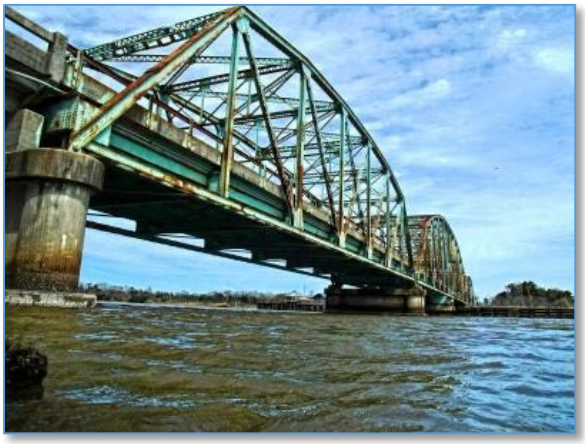
Once the cause of crashes has been determined, countermeasures are proposed and then evaluated. Improvement projects are selected based on the benefits they will provide compared to the cost of implementation. Sometimes, enforcement and education may be all that is necessary in order to reduce the number of crashes. Other times, multiple projects may be needed to mitigate a particular problem area.

Once the projects have been selected, they need to be prioritized based on their cost and projected benefits. Due to funding limitations, not all improvement projects can be implemented. After the projects have been selected and prioritized, a plan should be developed in order to implement the projects. An implementation plan will help ensure that resources and finances are available to complete the improvement projects in a timely manner. Implementation of the projects should occur as soon as possible to avoid cost increases and prevent potential crashes that may occur without the project in place.

Projects must be evaluated to determine whether they are effective or can be used to address similar problems in the future. This is typically done in a before-and-after analysis by observing the frequency and severity of the crashes several years before the implementation of the project and again for several years after the project has been completed. Two issues can arise in this method of analysis. First, if enforcement and/or education change from *before* to *after* conditions, such added (or subtracted) variables may affect the number of crashes occurring at that location. Second, "regression to the mean," a statistical phenomenon that can make natural variation in repeated data look like real change, must be taken into account to ensure that change in crash patterns and/or frequency can reasonably be attributed to the safety projects. In order to correct these two issues, control sites should be established that are similar to the study locations but have not had any other changes made that might affect traffic safety outcomes.

8.3 ROADWAY AND BRIDGE MAINTENANCE NEEDS

The existing condition of roads and bridges is only known for state-maintained facilities and those county highways and local bridges maintained under the supervision of the Office of State-Aid Road Construction (OSARC). OSARC oversees more than 10,000 miles of county highway--comprising approximately 15 percent of all local roads--built and maintained according to standards developed by the American Association of State Highway and Transportation Officials (AASHTO). The state-aid agency also administers the Local Bridge Replacement and Rehabilitation Program. In a 2013 report entitled *Mississippi's Transportation Infrastructure*, MDOT outlined a 20-year program for maintaining roads and bridges. The county-by-county inventory of needs presented in the report was based on a two-year program of inspections, rating road and bridge conditions in accordance with state and federal standards. The following highway segments were noted as having unsatisfactory pavement ratings:



US 90 Pearl River Bridge (Photo by William Blackwell)

Hancock County:

- Highway 607 from I-10 to US 90
- Highway 90 in Waveland and Bay Saint Louis

Harrison County:

- US 49 from Airport Road to 28th Street in Gulfport
- I-10 in the vicinity of the US 49 interchange
- I-10 from the Woolmarket interchange in Harrison County to the Jackson County line
- I-110 from its northern terminus just north of I-10 to its southern terminus at US 90

Jackson County:

- I-10 from Highway 609 to MS 63
- MS 57 from I-10 to US 90
- MS 63 from I-10 to US 90
- US 90 from Oak Street in Gautier to Jerry St. Pé Highway at Ingalls Shipyards
- US 90 from Pascagoula Street to Hospital Road in Pascagoula

There are 13 State-Aid bridges in Hancock County but only one MDOT-posted span, the US 90 bridge over the Pearl River at the Louisiana state line. Built in 1933 by the Wisconsin Bridge and Iron Company, the Pearl River Bridge has total length of 960.7 feet, deck width of 23.9 feet and vertical clearance above deck of 15 feet. An estimated 2,100 vehicles cross the bridge daily. The deck condition rating (as of April 2012) was *fair*, the superstructure condition was rated *poor*, substructure condition was *fair*, and the overall sufficiency rating was 6.0 (out of a possible 100.0). MDOT also maintains major bridges on Interstate 10

spanning the Pearl and Jourdan rivers and the US 90 bridge across the Bay of Saint Louis connecting Hancock County to Harrison County. Projected long-range rehabilitation costs shown in the MDOT report included the following amounts for state-maintained facilities in Hancock County:

- $11.726 million for pavement on highways
- $28.779 million for MDOT bridges
- $12.877 million for State-Aid bridges

There are 24 State-Aid bridges in Harrison County. I-10 bridges in the county include those crossing the Wolf River, Bayou Bernard (within the elevated US 49 interchange), the Biloxi River and the Tchoutacabouffa River. MDOT also maintains the US 90 bridge spanning the Bay of Biloxi, connecting Harrison County to Jackson County. The MDOT report identified the following costs for bridge and pavement rehabilitation over the next 20 years:

I-10 Pascagoula River Bridge

- $28.885 million for pavement on highways
- $35.855 million for MDOT bridges
- $42.585 million for State-Aid bridges

There are 19 State-Aid bridges in Jackson County and one MDOT-posted span. The latter is located on MS 57, crossing Red Creek just south of the George County line. The longest bridge in the Mississippi Gulf Area is the I-10 elevated section spanning the Pascagoula River basin. The total length of the bridge is 20,930.2 feet, almost four miles. Built in 1976, the bridge was inspected in October of 2012 and garnered ratings of *good* for deck condition and *satisfactory* for both superstructure condition and substructure condition. The 2013 MDOT report presented the following projections of 20-year maintenance costs for state routes in Jackson County:

- $36.182 million for pavement on highways
- $27.734 million for MDOT bridges
- $24.423 million for State-Aid bridges

8.4 FREIGHT TRANSPORTATION NEEDS

Trucking--As described in the *Mississippi Statewide Freight Plan* (MDOT 2015), the principal Mississippi Gulf Coast highway freight corridor is Interstate 10 from the Louisiana line to the Alabama border. The major intersecting highways are US 49 in Gulfport and MS 63 in Pascagoula. The three coastal counties intersected by the I-10 corridor account for 13 percent of both population and employment in Mississippi. Ingalls Shipbuilding, the state's largest employer with over 13,000 employees, is located in this corridor. Within the metropolitan area the corridor serves three major maritime ports located on the Gulf of Mexico, including deep-water ports in Gulfport and Pascagoula. Truck freight is the dominant mode of

goods transport in the area, and it is expected to grow from 61 percent of total freight in 2011 to 65 percent in 2040. The MDOT statewide plan identifies primary highway freight facilities and key connectors (see Figure 8-4). Identification of this network was based on an analysis of freight flow patterns that focused on three key corridor functions: (1) Providing interstate connectivity; (2) Providing access to key intermodal freight facilities and freight generators; and (3) Efficiently moving high volumes of freight to support the state's economic health. Output from the regional travel demand model and travel-time analysis was used to evaluate existing congestion in the freight corridor, including on the freight connectors, and to project congested conditions likely to occur in the future. Both current and foreseeable congestion, associated with the movement of goods by truck, is concentrated on US 49, a connector between I-10 and US 90 that provides direct access to the Mississippi State Port at Gulfport.

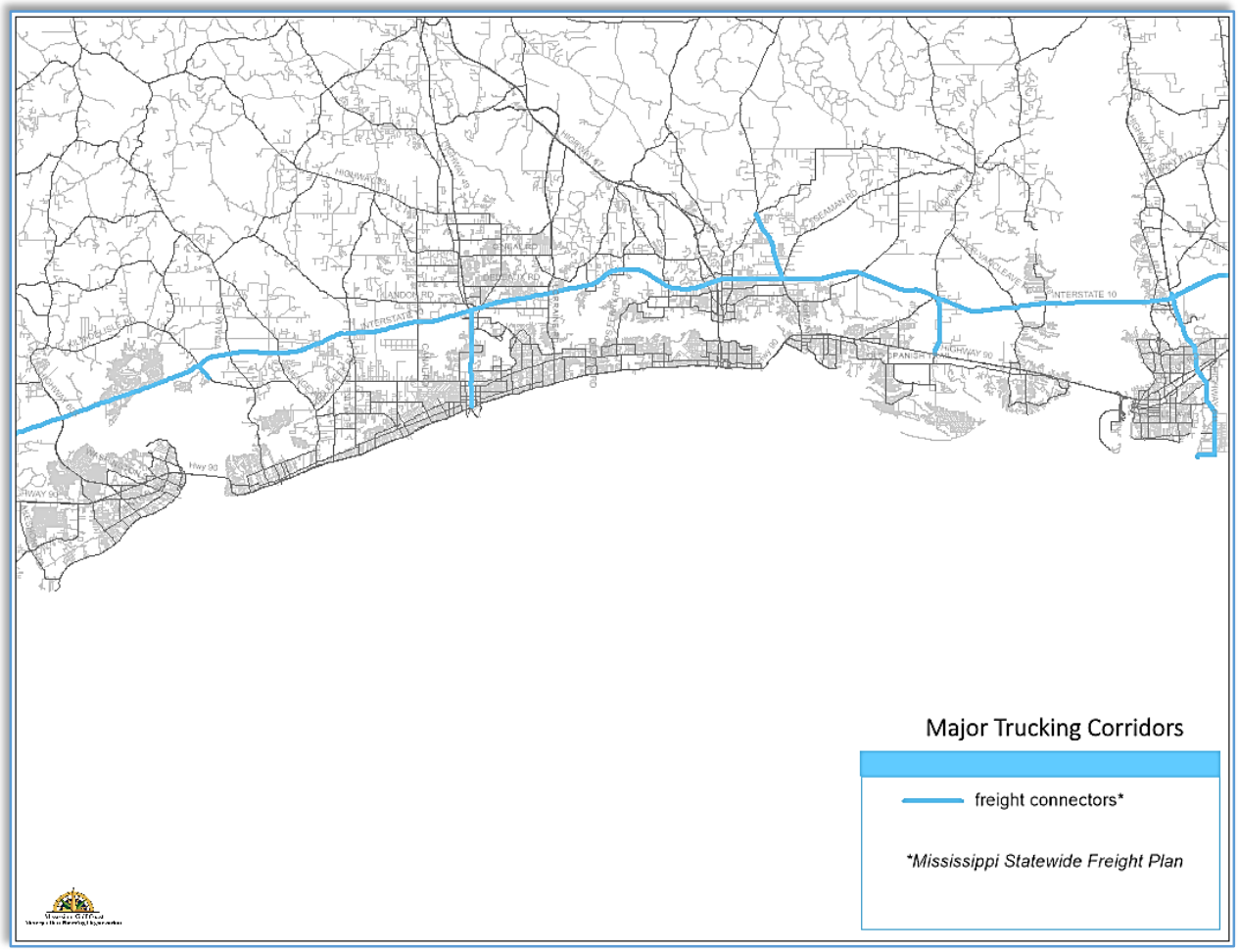
Railroads—The Hancock County Port and Harbor Commission is pursuing plans to install approximately 24 miles of new track to connect the existing Port Bienville Railroad (PBVR) to the Norfolk Southern mainline at Nichols. This long-contemplated addition to the shortline railroad will make it possible to ship freight north and south as well as east and west. On June 2, 2015 the Federal Railroad Administration issued a Notice of Intent for the preparation of an Environmental Impact Statement (EIS) in connection with the Port Bienville Railroad Project. The proposed improvement will expand the PBVR system to connect Port Bienville Industrial Park with the Norfolk Southern line between New Orleans and Hattiesburg via Stennis Space Center. Dual Class 1 rail service via the north-south Norfolk Southern line and the east-west CSXT line is intended to enable Hancock County and Stennis Space Center to attract industries that require long-distance rail service providing access to shipping destinations located north and northeast of the Mississippi Gulf Coast metropolitan area. MDOT completed a Feasibility Report for the project in 2013, identifying reasonable alternative corridors and projected economic benefits of the improvement.

Kansas City Southern entered into an agreement with the Mississippi State Port Authority in 2015 to make a joint investment in upgrading the line leading north from the Mississippi State Port at Gulfport to Hattiesburg. Pending improvements will render the KCS rail line capable of carrying standard 286,000-pound cars and double-stack trains. This enhancement of the regional freight transportation system has long been considered an essential element of plans for expanding the capability of the Mississippi State Port for moving goods in and out of the port efficiently.

8.5 BICYCLE AND PEDESTRIAN

While significant progress has been made in the development of bicycle and pedestrian facilities in the metropolitan area, the demand for non-motorized travel continues to grow, spurring efforts to provide sidewalks, bike paths, safe routes for cycling and multiuse pathways for both pedestrians and those riding bicycles. In addition to the local improvements designed to meet mobility needs within residential, commercial and recreational areas, there is a larger need for development of a regional network, serving longer trips between different sections of a city or even between cities. GRPC planners have sketched a network of separated paths that would improve bicycle mobility and increase connectivity throughout the Mississippi Gulf Coast area (see Figure 8-5). Highway 90 would serve as the spine of the network,

Figure 8-4: Major Trucking Corridors

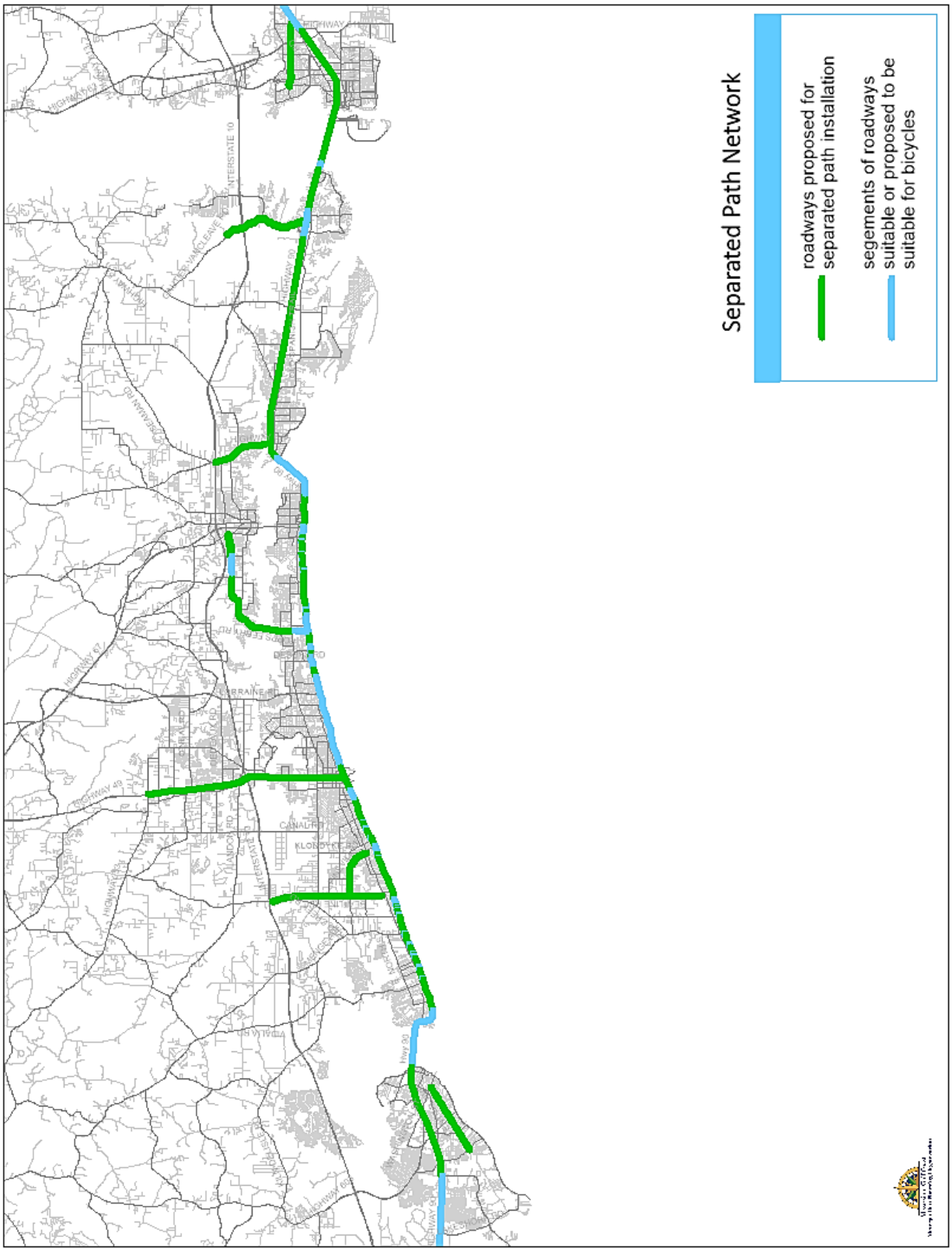


Source: Mississippi Department of Transportation (2015): Mississippi Statewide Freight Plan*; Gulf Regional Planning Commission.*

providing a continuous east-west route across the three coastal counties. North-south routes would radiate inland from the coast along major roadways such as Beatline Road and County Farm Road, Highway 49, Popp's Ferry Road, Highway 609 and the Gautier-Vancleave Road. Some segments of these routes would not be suitable for the installation of separated paths but could be adapted to accommodate bicycle travel safely.

This conceptual network is not intended to represent the total needs of the region. However, the segments selected represent recommendations from local comprehensive plans, the Hancock County Greenways Plan, the 2035 Long Range Transportation Plan, and/or input from local advocates and planners. Other objectives planners considered when identifying the proposed network components were connections to existing routes, schools, parks, transit routes and/or commercial centers. The proposed facility types have not been evaluated in terms of right-of-way costs or potential conflicts with utilities, drainage facilities or wetlands.

Figure 8-5: Proposed Separated-Path Network for Bicycle Travel



Source: Gulf Regional Planning Commission

The separated-path network includes the *Border to Border Route*, a trail based on the Gulf Coast Heritage Trails Partnership's signature project--the proposed Mississippi Coastal Heritage Trail--that would connect Infinity Science Center's Possum Walk Trail in western Hancock County to the Grand Bay National Estuarine Research Reserve in eastern Jackson County (see Figure 8-6). The route proposed supports the MPO objective to improve regional transportation system mobility, accessibility, and quality for all roadway users and modes. It incorporates the most direct route segments suitable for bicycling based on speed, traffic volume, available space to ride, and connection to existing bicycle and pedestrian facilities.

8.6 PUBLIC TRANSIT

Based on analysis of Coast Transit Authority (CTA) operations and funding over the past five years, and input from stakeholder groups and the general public, recommendations were developed for updating the Transit Development Plan (TDP) prepared for CTA by Burk-Kleinpeter, Inc. (BKI) for the period from 2010 to 2035. The current section of the Metropolitan Transportation Plan (MTP) provides an abbreviated synopsis of the principal issues affecting transit service in the Mississippi Gulf Coast area; goals and objectives for maintaining, improving and expanding transit service in the region; and an overview of the analytical approach adopted for identifying and evaluating unmet needs and potential opportunities. While a broad outline of planned improvements is presented in this section, specific details are reserved for presentation in a separate document updating the current TDP to be consistent with other components of the 2040 long-range transportation plan.

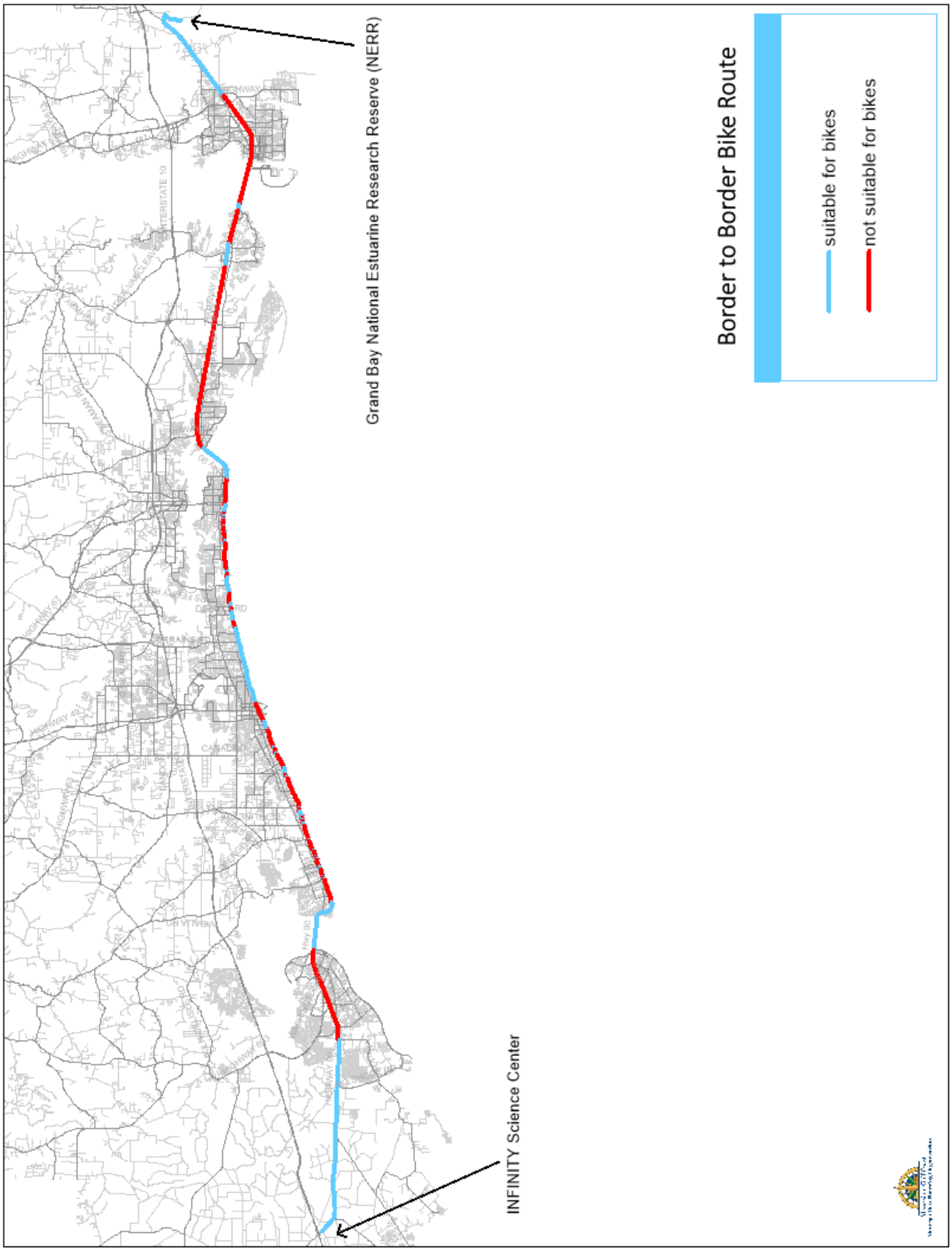
While particular emphasis is afforded the short-term element of the program, covering the five-year period from 2016 through 2020, appropriate attention is also given the mid-range (2021-2030) and long-range (2031-2040) implementation stages. The overarching purpose of the program is to establish the basis for continuing growth and development, over the next 25 years, of a transit system that not only survived Hurricane Katrina in 2005 but has grown and prospered over the decade since that catastrophic event. More detailed information regarding the analysis and development of recommendations will be found in the *Mississippi Gulf Coast Transit Development Plan Update: 2016-2040*.

Transit Funding

The overarching issue with respect to public transportation on the Mississippi Gulf Coast is the lack of a stable and sufficient source of funding for transit operations. During the period from 2010 through 2013, the share of CTA fixed-route transit operating expenses covered by fare revenues increased steadily, topping out at a little less than 19 percent. Of nine transit systems in Mississippi, Alabama and Louisiana with service area population between 50,000 and 200,000, only the City of Monroe (Louisiana) topped 19 percent in 2013, with a 19.8 percent fare recovery rate (see Table 8-4).

While data for 2014 are not yet available from the National Transit Database, it is apparent that since 2013 ridership and fare revenues have been adversely affected by the collapse of oil prices and resulting low cost of gasoline to the consumer (see Figure 8-7). (Ridership on regularly scheduled CTA routes was down by more than 85,000 passengers from 2013 to 2014 and fell another 140,000 in the 2105 operating

Figure 8-6: Proposed Border-to-Border Bicycle Trail



Source: Gulf Regional Planning Commission

year.) The fact that CTA is doing so well at recovering costs through fare revenues, compared to other operators in Mississippi and adjoining states, suggests that there is not a whole lot more that can be done to improve a well-designed and well-managed operation. Nevertheless, there are always things that can be done to make the system even better; and perhaps there are things that must be done in order to maintain the present level of performance.

It is to be hoped that fare revenues can be restored to the 2013 level and further expanded in the future—and that operating expenses can be held in check or even reduced by judicious route planning and scheduling—but the major obstacle confronting CTA is the lack of a local funding source that can be counted on from year to year. While the overall operating cost for all public transportation services provided by CTA exceeded the total cost of services provided by the City of Jackson in 2013, the Jackson transit system benefited from local support that surpassed local funding for CTA by more than $3.1 million (see Table 8-5).

The aggregate local contribution to transit operations in the Mississippi Gulf Coast area has declined in absolute terms in recent years, forcing cutbacks that have had a deleterious effect on ridership. Moreover, as noted in the 2010 TDP and reiterated in a report on funding prepared for CTA by BKI in 2012, the local percentage of operating funds has been decreasing since 2001.

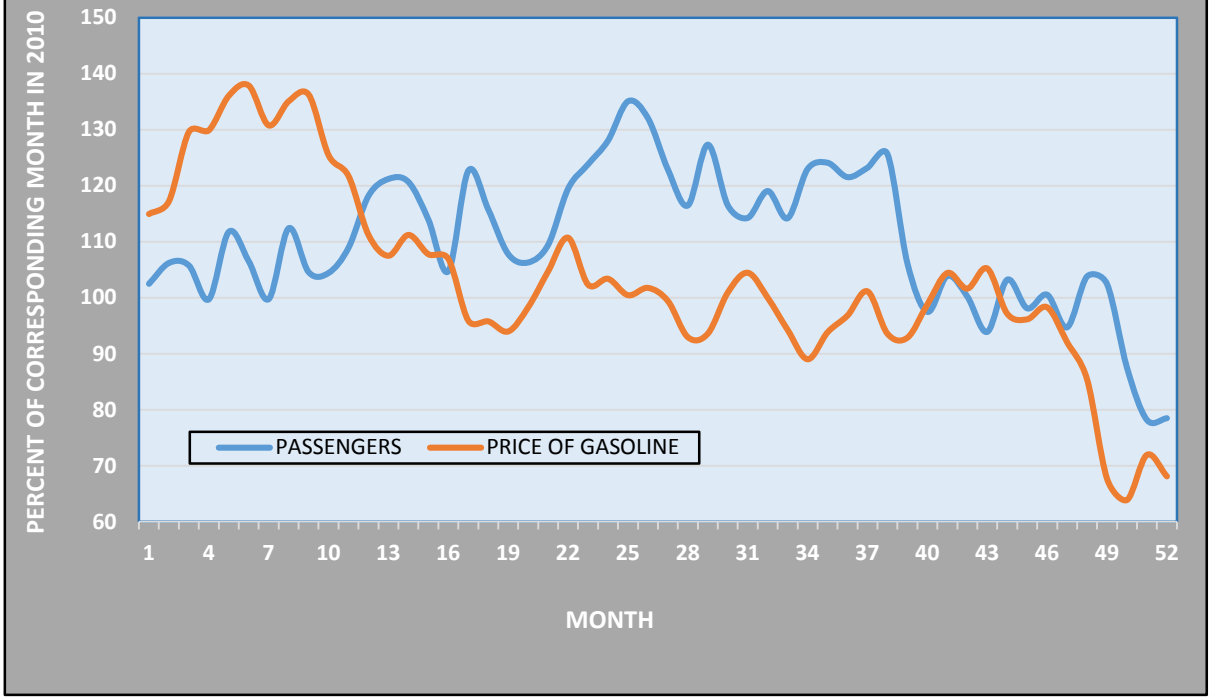
A little more than two-thirds of all operating funds made available to CTA in 2013 were used to cover expenses incurred for fixed-route bus service (see Table 8-6). Fare revenue generated by bus service represented a little less than 60 percent of the total amount paid by passengers for all services. Vanpool

Table 8-4:
CTA FARE REVENUES COMPARED TO OPERATING EXPENSES FOR COMPARABLE TRANSIT SYSTEMS

SYSTEM	URBANIZED AREA (UZA)	SERVICE AREA POPULATION	FARE REVENUE	OPERATING EXPENSES	PCT FARE RECOVERY
Coast Transit Authority	Gulfport MS	113,222	$765,203	$4,082,184	18.7%
Hub City Transit	Hattiesburg MS	51,084	$31,526	$867,600	3.6%
City of Jackson Transit	Jackson MS	173,514	$529,954	$3,125,387	17.0%
Tuscaloosa County Park & Transit	Tuscaloosa AL	136,487	$151,386	$1,257,289	12.0%
City of Huntsville AL Public Transit	Huntsville AL	127,000	$246,903	$2,084,007	11.8%
City of Alexandria	Alexandria LA	62,924	$434,767	$2,304,265	18.9%
City of Monroe Transit System	Monroe LA	50,000	$858,545	$4,327,135	19.8%
Lafayette Transit System	Lafayette LA	148,843	$528,435	$4,736,618	11.2%
Terrebonne Consolidated Govt	Houma LA	82,803	$120,673	$1,688,608	7.1%

Note: Survey included all systems in Alabama, Louisiana and Mississippi with service area population equal to at least 50,000 but less than 200,000.
Source: National Transit Database (2015) for data; calculations by Neel-Schaffer, Inc.

Figure 8-7:
CTA RIDERSHIP COMPARED TO PRICE OF GASOLINE BY MONTH
(JANUARY 2011 TO APRIL 2015)
Normalized as Percentage of 2010 Base-Line Condition



Source: National Transit Database; U. S. Department of Energy, Energy Information Administration; Neel-Schaffer, Inc.

services provided on a contractual basis by VPSI incurred only 13 percent of all operating expenses and generated 37 percent of total fare revenue. The commuter vanpool service had the highest farebox recovery rate, just over 60 percent, with the balance of costs being covered by a combination of Federal Transit Administration (FTA) Job Access Reverse Commute Program funds and contributions from participating employers.

The report prepared for CTA by BKI noted that local funding is appropriated annually by participating cities and counties from their general funds and added, "With undedicated local general fund dollars continually in high demand, transit must continually compete with other important community services for sustained funding levels" (*Getting on Board with Coast Transit Authority*, July 31, 2012, page 28). Four potential sources of funding, culled from an initial 40 considered in consultation with a stakeholder study group, were recommended for further exploration (page 39):

- *Court fees* imposed as a penalty stemming from a motorist violation resulting in suspension of the driver's license;

- *Rental car fees* primarily targeting non-resident visitors to the area;

Table 8-5:
2013 COAST TRANSIT AUTHORITY FUNDING BY SOURCE
COMPARED TO OTHER MISSISSIPPI SYSTEMS

SYSTEM	URBANIZED AREA	FUNDING SOURCE					
		FARES	FEDERAL	STATE	LOCAL	OTHER	TOTAL
Coast Transit Authority	Gulfport	$1,281,624	$3,173,357	$266,510	$1,132,009	$199,948	$6,053,448
Percent		*21.2%*	*52.4%*	*4.4%*	*18.7%*	*3.3%*	*100.0%*
Hub City Transit	Hattiesburg	$41,548	$752,768	$0	$346,401	$0	$1,140,717
Percent		*3.6%*	*66.0%*	*0.0%*	*30.4%*	*0.0%*	*100.0%*
City of Jackson	Jackson	$601,436	$344,002	$480,000	$4,267,055	$75,675	$5,768,168
Percent		*10.4%*	*6.0%*	*8.3%*	*74.0%*	*1.3%*	*100.0%*

Note: Funding amounts are for all services, including fixed-route, paratransit and commuter.
Source: National Transit Database (2015) for data; calculations by Neel-Schaffer, Inc.

- *Casino-based revenue* provided by operators under an agreement reimbursing CTA for casino-oriented transit service such as the Casino Hopper line;

- *Tri-county tourism-based tax* primarily targeting non-resident visitors by imposing a sales tax on accommodations and retail food and beverage purchases.

It remains to be seen whether any one of these or another revenue measure can attract the broad-based public and political support necessary to secure adoption at the local and/or state level. Nevertheless, it is likely that in the absence of some dedicated local funding source, CTA will be hard-pressed to continue providing regularly scheduled fixed-route transit service at the present level; and upgrading operations to attract additional patronage will be impossible.

Table 8-6:
2013 COAST TRANSIT AUTHORITY OPERATING EXPENSE
AND FARE REVENUE BY MODE

MODE	OPERATING EXPENSE	PCT OF EXP TOT	FARE REVENUE	PCT OF REV TOT	FARE PCT OF EXPENSE
Demand-Response	$1,145,046	19.1	$42,470	3.3	3.7
Fixed-Route Bus	$4,082,184	68.0	$765,203	59.7	18.7
Vanpool	$780,198	13.0	$473,951	37.0	60.7
TOTAL	$6,007,428	100.0	$1,281,624	100.0	21.3

Source: National Transit Database (2015); calculations by Neel-Schaffer, Inc.

Maintaining the Existing System

The immediate challenge confronting CTA is to maintain the existing system, consolidating the gains of the past 10 years, in order to provide a stable platform for future growth and expansion. While the overall performance of the system has been very good in recent years, it is possible that fare revenue could be increased or operating expense reduced by modifying service on routes that do not perform up to the system-wide standard.

Two modifications proposed for implementation during the five-year short-range planning period from 2016 to 2020 could make a not-insignificant contribution to the efficiency of fixed-route transit operations: The first would eliminate so-called "hail stops" made when someone wishing to board flags down a bus at a non-designated location. Eliminating such flag stops and providing proper signage at all designated stop locations could help improve schedule adherence and even reduce the time required to complete a scheduled trip. The second reform would involve eliminating unnecessary deviations from main travel routes. At the present time some buses turn in at designated locations to pick up passengers waiting at establishments set back from the street. The process of leaving the street to travel up a private drive, pick up passengers, return to the street and then merge into moving traffic consumes time that could be pared from the schedule by simply providing a properly signed stop location on the street and making curbside pick-ups standard policy for all fixed-route service.

Another very important alteration that needs to be implemented over the next five years involves reducing the time between scheduled trips in order to increase the frequency of service. Headways presently range from 45 to 90 minutes. CTA proposes to reduce 45-minute headways to 30 minutes wherever possible and to cut 90-minute trip intervals to 60 minutes. These measures would require additional equipment and operating funds, but they are essential if the transit system is to build a solid base of support among riders who consider bus service to be a convenient and reliable alternative to private-vehicle travel. Additional measures, such as those described above and others intended to reduce travel distance by shortening or redirecting routes, can also contribute to lessening the time between scheduled trips.

Proper maintenance of rolling stock and replacement of aging vehicles are also necessary measures if the transit system is to be kept in a state of good repair and service is to remain safe and reliable. CTA currently has on order seven new low-floor hybrid-electric buses with reclining seats, overhead luggage racks, wireless internet and electrical outlets. These vehicles will have a major impact on the public perception of transit as an attractive alternative to driving. The implementation of new technology will also serve to pique interest and appreciation of enhanced transit service. The *RouteShout* mobile app launched earlier this year allows riders to find out where a bus is located and when it will arrive at a specified stop. An individual waiting at a stop location or preparing to leave home to catch the bus no longer has to wonder when the transit vehicle will arrive; that information is readily available on his computer or cellular phone.

There is also an obvious need to maintain current performance standards for other CTA services: Demand-response paratransit and commuter vanpool operations. Regular parallel paratransit service will necessarily grow as the fixed-route system expands, and the ADA Paratransit Plus operation will continue providing transportation for qualified individuals throughout all three Mississippi Gulf Coast counties. CTA also remains committed to its highly successful commuter ridesharing program and will continue its outreach to large employers and efforts to secure or provide parking and other facilities needed to encourage public support and patronage. In addition, the Bike-n-Bus program has been extremely successful in attracting riders from among the cycling population by enabling them to mount their bikes on racks attached to the front end of buses so that they can easily shift from riding a bicycle to traveling in a transit vehicle and back again. The Bike-n-Bus Program will continue to be a staple of the CTA system.

Upgrading Facilities

In order to expand the transit system to meet the growing need for public transportation in the Mississippi Gulf Coast area it will be necessary to optimize utilization of the existing transit centers in Gulfport, Biloxi and D'Iberville. These are important transit hubs at which lines converge and from which they radiate to serve people living, working, shopping or engaging in recreational activities in their respective cities or traveling from one city to the other for these or other purposes. CTA is in the process of finalizing plans for expansion of the Gulfport Transit Center into the adjacent structure which served as the Gulfport Main Library for many years prior to Hurricane Katrina. The structure, gutted by the storm and abandoned by the Harrison County Library System, will be rehabilitated and reconfigured to serve as a multimodal transportation center. It will serve as a base for downtown shuttle service connecting Jones Park, the new aquarium and other waterfront attractions to office buildings, the post office, the new library, the county courthouse, Federal building and other destinations in the central business district of the city.

CTA also plans to locate transit super-stops at new hubs located at key transfer-points for travel in the region. One located in the vicinity of the I-10 interchange with US 49 will provide an opportunity to implement park-and-ride service for residents of the Orange Grove area and other more remote portions of Harrison County who work in or near downtown Gulfport or along the Highway 90 corridor served by the Beachcomber line. Another located in the vicinity of the I-10 interchange with I-110 will facilitate park-and-ride service for people who live in outlying portions of either Harrison or Jackson County and work in D'Iberville or Biloxi. A third hub is also proposed for the planned Coliseum Hotel and Convention District identified in the *City of Biloxi Comprehensive Plan*. The hub would be a major transfer-point between the Beachcomber, new express bus service linking the Gulfport and Biloxi transit centers, and a planned Popp's Ferry route that will connect to the Coliseum hub by way of the Popp's Ferry Road extension from Pass Road to US 90 currently under development. CTA will pursue negotiations with the owners and operators of major retail shopping malls, as well as the Mississippi Coast Coliseum Authority, to secure the necessary space at suitable locations for development of the proposed hubs and associated parking facilities.

In order to optimize planned express bus service in the Highway 90 corridor, and possibly along other major routes, CTA will seek the implementation of intelligent transportation systems (ITS) technology to facilitate the movement of transit vehicles. The first item on the ITS agenda is the installation of signal-preemption equipment on traffic lights and buses that would trigger a green light for approaching transit vehicles. This will be another key element of efforts to cut travel time and reduce headways.

Expansion of the Existing System

In addition to improving service by tightening up the schedule and cutting down the time between scheduled bus trips, CTA intends to expand the existing fixed-route transit network to areas where latent demand is presently unmet. A key objective in this regard relates to the need for more service connecting east-west routes in the older urban areas located along the Mississippi Sound to the areas that have been annexed or incorporated in the years since the City of D'Iberville achieved municipal status in 1988. Since then, both Gulfport and Biloxi have annexed large areas lying north of the old city limits, as did the City of Gautier in Jackson County. More recently, residents of the Diamondhead community in Hancock County voted to incorporate, and the one-time haven for retirees developed in the 1970s became the newest Mississippi Gulf coast municipality in January of 2012. The last 10 years have also seen a steady push to the north occasioned by the destruction of homes and businesses during Hurricane Katrina and the ensuing impact of stricter building requirements and drastically higher insurance costs. New bus routes need to follow the inland progression of development.

At the same time, there is clearly a need for more expeditious service in the east-west corridor running roughly parallel to the coastline in Harrison County. As traffic builds on Beach Boulevard (US 90) it becomes increasingly difficult for Beachcomber and Casino Hopper drivers to stay on schedule. This is especially the case during special events such as the annual weeklong *Cruisin' the Coast* celebration that attracts thousands of vintage automobile owners to the Coast. Adding as many as 10,000 cars to the traffic mix can result in serious congestion, especially when the drivers of those vehicles are only cruising and in no hurry to get anywhere. Two major studies undertaken in the past 20 years have focused on the need for a new roadway, running east and west somewhere between Highway 90 and Pass Road, which could provide relief for those two principal arterials. Both studies recommended development of a multimodal transportation corridor capable of carrying longer, faster vehicular trips so that Beach Boulevard could serve principally as a scenic route for more leisurely sightseeing trips, beach-bound travel or gaming-related trip-making. The proposed new corridor would also accommodate transit, initially facilitating express bus service on the limited-access roadway, and later providing a path for bus rapid transit (BRT) service between Gulfport and Biloxi.

Other proposed new routes were identified by analyzing base-year and projected future land use and demographic conditions. Detailed information regarding the analysis is presented in the *2040 Transit Development Plan*. This section of the long-range transportation plan focuses only on what went into the identification of short–term needs for new or reconfigured routes. The evaluation of potential new or modified routes assumed several key criteria:

- Service should be extended to areas with population and/or employment density sufficient to support transit patronage.

- System continuity should be maintained and strengthened by connecting new routes to existing lines whenever possible, preferably at hubs or other locations conducive to passenger transfers.

- Wherever possible new routes should follow well-traveled arterial routes with adequate roadway capacity.

- New or modified routes should be designed both to be seen by potential riders and to make sense as alternative travel choices, avoiding time-consuming indirect or circuitous paths.

- New or modified routes should be designed to allow the scheduling of service at 30 to 60-minute intervals in order to advance the CTA objective relating to reduced headways for regularly scheduled fixed-route service.

CTA bus routes presently provide fairly extensive coverage within a large portion of the Gulfport-Biloxi Urbanized Area, including the cities of Gulfport, Biloxi, D'Iberville and Ocean Springs (see Figure 8-8). Limited service in Bay Saint Louis has recently been added in the form of an isolated local circulator not connected to the rest of the system. No service is provided in the cities of Waveland, Pass Christian or Long Beach; nor is service available in the Jackson County cities east of Ocean Springs: Pascagoula, Moss Point and Gautier. There are also large portions of Gulfport and Biloxi that remain unserved, including much of the Orange Grove area and North Biloxi.

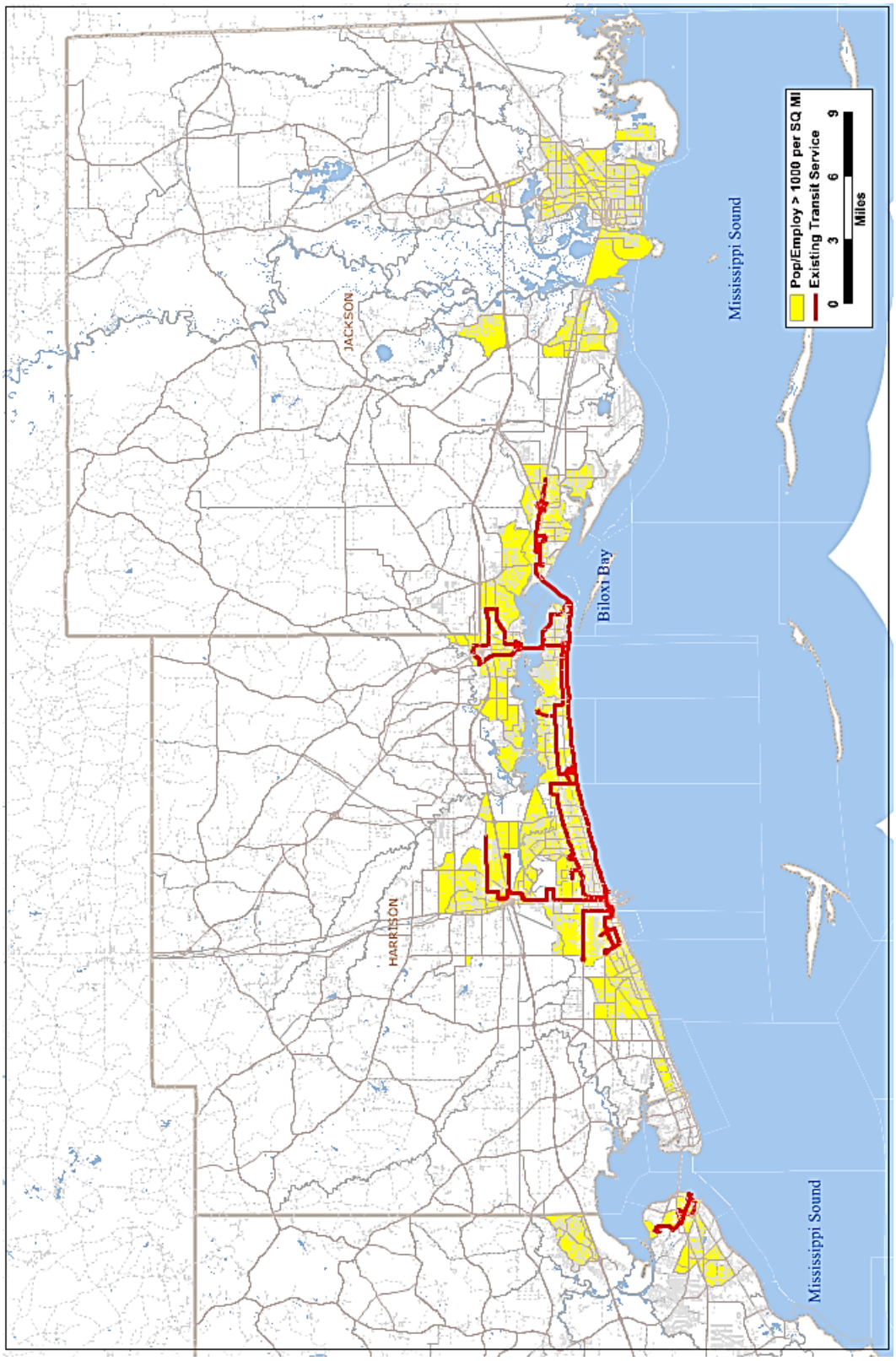
The initial criterion applied in assessing the potential suitability of these service gap areas for the location of new routes related to the concentration of population and employment. Density statistics were derived for the 797 traffic analysis zones in the three-county area delineated for the regional travel demand forecasting model. The criterion adopted to identify zones that might be capable of supporting transit service was population and/or employment density exceeding 1,000 residents or workers per square mile. (Traffic zones meeting that criterion are highlighted yellow in Figure 8-8). In Hancock County, Diamondhead and portions of Waveland and Bay Saint Louis met the base criterion. In the western portion of Harrison County, almost all traffic zones in Long Beach had population and/or employment density greater than 1,000, but very few in Pass Christian met the threshold value.

Most zones in Gulfport, Biloxi and D'Iberville exceeded the base density criterion. In the western portion of Jackson County, most of the zones included in the Gulfport-Biloxi Urbanized Area—in Ocean Springs, St. Martin and Gulf Hills—had population/employment density greater than 1,000. In the unserved Pascagoula-Moss Point Urbanized Area much of Gautier, most of Moss Point and virtually all of Pascagoula satisfied the initial criterion.

The criterion relating to continuity presents an obstacle to the implementation of new service in eastern Jackson County and must be waived if transit is to establish a foothold in the Pascagoula-Moss Point Urbanized Area. There is certainly an unmet need for transit in Pascagoula, Moss Point and Gautier; but it is difficult to see how it could be linked to the existing network, given the large gap in service-area potential east of Ocean Springs. On the other hand, new routes in Gulfport, Biloxi or Long Beach could easily be connected to existing lines at new or previously established transit hubs.

West of Gulfport, Highway 90 provides the most likely path for the extension of transit service. Major streets in Gulfport that currently do not accommodate bus routes include Highway 49 north of I-10, Airport Road, Hewes Avenue, Cowan Road, Lorraine Road and Courthouse Road. In Biloxi the entire length of Popp's Ferry Road is located in an area that could support transit. In Jackson County the numerous arterials presently lacking transit include the Gautier-Vancleave Road, Highway 90 and MS 63; Main Street and Martin Luther King Boulevard in Moss Point; Pascagoula Street, Telephone Road, and Market Street in Pascagoula; and others.

Figure 8-8: Potential Transit Service Areas



Source: Neel-Schaffer, Inc.

After evaluating a number of potential routes, with regard to these and the other criteria identified, the following seven were identified as the ones most likely to meet the need for new service and secure the patronage of people living, working or traveling in areas of unmet latent transit demand:

- ***Popp's Ferry Road*** from Edgewater Shopping Center to the Promenade in D'Iberville. The route would utilize Eisenhower Drive and Pass Road to reach Popp's Ferry Road; follow that thoroughfare from one end to the other; and connect to the Promenade hub by way of D'Iberville Boulevard and Promenade Parkway. The one-way travel distance would be approximately 9.50 miles, and the trip from one end to the other would require roughly 40 minutes, making it possible for two buses to provide service with 45-minute intervals between trips in each direction.

- ***Beachcomber – Long Beach*** from the Gulfport Transit Terminal to the WalMart in Pass Christian via Highway 90. The total length of the proposed route is about seven miles. A round-trip of 14 miles would require a little less than 60 minutes to complete, so it is possible a single bus could provide hourly service on the route.

- ***Beachcomber – Bay Saint Louis*** would provide service between the Pass Christian WalMart and Bay Saint Louis, connecting to the new Beachcomber-Long Beach line. Most of the route would be located on Highway 90. In Bay Saint Louis the line would terminate at the municipal parking facility on Court Street. Between the highway and the end of the line the route would follow Beach Boulevard and Court Street, circling back to Beach Boulevard on the return trip by way of Second Street and Main Street. The total route length would be approximately 10 miles, requiring roughly 40 minutes to complete a one-way trip; so two buses would be required to provide continuous service at 45-minute intervals.

- ***Ocean Springs-D'Iberville*** via Washington Avenue (Highway 609), the I-10 Connector Road, Mallette Road and Sangani Boulevard to the hub at the Promenade. Initiation of service on this route will follow completion of the I-10 Connector Road between Tucker Road (Highway 609) and the east end of Mallette Road at Daisy Vestry Road. Connecting service at the Promenade will include the new Popp's Ferry line and D'Iberville Route 4. At the opposite end the route will connect to Ocean Springs Route 7 at its point of origin on Washington Avenue in the vicinity of either Bienville Boulevard or Government Street. The total centerline length of the route is approximately seven miles. A round-trip could probably be accomplished in less than an hour, making it possible for a single bus to provide service on the route at 60-minute intervals.

- ***East-West Corridor*** express bus service between the Gulfport and Biloxi transit terminals, operating initially on Highway 90, would be relocated to the new multimodal transportation corridor eventually. The total one-way length of the route is about 12.25 miles. Buses would make a very limited number of stops, so it is likely a one-way trip could be completed in 40 minutes or less. Two buses could be assigned to provide weekday peak-period service at 45-minute intervals.

- ***Gautier-Pascagoula*** would provide service between the Gautier-Vancleave Road and downtown Pascagoula, via Highway 90 and Pascagoula Street, terminating at Delmas Avenue. This is one of two new routes that would establish transit service within the Pascagoula-Moss Point Urbanized Area. The route would be roughly 6.25 miles from end to end and require about 25 minutes to complete, so a single-bus could provide regularly scheduled service at 60-minute intervals.

- ***Pascagoula-Moss Point*** would provide service between the two cities in eastern Jackson County on Jackson Avenue, Market Street, Telephone Road, Main Street, Highway 613 and Dutch Bayou Road, looping back around at the northern end of the route via Elder Ferry Road, Jamestown Road and Sutton Road. The total length of the route would be approximately 7.25 miles. A one-way trip could probably be accomplished in less than 30 minutes, making it possible for a single bus to provide regularly scheduled service at 60-minute intervals.

In addition to the existing transit centers in Gulfport, Biloxi and D'Iberville, the expanded system would require new hubs in the central business districts of Bay Saint Louis, Oceans Springs and Pascagoula, at the Promenade in D'Iberville and at the WalMart in Pass Christian. Park-and-ride facilities should be developed in the vicinity of I-10 at Highway 49, Lorraine Road, I-110 and Highway 609.

Planning for future development of the system should explore the possibility of establishing transit service in Diamondhead and linking it to Bay Saint Louis. It should also examine the feasibility of service connecting Gautier to Ocean Springs. Other corridors in Gulfport, Biloxi and Long Beach may warrant further articulation of the existing system in the future. The planning basis for eventual implementation of bus rapid transit (BRT) in the East-West Corridor should be established, and conceptual plans for beachfront fixed-guideway service on or adjacent to Highway 90 in Gulfport and Biloxi should be developed.

9.0 FINANCIAL ANALYSIS

The metropolitan transportation plan (MTP) is required to be fiscally constrained, which is to say, the projected aggregate cost of programmed projects must not exceed the amount of funding that is reasonably expected to be available for transportation improvements. If the future is the great unknown, future public funding for infrastructure is the great unknowable. Local governments have become heavily dependent on the Federal government for the resources necessary to build and maintain their transportation systems. And while the Federal government replenishes its funds by claiming a share of the take every time a driver stops to pump fuel into his or her vehicle, there is no guarantee regarding what portion of those tax receipts will be spent on building or maintaining roads. Unlike social entitlement programs, there is no long-term locked-in commitment to the nation's transportation system. Funding for streets, highways and bridges—as well as public transit, bicycle paths, railroad crossing protection devices, and other expenditures related to the safety and mobility of the traveling public—is entirely dependent on periodic legislative action by the United States Congress to adopt a transportation funding bill. The terms and conditions of such legislation change as often as a new act is required to reauthorize programs state and local governments have come to depend on to meet their transportation needs. Recognizing that the future terms and conditions of bills debated in Congress are ultimately unfathomable, it is nevertheless possible to make an educated guess based on the admittedly risk-fraught assumption that the future will resemble the past. Having offered that disclaimer, the results of the financial analysis briefly described below provide numbers for use in programming long-range plan improvements that meet the principal criterion of fiscal constraint: They represent funding amounts that one can *reasonably expect* to be realized.

9.1 HISTORICAL FUNDING ANALYSIS

While metropolitan planning organizations (MPOs) take different approaches to the task of forecasting how much funding can reasonably be expected from Federal, state and local sources, Gulf Regional Planning (GRPC) has always proceeded in this endeavor by assuming that expenditures over the next 20 years or so will probably be consistent with the spending that has occurred in the previous decade or two. The Mississippi Department of Transportation (MDOT) has facilitated this approach by providing comprehensive data regarding projects funded in part with state or Federal contributions. For the present financial analysis, MDOT furnished a database listing all transportation expenditures in Hancock, Harrison and Jackson counties during the 15-year period from 1999 through 2013, the base year for development of the 2040 MTP.

Total spending for transportation improvements amounted to more than $1.493 billion in actual dollars (see Table 9-1). In order to convert that amount to monetary terms consistent with the 2013 value of the dollar, inflation factors derived from the *Consumer Price Index* were applied to the project costs for each past year (U. S. Department of Labor, Bureau of Labor Statistics 2015). The inflation-adjusted total for the 15-year analysis period exceeded $1.748 billion. Of that total more than 83 percent went to construction projects--$1.461 billion in 2013 real-dollar terms--and 62 percent of all construction funds were expended on new bridges. Virtually all of the $906 million (in 2013 dollars) spent for new spans went for the

construction of bridges to carry U. S. Highway 90 (US 90) across the Bay of Saint Louis and the Bay of Biloxi, replacing the structures destroyed by Hurricane Katrina in 2005. That represented nearly 52 percent of all transportation spending, including expenditures for facilities and equipment, maintenance and non-roadway-related items. Roadway construction costs represented another 24 percent of all spending, totaling $347 million. The remaining construction costs were distributed among new interchanges, roadway widening and overlay projects, bicycle and pedestrian facilities and intersection improvements. Road and bridge maintenance accounted for nearly 12 percent of all money spent--$192 million. Expenditures for facilities and equipment—street lighting and safety improvements, traffic signals, and roadside or right-of-way enhancements such as rest stops, visitor centers and landscaping—totaled close to $49 million. Another $19 million-plus went to non-roadway-related projects.

Table 9-1:

MISSISSIPPI GULF COAST TRANSPORTATION FUNDING BY CATEGORY OF EXPENDITURE: 1999-2013

CATEGORY	TOTAL EXPENDITURE (1)	ADJUSTED TOTAL EXPENDITURE (2)	AVERAGE ANNUAL EXPENDITURE (1)	ADJUSTED AVG ANNUAL EXPENDITURE (2)	PCT OF TOTAL
Bicycle and Pedestrian Facilities	$9,980,314	$12,106,704	$665,354	$807,114	0.69
Bridge Construction	$760,759,430	$906,080,239	$50,717,295	$60,405,349	51.81
Interstate/Interchange	$59,095,495	$59,624,900	$3,939,700	$3,974,993	3.41
Intersection Improvements	$1,300,992	$1,492,667	$86,733	$99,511	0.09
Road Construction	$347,026,075	$420,969,714	$23,135,072	$28,064,648	24.07
Roadway Widening and Overlay	$53,685,218	$61,038,987	$3,579,015	$4,069,266	3.49
TOTAL CONSTRUCTION	$1,231,847,525	$1,461,313,210	$82,123,168	$97,420,881	83.57
Lighting and Safety	$15,194,363	$18,099,282	$1,012,958	$1,206,619	1.04
Traffic Signals	$23,357,455	$27,393,932	$1,557,164	$1,826,262	1.57
Roadside Improvements	$10,405,098	$12,431,719	$693,673	$828,781	0.71
TOTAL FACILITIES/EQUIPMENT	$48,956,917	$57,924,933	$3,263,794	$3,861,662	3.31
Bridge Maintenance and Repair	$24,329,154	$26,949,597	$1,621,944	$1,796,640	1.54
Road Maintenance/Reconstruction	$168,542,363	$180,746,057	$11,236,158	$12,049,737	10.34
TOTAL MAINTENANCE	$192,871,517	$207,695,654	$12,858,101	$13,846,377	11.88
Facilities (Non-Roadway)	$19,595,119	$21,772,917	$1,306,341	$1,451,528	1.25
TOTAL NON-ROADWAY-RELATED	$19,595,119	$21,772,917	$1,306,341	$1,451,528	1.25
TOTAL ALL CATEGORIES	$1,493,271,078	$1,748,706,714	$99,551,405	$116,580,448	100.00

(1) Actual amounts expended (in current-year dollars).

(2) Real dollars (adjusted for inflation to 2013 base year).

Source: Mississippi Department of Transportation; calculations by Neel-Schaffer, Inc.

In order to establish a basis for projecting the amounts that would be available for use in each of the three plan stages (2016-2020, 2021-2030, 2031-2040) the categorized costs were annualized. This yielded an average annual overall expenditure of $99.55 million for the period from 1999 through 2013. Converting this total to 2013 dollars resulted in an average annual expenditure of $116.58 million. Of that total more than $97 million related to construction projects, including $60 million for bridges and $28 million for roads.

A further effort to distinguish between state and local projects revealed that, during the historical period studied, approximately 96.7 percent of all transportation expenditures were for state-sponsored projects: $1.444 billion compared to $48.92 million for local projects (see Table 9-2). Adjusting the categorical subtotals for inflation resulted in 2013 real-dollar amounts of $1.694 billion for state-sponsored improvements and $54.67 million for projects completed under local jurisdiction.

Converting these jurisdictional totals to average annual figures revealed that MDOT spent more than $96 million a year on projects in the Mississippi Gulf Coast Metropolitan Planning Area (MPA) (see Table 9-3). Local project expenditures averaged $3.26 million per year. Updating the categorical subtotals to 2013 dollars produced estimated annual expenditures of nearly $113 million for state-sponsored projects and about $3.64 million for local improvements.

9.2 PROJECTED FUTURE FUNDING

Federal funding for local projects is provided through the Surface Transportation Program (STP) managed by the Federal Highway Administration (FHWA). STP funds are allocated among the states on a formula apportionment basis for administration by the state department of transportation (DOT). The state DOT is authorized to make use of one-half of the apportioned funds at its own discretion. The other half must be distributed among three groups of recipients: Urbanized areas with population equal to or exceeding 200,000; urban areas with population less than 200,000; and rural areas. Funds may be used for improvements on any Federal-Aid System (FAS) route. FAS routes include National Highway System (NHS) facilities and all other roads that are eligible to receive Federal-aid funding, including functionally classified collectors and arterials in urban areas. The MPO is responsible for the allocation of an urban area's apportionment to specific projects. The program provides 80 percent of the required funding for a project, leaving 20 percent to be furnished by the local sponsor.

MDOT has asserted (in the *Statewide Transportation Improvement Program: Fiscal Year 2015-2019*), "While it is probably reasonable to assume that the levels of state and federal funding for transportation projects in the years ahead will be generally consistent with amounts which have been made available in the past, local funding presents a much more complex and less easily resolved picture." The problem with the STP has never been a lack of adequate Federal funding; rather it has been the difficulty of securing the local commitment of matching funds. MDOT also notes, "At the same time, the massive infusion of state and federal assistance for emergency repairs in the wake of [Hurricane Katrina] has somewhat skewed the historical data, making it necessary to consider not just near-term conditions but to adopt a longer perspective on past investment in transportation infrastructure and operations."

Table 9-2:
MISSISSIPPI GULF COAST TRANSPORTATION FUNDING BY TYPE OF PROJECT AND JURISDICTIONAL RESPONSIBILITY (1999-2013)

	1999-2013 EXPENDITURE		
CATEGORY	STATE	LOCAL	TOTAL
Bicycle and Pedestrian Facilities	$7,024,532	$2,955,782	$9,980,314
Bridge Construction	$760,759,430	$0	$760,759,430
Interchange Construction	$59,095,495	$0	$59,095,495
Intersection Improvements	$1,300,992	$0	$1,300,992
Road Construction	$335,331,616	$11,694,459	$347,026,075
Roadway Widening and Overlay	$53,685,218	$0	$53,685,218
TOTAL CONSTRUCTION	$1,217,197,285	$14,650,241	$1,231,847,525
ADJUSTED TOTAL (2013 Dollars)	$1,443,933,956	$17,379,253	$1,461,313,210
Lighting and Safety	$13,835,037	$1,359,326	$15,194,363
Traffic Signals	$21,053,946	$2,303,509	$23,357,455
Roadside Improvements	$10,405,098	$0	$10,405,098
TOTAL EQUIPMENT AND FACILITIES	$45,294,081	$3,662,835	$48,956,916
ADJUSTED TOTAL (2013 Dollars)	$53,591,133	$4,333,800	$57,924,933
Bridge Maintenance and Repair	$24,329,154	$0	$24,329,154
Road Maintenance	$137,930,297	$30,612,066	$168,542,363
TOTAL MAINTENANCE	$162,259,451	$30,612,066	$192,871,517
ADJUSTED TOTAL (2013 Dollars)	$174,730,739	$32,964,914	$207,695,654
Facilities (Non-Roadway)	$19,595,119	$0	$19,595,119
TOTAL NON-ROADWAY-RELATED	$19,595,119	$0	$19,595,119
ADJUSTED TOTAL (2013 Dollars)	$21,772,917	$0	$21,772,917
TOTAL ALL CATEGORIES	$1,444,345,936	$48,925,142	$1,493,271,078
ADJUSTED TOTAL (2013 Dollars)	$1,694,028,746	$54,677,968	$1,748,706,714

Source: Mississippi Department of Transportation; Neel-Schaffer, Inc.

The huge expenditures required to replace the Highway 90 bridges represented a one-time emergency infusion of funds that cannot be expected to recur on a regular basis. Therefore those costs were eliminated from further consideration in developing the forecast of future funding availability. Moreover, in forecasting short-term funding for local projects, the historical data were set aside in favor of amounts included in the current fiscally constrained Statewide Transportation Improvement Program (STIP).

The STIP assumes an annual allocation of $5,050,000 in STP funds and $300,000 in Transportation Alternatives Program (TAP) funding for the Mississippi Gulf Coast (see Table 9-4). Local match of $1,212,500 makes for a programmed annual total of $6,562,500. In addition, the total amount available for transportation projects during the five-year period covered by the STIP includes $14,901,320 in carryover funds for STP projects and $687,000 in carryover funds for safety projects. The overall amount available for transportation projects during the current period (2015-2019) is $48,400,820.

Table 9-3:
MISSISSIPPI GULF COAST AVERAGE ANNUAL TRANSPORTATION FUNDING
BY TYPE OF PROJECT AND JURISDICTIONAL RESPONSIBILITY (1999-2013)

	AVERAGE ANNUAL FUNDING		
CATEGORY	STATE	LOCAL	TOTAL
Bicycle and Pedestrian Facilities	$468,302	$197,052	$665,354
Bridge Construction	$50,717,295	$0	$50,717,295
Interstate/Interchange Construction	$3,939,700	$0	$3,939,700
Intersection Improvements	$86,733	$0	$86,733
Road Construction	$22,355,441	$779,631	$23,135,072
Roadway Widening and Overlay	$3,579,015	$0	$3,579,015
TOTAL CONSTRUCTION	$81,146,486	$976,683	$82,123,168
ADJUSTED TOTAL (2013 Dollars)	$96,262,264	$1,158,617	$97,420,881
Lighting and Safety	$922,336	$90,622	$1,012,958
Traffic Signals	$1,403,596	$153,567	$1,557,164
Roadside Improvements	$693,673	$0	$693,673
TOTAL EQUIPMENT AND FACILITIES	$3,019,605	$244,189	$3,263,794
ADJUSTED TOTAL (2013 Dollars)	$3,572,742	$288,920	$3,861,662
Bridge Maintenance and Repair	$1,621,944	$0	$1,621,944
Road Maintenance	$9,195,353	$2,040,804	$11,236,158
TOTAL MAINTENANCE	$10,817,297	$2,040,804	$12,858,101
ADJUSTED TOTAL (2013 Dollars)	$11,648,716	$2,197,661	$13,846,377
Facilities (Non-Roadway)	$1,306,341	$0	$1,306,341
TOTAL NON-ROADWAY-RELATED	$1,306,341	$0	$1,306,341
ADJUSTED TOTAL (2013 Dollars)	$1,451,528	$0	$1,451,528
TOTAL ALL CATEGORIES	$96,289,729	$3,261,676	$99,551,405
ADJUSTED TOTAL (2013 Dollars)	$112,935,250	$3,645,198	$116,580,448

Source: Mississippi Department of Transportation; Neel-Schaffer, Inc.

Table 9-4:
PROGRAMMED FUNDING FOR LOCAL PROJECTS: FISCAL YEARS 2015-2019

SOURCE	BASE ANNUAL AMOUNT		
	Federal	Local	Total
Surface Transportation Program (less set-asides)	$3,650,000	$912,500	$4,562,500
Safety Projects (set-aside)	$500,000	$0	$500,000
Bicycle, Pedestrian and Transit Projects (set-aside)	$500,000	$125,000	$625,000
MPO Studies/Projects (set-aside)	$400,000	$100,000	$500,000
Transportation Alternatives Program	$300,000	$75,000	$375,000
TOTAL	$5,350,000	$1,212,500	$6,562,500

SOURCE	TOTAL AMOUNT		
	Federal	Local	Total
Surface Transportation Program (less set-asides)	$33,151,320	$4,562,500	$37,713,820
Safety Projects (set-aside)	$3,187,000	$0	$3,187,000
Bicycle, Pedestrian and Transit Projects (set-aside)	$2,500,000	$625,000	$3,125,000
MPO Studies/Projects (set-aside)	$2,000,000	$500,000	$2,500,000
Transportation Alternatives Program	$1,500,000	$375,000	$1,875,000
TOTAL	$42,338,320	$6,062,500	$48,400,820

Note: Total for Surface Transportation Program (less set-asides) *includes $14,901,320 in carryover funds.*
Total for Safety Projects (set-aside) *includes $687,000 in carryover funds.*
Source: Mississippi Department of Transportation (2014), Statewide Transportation Improvement Program: 2015-2019.

The assumption was made that the same amount would be available for the five-year period from 2016 through 2020. Furthermore, it was assumed that the current set-asides for safety projects and alternative transportation improvements ($500,000 each), and for MPO studies and other unspecified uses ($400,000), would be continued. The Transportation Policy Committee (TPC) for the Mississippi Gulf Coast MPO has committed 10 percent of its annual allotment of STP funds for projects designed to enhance the safety of individuals traveling by all modes in the area. The TPC has committed an equal amount for improvements that facilitate travel by bicycle, on foot or by transit. These funds are in addition to those that local governments can tap under the Transportation Alternatives Program (TAP).

The TAP was authorized under Section 1122 of the *Moving Ahead for Progress in the 21st Century Act* (MAP-21). Section 1122 reserves two percent of the total amount authorized for apportionment to the states from the Highway Trust Fund Highway Account each fiscal year. Permitted uses include on- and off-road pedestrian and bicycle facilities; infrastructure projects for improving non-driver access to public transportation and for enhancing personal mobility; community improvement activities; environmental mitigation; recreational trails; safe routes to school; and projects for planning, designing or constructing roadways largely located within the right-of-way limits of former Interstate Highway System facilities or other divided highways. The TAP apportionment for each state includes separate amounts for urban areas with population greater than 200,000; for those with population greater than 5,000 but less than 200,000;

and for areas with 5,000 or fewer residents. The Gulfport Urbanized Area (UZA), with 2010 population of 208,948, receives an annual apportionment of TAP funds. Local governments located in the Pascagoula UZA, which had a 2010 population of 50,428, have to request TAP funding from the account for urban areas with less than 200,000 residents administered by MDOT.

MDOT assumed a three percent per annum increase in capital and operating expenses in estimating project costs for improvements to state-maintained facilities. Federal regulations contain an explicit requirement that project costs be expressed not in real dollars but in "year of expenditure dollars." These might better be labeled "unreal dollars" since they have no basis in reality. The collapse of oil prices has left state DOTs strapped for cash and called into question the assumption of never-ending monetary inflation. Nevertheless, the requirement that "future dollars" be used in estimating project costs stands and must be met. In order to project the availability of future funding for transportation improvements in a manner consistent with the requirement for fiscal constraint, the average annual expenditure amounts previously developed for the base year (2013) were first updated to 2015 dollars, assuming an annual inflation rate of one percent. The same rate was then applied to all succeeding years from 2016 through 2040 in order to calculate the projected availability of funds for all categories and sub-categories of transportation improvements in the short-term (2016-2020), intermediate (2021-2030) and long-range (2031-2040) planning periods. This resulted in the following projected totals for the three stages of the long-range transportation plan (see tables 9-5, 9-6 and 9-7):

- 2016-2020 $ 256,811,419
- 2021-2035 $ 553,590,961
- 2031-2040 $ 611,508,825

These totals include all potential expenditures for transportation-related improvements. The following amounts are projected to be available for maintenance projects:

	Bridge Maintenance	Road Maintenance	Total Maintenance
2016-2020	$ 8,523,403	$ 59,046,630	$ 67,570,033
2021-2030	$ 18,373,323	$ 127,282,816	$ 145,656,139
2031-2040	$ 20,295,579	$ 140,599,414	$ 160,894,993

Projected expenditures for roadside improvements, such as rest stops and landscaping, are not contemplated in the Staged Improvement Program presented in Chapter 11. Nor are costs that may be incurred for non-roadway facilities. The focus of the program is on needed surface transportation improvements in four categories: Alternative Transportation; Safety Improvements; Roadway Construction; and Interstate/Interchange Improvements. The Alternative Transportation category includes pedestrian and bicycle facilities and public transportation improvements funded through the Surface Transportation Program rather than transit-only funding sources administered by the Federal Transit Administration.

Table 9-5:

MISSISSIPPI GULF COAST PROJECTED TRANSPORTATION FUNDING BY CATEGORY OF EXPENDITURE: STAGE 1 (2016-2020)

CATEGORY	AVERAGE ANNUAL EXPENDITURE (2013 $$)	AVERAGE ANNUAL EXPENDITURE (2015 $$)	2016-2020 PROJECTED EXPENDITURE 2016	2017	2018	2019	2020	TOTAL
Bicycle and Pedestrian	$665,354	$678,661	$685,448	$692,302	$699,225	$706,218	$713,280	$3,496,474
Interstate/Interchange	$3,974,993	$4,054,493	$4,095,038	$4,135,988	$4,177,348	$4,219,122	$4,261,313	$20,888,808
Road Improvements	$26,800,819	$27,336,835	$27,610,204	$27,886,306	$28,165,169	$28,446,821	$28,731,289	$140,839,788
Total Construction	$31,441,166	$32,069,990	$32,390,690	$32,714,596	$33,041,742	$33,372,160	$33,705,881	$165,225,069
Lighting, Safety, Signals	$2,570,121	$2,621,524	$2,647,739	$2,674,216	$2,700,958	$2,727,968	$2,755,248	$13,506,129
Roadside Improvements	$693,673	$707,547	$714,622	$721,768	$728,986	$736,276	$743,639	$3,645,291
Total Equipment and Facilities	$3,263,794	$3,329,070	$3,362,361	$3,395,985	$3,429,944	$3,464,244	$3,498,886	$17,151,420
Bridge Maintenance and Repair	$1,621,944	$1,654,382	$1,670,926	$1,687,636	$1,704,512	$1,721,557	$1,738,773	$8,523,403
Road Maintenance	$11,236,158	$11,460,881	$11,575,490	$11,691,244	$11,808,157	$11,926,238	$12,045,501	$59,046,630
Total Maintenance	$12,858,101	$13,115,263	$13,246,416	$13,378,880	$13,512,669	$13,647,795	$13,784,273	$67,570,033
Facilities (Non-Roadway)	$1,306,341	$1,332,468	$1,345,793	$1,359,251	$1,372,843	$1,386,572	$1,400,437	$6,864,896
Total Facilities (Non-Roadway)	$1,306,341	$1,332,468	$1,345,793	$1,359,251	$1,372,843	$1,386,572	$1,400,437	$6,864,896
TOTAL								$256,811,419

Table 9-6:

MISSISSIPPI GULF COAST PROJECTED TRANSPORTATION FUNDING BY CATEGORY OF EXPENDITURE: STAGE 2 (2021-2030)

CATEGORY	AVG ANN EXPENDITURE (2013 $$)	2020 PROJECTED EXPENDITURE	2021-2025 PROJECTED EXPENDITURE					5-YEAR SUBTOTAL
			2021	2022	2023	2024	2025	
Bicycle and Pedestrian	$665,354	$713,280	$720,413	$727,617	$734,893	$742,242	$749,664	$3,674,829
Interstate/Interchange	$3,974,993	$4,261,313	$4,303,926	$4,346,965	$4,390,435	$4,434,339	$4,478,683	$21,954,349
Road Improvements	$26,800,819	$28,731,289	$29,018,602	$29,308,788	$29,601,876	$29,897,894	$30,196,873	$148,024,032
Total Construction	$31,441,166	$88,038,521	$34,042,940	$34,383,370	$34,727,204	$35,074,476	$35,425,220	$173,653,210
Lighting, Safety, Signals	$2,570,121	$2,755,248	$2,782,800	$2,810,628	$2,838,734	$2,867,122	$2,895,793	$14,195,078
Roadside Improvements	$693,673	$743,639	$751,075	$758,586	$766,172	$773,833	$781,572	$3,831,238
Total Equipment and Facilities	$3,263,794	$3,498,886	$3,533,875	$3,569,214	$3,604,906	$3,640,955	$3,677,365	$18,026,315
Bridge Maintenance and Repair	$1,621,944	$1,738,773	$1,756,160	$1,773,722	$1,791,459	$1,809,374	$1,827,467	$8,958,183
Road Maintenance	$11,236,158	$12,045,501	$12,165,956	$12,287,615	$12,410,492	$12,534,596	$12,659,942	$62,058,602
Total Maintenance	$12,858,101	$13,784,273	$13,922,116	$14,061,337	$14,201,951	$14,343,970	$14,487,410	$71,016,784
Facilities (Non-Roadway)	$1,306,341	$1,400,437	$1,414,442	$1,428,586	$1,442,872	$1,457,301	$1,471,874	$7,215,074
Total Facilities (Non-Roadway)	$1,306,341	$1,400,437	$1,414,442	$1,428,586	$1,442,872	$1,457,301	$1,471,874	$7,215,074
TOTAL (5 Years)								$269,911,384

CATEGORY	AVG ANN EXPENDITURE (2013 $$)	2025 PROJECTED EXPENDITURE	2026-2030 PROJECTED EXPENDITURE					5-YEAR SUBTOTAL
			2026	2027	2028	2029	2030	
Bicycle and Pedestrian	$665,354	$749,664	$757,161	$764,733	$772,380	$780,104	$787,905	$3,862,282
Interstate/Interchange	$3,974,993	$4,478,683	$4,523,470	$4,568,705	$4,614,392	$4,660,535	$4,707,141	$23,074,242
Road Improvements	$26,800,819	$30,196,873	$30,498,842	$30,803,830	$31,111,869	$31,422,987	$31,737,217	$155,574,746
Total Construction	$31,441,166	$92,529,370	$35,779,473	$36,137,268	$36,498,640	$36,863,627	$37,232,263	$182,511,270
Lighting, Safety, Signals	$2,570,121	$2,895,793	$2,924,751	$2,953,998	$2,983,538	$3,013,374	$3,043,508	$14,919,169
Roadside Improvements	$693,673	$781,572	$789,387	$797,281	$805,254	$813,307	$821,440	$4,026,669
Total Equipment and Facilities	$3,263,794	$3,677,365	$3,714,138	$3,751,280	$3,788,793	$3,826,680	$3,864,947	$18,945,838
Bridge Maintenance and Repair	$1,621,944	$1,827,467	$1,845,742	$1,864,200	$1,882,842	$1,901,670	$1,920,687	$9,415,140
Road Maintenance	$11,236,158	$12,659,942	$12,786,542	$12,914,407	$13,043,551	$13,173,987	$13,305,727	$65,224,214
Total Maintenance	$12,858,101	$14,487,410	$14,632,284	$14,778,607	$14,926,393	$15,075,657	$15,226,413	$74,639,354
Facilities (Non-Roadway)	$1,306,341	$1,471,874	$1,486,592	$1,501,458	$1,516,473	$1,531,638	$1,546,954	$7,583,116
Total Facilities (Non-Roadway)	$1,306,341	$1,471,874	$1,486,592	$1,501,458	$1,516,473	$1,531,638	$1,546,954	$7,583,116
TOTAL (5 Years)								$283,679,578
TOTAL - Stage 2								$553,590,961

Table 9-7:

MISSISSIPPI GULF COAST PROJECTED TRANSPORTATION FUNDING BY CATEGORY OF EXPENDITURE: STAGE 3 (2031-2040)

CATEGORY	AVG ANN EXPENDITURE (2013 $$)	2030 PROJECTED EXPENDITURE	2031-2035 PROJECTED EXPENDITURE					5-YEAR SUBTOTAL
			2031	2032	2033	2034	2035	
Bicycle and Pedestrian	$665,354	$787,905	$795,784	$803,742	$811,779	$819,897	$828,096	$4,059,297
Interstate/Interchange	$3,974,993	$4,707,141	$4,754,212	$4,801,755	$4,849,772	$4,898,270	$4,947,252	$24,251,261
Road Improvements	$26,800,819	$31,737,217	$32,054,589	$32,375,135	$32,698,887	$33,025,876	$33,356,134	$163,510,621
Total Construction	$31,441,166	$97,249,298	$37,604,586	$37,980,631	$38,360,438	$38,744,042	$39,131,483	$191,821,180
Lighting, Safety, Signals	$2,570,121	$3,043,508	$3,073,943	$3,104,682	$3,135,729	$3,167,086	$3,198,757	$15,680,197
Roadside Improvements	$693,673	$821,440	$829,654	$837,951	$846,330	$854,793	$863,341	$4,232,070
Total Equipment and Facilities	$3,263,794	$3,864,947	$3,903,597	$3,942,633	$3,982,059	$4,021,880	$4,062,098	$19,912,267
Bridge Maintenance and Repair	$1,621,944	$1,920,687	$1,939,894	$1,959,292	$1,978,885	$1,998,674	$2,018,661	$9,895,407
Road Maintenance	$11,236,158	$13,305,727	$13,438,784	$13,573,172	$13,708,904	$13,845,993	$13,984,452	$68,551,304
Total Maintenance	$12,858,101	$15,226,413	$15,378,678	$15,532,464	$15,687,789	$15,844,667	$16,003,114	$78,446,711
Facilities (Non-Roadway)	$1,306,341	$1,546,954	$1,562,424	$1,578,048	$1,593,828	$1,609,767	$1,625,864	$7,969,931
Total Facilities (Non-Roadway)	$1,306,341	$1,546,954	$1,562,424	$1,578,048	$1,593,828	$1,609,767	$1,625,864	$7,969,931
TOTAL (5 Years)								$298,150,088

CATEGORY	AVG ANN EXPENDITURE (2013 $$)	2035 PROJECTED EXPENDITURE	2036-2040 PROJECTED EXPENDITURE					5-YEAR SUBTOTAL
			2036	2037	2038	2039	2040	
Bicycle and Pedestrian	$665,354	$828,096	$836,377	$844,741	$853,188	$861,720	$870,337	$4,266,362
Interstate/interchange	$3,974,993	$4,947,252	$4,996,725	$5,046,692	$5,097,159	$5,148,130	$5,199,612	$25,488,317
Road Improvements	$26,800,819	$33,356,134	$33,689,696	$34,026,593	$34,366,859	$34,710,527	$35,057,632	$171,851,306
Total Construction	$31,441,166	$102,209,990	$39,522,797	$39,918,025	$40,317,205	$40,720,377	$41,127,581	$201,605,985
Lighting, Safety, Signals	$2,570,121	$3,198,757	$3,230,745	$3,263,052	$3,295,683	$3,328,639	$3,361,926	$16,480,044
Roadside Improvements	$693,673	$863,341	$871,975	$880,695	$889,502	$898,397	$907,380	$4,447,948
Total Equipment and Facilities	$3,263,794	$4,062,098	$4,102,719	$4,143,747	$4,185,184	$4,227,036	$4,269,306	$20,927,992
Bridge Maintenance and Repair	$1,621,944	$2,018,661	$2,038,848	$2,059,236	$2,079,828	$2,100,627	$2,121,633	$10,400,172
Road Maintenance	$11,236,158	$13,984,452	$14,124,297	$14,265,540	$14,408,195	$14,552,277	$14,697,800	$72,048,110
Total Maintenance	$12,858,101	$16,003,114	$16,163,145	$16,324,776	$16,488,024	$16,652,904	$16,819,433	$82,448,282
Facilities (Non-Roadway)	$1,306,341	$1,625,864	$1,642,123	$1,658,544	$1,675,130	$1,691,881	$1,708,800	$8,376,477
Total Facilities (Non-Roadway)	$1,306,341	$1,625,864	$1,642,123	$1,658,544	$1,675,130	$1,691,881	$1,708,800	$8,376,477
TOTAL (5 Years)								$313,358,736
TOTAL - Stage 3								$611,508,825

Safety improvements may include lighting, signage, signalization, enhanced signal control systems, railroad-highway crossing protection devices, traffic monitoring equipment, channelization and other intersection geometry improvements, or other actions intended to make travel safer.

Roadway Construction projects fall into three principal groups: (1) New construction involving the extension or realignment of existing routes or the building of entirely new streets and highways; (2) Improvements to existing roads such as the addition of turn or travel lanes, roadway reconstruction, or the installation of raised medians and other access management measures; and (3) Roadway widening and overlay projects. The Interstate/Interchange category is reserved for improvements to the interstate highway system, including the addition of travel lanes, construction of new interchanges, or reconstruction of existing interchanges.

The total amount projected to be available for improvements in these four categories over the next 25 years falls just below $1 billion (see Table 9-8). More than three-quarters of that total—approximately $780 million—falls in the Road Construction category. The anticipated availability of funding for the other three categories is roughly equal to the following amounts: Interstate/Interchange Improvements - $115 million; Safety - $75 million; Alternative Transportation - $28 million. A little more than $800 million is projected to be available for state-maintained highway projects; a little less than $200 million for local street and highway improvements, bicycle and pedestrian facilities, and safety projects.

Table 9-8:
PROJECTED STAGED IMPROVEMENT PROGRAM FUNDING BY CATEGORY

	PROJECTED FUNDING AVAILABILITY			
FUNDING CATEGORY	Stage 1 2016-2020	Stage 2 2021-2030	Stage 3 2031-2040	TOTAL
Alternative Transportation (Local)	$5,680,000	$10,939,316	$12,083,810	$28,703,126
Safety Improvements (Local)	$3,187,000	$5,336,252	$5,894,591	$14,417,843
Road Construction (Local)	$40,313,820	$53,494,600	$59,091,319	$152,899,739
Road Construction (State)	$100,525,968	$250,104,178	$276,270,608	$626,900,754
Interstate/Interchange (State)	$20,888,809	$45,028,591	$49,739,578	$115,656,978
Safety Improvements (State)	$11,006,129	$23,777,995	$26,265,650	$61,049,774
TOTAL	$181,601,726	$388,680,932	$429,345,556	$999,628,214

Note: Alternative Transportation *amounts shown in previous tables (under "Bicycle and Pedestrian Facilities") have been adjusted to achieve consistency with the Statewide Transportation Improvement Program. Stage 1* Road Construction (Local) *amount includes Surface Transportation Program (STP) carryover funds ($14,901,320) from previous years. Stage 1* Safety Improvements (Local) *amount also includes STP carryover funds ($687,000).*

Source: Mississippi Department of Transportation (2014): Statewide Transportation Improvement Program: 2015-2019.

Federal funding for public transportation is available through the Federal Transit Administration (FTA). Programs include the Discretionary Grant Program (Section 5309), the Enhanced Mobility for Seniors and Individuals with Disabilities Program (Section 5310), the Job Access/Reverse Commute Program (Section

5316), the New Freedom Program (5317) and the Transportation Planning Program (Section 5303). (Projected funding for Coast Transit Authority is addressed in the *Mississippi Gulf Coast Transit Development Update: 2016-2040*.)

10.0 PROJECT DEVELOPMENT AND PRIORITIZATION

The projects identified for consideration in the future needs analysis were each evaluated based on goals and objectives adopted by the Metropolitan Planning Organization (MPO) Transportation Policy Committee. Seven general categories of criteria were used to assess the likely benefits associated with proposed transportation improvements. A weight was assigned to each category in the form of a maximum possible score. Within each category projects were awarded points depending on how likely they were to advance the stipulated objective (see box at right). In some cases, the total points that could be awarded within a given category were allocated among two or more sub-categories as explained below.

Project Evaluation Categories (Range of Possible Points)

- Project Benefit (0-40)
- Connectivity/Continuity (0-15)
- Economic Development/Modal Benefit (0-15)
- Environmental/Community Impacts (0-10)
- Safety (0-20)

10.1 PROJECT BENEFIT

Some benefits of transportation improvements are quantifiable and can even be monetized. Expressing the value of projected benefits in monetary terms makes it possible to compare what one expects to get out of a project with what one will have to put into it (i.e., the monetary expenditure required to build a new facility, install new equipment or initiate new service). While some benefits are not so easily monetized, and may not even be subject to quantification, the value of travel time-savings has long been a primary measure of the worth attributable to transportation investments. The standard approach to the valuation of travel time is based on median annual household income for personal travel and the average wage rate for business travel. Different rates are frequently developed for varying travel purposes and vehicle types. Examples include specific rates for trips made by workers during the workday, commuting trips and personal travel, as well as rates for medium and heavy-truck travel.

In order to estimate the value of travel time-savings likely to result from transportation projects considered for inclusion in the long-range plan, separate monetary rates for passenger-vehicle and freight-truck travel were adopted. The value of travel time-savings was calculated by applying these standardized hourly cost factors to the reduction in travel time projected to result from a proposed improvement. Travel-time savings are easily derived from travel demand model output for separate network assignments representing the unimproved and improved conditions respectively. Time-savings correspond to the difference in vehicle-hours traveled (VHT) between the base case and the build alternative under consideration.

Trucks--The value of travel time for individuals traveling in trucks considers both the average wage paid drivers and other relevant factors such as excess costs avoided by on-time delivery. Failure to make a delivery on time may result in additional costs due to product spoilage or other consequences of a missed delivery window. For example, the delivery of concrete or cement beyond its useful life may mean loss of the product itself. The arrival of a truck for pick-up or delivery after a gate or loading dock has been closed may extend delivery time into the following day, requiring the payment of additional wages to the

driver, possibly at a higher rate. The U. S. Department of Transportation recommends using an hourly rate of $25.80 for time-savings associated with travel in trucks (U. S. Department of Transportation, *2015 Benefit-Cost Analysis Guidance for TIGER Grant Applicants*). The analysis awarded up to five points—of the 40 allocated to the first evaluative category--for travel time-savings benefiting the users and operators of trucks.

Passenger Vehicles—Passenger-vehicle benefits are affected by a variety of factors. Commuting trips are very sensitive to the costs of lost productivity due to travel time variability under congested road conditions. The analysis also took into consideration workers making trips during the day. These include, for instance, trips to secure repair services, make package deliveries and to travel to and from meetings. Excess time spent in traffic results in extra expenses related to workers' wages and overhead costs. Congestion delay causes more time in traffic which also increases fuel costs. The U. S. Department of Transportation recommends a value of $19.00 per hour for intercity personal-vehicle travel. This is a weighted average based on a distribution of travel by trip purpose that assumes 78.6 percent personal travel and 21.4 percent business travel. The analysis awarded up to five points (of the categorical total of 40) for travel time-savings expected to benefit personal vehicle operators and passengers.

Benefit-Cost Ratio

The objective of a benefit-cost analysis is to translate the effects of an investment into monetary terms and to account for the fact that benefits generally accrue over a long period of time while capital costs are incurred primarily in the initial years. The primary transportation-related elements that can be monetized are travel-time costs, vehicle operating costs, safety costs, ongoing maintenance costs, and remaining capital value (a combination of capital expenditure and salvage value). For some kinds of projects, such as bypasses, travel time and safety may improve but operating costs may increase due to longer travel distance. A properly conducted benefit-cost analysis should indicate whether travel time savings and safety benefits related to reduced accidents, injuries and deaths exceed the costs of design and construction and the long-term increased operating costs.

In economic terms, the cost of a transportation investment is the value of the resources that must be consumed to bring about the project. The total value of construction and any additional maintenance costs must be estimated. It is important to note that the analysis does not emphasize who incurs the cost but rather aims to include any and all costs involved in implementing the project. In addition to the points awarded for time-savings identified as project benefits, the evaluation assigned up to five points (of the 40 allotted to this category) for an overall benefit-cost ratio greater than 1.00.

Mitigate Traffic Congestion and Enhance Quality of Life

Due the Mississippi Gulf Coast region's continuing recovery from Hurricane Katrina and ongoing population and economic growth, roadways are likely to experience increasing traffic volumes and congestion in the years ahead. In connection with development of the 2040 Metropolitan Transportation Plan (MTP), the GRPC Congestion Management Program (CMP) and travel demand forecasting model were updated. These important tools help planners identify areas of current and potential future

congestion and to quantify the associated travel delay. The CMP uses travel-time data to identify areas of existing vehicle delay; the travel demand model is used to identify areas of projected future traffic congestion. Results generated by these tools helped to score and prioritize transportation projects based on anticipated benefits.

The analysis conducted with regard to this particular category posed two questions, awarding up to 10 points in each case for a positive answer:

- *Does this project address an existing congestion problem?*
- *Is this project intended to meet expected future travel demand?*

While increasing traffic volumes are usually a good thing for business, neighborhoods can be very vulnerable to high volumes and vehicle speeds. Noise, safety and air quality impacts, and the potential disruption of community cohesion, may all adversely affect a community as traffic volumes and travel speeds increase. Measures may be required to mitigate such effects, or it may be necessary to alter or forego a project likely to have excessive adverse impacts such as these. In order to account for the benefits accruing from diverting excess through traffic from residential areas, or slowing traffic passing through neighborhoods, up to five points were awarded for a positive response to the following question:

- *Does this project reduce and/or slow traffic in residential neighborhoods?*

The following summarizes the range of possible points that could be awarded in each of the six sub-categories included in the first evaluation category:

Project Benefit:	Truck time-savings (0-5)
	Auto time-savings (0-5)
	Overall benefit-cost ratio (0-5)
	Addresses existing congestion (0-10)
	Meets expected future travel demand (0-10)
	Reduces/slows traffic in residential neighborhoods (0-5)
Total Possible Points:	0-40

10.2 CONNECTIVITY AND CONTINUITY

Connectivity benefits play an important part in maintaining and expanding the functionality of the transportation system, by providing or supporting alternative travel choices, including both diverging paths and multiple travel routes. Projects were given points based on the scale of the transportation project's service area. Up to five points were awarded for a project intended to serve a particular land use. Up to 10 points were granted for a project intended to serve a specific corridor, provided it was not one of the designated mobility corridors. Another 10 points were awarded for a project intended to improve a designated mobility corridor, benefiting the entire system or a significant portion of it. Notable

examples of projects that might enhance the continuity of the system as a whole, or major portions thereof, include the following:

- *Extension of Beatline Road from Railroad Street to Highway 90* would provide a direct route in the western half of Harrison County from US 90 to Interstate 10 (I-10) at the County Farm Road interchange.
- *Construction of a new road connecting Popp's Ferry Road to the I-10 Woolmarket interchange* would establish a direct route in the eastern half of Harrison County roughly midway between Highway 605 in Gulfport and Interstate 110 (I-110 in downtown Biloxi).
- *Widening Popp's Ferry Road from Riverview Drive to the Back Bay of Biloxi and from the Back Bay to Pass Road* would complement ongoing projects to construct a new bridge across the Back Bay and to extend Popp's Ferry Road from Pass Road to Beach Boulevard (US 90), significantly enhancing north-south mobility in west Biloxi.

The indicated sub-categories are mutually exclusive, such that an improvement serving a particular land use can only be awarded up to five points; a project that improves access to a corridor that is not a designated mobility corridor cannot be awarded more than 10 points; and only an improvement enhancing connectivity to a designated mobility corridor can garner as many as 15 points in this category. The following summarizes the range of possible points that could be awarded in each of the three sub-categories included in the second evaluation category:

Connectivity/Continuity:	Serves local land use (0-5)
	Serves specific corridor (0-10)
	Serves designated mobility corridor (0-15)
Total Possible Points:	0-15

10.3 ECONOMIC DEVELOPMENT OR MODAL BENEFIT

The analysis of projects within this evaluation category posed three questions and awarded up to five points for each positive response:

- *Does this project serve freight use on an identified freight connector?* The overall performance of the transportation system is enhanced by measures that promote the availability and efficient interaction of different modes linked in ways that facilitate the safe and efficient movement of people and goods.

- *Is this project on a roadway with fixed-route transit service?* Projects that improve the efficiency of transit are also beneficial to the region as a whole. As transit options attract more daily commuters and other regular riders, fewer vehicles will be on the road, resulting in lower vehicle emissions and reduced traffic congestion. Therefore, projects that are on roadways used for

regularly scheduled transit service benefit not just those who use public transportation but other travelers and the service area as a whole.

- *Will this project generate new economic development and help attract people to the area?* This item addresses whether a project would be likely to have a significant positive effect on the attractiveness of the area as a place to live or locate a business. A transportation project can affect an area's ability to attract new businesses and encourage them to stay and grow. Success in such an endeavor can have the public benefit of raising property values in the vicinity of the project. Some projects have obvious economic development impacts that expand a community's tax base and enhance the quality of life for people who live in the area. Examples include roadway improvements that enhance access to shopping centers, major employers or casinos.

Potential projects that might address categorical needs pinpointed by the questions posed above include the following:

- *Construction of Highway 601 from I-10 to the Mississippi State Port at Gulfport* would reduce truck traffic on congested U. S. Highway 49 (US 49) by approximately 30 percent, according to output from the regional travel demand forecasting model.
- *Construction of the proposed Pine Street extension at the east end of Biloxi* would complete the Back Bay loop, linking Back Bay Boulevard, Beach Boulevard, Caillavet Street and Bayview Avenue to provide a continuous route with convenient access to casinos, MGM Park, the Biloxi Transit Center, the Ohr-O'Keefe Museum, the Maritime and Seafood Industry Museum, Point Cadet Plaza, St. Michael's Catholic Church, the Bay of Biloxi bridge and multiuse path, and numerous other attractions.
- *US 90 improvements from Azalea Drive to I-110 and from I-110 to Keller Avenue*—including improved channelization, access management measures, transit signal preemption facilities, and transit lanes or cutouts in these segments--would facilitate better transit service and make public transportation more attractive to potential riders.
- *Reconstruction of Pass Road and the implementation of access management measures from Cowan Road to Washington Avenue in Gulfport and from DeBuys Road to Stennis Drive in Biloxi* would help to improve the safety and efficiency of transit operations on what is already one of Coast Transit Authority's heavily patronized routes.

The following summarizes the range of possible points that could be awarded in each of the three sub-categories included in the third evaluation category:

Economic Development/	Serves freight use (0-5)
Modal Benefit:	On transit route (0-5)
	Will generate economic activity (0-5)
Total Possible Points:	0-15

10.4 ENVIRONMENTAL AND COMMUNITY IMPACTS

To ensure that environmental concerns, Title VI compliance and environmental justice principles are incorporated in the planning process, GRPC planners mapped areas with concentrations of minority and low-income residents. This was done to comply with Federal requirements that the benefits and burdens of transportation investments be equitably distributed. Environmentally sensitive areas were also mapped in order to identify locations where project impacts might occur. For the purposes of project evaluation in the context of long-range plan development, the following criteria were used to specify foreseeable environmental and community impacts:

- *Wetlands and Other Biological Resources*—There are many diverse upland and wetland habitats throughout Mississippi, but nowhere in the state are habitats more functionally important than those in the coastal wetlands located along the beautiful Mississippi Gulf Coast in Hancock, Harrison and Jackson counties. Adverse impacts on natural resources are to be avoided whenever possible and mitigated when they cannot be avoided, as required by environmental law and regulation. Up to five points were added to a project's score depending on how well it could avoid or mitigate environmental impacts and have beneficial rather than negative impacts on biological resources.

- *Community Impacts*--New construction and widening projects in or near traditionally underserved areas have the potential to provide positive benefits to communities but also may have negative impacts due to disruption of community cohesion and the displacement of residents and businesses. In the event of anticipated negative impacts, points were limited or withheld altogether, depending on the nature and extent of the foreseen effects. Where severe and potentially irremediable community disruption or environmental degradation seemed likely or even highly possible a project was simply disqualified from further consideration. At the same time, a roadway reconstruction project in or near a traditionally underserved area may have a significant positive effect on its attractiveness as a place to live or locate a business without displacing people who live or do business there. Property values may rise as a result of increasing demand for property, which is itself frequently a direct consequence of rising incomes and profits. Intersection projects improve travel time and decrease congestion, usually without having a significant impact on personal property. Up to five points were added to a project's score where positive environmental or community impacts were anticipated.

Most of the projects proposed in the MTP would have no significant impact on traditionally underserved communities or on sensitive environmental resources, but it is essential to identify those that could. The following merited careful consideration:

- *Construction of the Harrison County East-West Multimodal Corridor adjacent to the CSX Railroad* would locate a new road in proximity to several low-income and minority residential areas adjacent to the rail line. While providing access to a high-quality transportation facility in the area, it is possible that the route would require acquisition of right-of-way resulting in the

displacement of some residents and businesses. Some wetland impacts are probably unavoidable, especially at the west end of the route in the Pass Christian area.

- *Construction of Highway 601, possibly as a controlled-access urban expressway, connecting the Mississippi State Port at Gulfport to I-10* along an alignment that would traverse low-income and minority areas in west Gulfport may disrupt neighborhoods and undermine community cohesion. It would also have an impact on wetlands.

- *Construction of the proposed Woolmarket Connector linking Popp's Ferry Road to the I-10 interchange at Woolmarket* would require a long elevated section traversing wetlands

- *Intersection projects of possible concern* include improvements on MS 63 at Dantzler Street and on Highway 613 at Grierson Street in Moss Point; on US 90 at Blue Meadow Road in Bay Saint Louis; and on US 49 at Dedeaux Road and US 49 at Community Road in Gulfport. All of these are located on the edge of low-income and minority areas.

- *Roadway reconstruction and widening projects* on Pass Road and on Three Rivers Road would not need significant right-of-way while benefiting traditionally underserved communities. These transportation improvements would enhance traffic flow for residents of these communities as they travel to and from their homes.

Potential impacts relating to cultural resources, noise, hazardous materials, residential property or business establishments are difficult to evaluate in the absence of a reasonably well-defined project location. The requisite degree of specificity is simply not possible with regard to most of the projects considered. An attempt was made to identify known impediments to the implementation of projects, but the task of minimizing adverse effects or avoiding them altogether will have to be taken up at the next stage of project development.

10.5 SAFETY CONSIDERATIONS

Enhanced safety is one of the principal positive outcomes hoped for from a transportation improvement. Benefits occur when the number and/or severity of crashes is reduced on a facility or set of facilities because of the transportation improvement. Such benefits can be measured in terms of accidents, property damage, injuries and fatalities avoided as a result of improvements to a roadway. Projects recommended for the fiscally constrained long-range plan were proposed primarily on the basis of their ability to enhance mobility in the region. Nevertheless, the degree to which they would also make the transportation system safer was also an important consideration in the evaluation process. The MPO Safety Management Program (*Get to B*) uses Surface Transportation Program (STP) funds, set aside for safety-related projects, to identify needed improvements on the basis of accident records and systematic analysis of relevant conditions. Crash rates were calculated for each proposed project location on the basis of a comprehensive vehicular accident database provided by the Mississippi Department of Transportation (MDOT) and traffic volume estimates based on actual counts conducted by GRPC in 2013.

Projects were given priority based on their crash rates expressed in collisions per million vehicle miles. The equations that were used were the following:

- Corridor crash rate = (N * 1,000,000) / (365 * AADT * L)
- Intersection Crash Rate = (N * 1,000,000) / (365 * AADT)

Where: N = Average annual number of crashes
AADT = Annual average daily traffic
L = Length of the roadway segment in miles

Evaluations were done on proposed project sites with high accident frequency to discover what type of accidents were occurring. The roadway segments at the top of the list below would all benefit from improved channelization and access management achieved by the installation of medians. Safety audits should be performed at the intersection sites to determine the causes of frequent accidents. Up to 20 points were added to a project's score depending on the degree to which it could be expected to enhance the safety of motorists and others traversing a roadway segment or intersection.

BILOXI - US 90 BETWEEN I-110 AND KELLER AVE	The majority of accidents occurring on this segment are due to cars leaving their lanes and hitting other cars.
GULFPORT – PASS ROAD AND COWAN ROAD INTERSECTION	Most of the accidents at this intersection are rear-end accidents. Angle crashes are less frequent.
GULFPORT – US 49 AND CREOSOTE ROAD INTERSECTION	Most of the accidents at this intersection are rear-end crashes. Angle crashes are less frequent.
GULFPORT – COWAN ROAD FROM MAGNOLIA STREET TO PASS ROAD	Mostly rear-end crashes occur on this segment.
GULFPORT – US 49 AT MS 53 INTERSECTION	The accidents occurring at this intersection include both rear-end crashes and those involving left-turning vehicles.
PASCAGOULA – US 90 AT HOSPITAL ROAD INTERSECTION	The accidents occurring at this intersection include rear-end crashes, angle accidents and those involving left-turning vehicles.
BILOXI – POPP'S FERRY ROAD FROM THE BACK BAY BRIDGE TO PASS ROAD	Mostly rear-end crashes are occurring here.
BILOXI – CEDAR LAKE ROAD FROM I-10 TO POPP'S FERRY ROAD	There is no predominant accident type occurring here. Accidents include rear-end, sideswipe, angle, etc.

10.6 PLAN CONSISTENCY/LOCAL COMMITMENT

The evaluation awarded up to five additional points if it could be demonstrated that a project satisfied one or both of the following criteria regarding consistency with an adopted local plan and a local commitment of support for the project:

- The project was already listed in a local planning document, such as a major thoroughfares plan or the transportation element of a comprehensive plan; and

- The local county or municipal government having jurisdictional responsibility for the proposed improvements had demonstrated a commitment to provide the matching funds required to secure additional Federal funding necessary to pay for its implementation.

In the event of it being determined that the local jurisdiction had actually already appropriated funds for the proposed project and was fully committed to its implementation, the evaluation process was rendered moot; and the improvement was advanced to the Staged Improvement Program without further consideration of its merits.

The results of the project evaluation and prioritization process are summarized below (see Table 10-1).

Table 10-1:

RATING AND RANKING OF PROJECTS CONSIDERED FOR INCLUSION IN STAGED IMPROVEMENT PROGRAM

ID	JURISDICTION	ROUTE	FROM/AT	TO	AUTO TRAVEL TIME (0-5)	TRUCK TRAVEL TIME (0-5)	OVERALL BENEFIT/ COST (0-10)	EXISTING CONGES-TION (0-10)	FUTURE TRAVEL DEMAND (0-10)	CONNEC-TIVITY/ CONTINUITY (0-15)	GOODS MOVE-MENT (0-5)	TRANSIT SER-VICE (0-5)	ECO-NOMIC ACTIVITY (0-5)	ENVIRON-MENTAL IMPACT (0-5)	COMMU-NITY IMPACT (0-5)	SAFETY CONSIDER-ATIONS (0-20)	TOTAL (0-100)
52	Gulfport	Hwy 49	Creosote Rd	--	5	5	10	10	10	15	5	0	0	5	2	20	87
71	Gulfport	Hwy 49	Airport Rd	--	5	4	9	10	10	15	5	5	0	5	2	10	80
50	Gulfport	Hwy 49	Dedeaux Rd	--	5	4	10	10	10	15	0	0	0	5	5	15	79
59	Gulfport	Pass Rd	Cowan Rd	--	3	2	7	10	10	15	0	5	0	5	2	20	79
56	Gulfport	Hwy 49	Hwy 53	--	4	3	8	10	10	15	0	0	0	5	2	20	77
57	Ocean Springs	Hwy 90	Hwy 609	--	4	3	8	10	10	15	0	5	0	5	2	15	77
60	Gulfport	Hwy 49	Community Rd	--	5	5	9	10	10	15	0	0	0	5	5	10	74
55	Gulfport	Hwy 49	O'Neal Rd	--	5	3	9	10	10	15	0	0	0	5	2	15	74
42	Biloxi	Hwy 90	I-110	Keller Ave	5	3	8	10	0	15	0	5	0	5	2	20	73
49	Hancock	Kiln Delisle Rd	Hwy 603	--	5	5	10	10	10	15	0	0	0	5	2	10	72
54	Gulfport	Hwy 49	Landon Rd	--	4	3	8	10	10	15	0	0	0	5	2	15	72
47	Gulfport	Hwy 605	Magnolia St	Pass Rd	4	3	10	0	10	15	0	0	0	5	2	20	69
24	Gulfport	Hwy 605	Dedeaux Rd	I-10	2	2	6	10	10	15	0	0	0	5	2	15	67
72	Biloxi	Cedar Lake Rd	Popps Ferry Rd	--	5	5	10	10	0	10	0	5	0	5	2	15	67
17	Biloxi	Popp's Ferry Rd	Riverview Dr	Bridge	2	2	5	10	10	15	0	5	0	5	2	10	66
44	Gulfport	Pass Road	Cowan Road	Washington Ave	5	3	7	10	0	10	0	5	0	5	5	15	65
69	Bay St Louis	Hwy 90	Blue Meadow Rd	--	2	2	6	10	0	15	0	5	0	5	5	15	65
43	Biloxi	Hwy 90	Azalea Dr	I-110	3	2	7	10	0	15	0	5	0	5	2	15	64
65	Jackson	Hwy 613	Hwy 63	--	3	2	7	10	10	15	0	0	0	5	2	10	64
63	Moss Point	Hwy 63	Grierson St	--	2	1	5	10	0	15	5	0	0	5	5	15	63
15	Biloxi	Popp's Ferry Rd	North shore	South shore	2	2	2	10	10	15	0	5	0	5	2	10	63
46	Pascagoula	Hwy 90	Hospital Rd	Veterans Blvd	4	5	7	10	0	10	0	0	0	5	2	20	63
62	Jackson	Hwy 609	Lemoyne Blvd	--	4	3	9	10	0	15	0	5	0	5	2	10	63
45	Biloxi	Pass Road	Debuys Rd	Stennis Dr	5	4	8	10	0	10	0	5	0	5	5	10	62
16	Biloxi	Popp's Ferry Rd	Bridge	Pass Rd	0	0	0	10	10	15	0	5	0	5	2	15	62
73	Biloxi	Cedar Lake Rd	I-10	Popps Ferry Rd	5	5	10	10	0	10	0	0	0	5	2	15	62
36	Harrison	I-10	Lorrraine Rd	--	5	4	5	0	10	15	0	0	0	5	2	15	61
33	Gulfport	Highway 601	I-10	US 90	5	5	5	10	10	15	5	0	5	0	0	0	60
58	Jackson	Hwy 63	Hwy 614	--	2	1	4	10	10	15	0	0	0	5	2	10	59
67	Ocean Springs	Hwy 90	Hwy 57	--	3	2	7	10	0	15	5	0	0	5	2	10	59
10	Harrison County	Beatline Rd	I-10	Red Creek Rd	3	2	6	0	10	15	0	0	0	5	2	15	58
19	Gulfport	Three Rivers Rd	Crossroads Pkwy	Seaway Rd	0	0	1	0	10	10	0	5	0	5	5	20	56
34	Biloxi	Popps Ferry Connect	Woolmarket Exit	Riverview Dr	5	4	5	10	10	15	0	0	5	0	2	0	56
1	MDOT	MS 43	North of Kiln	Existing 4-Lane	5	4	4	10	10	15	0	0	0	5	2	0	55
64	Bay St Louis	Hwy 90	Hwy 603	--	2	3	6	10	0	15	0	0	0	5	2	10	53
5	MDOT	US 90	Hwy 609	Dolphin Dr	0	0	0	10	10	15	0	5	0	5	2	5	52
20	Jackson County	Seaman Rd	I-10 Connector Rd	Jordan Rd	3	2	5	0	10	10	0	0	0	5	2	15	52

Table 10-1:

RATING AND RANKING OF PROJECTS CONSIDERED FOR INCLUSION IN STAGED IMPROVEMENT PROGRAM

ID	JURISDICTION	ROUTE	FROM/AT	TO	AUTO TRAVEL TIME (0-5)	TRUCK TRAVEL TIME (0-5)	OVERALL BENEFIT/ COST (0-10)	EXISTING CONGES-TION (0-10)	FUTURE TRAVEL DEMAND (0-10)	CONNEC-TIVITY/ CONTINUITY (0-15)	GOODS MOVE-MENT (0-5)	TRANSIT SER-VICE (0-5)	ECO-NOMIC ACTIVITY (0-5)	ENVIRON-MENTAL IMPACT (0-5)	COMMU-NITY IMPACT (0-5)	SAFETY CONSIDER-ATIONS (0-20)	TOTAL (0-100)
61	Biloxi	Hwy 90	White Ave	--	2	2	6	10	0	15	0	5	0	5	2	5	52
22	Gulfport	MS 53	US 49	County Farm Rd	3	2	4	0	10	10	0	0	0	5	2	15	51
41	Ocean Springs	I-10	Hwy 609	--	3	2	3	10	0	15	5	0	0	5	2	5	50
68	Gulfport	Hwy 90	30th Ave	--	3	2	8	10	0	15	0	0	0	5	2	5	50
40	Gautier	I-10	Hwy 57	--	2	2	3	10	0	15	0	5	0	5	2	5	49
29	Biloxi	East-West Corridor	Popps Ferry Rd	I-110	5	5	4	10	0	15	0	5	0	5	0	0	49
6	Gulfport	Landon Rd	US 49	34th Ave	1	1	4	0	10	10	0	0	0	5	2	15	48
28	Gulfport	East-West Corridor	Hwy 605	Popps Ferry Rd	5	4	4	10	0	15	0	5	0	5	0	0	48
53	Jackson	Hwy 90	Gauiter-Vancleave Rd	--	2	2	6	10	0	15	0	0	0	5	2	5	47
27	Gulfport	East-West Corridor	US 49	Hwy 605	5	4	3	10	0	15	0	5	0	5	0	0	47
4	MDOT	I-10	Diamondhead	Wolf River	5	5	4	0	0	15	5	0	0	5	2	5	46
66	Jackson	Hwy 63	Saracennia Rd	--	2	1	6	10	0	15	0	0	0	5	2	5	46
3	MDOT	MS 57	Mariposa Ln	I-10 Frontage Rd	5	4	4	0	10	15	0	0	0	5	2	0	45
39	Hancock	I-10	Hwy 603	--	3	2	3	10	0	15	0	0	0	5	2	5	45
9	Gulfport	Canal Road	I-10	28th Street	2	2	3	0	10	10	0	0	0	5	2	10	44
25	Jackson	Highway 613	MS 63	Saracennia Rd	2	1	2	0	10	10	0	0	0	5	2	10	42
51	Gulfport	Hwy 90	Hwy 49	--	2	2	6	10	0	15	0	0	0	5	2	0	42
18	Gulfport	Three Rivers Rd	Angela Dr	Crossroads Pkwy	1	1	4	0	0	10	0	0	0	5	5	15	41
38	Hancock	I-10	Diamondhead	--	4	5	5	0	10	10	0	0	0	5	2	0	41
11	Gulfport	Dedeaux Rd	Stewart Rd	Hwy 605	2	1	2	0	0	10	0	0	0	5	5	15	40
70	Moss Point	Main St	Dantzler St	--	2	1	5	10	0	10	0	0	0	5	5	0	38
2	MDOT	US 49	School Rd	O'Neal Rd	2	1	2	0	0	15	0	0	0	5	2	10	37
35	Harrison	I-10	County Farm Rd	--	2	2	1	0	10	15	0	0	0	5	2	0	37
48	Jackson	Beachview Dr	Old Spanish Trail	Point aux Chenes Rd	1	2	1	0	0	10	0	0	0	5	2	15	36
31	Long Beach	East-West Corridor	Beatline Rd	Jeff Davis Ave	4	4	4	0	0	15	0	0	0	5	0	0	32
37	Harrison	I-10	Menge Ave	--	1	1	1	0	10	10	0	0	0	5	2	0	30
30	Gpt/Long Beach	East-West Corridor	Jeff Davis Ave	US 49	4	3	3	0	0	15	0	0	0	5	0	0	30
26	Diamondhead	Gex Drive	Aloha Dr	Diamondhead Dr S	0	0	1	0	10	10	0	0	0	5	2	0	28
23	Gulfport	Washington Ave	Airport Rd	54th St	1	1	5	0	0	10	0	0	0	5	5	0	27
21	Biloxi	Division Street	Caillavet St	Forrest Ave to KAFB	0	0	0	0	10	10	0	0	0	5	2	0	27
32	Pass Christian	East-West Corridor	Henderson Point	Beatline Rd	5	4	3	0	0	15	0	0	0	0	0	0	27
8	Long Beach	Beatline Road Ext	Railroad St	US 90	1	1	1	0	0	15	0	0	0	5	2	0	25
14	Jackson County	Old Fort Bayou Rd	Washington Ave	Yellow Jacket Rd	1	1	1	0	0	10	0	0	0	5	2	5	25
7	Biloxi	Pine St	Back Bay Blvd	US 90	0	0	0	0	0	5	0	5	5	5	2	0	22
12	Ocean Springs	Ocean Springs Rd	Reilly Rd	US 90	0	0	0	0	0	10	0	0	0	5	2	5	22
13	Jackson County	Ocean Springs Rd	Reilly Rd	Hwy 57	0	0	0	0	0	10	0	0	0	5	2	5	22

Source: Gulf Regional Planning Commission

11.0 STAGED IMPROVEMENT PROGRAM

11.1 FISCALLY CONSTRAINED PLAN

The Staged Improvement Program, outlined in this section, presents a fiscally constrained plan for meeting the projected future safety and mobility needs of people traveling in the Mississippi Gulf Coast Metropolitan Planning Area (MPA) whether by auto, truck, bicycle or on foot; for work, shopping, personal business, recreation or any other purpose. The projects proposed for implementation address needs and concerns identified in previous chapters relating to environmental conditions (4.0), land use and demographic factors (5.0), the existing transportation system (6.0), projected future travel demand (7.0) and needed transportation infrastructure improvements (8.0). The financial analysis (described in Chapter 9.0) attempted to determine the amount of funding for transportation improvements that could reasonably be expected to be available in the period from 2016 to 2040. This was accomplished by reviewing all transportation expenditures made in the area during the 15-year period from 1999 through 2013, then taking into consideration the amounts currently authorized for use in the Statewide Transportation Improvement Program for 2015-2019.

Funding amounts were projected for four categories of improvements: *Alternative transportation improvements* such as sidewalks, bicycle paths and facilities supporting access to transit; *Road improvements* such as adding lanes, reconstructing existing routes, building new roads or modifying intersection geometry; *Safety improvements* such as roadway lighting, signage, signalization, railroad crossing protection devices or other measures designed to make travel conditions safer and transportation facilities more efficient; and *Interstate and interchange* improvements such as adding lanes, modifying existing interchanges or constructing new ramps to enhance access to the interstate system. The analysis yielded a projected total amount available for transportation improvements, over the 25-year planning period, of $999 million or just under $40 million per year.

In accordance with Federal Highway Administration (FHWA) regulatory guidance, funds projected to be available are expressed in *future dollars* based on the assumption that the real value of the currency will change (decline) over time. The Bureau of Labor Statistics *Consumer Price Index (CPI) Inflation Calculator* indicates that the purchasing power of the dollar has decreased by less than one percent per annum in each of the last two years and that in six of the last seven years the annual inflation rate has been below two percent. The overall decline in the value of the dollar over the past seven years has been less than 10 percent. In the absence of any reason to expect a significant deviation from the current trend, the assumption was made that inflation would continue at or near its present rate for the foreseeable future. The projected total funding amount of $999 million over 25 years is based on an assumed inflation rate of one percent per annum. The total amount projected to be available includes $28.70 million for alternative transportation improvements, $75.46 million for safety enhancements, $779.79 million for road improvements and $115.66 million for interstate highway improvements. The amount programmed for local improvement projects is $196,020,708. Funding for projects to be sponsored by the state (or others) amounts to $803,607,508 or 80 percent of the total.

STAGE 1 (2016-2020)

Approximately half of the projects listed in the Stage 1 program are included in the *Statewide Transportation Improvement Program: Fiscal Years 2015-2019* (see Table 11-1). The other half are almost evenly divided between roadway projects and bicycle or pedestrian improvements. The bicycle improvements include 11 segments of the proposed *Border-to-Border* separated pathway along U. S. Highway 90 (US 90). Other projects include five roadway improvements, two intersection projects, one interchange upgrade and one new sidewalk. Stage 1 envisions the expenditure of $142.87 million for transportation improvements, leaving a balance of $38.72 million to be carried over to Stage 2.

STAGE 2 (2021-2030)

Stage 2 includes 50-plus projects, more than 40 of which are proposed improvements to surface roadways and intersections (see Table 11-2). In addition, there are three interstate enhancements (two interchange upgrades and one lane addition) and nine bicycle projects, including three more sections of the Border-to-Border separated pathway along US 90. The projected total cost of Phase 2 is $364.04 million, leave a balance of $63.36 million to be carried over to Stage 3.

STAGE 3 (2031-2040)

There is one holdover highway project from the current Statewide Transportation Improvement Program in the Stage 3 program, two new interstate improvements (one interchange and one lane addition) and another dozen roadway and intersection enhancements (see Table 11-3). There are also another 30 bicycle pathway projects, including the remaining 18 segments of the Border-to-Border separated pathway along US 90. Total spending for Stage 3 is projected to be $373.44 million, with an unexpended balance of $113.53 million.

UNFUNDED IMPROVEMENTS

A total of 14 projects were identified for which sufficient funding is not expected to be available (see Table 11-4). Six of these represent segments of the proposed East-West Multimodal Transportation Corridor in Harrison County. Another is the proposed connector between Interstate 10 (I-10) and Popp's Ferry Road. There are also four interstate projects (three interchanges and one lane addition) and three bicycle pathway projects. The total projected need for these projects is $624.72 million. The unfunded balance amounts to $511.19 million. These improvements will not be made unless funding over and above that which can reasonably be expected to be available, during the 25-year period covered by the long-range plan, is provided by some as yet unidentified source.

11.2 PROJECTED EFFECTIVENESS OF PLANNED IMPROVEMENTS

In order to assess the probable effectiveness of roadway capacity projects included in the Staged Improvement Program, travel demand model assignments were generated for each of the program components (2020, 2030 and 2040) and compared to the base-year (2013) assignment for the existing network and the long-range (2040) assignment for the existing-plus-committed (E+C) network.

Table 11-1:
STAGED IMPROVEMENT PROGRAM - STAGE 1 IMPROVEMENTS (2016-2020)

ID	COUNTY	LOCATION	ROUTE	FROM	TO	CATEGORY	IMPROVEMENT	FUNDING CATEGORY					
								Alternative Transportation (Local)	Safety Improvements (Local)	Road Construction (Local)	Road Construction (State/Other)	Interstate/ Interchange (State)	Safety Improvements (State)
STAGE 1 (2016 - 2020) ESTIMATED AMOUNT AVAILABLE								$ 5,680,000	$ 3,187,000	$ 40,313,820	$ 100,525,968	$ 20,888,809	$ 11,006,129
999	Hancock	Bay Saint Louis	Old Spanish Trail	Main Street	Waveland city limit	Alternative Transportation	Pedestrian pathway lighting			$ 800,800			
999	Harrison	Biloxi	Popp's Ferry Road	Cedar Lake Road	D'Iberville city limit	Road Improvements	Widen to 4-lane divided			$ 4,006,003			
999	Harrison	Biloxi	Popp's Ferry Road	Pass Road	Beach Boulevard	Road Improvements	New 4-lane divided construction			$ 2,704,000			
999	Harrison	D'Iberville	D'Iberville Blvd/Big Ridge Rd	I-10	I-110	Road Improvements	Widen to 4-lane divided			$ 3,672,472			
999	Harrison	Gulfport	Dedeaux Road	Three Rivers Road	Highway 605	Road Improvements	Widen to 4-lane divided			$ 3,750,000			
999	Harrison	Gulfport	Courthouse Road	Pass Road	US 90	Road Improvements	Add median, sidewalks, lighting			$ 3,354,415			
999	Harrison	Harrison County	Lorraine Road	Biloxi River Bridge	--	Road Improvements	Bridge replacement			$ 1,513,996			
999	Jackson	Pascagoula	Hospital Road	Old Mobile Highway	US 90	Road Improvements	Reconstruction			$ 2,866,522			
999	Jackson	Moss Point	Main Street	Ely Street	Jefferson Street	Alternative Transportation	Construct sidewalks	$ 555,000					
999	Jackson	Gautier	MS 57	Brown Road	[Intersection]	Road Improvements	New signal		$ 125,000				
999	Jackson	Gautier	Martin Bluff Road	Gautier-Vancleave Rd	I-10 Frontage Road	Road Improvements	Reconstruction			$ 3,328,004			
999	Jackson	Jackson County	LeMoyne Boulevard	Brittany Avenue	[Intersection]	Road Improvements	Signal, signage, striping			$ 385,000			
999	Jackson	Jackson County	Highway 609	Old Fort Bayou Road	[Intersection]	Road Improvements	Realign, reconstruct intersection			$ 1,867,050			
999	Multiple	Multiple	Grouped Projects	--	--	Alternative Transportation	--	$ 2,225,750					
999	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--		$ 2,375,000				
999	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--						$ 9,734,129
999	Jackson	Jackson County	I-10 Connector	Daisy Vestry Road	Seaman Road	Road Improvements	New construction				$ 12,305,000		
999	Jackson	Jackson County	Interstate 10	Highway 609	Gautier-Vancleave Rd	Interstate/Interchange	Widen to 6 lanes				$ 35,100,000		
19	Harrison	Gulfport	Three Rivers Road	Crossroads Parkway	Seaway Road	Road Improvements	Widen to 4-lane divided			$ 424,530			
25	Harrison	Gulfport	Landon Road	Hwy 49	34th Street	Road Improvements	Widen to 4-lane divided			$ 2,492,000			
33	Harrison	Gulfport	Airport Road	Existing 4-lane	Washington Avenue	Road Improvements	Widen to 4-lane			$ 687,500			
36	Harrison	Harrison	I-10	Lorrraine Road	--	Interstate/Interchange	Interchange improvements					$ 11,845,500	
47	Harrison	Gulfport	Hwy 605	Magnolia Street	Pass Road	Road Improvements	Reconstruction				$ 1,224,300		
48	Jackson	Jackson	Beachview Drive	Old Spanish Trail	Point Aux Chenes Rd	Road Improvements	Reconstruction			$ 8,362,463			
50	Harrison	Gulfport	US 49	Dedeaux Road	[Intersection]	Safety Improvements	Intersection improvements						$ 636,000
52	Harrison	Gulfport	US 49	Creosote Road	[Intersection]	Safety Improvements	Intersection improvements						$ 636,000
74	Harrison	Pass Christian	North Street	High School	Pass Estates	Alternative Transportation	Sidewalks	$ 566,000					
75	Harrison	Long Beach	Pineville Road	Railroad Street	Beatline Road	Alternative Transportation	Construct Separated Path PH 1	$ 1,020,000					
76	Harrison	D'Iberville	Popp's Ferry Road	Gay Road	D'Iberville Boulevard	Alternative Transportation	Construct Separated Path PH 1	$ 1,313,250					
101	Jackson	Ocean Springs	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 3,374,500		
102	Jackson	Ocean Springs	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 3,374,500		
103	Jackson	Ocean Springs	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 3,374,500		
104	Jackson	Gautier	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 2,596,750		
105	Jackson	Gautier	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 2,596,750		
106	Jackson	Gautier	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 2,596,750		
107	Hancock	Bay St Louis	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 1,695,750		
108	Hancock	Bay St Louis	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 1,695,750		
109	Hancock	Bay St Louis	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 1,695,750		
Subtotal for Scenario 1 Projects					*Overall Total*	$142,876,684		$ 5,680,000	$ 2,500,000	$ 40,214,755	$ 71,630,300	$ 11,845,500	$ 11,006,129
Balance available for Stage 2 Projects					*Overall Balance*	$38,725,043		$ -	$ 687,000	$ 99,066	$ 28,895,668	$ 9,043,309	$ -

Note: ID 999 *indicates project programmed in current Statewide Transportation Improvement Program. Local road construction amount includes $14,901,320 in Surface Transportation Program (STP) carryover funds and $2,500,000 in STP funds programmed for unspecified MPO uses.*

Alternative transportation funding includes $555,000 in STP Non-Urban funds made available by the Mississippi Department of Transportation for local use.

Source: Gulf Regional Planning Commission; Mississippi Department of Transportation: Statewide Transportation Improvement Program: FY 2015-2019 *for local project funding availability.*

Table 11-2:
STAGED IMPROVEMENT PROGRAM - STAGE 2 IMPROVEMENTS (2021-2030)

ID	COUNTY	LOCATION	ROUTE	FROM	TO	CATEGORY	IMPROVEMENT	FUNDING CATEGORY					
								Alternative Transportation (Local)	Safety Improvements (Local)	Road Construction (Local)	Road Construction (State/Other)	Interstate/ Interchange (State)	Safety Improvements (State)
STAGE 1 (2016 - 2021) PROJECTED CARRYOVER AMOUNT								$ -	$ 687,000	$ 99,066	$ 28,895,668	$ 9,043,309	$ -
STAGE 2 (2021 - 2030) ESTIMATED BASE AMOUNT AVAILABLE								$ 10,939,316	$ 5,336,252	$ 53,494,600	$ 250,104,178	$ 45,028,591	$ 23,777,995
STAGE 2 (2021 - 2030) ESTIMATED TOTAL AMOUNT AVAILABLE								$ 10,939,316	$ 6,023,252	$ 53,593,666	$ 278,999,846	$ 54,071,900	$ 23,777,995
999	Harrison	Gulfport	Highway 601	Interstate 10	Mississippi State Port	Road Improvements	Construct new expressway				$ 59,902,400		
1	Hancock	Hancock County	MS 43	Kiln Bypass	--	Road Improvements	New construction				$ 60,523,200		
3	Jackson	Jackson County	MS 57	Interstate 10	Vancleave	Road Improvements	Realign and add 2 lanes				$ 87,200,000		
5	Jackson	Ocean Springs-Gautier	US 90	Hwy 609	Dolphin Drive	Road Improvements	Add 2 lanes				$ 37,571,700		
6	Harrison	Gulfport	Landon Road	US 49	34th Avenue	Road Improvements	Widen to 4-lane divided road			$ 2,783,030			
7	Harrison	Biloxi	Pine Street	Back Bay Boulevard	US 90	Road Improvements	Construct 4-lane divided road				$ 14,769,000		
8	Harrison	Long Beach	Beatline Road Extension	Railroad Street	US 90	Road Improvements	New 4-lane construction			$ 3,766,875			
11	Harrison	Gulfport	Dedeaux Road	Stewart Road	Hwy 605	Road Improvements	Road Improvements			$ 10,563,855			
12	Jackson	Ocean Springs	Ocean Springs Road	Reilly Road	US 90	Road Improvements	Widen to 3-lane road			$ 9,973,500			
16	Harrison	Biloxi	Popp's Ferry Road	Back Bay	Pass Road	Road Improvements	Widen to 4-lane divided road			$ 3,820,770			
17	Harrison	Biloxi	Popp's Ferry Road	Riverview Drive	Back Bay of Biloxi	Road Improvements	Reconstruct as 4-lane road			$ 4,761,945			
18	Harrison	Gulfport	Three Rivers Road	Angela Drive	Crossroads Parkway	Road Improvements	Reconstruct as 4-lane road			$ 1,551,840			
21	Harrison	Biloxi	Division Street	Caillavet Street	Forrest Ave-Keesler AFB	Road Improvements	Widen to 4-lane divided road			$ 3,160,390			
23	Harrison	Gulfport	Washington Avenue	Airport Road	54th Street	Road Improvements	Widen to 3-lane road			$ 1,950,780			
24	Harrison	Gulfport	Hwy 605	Dedeaux Road	I-10	Road Improvements	Widen to 4-lane divided road				$ 1,252,390		
26	Hancock	Diamondhead	Gex Drive	Aloha Drive	Diamondhead Drive S	Road Improvements	Widen to 4-lane divided road			$ 2,393,580			
35	Harrison	Harrison	I-10	County Farm Road	[Interchange]	Interstate/Interchange	Interchange Improvements					$ 11,175,000	
37	Harrison	Harrison	I-10	Menge Avenue	[Intechange]	Interstate/Interchange	Interchange Improvements					$ 11,175,000	
42	Harrison	Biloxi	US 90	I-110	Keller Avenue	Road Improvements	Reconstruction				$ 4,197,600		
43	Harrison	Biloxi	US 90	Azalea Drive	I-110	Road Improvements	Reconstruction				$ 2,516,250		
44	Harrison	Gulfport	Pass Road	Cowan Road	Washington Avenue	Road Improvements	Reconstruction			$ 6,996,000			
46	Jackson	Pascagoula	US 90	Hospital Road	Veterans Boulevard	Road Improvements	Reconstruction				$ 4,496,250		
49	Hancock	Hancock	Kiln-Delisle Road	Hwy 603	[Intersection]	Safety Improvements	Intersection Improvements		$ 738,000				
51	Harrison	Gulfport	US 90	US 49	[Intersection]	Road Improvements	Intersection Improvements				$ 2,050,000		
53	Jackson	Jackson	US 90	Gautier-Vancleave Rd	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
54	Harrison	Gulfport	US 49	Landon Road	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
55	Harrison	Gulfport	US 49	O'Neal Road	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
56	Harrison	Gulfport	US 49	MS 53	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
57	Jackson	Ocean Springs	US 90	Hwy 609	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
58	Jackson	Jackson	MS 63	Hwy 614	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
59	Harrison	Gulfport	Pass Road	Cowan Road	[Intersection]	Safety Improvements	Intersection Improvements		$ 738,000				
60	Harrison	Gulfport	US 49	Community Road	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
61	Harrison	Biloxi	US 90	White Avenue	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
62	Jackson	Jackson County	Hwy 609	Lemoyne Boulevard	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
63	Jackson	Moss Point	MS 63	Grierson Street	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
64	Hancock	Bay St Louis	US 90	MS 43	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
65	Jackson	Jackson	Hwy 613	MS 63	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
66	Jackson	Jackson	MS 63	Saracennia Road	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
67	Jackson	Ocean Springs	US 90	MS 57	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
68	Harrison	Gulfport	US 90	30th Avenue	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
69	Hancock	Bay St Louis	US 90	Blue Meadow Road	[Intersection]	Safety Improvements	Intersection Improvements						$ 738,000
72	Harrison	Biloxi	Cedar Lake Road	Popps Ferry Road	[Intersection]	Safety Improvements	Intersection Improvements		$ 738,000				
73	Harrison	Biloxi	Cedar Lake Road	I-10	Popps Ferry Road	Road Improvements	Reconstruction			$ 1,442,925			
--	Multiple	Multiple	Grouped Projects	--	--	Alternative Transportation	--	$ 2,458,610					
--	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--		$ 2,623,475				
--	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--						$ 10,752,534
Subtotal for Stage 2 Projects					*Overall Total*	$379,850,899		$ 2,458,610	$ 4,837,475	$ 53,165,490	$ 274,478,790	$ 22,350,000	$ 22,560,534
Balance available for Stage 3 Projects					*Overall Balance*	$47,555,075		$ 8,480,706	$ 1,185,777	$ 428,176	$ 4,521,056	$ 31,721,900	$ 1,217,461

Note: ID 999 indicates project programmed in current Statewide Transportation Improvement Program.

Source: Gulf Regional Planning Commission.

Table 11-3:
STAGED IMPROVEMENT PROGRAM - STAGE 3 IMPROVEMENTS (2031-2040)

ID	COUNTY	LOCATION	ROUTE	FROM	TO	CATEGORY	IMPROVEMENT	FUNDING CATEGORY					
								Alternative Transportation (Local)	Safety Improvements (Local)	Road Construction (Local)	Road Construction (State/Other)	Interstate/ Interchange (State)	Safety Improvements (State)
STAGE 2 (2021 - 2030) PROJECTED CARRYOVER AMOUNT								**$ 8,480,706**	**$ 1,185,777**	**$ 428,176**	**$ 4,521,056**	**$ 31,721,900**	**$ 1,217,461**
STAGE 3 (2031 - 2040) ESTIMATED BASE AMOUNT AVAILABLE								**$ 12,083,810**	**$ 5,894,591**	**$ 59,091,319**	**$ 276,270,608**	**$ 49,739,578**	**$ 26,265,650**
STAGE 3 (2031 - 2040) ESTIMATED TOTAL AMOUNT AVAILABLE								**$ 20,564,516**	**$ 7,080,368**	**$ 53,787,691**	**$ 280,791,664**	**$ 81,461,478**	**$ 27,483,111**
2	Harrison	Gulfport	US 49	School Road	O'Neal Road	Road Improvements	Widen to 6-lane divided road				$ 24,811,500		
4	Hancock/	Harrison County	I-10	Diamondhead	Wolf River	Interstate/Interchange	Add lane each way					$ 62,765,050	
9	Harrison	Gulfport	Canal Road	I-10	28th Street	Road Improvements	Widen to 4-lane road			$ 14,230,125			
10	Harrison	Harrison County	County Farm Road	I-10	Red Creek Road	Road Improvements	Widen to 4-lane divided road			$ 5,637,705			
13	Jackson	Jackson County	Ocean Springs Road	Reilly Road	Hwy 57	Road Improvements	Widen to 3-lane road			$ 10,705,500			
14	Jackson	Jackson County	Old Fort Bayou Road	Washington Avenue	Yellow Jacket Road	Road Improvements	Widen to 3-lane road			$ 8,418,000			
15	Harrison	Biloxi	Popp's Ferry Road	North Shore Back Bay	South Shore Back Bay	Road Improvements	Construct new 4-lane bridge				$ 90,600,000		
20	Jackson	Jackson County	Seaman Road	I-10 Connector Road	Jordan Road	Road Improvements	Widen to 4-lane divided road			$ 7,992,848			
22	Harrison	Gulfport	MS 53	US 49	County Farm Road	Road Improvements	Widen to 4-lane road				$ 17,438,940		
38	Hancock	Hancock	I-10	Diamondhead Drive	[Interchange]	Interstate/Interchange	Interchange Improvements					$ 16,762,500	
45	Harrison	Biloxi	Pass Road	DeBuys Road	Stennis Drive	Road Improvements	Reconstruction			$ 5,378,175			
70	Jackson	Moss Point	Main Street	Dantzler Street	[Intersection]	Road Improvements	Intersection Improvements			$ 815,210			
71	Harrison	Gulfport	US 49	Airport Road	[Intersection]	Safety Improvements	Intersection improvements						$ 815,210
--	Multiple	Multiple	Grouped Projects	--	--	Alternative Transportation	--	$ 2,715,835					
--	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--		$ 2,897,950				
--	Multiple	Multiple	Grouped Projects	--	--	Safety Improvements	--						$ 11,877,490
Sub-Total for Stage 3 Projects					*Overall Total*	$283,862,038		$2,715,835	$2,897,950	$53,177,563	$132,850,440	$79,527,550	$12,692,700
Balance Available for Unfunded Projects					*Overall Balance*	$187,306,790		$ 17,848,681	$ 4,182,418	$ 610,129	$ 147,941,224	$ 1,933,928	$ 14,790,411

Source: Gulf Regional Planning Commission.

Table 11-4:
STAGED IMPROVEMENT PROGRAM - UNFUNDED IMPROVEMENTS

ID	COUNTY	LOCATION	ROUTE	FROM	TO	CATEGORY	IMPROVEMENT	FUNDING CATEGORY					
								Alternative Transportation (Local)	Safety Improvements (Local)	Road Construction (Local)	Road Construction (State/Other)	Interstate/ Interchange (State)	Safety Improvements (State)
STAGE 3 (2021 - 2030) PROJECTED CARRYOVER AMOUNT								$ 17,848,681	$ 4,182,418	$ 610,129	$ 147,941,224	$ 1,933,928	$ 14,790,411
27	Harrison	Gulfport	East-West Corridor	US 49	Hwy 605	Road Improvements	Construct 4-lane roadway				$ 56,067,500		
28	Harrison	Gulfport	East-West Corridor	Hwy 605	Popps Ferry Road	Road Improvements	Construct 4-lane roadway				$ 41,298,500		
29	Harrison	Biloxi	East-West Corridor	Popps' Ferry Road	I-110	Road Improvements	Construct 4-lane roadway				$ 70,016,000		
30	Harrison	Gulfport/Long Beach	East-West Corridor	Jeff Davis Avenue	US 49	Road Improvements	Construct 4-lane roadway				$ 53,059,000		
31	Harrison	Long Beach	East-West Corridor	Beatline Road	Jeff Davis Avenue	Road Improvements	Construct 4-lane roadway				$ 30,768,750		
32	Harrison	Pass Christian	East-West Corridor	Henderson Point	Beatline Road	Road Improvements	Construct 4-lane roadway				$ 86,699,500		
34	Harrison	Biloxi	Woolmarket Connector	I-10	Popp's Ferry@Riverview	Road Improvements	Construct 4-lane roadway				$ 102,475,000		
39	Hancock	Hancock	I-10	Hwy 603	[Interchange]	Interstate/Interchange	Interchange Improvements					$ 16,762,500	
40	Jackson	Gautier	I-10	Hwy 57	[Interchange]	Interstate/Interchange	Interchange Improvements					$ 16,762,500	
41	Jackson	Ocean Springs	I-10	Hwy 609	--	Interstate/Interchange	Interchange improvements					$ 11,845,500	
77	Hancock	Hancock County	I-10	Louisiana state line	MS 43	Interstate/Interchange	Add lane each way					$ 132,341,812	
110	Harrison	Biloxi	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 2,511,750		
111	Harrison	Biloxi	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 2,511,750		
112	Harrison	Biloxi	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 2,511,750		
116	Harrison	Gulfport	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 1,816,875		
117	Harrison	Gulfport	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 1,816,875		
118	Harrison	Gulfport	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 1,816,875		
119	Harrison	Long Beach	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 1,602,250		
120	Harrison	Long Beach	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 1,602,250		
121	Harrison	Long Beach	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 1,602,250		
122	Jackson	Pascagoula	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 3,374,500		
123	Jackson	Pascagoula	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 3,374,500		
124	Jackson	Pascagoula	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 3,374,500		
125	Harrison	Pass Christian	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 2,235,500		
126	Harrison	Pass Christian	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 2,235,500		
127	Harrison	Pass Christian	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 2,235,500		
128	Hancock	Waveland	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 1				$ 969,000		
129	Hancock	Waveland	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 2				$ 969,000		
130	Hancock	Waveland	Border to Border - US 90	--	--	Alternative Transportation	Construct Separated Path PH 3				$ 969,000		
131	Jackson	Moss Point	Martin Luther King Blvd	Magnolia Street	Kreole Avenue	Alternative Transportation	Construct Separated Path PH 1	$ 1,270,750					
132	Jackson	Moss Point	Martin Luther King Blvd	Magnolia Street	Kreole Avenue	Alternative Transportation	Construct Separated Path PH 2	$ 1,270,750					
133	Jackson	Moss Point	Martin Luther King Blvd	Magnolia Street	Kreole Avenue	Alternative Transportation	Construct Separated Path PH 3	$ 1,270,750					
134	Jackson	Jackson County	Hwy 609	Fort Bayou Bridge	I-10	Alternative Transportation	Construct Separated Path PH 1				$ 1,130,500		
135	Jackson	Jackson County	Hwy 609	Fort Bayou Bridge	I-10	Alternative Transportation	Construct Separated Path PH 2				$ 1,130,500		
136	Jackson	Jackson County	Hwy 609	Fort Bayou Bridge	I-10	Alternative Transportation	Construct Separated Path PH 3				$ 1,130,500		
137	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 1				$ 1,997,500		
138	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 2				$ 1,997,500		
139	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 3				$ 1,997,500		
140	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 4				$ 1,997,500		
141	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 5				$ 1,997,500		
142	Harrison	Gulfport	US 49	Hwy 53	US 90	Alternative Transportation	Construct Separated Path PH 6				$ 1,997,500		
143	Harrison	Biloxi	Popp's Ferry Road	Cedar Lake Road	Pass Road	Alternative Transportation	Construct Separated Path PH 1	$ 1,955,000					
144	Harrison	Biloxi	Popp's Ferry Road	Cedar Lake Road	Pass Road	Alternative Transportation	Construct Separated Path PH 2	$ 1,955,000					
145	Harrison	Biloxi	Popp's Ferry Road	Cedar Lake Road	Pass Road	Alternative Transportation	Construct Separated Path PH 3	$ 1,955,000					
146	Harrison	Long Beach	Pineville Road	Railroad Street	Beatline Road	Alternative Transportation	Construct Separated Path PH 2	$ 1,020,000					
147	Harrison	Long Beach	Pineville Road	Railroad Street	Beatline Road	Alternative Transportation	Construct Separated Path PH 3	$ 1,020,000					
149	Harrison	Long Beach	County Farm Rd-Beatline Rd	I-10	Railroad Street	Alternative Transportation	Construct Separated Path PH 2	$ 2,210,000					
150	Harrison	Long Beach	County Farm Rd-Beatline Rd	I-10	Railroad Street	Alternative Transportation	Construct Separated Path PH 3	$ 2,210,000					
151	Hancock	Waveland	Central Avenue	Waveland Avenue	City Limits	Alternative Transportation	Construct Separated Path PH 1	$ 1,402,500					
152	Hancock	Waveland	Central Avenue	Waveland Avenue	City Limits	Alternative Transportation	Construct Separated Path PH 2	$ 1,402,500					
153	Hancock	Bay St Louis	Central Avenue	City Limits	Washington St	Alternative Transportation	Construct Separated Path	$ 1,530,000					
Total for Unfunded Projects					*Overall Total*	$691,474,937		$ 20,472,250	$ -	$ -	$ 493,290,375	$ 177,712,312	$ -
Balance of Funds Available (Lacking)					*Overall Balance*	($504,168,147)		$ (2,623,569)	$ 4,182,418	$ 610,129	$ (345,349,151)	$ (175,778,384)	$ 14,790,411

Source: Gulf Regional Planning Commission.

The base-year network included only streets and highways that were actually in service in 2013. It was necessary to exclude improvements made subsequent to that year, as annual average daily traffic (AADT) estimates for 2013 (the latest available) were used to calibrate the regional travel demand forecasting model. The E+C network included additional improvements made after 2013 and *committed* improvements actively under development. Summary statistical data for the five networks modeled indicated the following (see Table 11-5):

- The demand for travel in the region will continue to grow as population and economic activity expand over the next quarter-century. Based on the land use and demographic forecast incorporated in the model, vehicle-miles traveled (VMT), the standard measure of aggregate demand, is expected to increase by approximately one-third (almost 4.7 million miles daily) from 2015 to 2040. Implementation of all planned roadway capacity enhancements in the Staged Improvement Program would reduce VMT very slightly, roughly one-tenth of one percent compared to the 2040 E+C assignment.

- Vehicle-hours traveled (VHT), the standard measure of aggregate travel time, is projected to increase by nearly 150,000 hours daily or a little less than 40 percent. The difference in growth rates, between vehicle-miles and vehicle-hours, suggests that the time required to complete a trip of a specified length will increase by about five percent over the 25-year planning period.

- This additional travel time corresponds to an increase in vehicle-hours of delay (VHD), the standard measure of aggregate time lost due to traffic congestion. Delay represents the difference between the actual travel time required to make a designated trip and the time that would be required to make the same trip under free-flow conditions. Obviously unobstructed travel is an unobtainable ideal, but it provides a useful basis for quantifying the relative impact of congestion associated with varying scenarios. Based on the output generated by the base-year and long-range travel assignments, aggregate delay would increase by a little more than two-

Table 11-5:
PROJECTED DAILY VEHICLE-MILES AND HOURS TRAVELED AND VEHICLE-HOURS OF DELAY FOR STAGED IMPROVEMENT PROGRAM COMPARED TO BASE-YEAR AND LONG-RANGE ASSIGNMENTS

YEAR	NETWORK	DAILY VEHICLE-MILES TRAVELED	DAILY VEHICLE-HOURS TRAVELED	DAILY VEHICLE-HOURS OF DELAY	PERCENT DELAY	AVERAGE SPEED (MPH)
2013	Existing	13,829,101	385,145	58,732	15.25	35.91
2020	Stage 1	15,505,810	439,491	73,136	16.64	35.28
2030	Stage 2	16,972,141	483,825	84,242	17.41	35.08
2040	Stage 3	18,526,041	532,620	97,973	18.39	34.78
2040	E+C	18,532,770	543,780	106,928	19.66	34.08

Note:
Existing-plus-Committed (E+C) network includes only improvements already programmed for implementation.

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

thirds if all projects in the Staged Improvement Program were implemented. In the absence of additional improvements, beyond those included in the E+C network, the increase in VHD would likely exceed 82 percent.

- Under current conditions, more than 15 percent of the time spent traveling is attributable to delay resulting from traffic congestion. In the absence of additional improvements, beyond those already committed to implementation, VHD would expand to account for almost 20 percent of total travel time. The implementation of all roadway capacity enhancements in the Staged Improvement Program would reduce the VHD share of total travel time to approximately 18.4 percent.

- Average operating speed for all vehicles on the current roadway network is roughly 35.9 miles per hour (mph). Increasing congestion over the next 25 years is projected to reduce average operating speed to 34.1 mph in the absence of additional improvements. Implementation of the Staged Improvement Program would result in a decrease of approximately 1.1 mph to 34.8 mph.

The probable effectiveness of the Staged Improvement Program was also analyzed in terms of the impact proposed improvements would have on congested roadways with projected volume-to-capacity (V/C) ratios expected to exceed 1.00 (i.e., theoretical capacity) at some point between the base year (2013) and the long-range planning horizon (2040). Fourteen such roadways were identified – 10 in Harrison County, three in Jackson County and one in Hancock County (see Table 11-6). The analysis indicated there are currently seven roads with V/C greater than 1.00. In the absence of additional improvements, other than those already committed to implementation, that number would increase to 11 by 2040. Model output indicated the number would be reduced to three by making all of the improvements included in the Staged Improvement Program. Without the proposed improvements, the weighted average V/C for congested roadways would increase from 1.03 to 1.20 by 2040. Assuming implementation of the Staged Improvement Program, the weighted average V/C for congested roadways would only increase to 1.04.

The three roads which did not show a substantial improvement in V/C were U. S. Highway 49 (US 49), Highway 605 (Lorraine Road) and Menge Avenue. The Menge Avenue deficiency is marginal and limited to the short section of that road within its interchange with Interstate 10 (I-10). Congested conditions on the other two routes are more severe and much more widespread. However, it did not prove possible to address them within the context of the fiscally constrained Staged Improvement Program, since the solution to each would likely Involve construction of an entirely new alternate route. This possibility was entertained by the construction of an *unfunded* model network including additional projects beyond those built into the Staged Improvement Program networks.

11.3 UNFUNDED PROJECTS

While only those projects already listed in the Statewide Transportation Improvement Program (STIP) can be regarded as being actually *funded* in any real sense, all of those included in the fiscally constrained Staged Improvement Program were treated as such in developing the long-range plan presented herein.

Table 11-6:

PROJECTED IMPACT OF STAGED IMPROVEMENT PROGRAM PROJECTS ON POTENTIALLY DEFICIENT ROADWAY SEGMENTS

SEG-MENT NO	COUNTY	ROADWAY (2)	FROM (N/W)	TO (S/E)	LENGTH (MI)	TOTAL (2-WAY) TRAFFIC AND MAXIMUM (1-WAY) VOLUME/CAPACITY									
						BASE (2013)		Stage 1 (2020)		Stage 2 (2030)		Stage 3 (2040)		E+C (2040)	
						VOL	V/C	VOL	V/C	VOL	V/C	VOL	V/C	VOL	V/C
1	Harrison	County Farm Rd	I-10 WB Off-Ramp	Red Creek Road	1.21	11,371	1.05	17,744	1.38	19,212	1.28	22,394	0.75	20,934	1.40
2	Harrison	MS 53	Old Highway 49	US 49	0.79	20,792	1.03	23,991	1.25	25,292	1.32	31,178	0.82	26,576	1.39
3	Harrison	US 49	Duckworth Road	Creosote Road	3.84	73,336	1.20	87,779	1.43	94,644	1.55	100,325	1.64	100,906	1.65
4	Harrison	Lorraine Rd-Cowan Rd	Dedeaux Road	Pass Road	3.62	38,692	1.02	48,802	1.16	50,324	1.27	50,131	1.33	51,977	1.31
5	Harrison	Promenade Pkwy	D'iberville Blvd	MS 15	0.62	11,344	1.26	8,009	0.81	8,289	0.82	8,715	0.76	8,042	0.74
6	Harrison	Sangani Blvd	MS 15	Lamey Bridge Rd	0.50	14,773	1.25	13,474	0.82	13,942	0.86	15,025	0.85	15,806	0.83
7	Hancock	MS 43	Highway 603	Kiln-DeLisle Road	1.42	12,849	0.68	19,412	1.03	27,940	0.72	31,153	0.82	24,339	1.28
8	Harrison	Division Street	Forrest Avenue	Caillavet Street	0.67	19,055	1.29	21,339	1.32	22,739	0.76	25,444	0.83	17,460	1.04
9	Jackson	Seaman Rd	Jordan Road	I-10 Connector Rd	1.87	13,905	0.92	16,471	1.09	15,604	1.03	17,792	0.59	17,713	1.17
10	Jackson	Bienville Blvd (US 90)	Vermont Avenue	Bechtel Boulevard	0.78	39,660	0.98	39,910	0.97	46,475	0.76	48,406	0.77	42,826	1.05
11	Harrison	Canal Road	I-10 WB Off-Ramp	28th Street	2.57	9,426	0.73	16,247	0.85	19,542	1.02	26,366	0.69	22,425	1.17
12	Harrison	Three Rivers Rd	Crossroads Pkwy	Seaway Road	0.10	15,471	0.79	17,193	0.89	18,941	0.50	21,276	0.55	22,105	1.14
13	Harrison	Menge Ave	I-10 WB Off-Ramp	I-10 EB On-Ramp	0.19	8,709	0.87	9,906	0.98	10,879	1.03	10,616	1.07	11,712	1.13
14	Jackson	US 90	Ladnier Road	Oak Street	2.07	36,560	0.86	30,711	0.72	32,451	0.76	34,146	0.80	33,794	0.79
15	Jackson	Highway 614	MS 63	Highway 613	4.66	11,317	0.77	12,266	0.81	15,373	1.04	16,742	1.11	15,534	1.04
Number of Deficient Segments						7		7		8		4		12	
Average Traffic Volume						22,484		25,550		28,110		30,647		28,810	
Average Volume/Capacity						0.98		1.03		0.98		0.89		1.14	
Weighted Average Volume/Capacity						1.02		1.09		1.06		1.01		1.23	

Notes:

Potentially deficient roadway segements are those with projected volume/capacity > 1.00 for one or more of the travel assignments generated.

Termini for deficient segments are the nearest major streets (or bridges) east and west, or north and south, of links having volume/capacity > 1.00.

Source: Mississippi Gulf Coast Regional Travel Demand Forecasting Model (2015).

There were three major roadway projects that could not be accommodated within the fiscally constrained Staged Improvement Program. The first of these was the proposed East-West Corridor, a new route that would provide a four-lane limited-access alternative to US 90, spanning most of Harrison County. For modeling purposes it was assumed that on the west end it would connect to US 90 via Bayview Street near the Henderson Point end of the Bay of Saint Louis bridge. On the east end a terminus in the vicinity of the downtown Biloxi Transit Center located on Martin Luther King Jr. Boulevard at Reynoir Street was assumed. In between the route would likely incorporate a number of existing streets located in the vicinity of the CSX railroad right-of-way, such as Railroad Street in Long Beach and Gulfport and Irish Hill Drive in Biloxi. Depending on the availability of funding in the future, it would probably be necessary to construct this proposed roadway in phases with higher demand segments connecting Gulfport and Biloxi being built before lower demand segments in the western half of Harrison County.

A second unfunded project would provide a direct connection from I-10 to US 90 in the area between Highway 605 and Interstate 110 (I-110). The proposed project envisioned here is a new route connecting Popp's Ferry Road to the existing I-10 interchange at Woolmarket. The connection would be a four-lane roadway tying into Popp's Ferry in the vicinity of Riverview Drive. It is not envisioned that there would be any access except at the northern and southern termini of the new route.

The third unfunded project would be the addition of one lane in each direction on the portion of I-10 located between the Louisiana state line and MS 43 in Hancock County. This represents a major component of MDOT plans to provide at least three lanes each way on I-10 all the way across the state.

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APPENDIX:

TYPICAL SECTION DRAWINGS

The typical section drawings presented herein represent examples of roadway design concepts consistent with the Complete Streets Policy adopted by the Transportation Policy Committee for the Mississippi Gulf Coast Metropolitan Planning Organization.

Representative Roadway Sections:

(1) Two-Lane Road with Multi-Use Path and Sidewalk

(2) Two-Lane Road with Bike Lanes and Sidewalks

(3) Two-Lane Road with Sidewalks, Curb and Gutter

(4) Two-Lane Road with Sidewalks and Surface Drainage

(5) Two-Lane Road with On-Street Parking, Sidewalks and Bike Lanes

(6) Three-Lane Road with Multi-Use Path and Sidewalk

(7) Three-Lane Road with Bike Lanes and Sidewalks

(8) Three-Lane Road with Sidewalks, Curb and Gutter

(9) Three-Lane Road with Sidewalks and Surface Drainage

(10) Three-Lane Road with On-Street Parking, Sidewalks and Bike Lanes

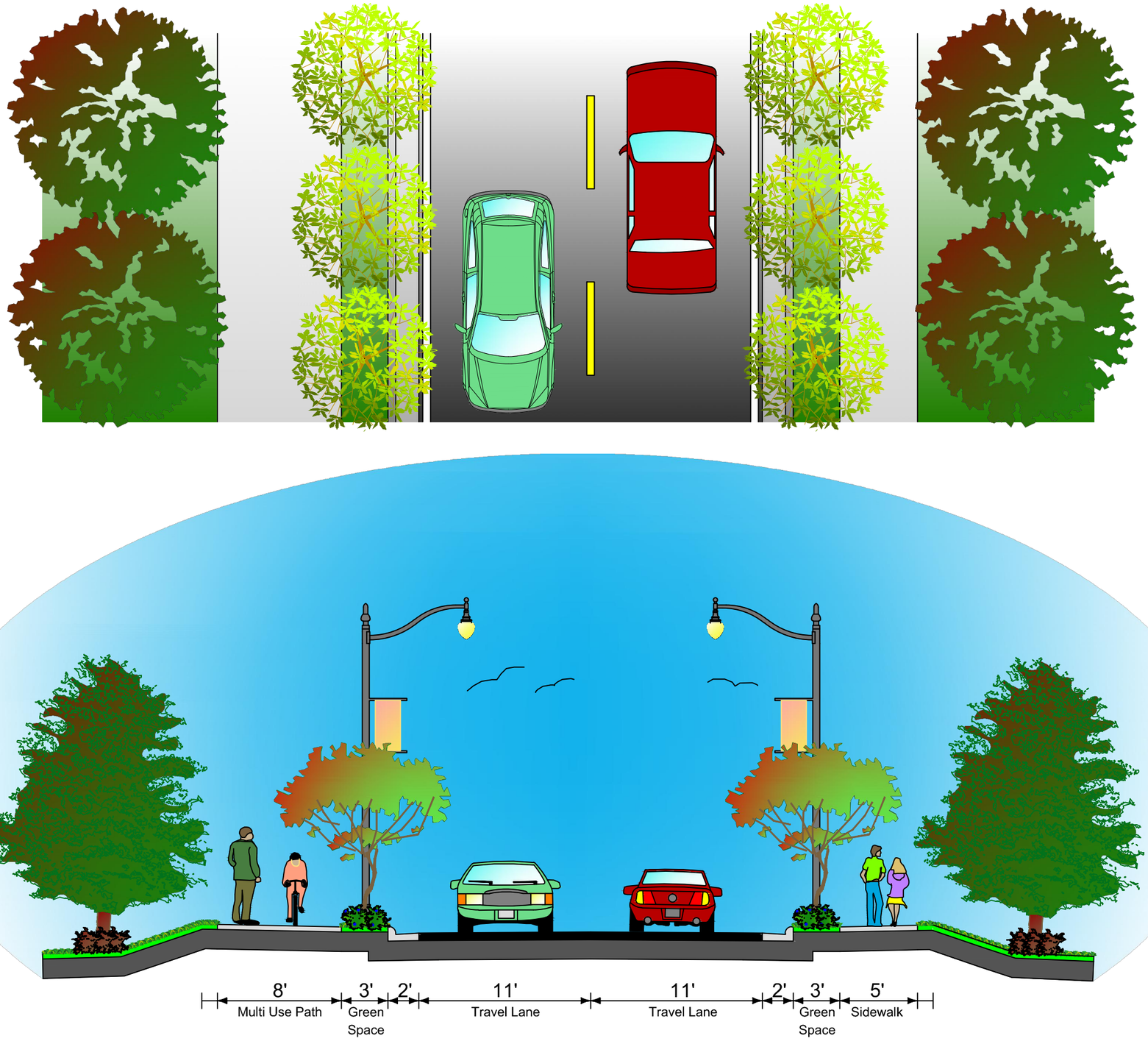
(11) Four-Lane Road with Median, Multi-Use Path and Sidewalk

(12) Four-Lane Road with Median, Bike Lanes and Sidewalks

(13) Four-Lane Road with Median and Sidewalks

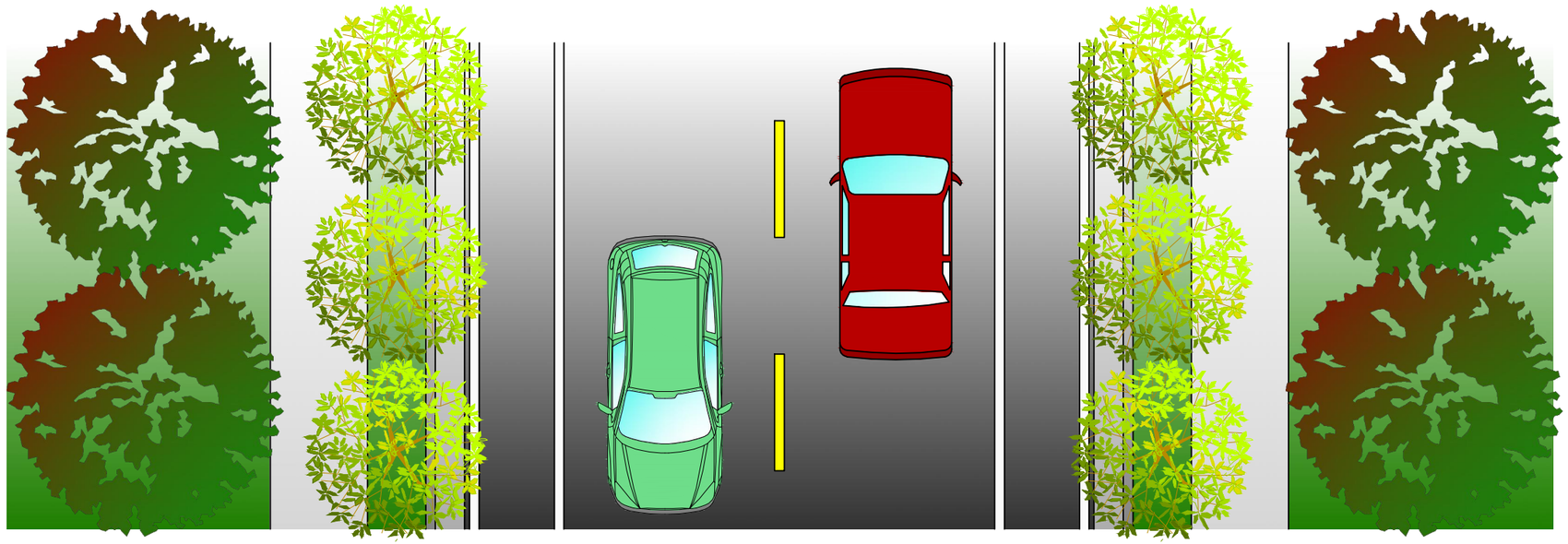
(14) Four-Lane Road with Median, Sidewalks and Surface Drainage

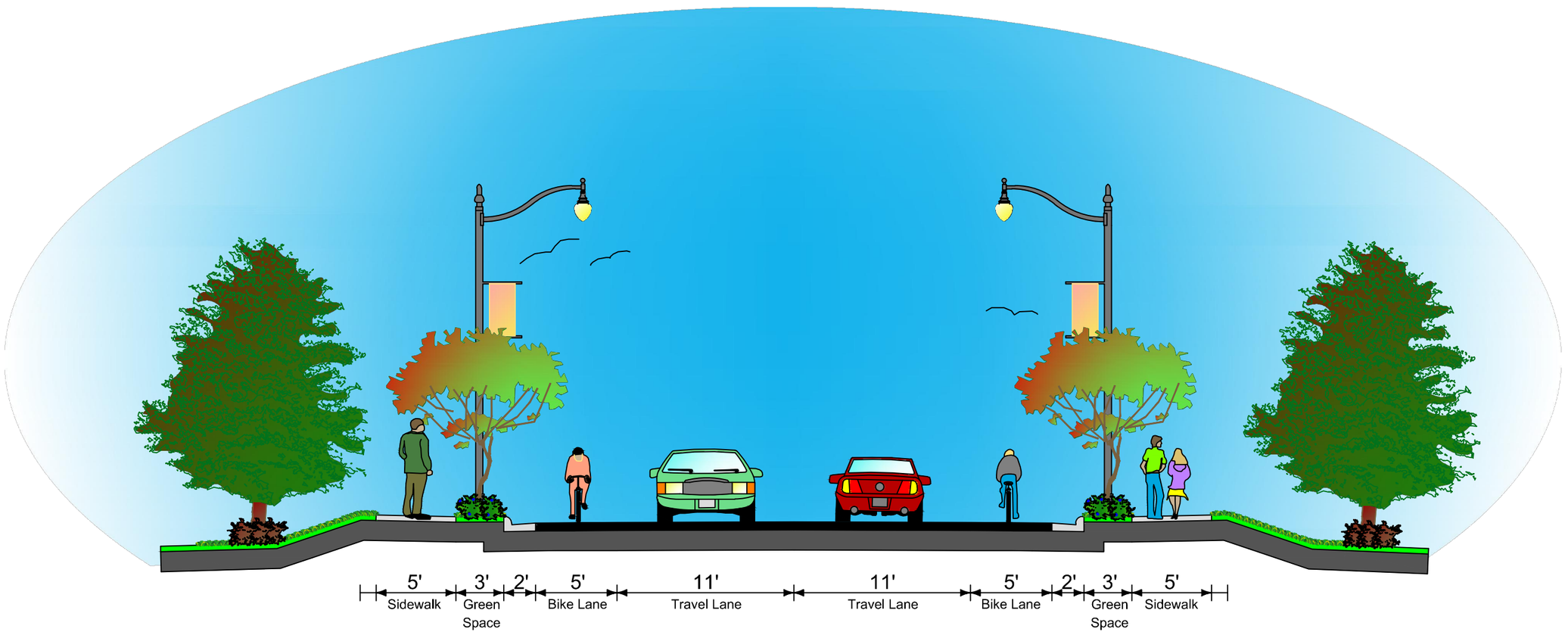
(15) Four-Lane Road with Median, On-Street Parking, Sidewalks and Bike Lanes



TWO-LANE ROAD WITH MULTI-USE PATH AND SIDEWALK

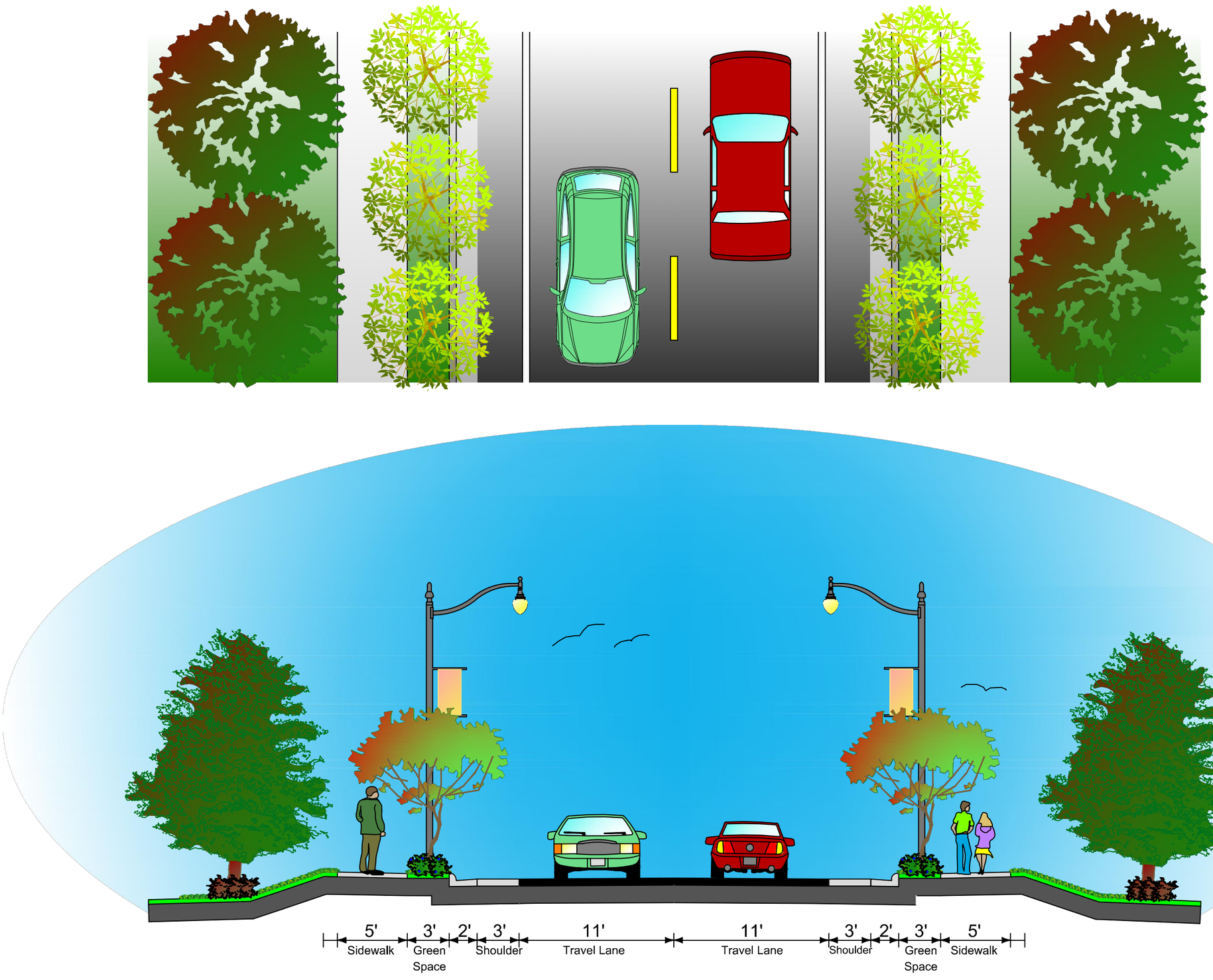
45-Foot Minimum Right-of-Way



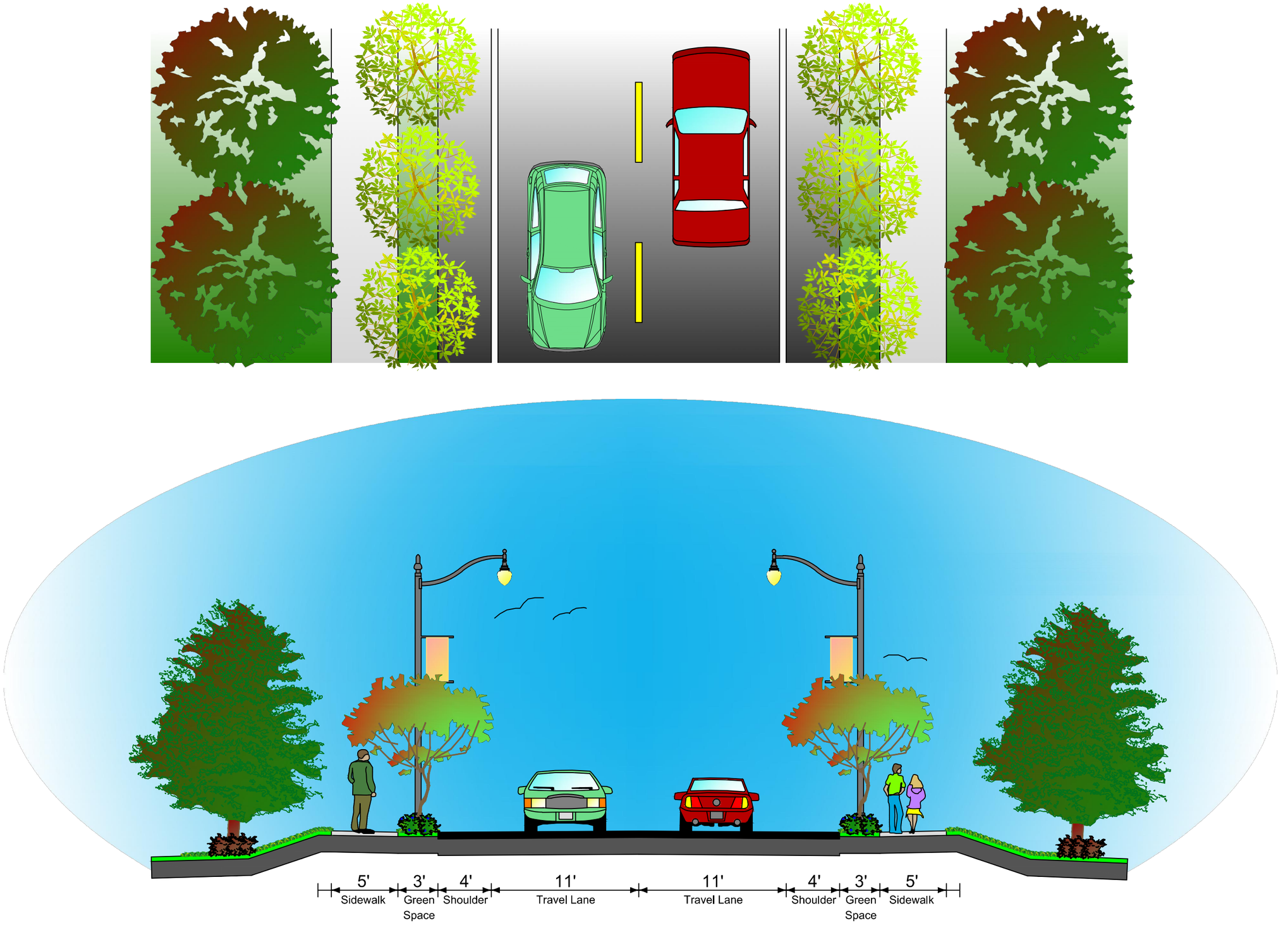


TWO-LANE ROAD WITH BIKE LANES AND SIDEWALKS

52-Foot Minimum Right-olf-Way

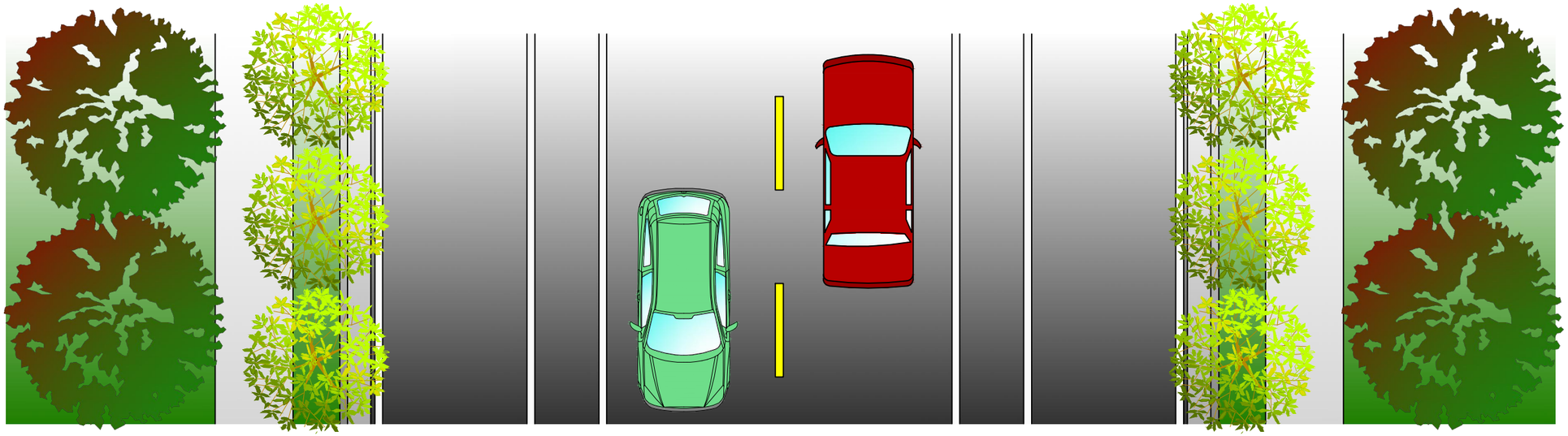


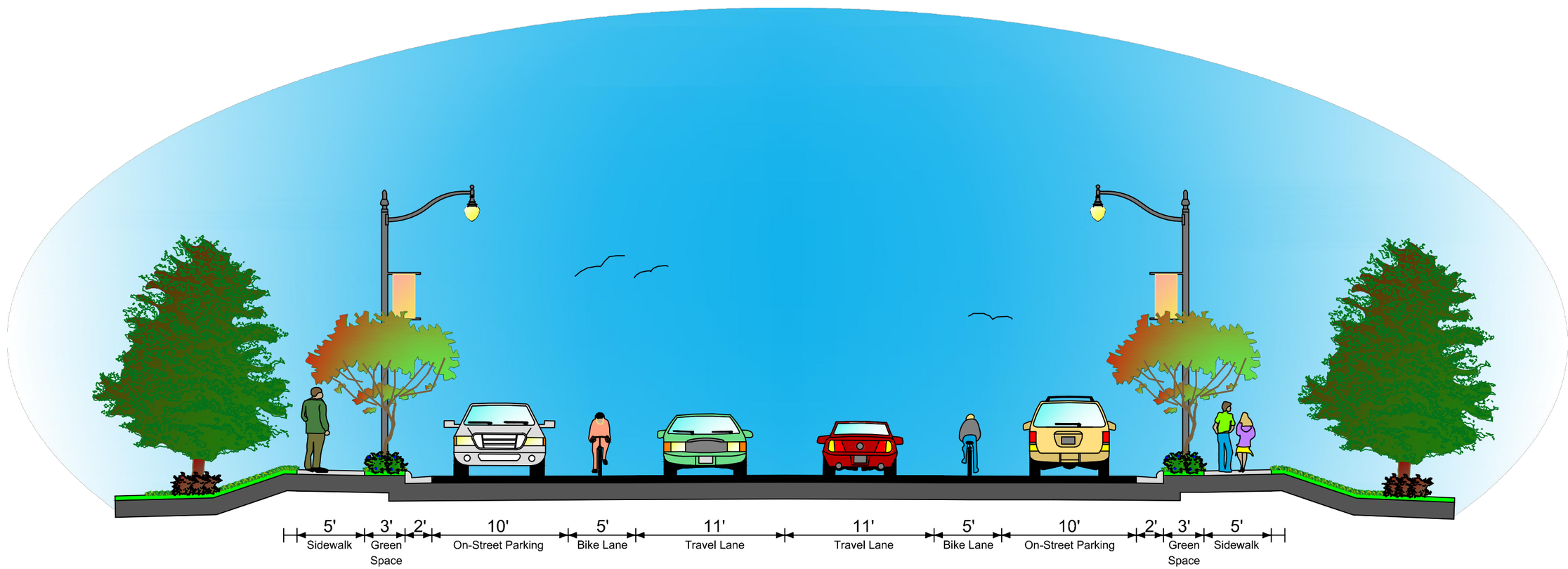
TWO-LANE ROAD WITH SIDEWALKS, CURB AND GUTTER
48-Foot Minimum Right-of-Way



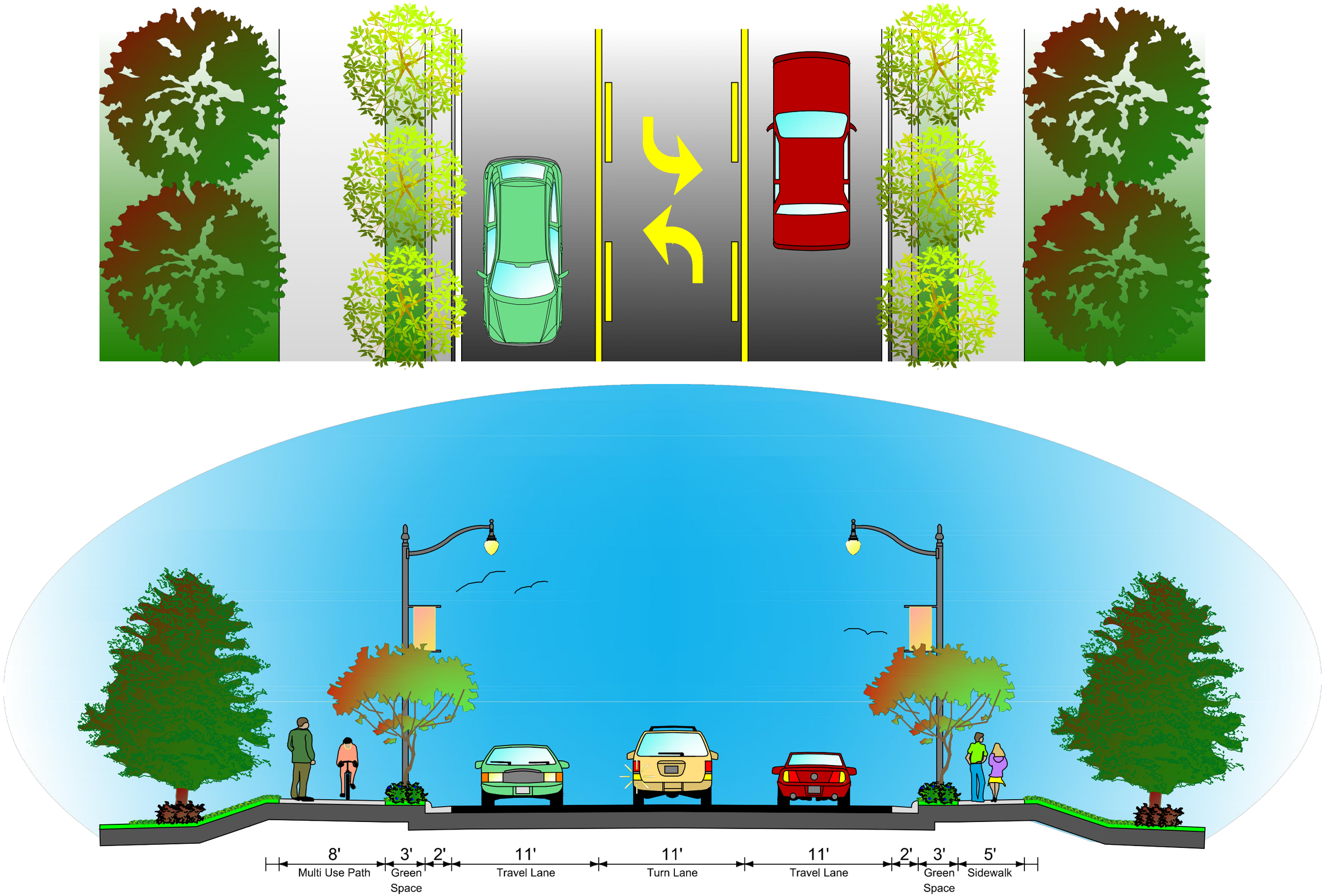
TWO-LANE ROAD WITH SIDEWALKS AND SURFACE DRAINAGE

46-Foot Minimum Right-of-Way



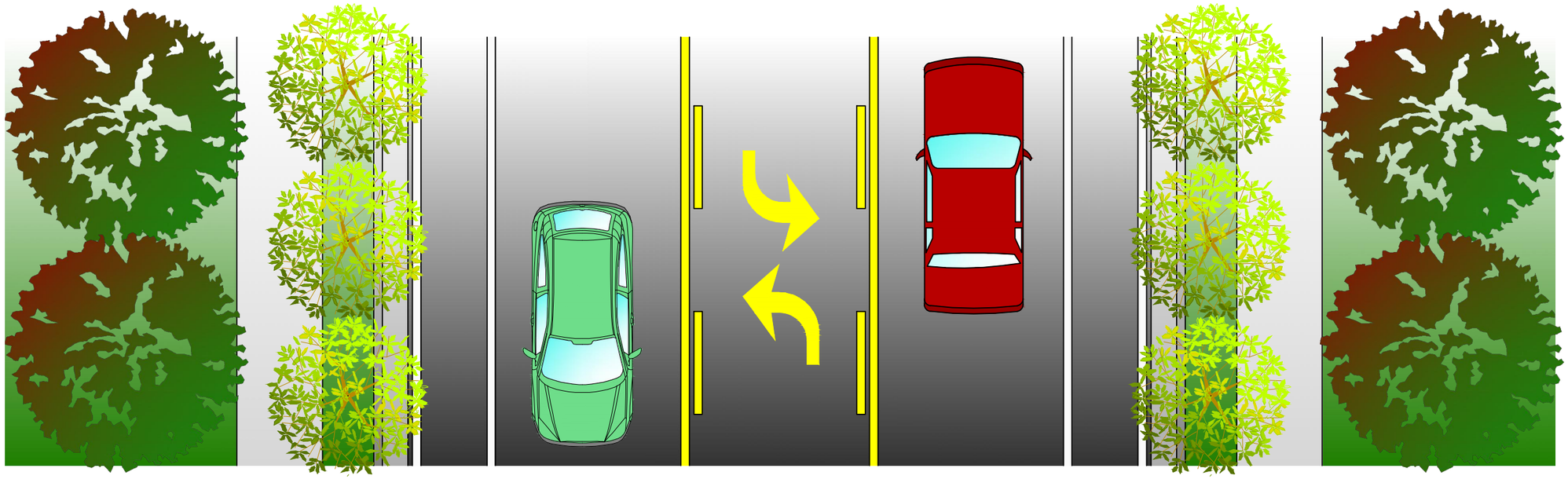


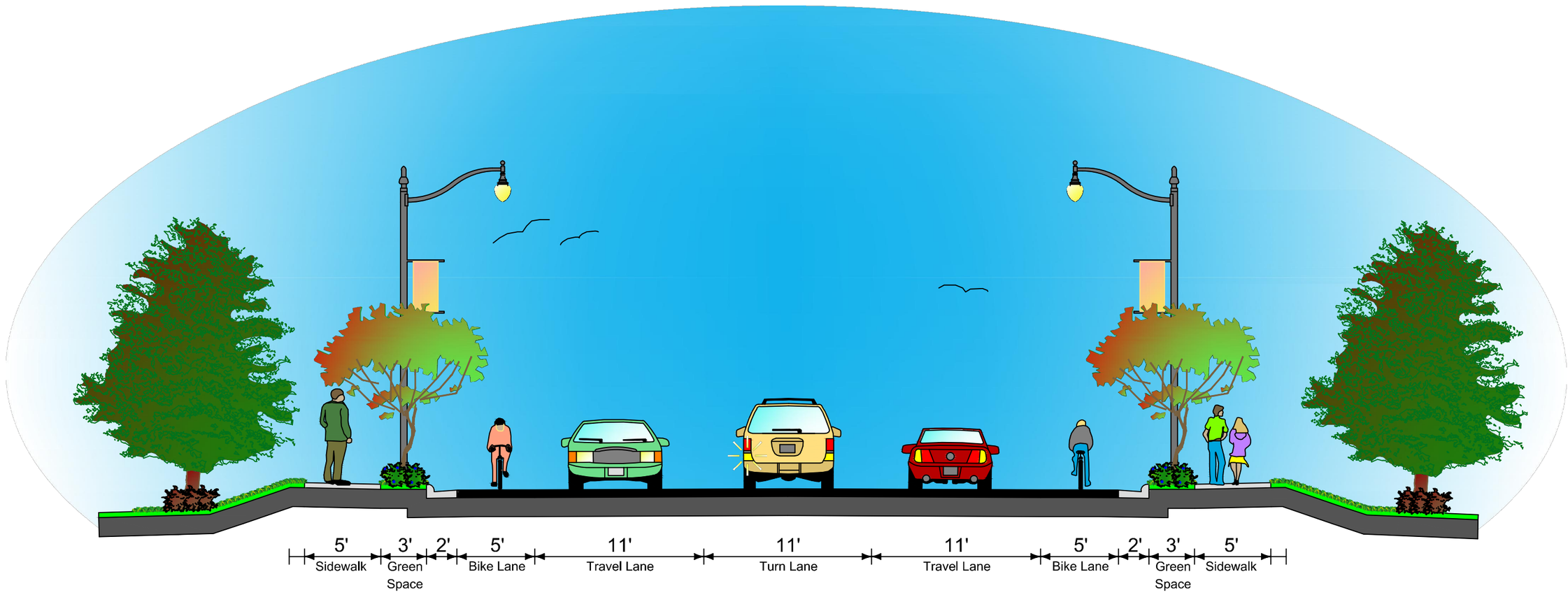
TWO-LANE ROAD WITH ON-STREET PARKING, SIDEWALKS AND BIKE LANES
72-Foot Minimum Right-of-Way



THREE-LANE ROAD WITH MULTI-USE PATH AND SIDEWALK

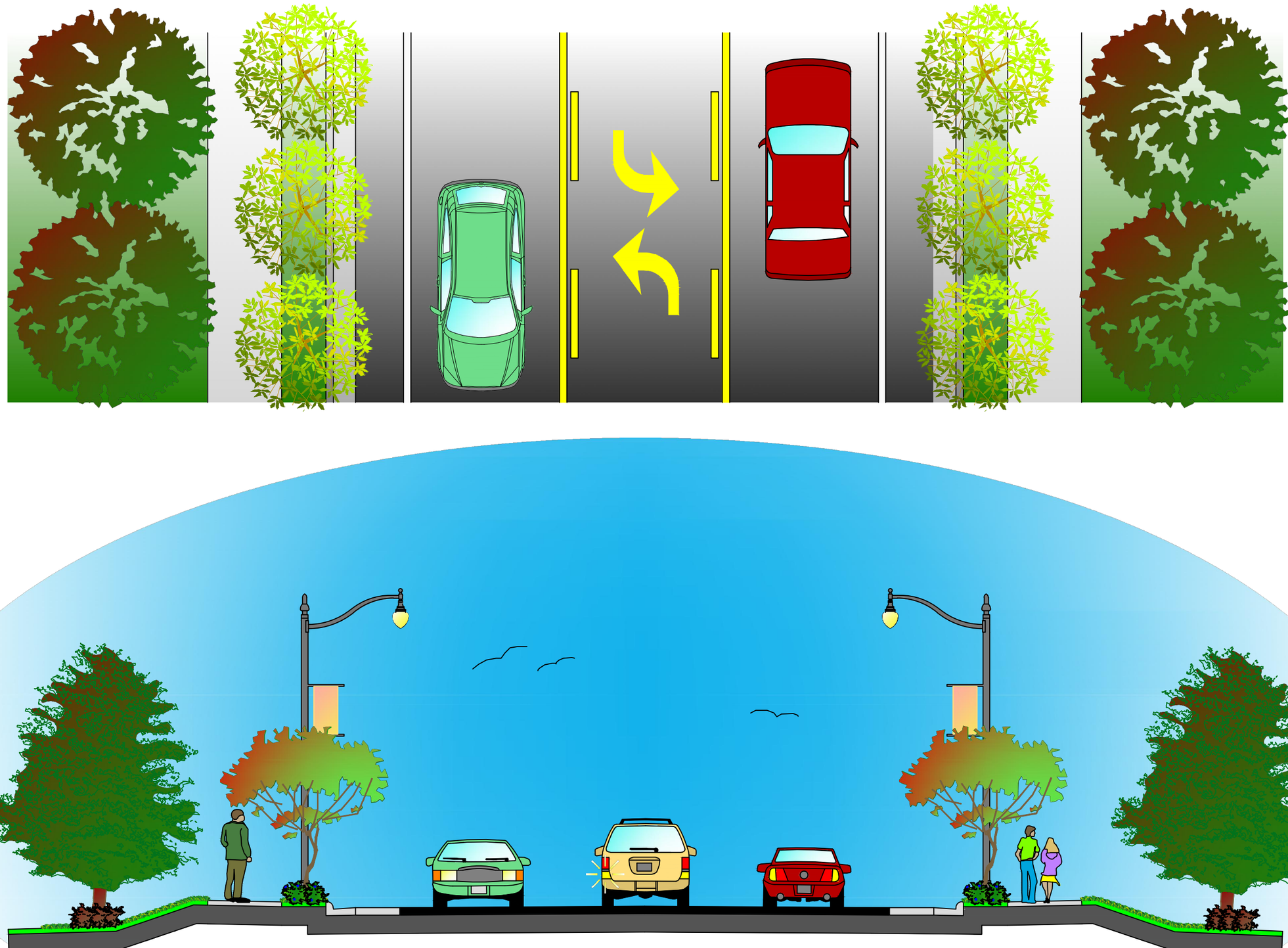
56-Foot Minimum Right-of-Way



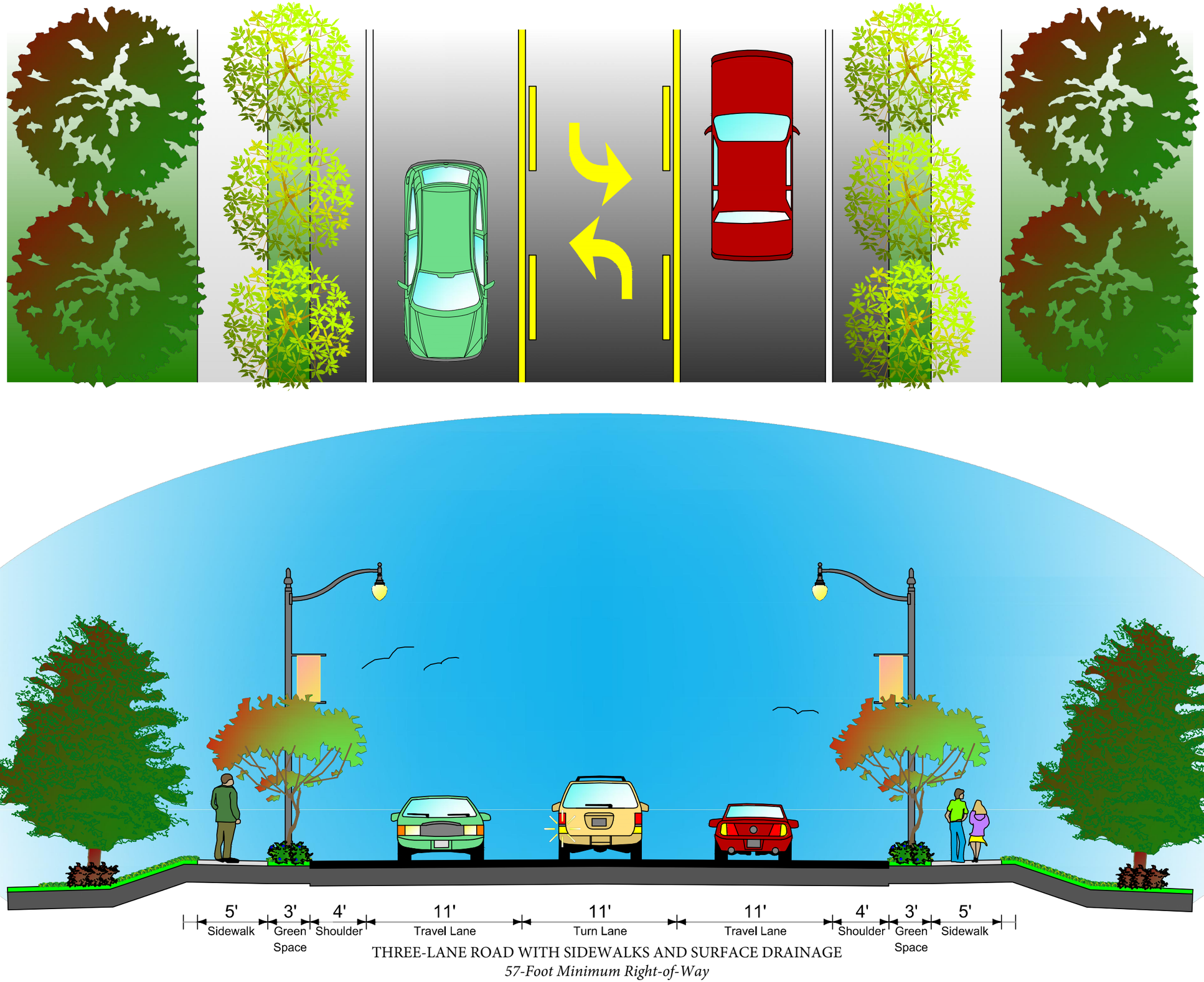


THREE-LANE ROAD WITH BIKE LANES AND SIDEWALKS

63-Foot Minimum Right-of-Way

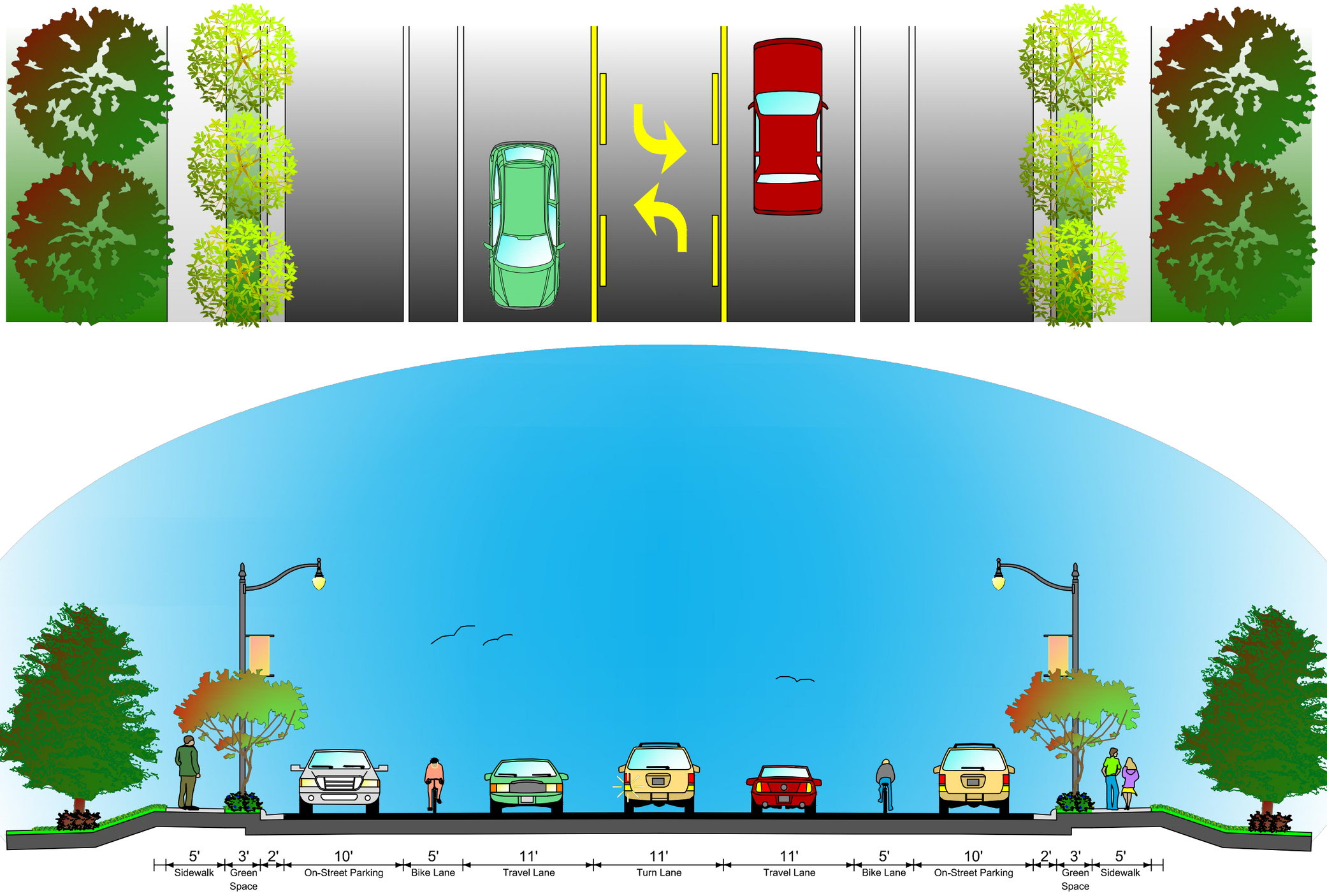


THREE-LANE ROAD WITH SIDEWALKS, CURB AND GUTTER
59-Foot Minimum Right-of-Way

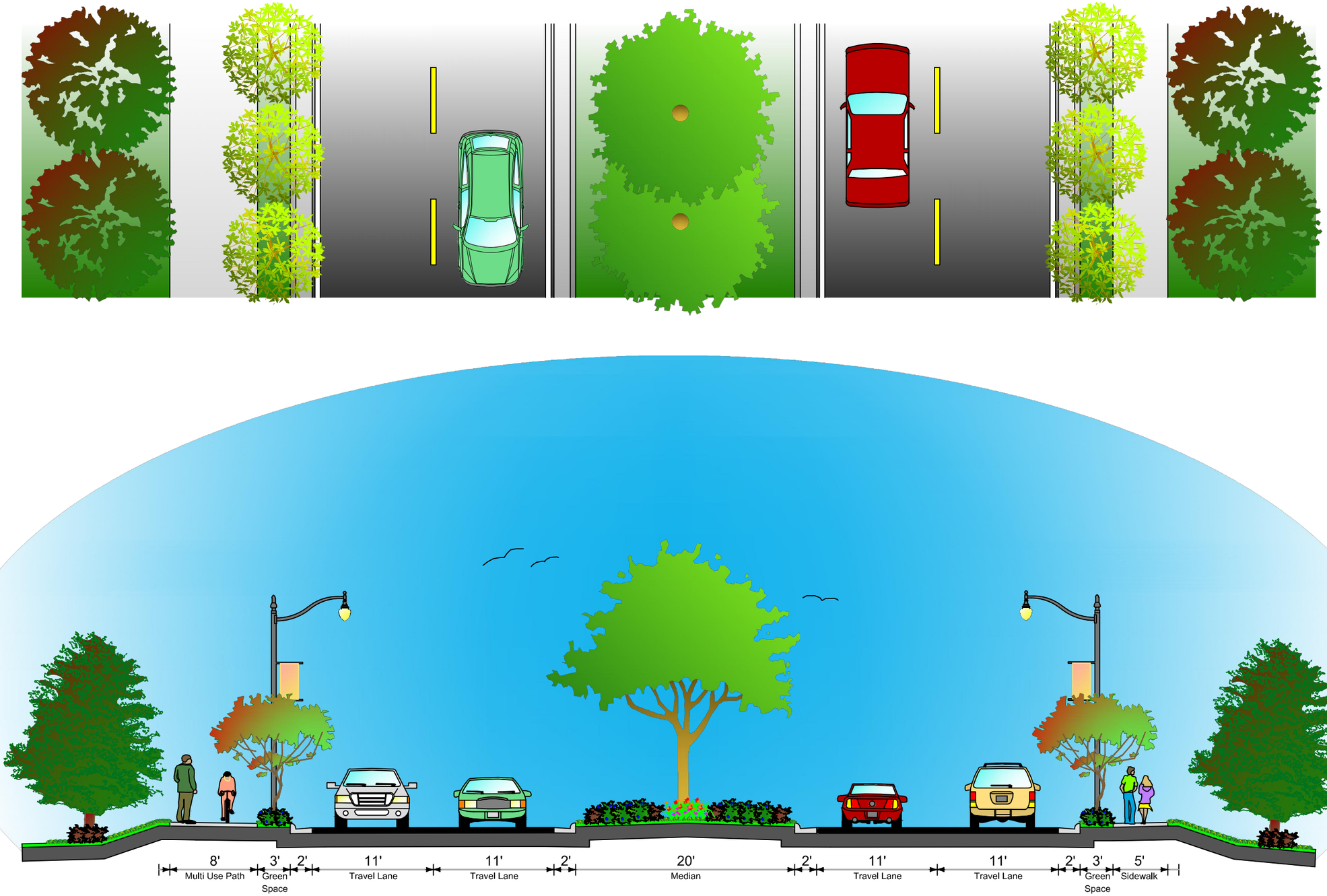


THREE-LANE ROAD WITH SIDEWALKS AND SURFACE DRAINAGE

57-Foot Minimum Right-of-Way

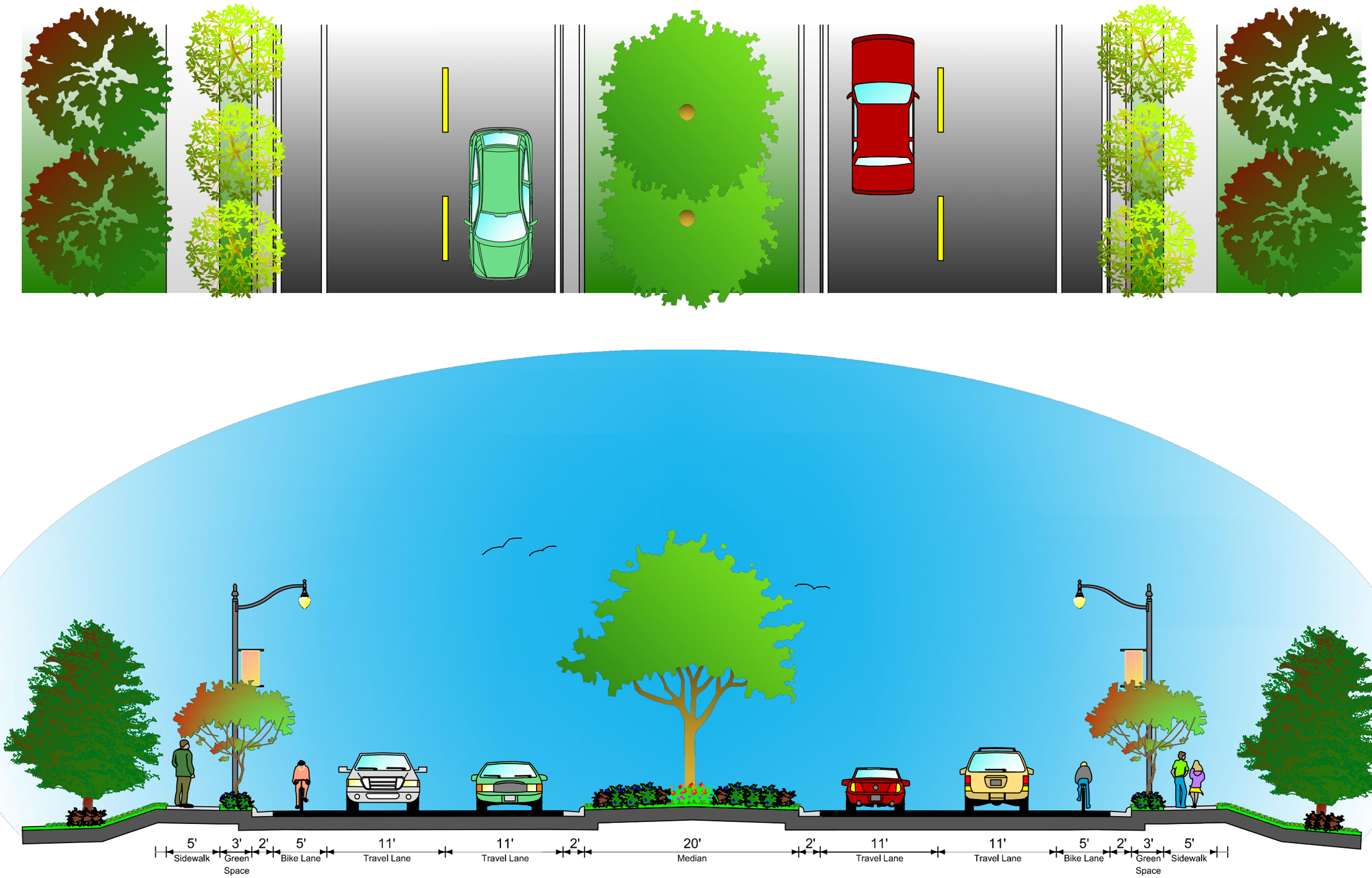


THREE-LANE ROAD WITH ON-STREET PARKING, SIDEWALKS AND BIKE LANES
83-Foot Minimum Right-of-Way



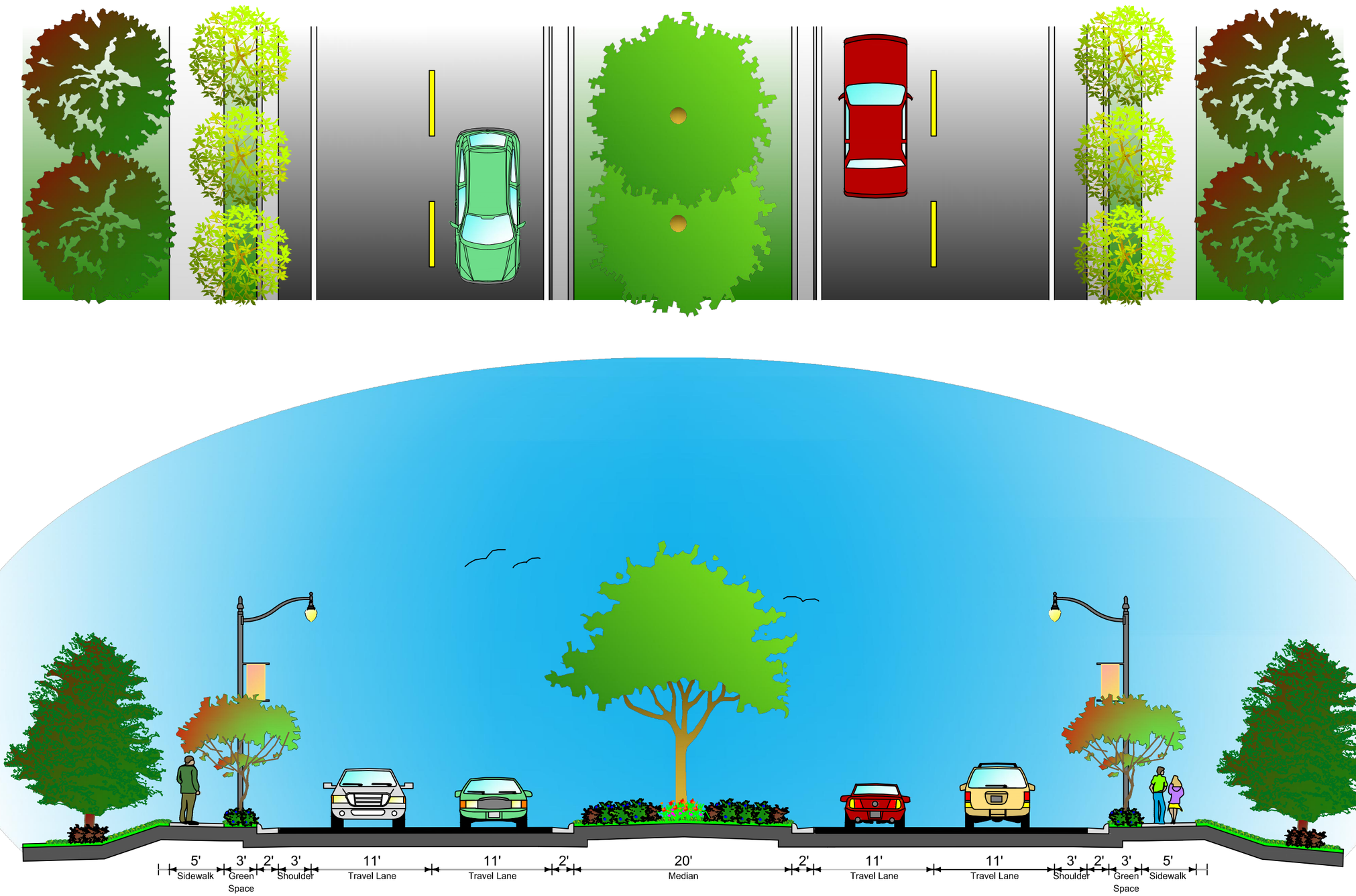
FOUR-LANE ROAD WITH MEDIAN, MULTI-USE PATH AND SIDEWALK

91-Foot Minimum Right-of-Way



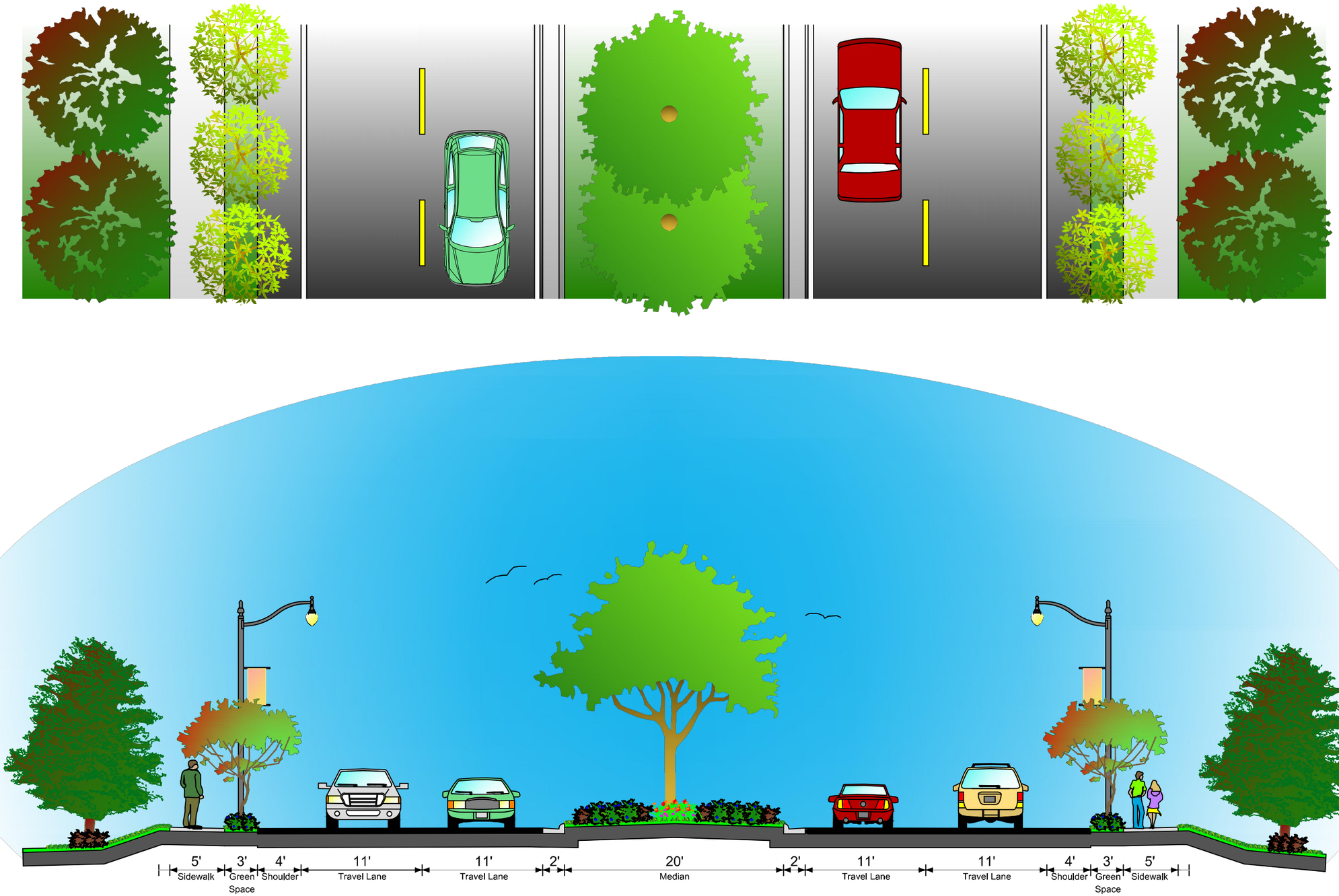
FOUR-LANE ROAD WITH MEDIAN, BIKE LANES AND SIDEWALKS

98-Foot Minimum Right-of-Way



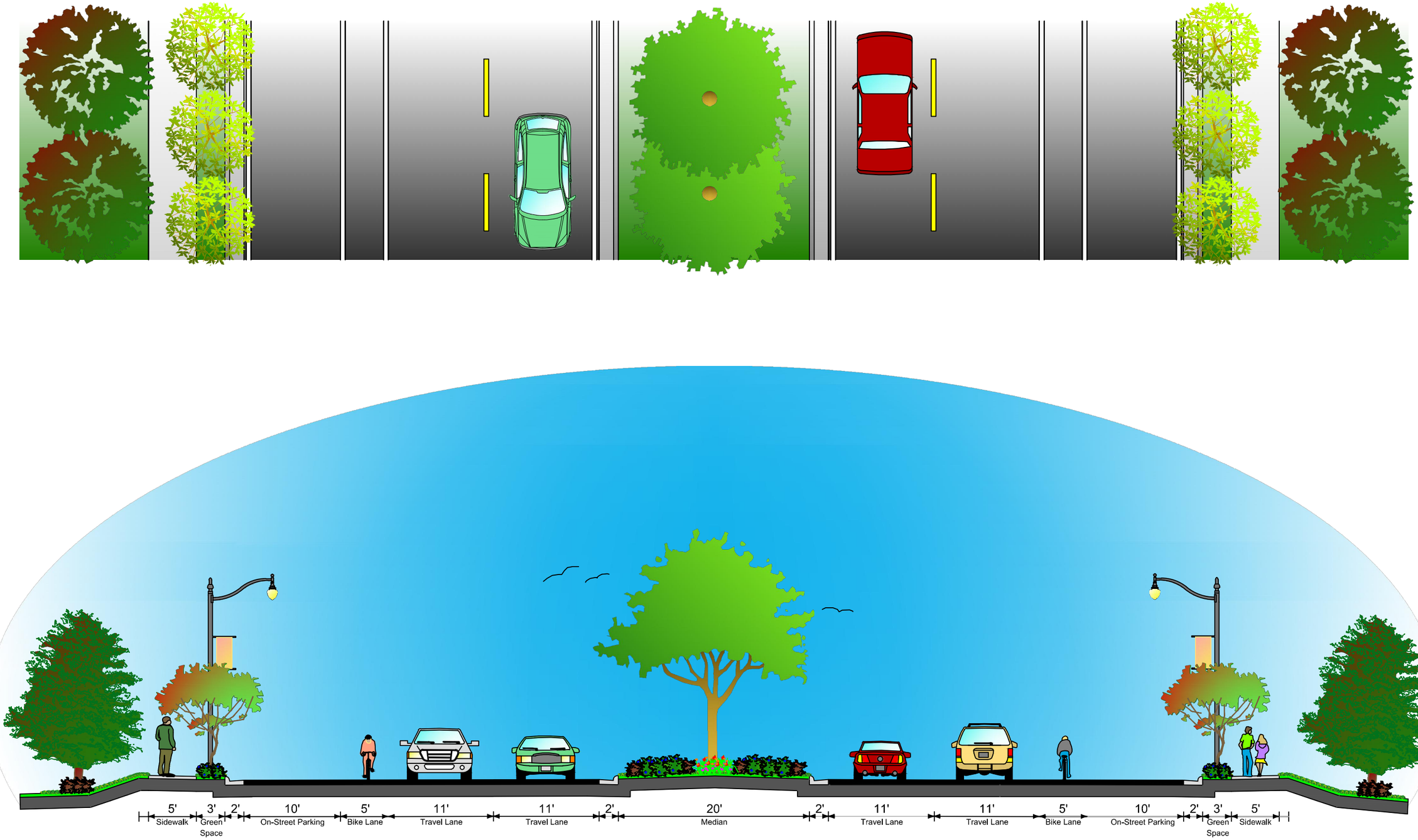
FOUR-LANE ROAD WITH MEDIAN AND SIDEWALKS

94-Foot Minimum Right-of-Way



FOUR-LANE ROAD WITH MEDIAN, SIDEWALKS AND SURFACE DRAINAGE

92-Foot Minimum Right-of-Way



FOUR-LANE ROAD WITH MEDIAN, ON-STREET PARKING, SIDEWALKS AND BIKE LANES

118-Foot Minimum Right-of-Way

Part of the Mississippi Unified Long-Range Transportation Infrastructure Plan (MULTIPLAN), sponsored by the Mississippi Department of Transportation

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