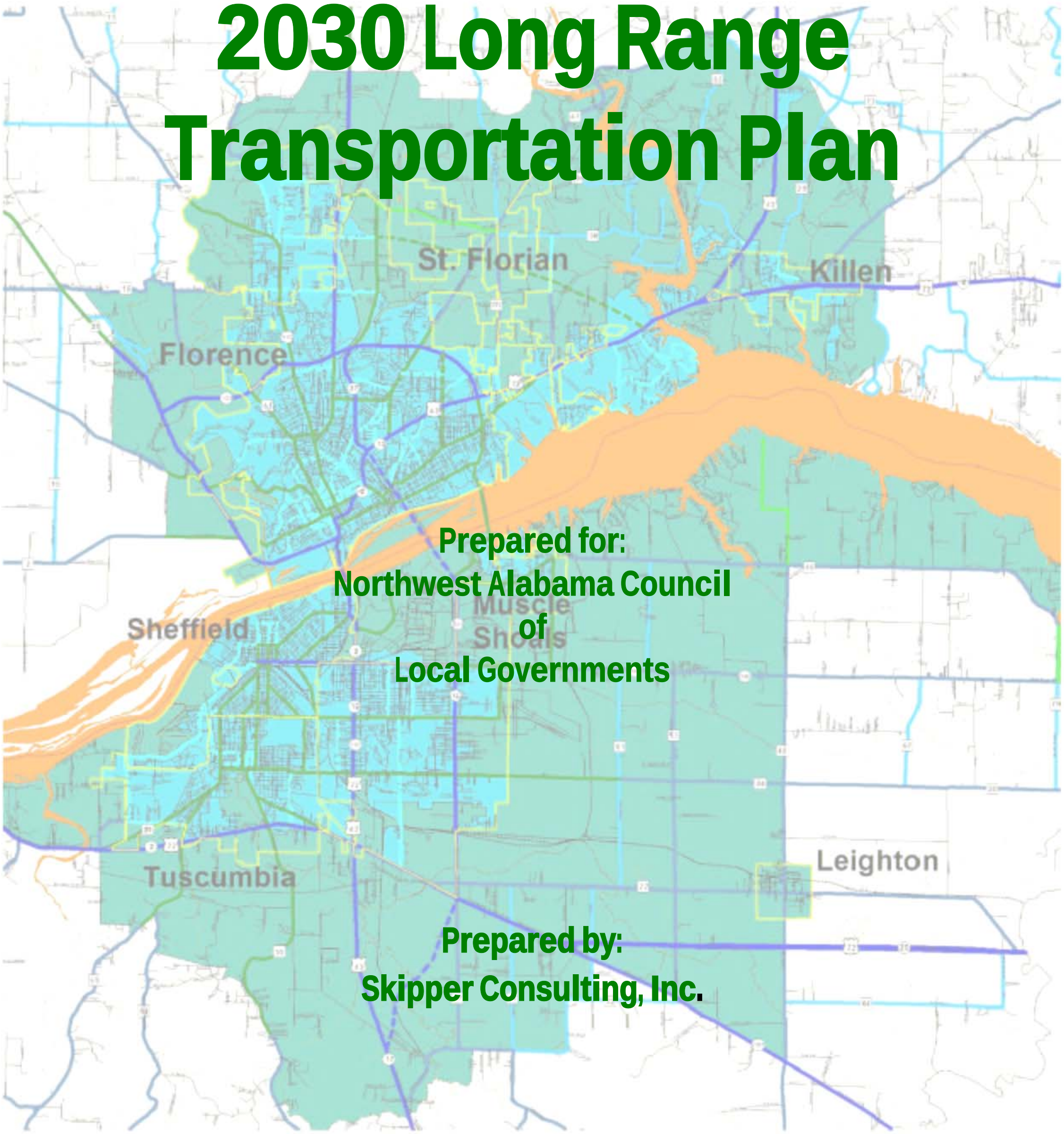
SHOALS AREA
2030 Long Range Transportation Plan



Prepared for:
Northwest Alabama Council of Local Governments

Prepared by:
Skipper Consulting, Inc.

December 2005

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INTRODUCTION

This report documents the year 2030 long-range transportation plan for the Shoals Area Transportation Study. The long-range transportation plan is a document required by the Federal Highway Administration and Federal Transit Administration in accordance with 23 CFR 450. The basis for this requirement arises from the passage of the Transportation Equity Act for the Twenty-first Century (TEA 21). This plan is a portion of the overall transportation planning function of the metropolitan planning process. The long-range transportation plan addresses a twenty-five year planning horizon, through the year 2030. However, this plan must be updated every five years. The long-range transportation plan addresses the multi-modal aspects of the transportation system of the Shoals study area. Movement of persons and goods are included in planning recommendations.

TEA-21 consolidates the previous sixteen planning factors into seven broad areas to be considered in the planning process. Projects and strategies that address these seven factors must now be considered. Below is a list of the seven factors and how they were considered in this plan update.

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

    Most projects that were selected for inclusion in the plan are anticipated to improve traffic flow and access; thus improving economic vitality, competitiveness, productivity and efficiency in the business arena.

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

    An objective of this plan update is to develop projects that will improve the safety and security of the traveling public by eliminating traffic congestion and transportation hazards from the network.

- Increase the accessibility and mobility options available to people and for freight;

  This plan update concentrates on increasing the accessibility and mobility options available to people and for freight by virtue of being an intermodal plan. The roadway projects increase accessibility and mobility by providing new links in the network and additional roadway capacity on some of the existing links. The different mode choices which are provided for in this plan offer options other than roadways to both people and freight.

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

  As each project was added to this plan the social and environmental impacts of the project were considered. The purpose of each project is to improve the efficiency of the transportation network. Efficient transportation networks 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;

  The interaction between modes of transportation was considered as each project was developed in this plan update. These goals and objectives were addressed as each project was selected for the plan.

- Promote efficient system management and operation;

  Because of the limited financial resources available to the urbanized area, any project that is selected for the transportation plan must promote systems efficiency.

- Emphasize the preservation of the existing transportation system;

  Each government involved in the MPO process realizes in order to have an efficient transportation system the current transportation infrastructure must be maintained. Therefore the participating governments make every effort to keep the existing transportation system open and functioning properly.

The process of preparing the long-range transportation plan included several opportunities for input of public comments and comments by local elected officials. The process included input by these groups early in the planning process, as well as input regarding the entire long-range transportation plan in its draft stage.

BACKGROUND

This project is an update of the current long-range transportation plan for the Shoals study area. The current long-range transportation plan was adopted by the MPO in May 2003. The base year of the current long-range transportation plan was 1998 and the horizon year was 2025. Responsibility for transportation planning for the MPO, including the long range transportation plan, rests with the staff of the Northwest Alabama Council of Local Governments (NACOLG).

Study Area Boundary

There are two boundaries that are defined in a transportation study area, the urban area boundary and the study area boundary. The urban area boundary is defined largely by the U. S. Census Bureau. The study area boundary is defined by the MPO in cooperation with the Alabama Department of Transportation. The study area is defined as the urban area boundary plus the area that is projected to become urbanized within the next twenty years. Included in the Shoals Area Transportation Study are the Cities of Florence, Sheffield, Tuscumbia and Muscle Shoals plus portions of Colbert and Lauderdale Counties as shown in Figure 1.

Traffic Analysis Zones

The study area is divided into individual cells called traffic analysis zones (TAZ). A traffic analysis zone is defined as a subdivision of a study area of homogeneous land use within a distinct border for the compilation of land use and traffic generation data. The TAZ system developed by the Shoals Area MPO was employed for this analysis. 178 internal zones and 20 external zones are included within the study area boundary. The TAZ structure is illustrated in Figure 2.

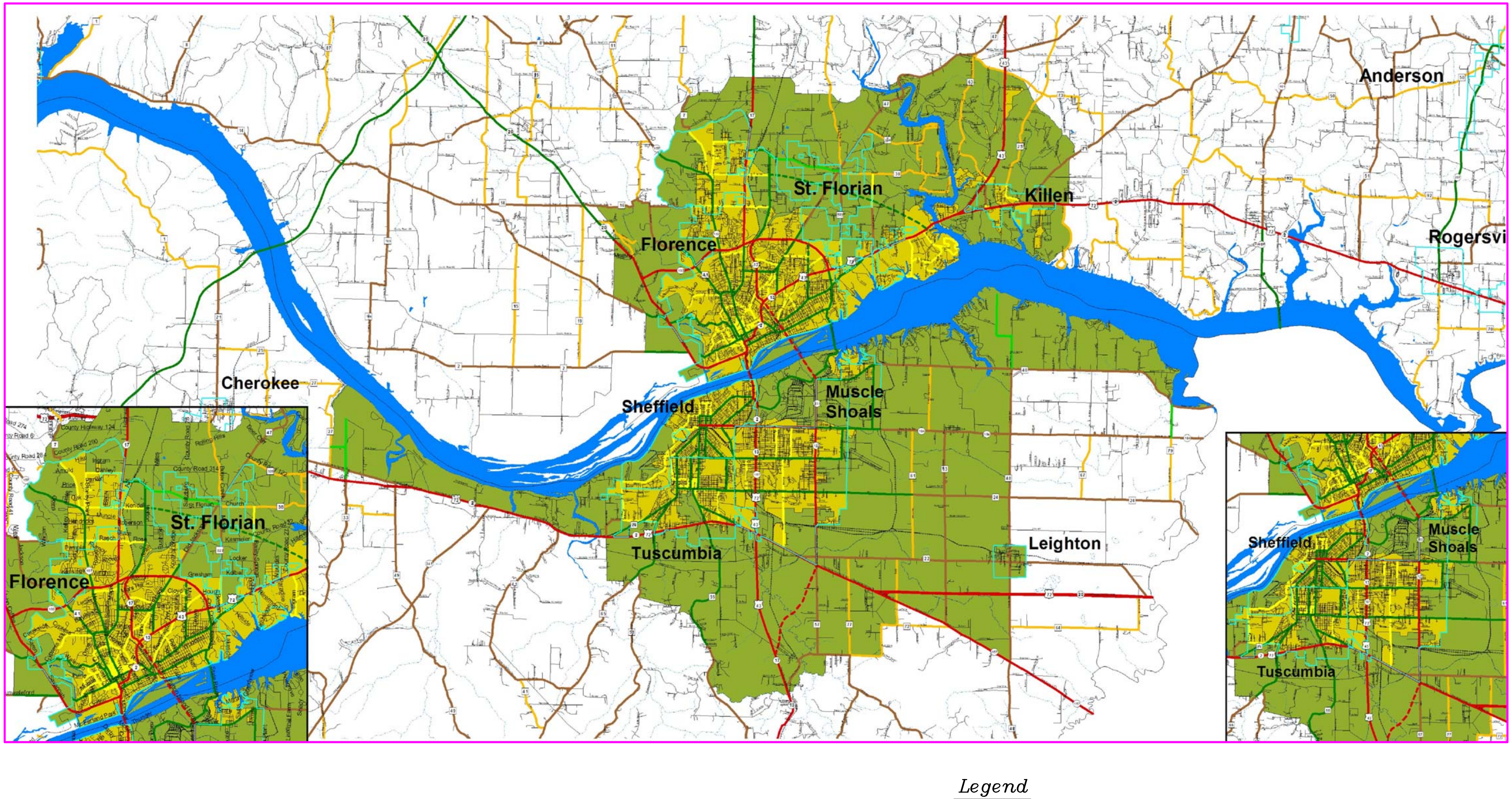

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FIGURE 1

STUDY AREA BOUNDARY

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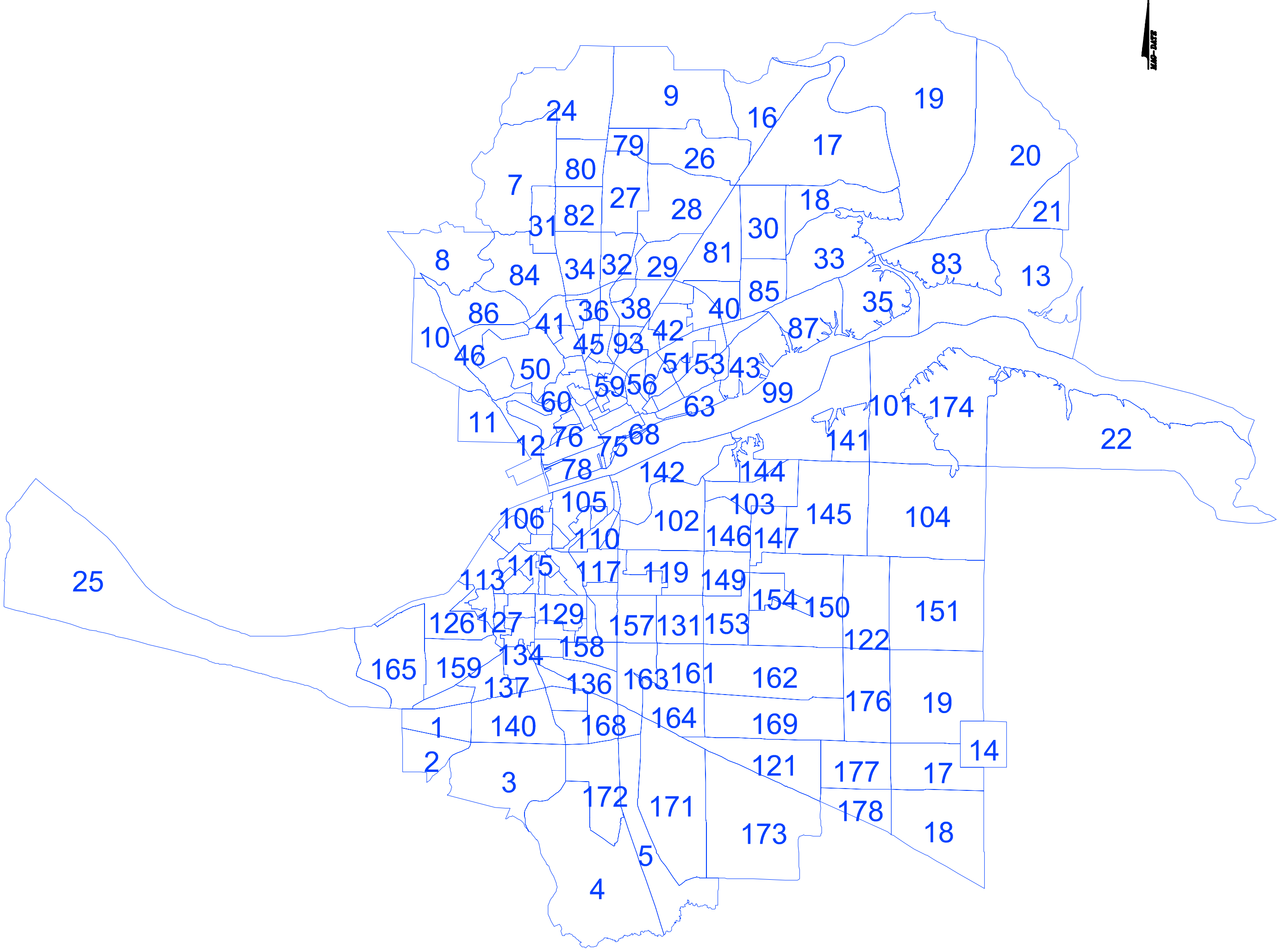

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FIGURE 2

TRAFFIC ANALYSIS ZONES

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METROPOLITAN PLANNING ORGANIZATION STRUCTURE

Transportation planning within the Shoals study area falls under the auspices of the Shoals Area MPO. The Shoals Area Transportation Study was created in 1974 upon execution of an agreement between the cities of Florence, Sheffield, Tuscumbia and Muscle Shoals, Colbert County, Lauderdale County, the Northwest Alabama Council of Local Governments, and the State of Alabama Highway Department (now the State of Alabama Department of Transportation). The MPO is made up of the Policy Committee, the Technical Advisory Committee and the Citizens Advisory Committee. The Policy Committee membership is outlined in the MPO bylaws. The Technical Advisory Committee and the Citizens Advisory Committee are appointed by the Policy Committee. Following is a list of the policy committee members:

- the mayor of the City of Florence
- the mayor of the City of Sheffield
- the mayor of the City of Tuscumbia
- the mayor of the City of Muscle Shoals
- a member of the Colbert County Commission
- a member of the Lauderdale County Commission
- the Executive Director of the Northwest Alabama Council of Local Governments
- the second division engineer of the Alabama Department of Transportation
- the transportation planning engineer of the Alabama Department of Transportation (non-voting)
- the division administrator of the Federal Highway Administration (non-voting)

This committee is in charge of all decision-making responsibilities relative to the transportation planning process in the Shoals Study Area.

The Metropolitan Planning Organization Policy Committee receives input and advice from the Technical Advisory Committee (TAC). This committee consists of members who work in areas related to transportation planning and, who, in many instances work directly in some planning capacity such as city planning and engineering. This committee is vital to the success of the overall transportation planning process as these professionals are the individuals that must integrate the end product of their collective efforts into their own work responsibilities on a daily basis. This is also the first line of the decision-making responsibility in the planning process.

EXISTING TRANSPORTATION SYSTEM

Roadway Classifications and Descriptions

All transportation networks have some form of classification to categorize the hierarchy of movement in the system. The roadway network developed for the Shoals study area was based on the functional classification system prepared by the Alabama Department of Transportation with assistance from the MPO. The components of this network are principal arterials, minor arterials, and collectors. The distribution of mileage in these classifications was as follows:

Principal Arterials	134.32 miles
Minor Arterials	158.12 miles
Collector Roads	337.52 miles
TOTAL	629.96 miles

Each type of roadway provides separate and distinct traffic service functions and is best suited for accommodating particular demands. Their designs also vary in accordance with the characteristics of traffic to be served by the roadway. The following is a brief description of each roadway type.

- *Arterials* are important components of the total transportation system. They serve as feeders to the interstate system as well as major travelways between land use concentrations within and beyond the study area. Arterials are typically roadways with relatively high traffic volumes and traffic signals at major intersections. The primary function of arterials is moving traffic. Arterials provide a means for local travel and land access.

- *Collectors* provide both land service and traffic movement functions. Collectors serve as feeders between arterials as well as provide access to the local streets. Collectors are typically lower volume roadways that accommodate short distance trips.

Existing Traffic Volumes

Traffic volume as indicated by traffic counts at various locations on the roadway network reflect current travel patterns and how well the network is serving the travel demand. The traffic counts are collected throughout the study area annually by ALDOT. Existing average annual daily traffic counts which were conducted in 2000 are shown in Figure 3.

Roadway Capacity

Roadway networks are evaluated by comparing the traffic volumes along each facility to the facility's capacity. Roadway capacity is defined as the ability of the facility to accommodate traffic. Service flow volume is the level of traffic flow (vehicles per day) that can be accommodated at various levels of service. The current level of service scale, as developed by the Transportation Research Board in the *Highway Capacity Manual, Seventh Edition*, ranges from a level of service "A" to a level of service "F". Abbreviated definitions of each level of service are as follows:

Level of Service A	Free traffic flow
Level of Service B	Stable traffic flow
Level of Service C	Stable traffic flow
Level of Service D	High-density stable traffic flow
Level of Service E	Capacity level traffic flow
Level of Service F	Forced or breakdown traffic flow

As a general rule, desired operation of a roadway should be no lower than level of service "C". Level of service "D" may be acceptable under certain circumstances. A level of service "E" or "F" is considered unacceptable.

The methodology used to evaluate roadway segment capacity in this project was a tabular analysis relating roadway classification, number of lanes, levels of service, and daily service volumes. The estimated 24-hour capacities of the facilities included in the area network are shown in Table 1. Figure 4 summarizes the roadway segments that are deficient.

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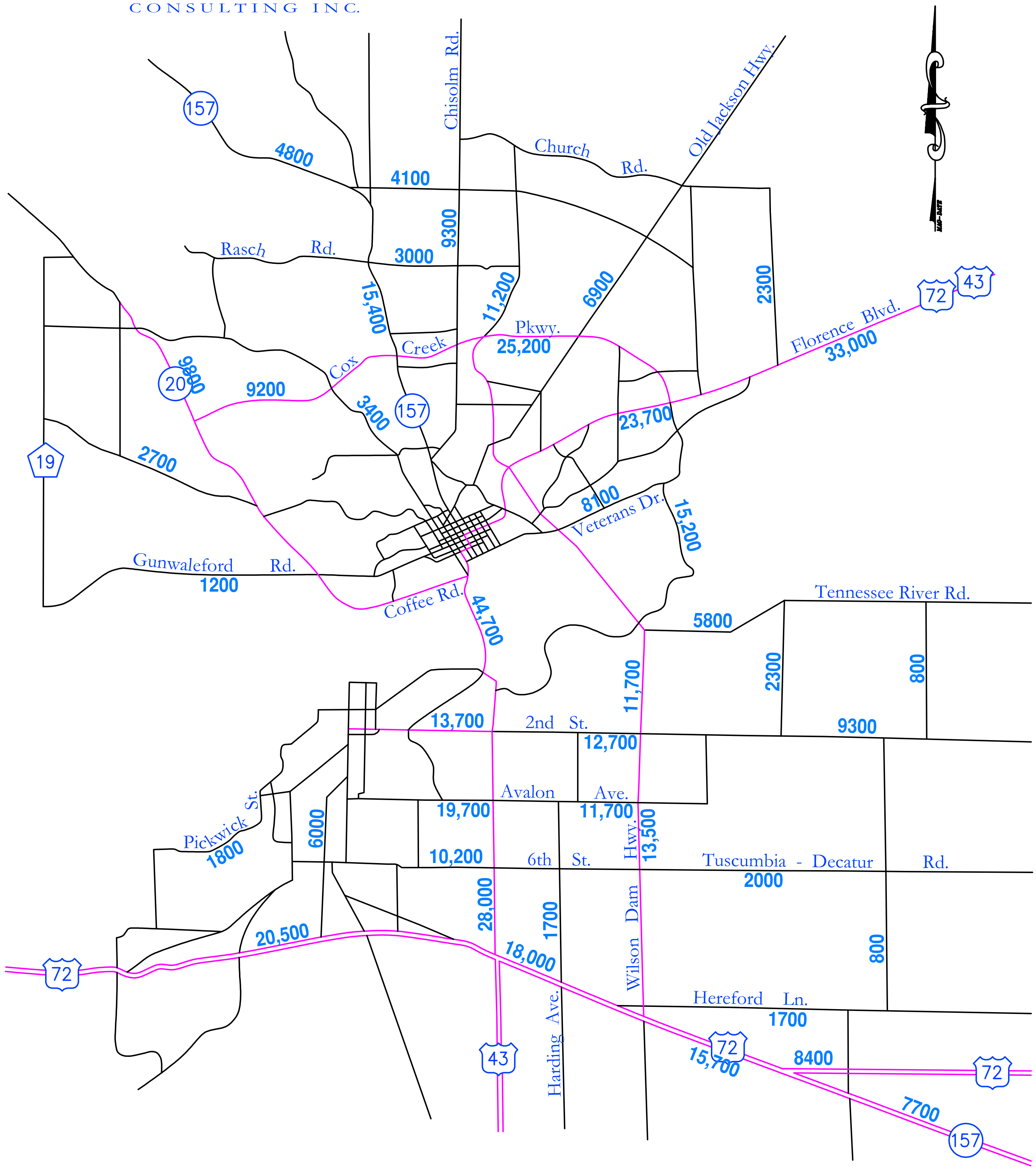

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72 U.S. HIGHWAY

157 STATE ROUTE

19 COUNTY ROAD

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FIGURE 3

EXISTING TRAFFIC VOLUMES

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TABLE 1
ALDOT APPROVED CAPACITIES

Link Type	Functional Classification	Number of Lanes	Daily Capacity
11	Freeways	4	68,000
12		6	102,000
13		8	136,000
14		10	170,000
21	Expressways	4	50,000
22		6	75,000
23		8	100,000
31	Divided Principal Arterials	2	22,000
32		4	33,9000
33		6	50,000
34		8	73,6000
35	Undivided Principal Arterials	2	17,800
36		4	31,000
37		6	45,800
38		8	63,100
41	Divided Minor Arterials	2	21,000
42		4	31,900
43		6	45,600
44		8	
45	Undivided Minor Arterials	2	17,800
46		4	27,400
47		6	
48		8	
51	Divided Collectors	2	20,800
52		4	28,500
53		6	42,000
54	Undivided Collectors	2	16,600
55		4	26,200
56		6	38,700
61	One-Way Principal Arterials	2	17,100
62		3	25,600
63		4	
71	One-Way Minor Arterials	2	14,100
72		3	19,500
73		4	26,000
81	One-Way Collectors	2	11,300
82		3	15,600
83		4	20,800
91	One-Way Ramps	1	9,000
92		2	18,000
93		3	27,000
98	Time Barriers		
99	Centroid Connectors	2	14,000

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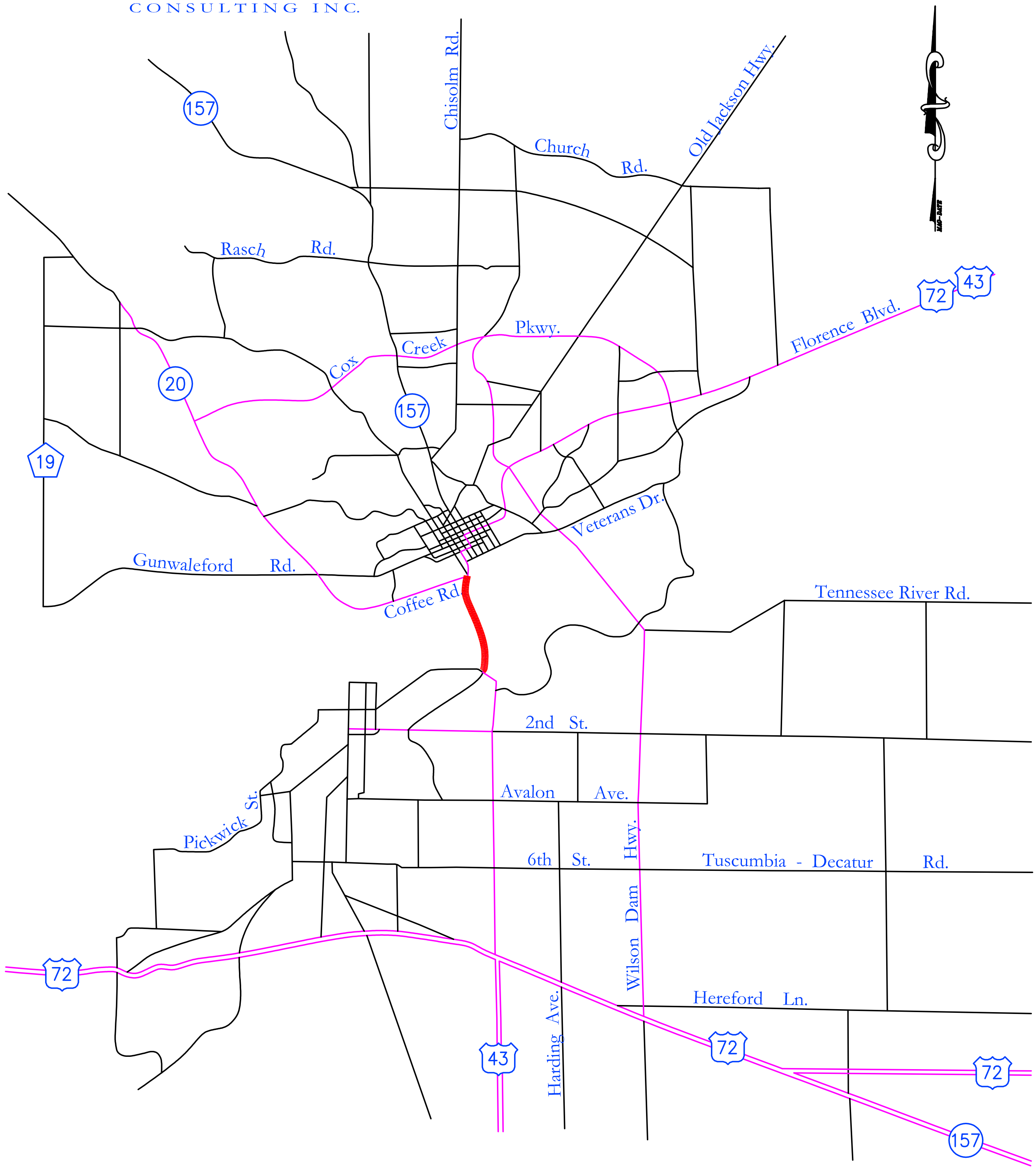

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- 72 U.S. HIGHWAY
- 157 STATE ROUTE
- 19 COUNTY ROAD

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FIGURE 4

EXISTING DEFICIENT LINKS

SHOALS AREA LRTP

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Public Transit

The NACOLG Urbanized Public Transit Program operates in the Florence Urbanized area, covering the cities of Florence, Muscle Shoals, Tuscumbia and Sheffield. NACOLG Transit has a fleet of 33 vehicles, consisting of mini-buses, commuter and modified vans. Management of the Transit Program is provided by the Transportation Department at the NACOLG offices in Muscle Shoals, Alabama.

The Demand Response public transit operates Monday through Friday. Routes are scheduled from 8:30 a.m. until 4:30 p.m. To complement the demand response routes, a shopping shuttle in the City of Florence operates four days per week serving the low-income residential communities and all of the major shopping centers in the respective communities. The shuttle route is subsidized by the City and the Housing Authority. The City of Florence subsidizes evening transportation three times per month for handicapped citizens who attend support groups. Two public routes operate from Muscle Shoals to Decatur and Huntsville for workers that reside in Colbert and Lauderdale Counties; work routes operate five to seven days a week and run according to the riders' work schedules.

Transit services for 14 routes are coordinated with the social service agencies throughout the urbanized area. These routes operate twice a day, five days a week. Contracted routes are scheduled according to the demand of the agencies and operate as early as 6:00 a.m. and as late as 11:00 p.m. All contract routes are open to the general public and rides are scheduled on demand.

Special transportation services are scheduled for local cities, tourism boards, conferences, local colleges and committees that work with festivals, games and other events in the service area.

Pedestrian and Bicycle Facilities

Sidewalks are available in various locations throughout the study area, with the highest concentration in the downtown areas. There are several bicycle and pedestrian facilities in the study area. The City of Florence has developed a series of pedestrian and bicycle trails along the banks of the Tennessee River. The most extensive system is located within the Tennessee Valley Authority

Reservation in Muscle Shoals. In the central business districts of Florence, Sheffield and Tuscumbia most signalized intersections are equipped with pedestrian signals and crosswalks to assist in the safe movement of pedestrians.

Intermodal System

The Intermodal System consists of sites providing linkages between one or more modes of transportation. In a true intermodal system, the performance or use of one mode will affect another. The intermodal system should provide an efficient, safe, and convenient process to move goods and people.

There is an extensive intermodal system in the Shoals area. Included in this system are two railways, Norfolk-Southern Railroad and the Tennessee Southern Rail Company. Norfolk-Southern serves Colbert County with connections to markets to the east, west and south of the Shoals Area. The Tennessee Southern Rail Company is a shortline railroad that serves Lauderdale County with connections into middle Tennessee. The rail service in the Shoals Area is freight based with no passenger rail service.

The Tennessee River provides unique opportunities for commercial and industrial transportation in the Shoals Area. The navigable waterway has created the opportunity for thousands of industrial and service jobs at businesses and industries that utilize the river for transportation. Port facilities are available on both sides of the waterway for use by commercial and industrial interests. Public and private docks are located along the Tennessee River providing and intermodal transportation connection. The Muscle Shoals Regional Airport is located north of U.S. Highway 72 Alternate in the southeastern corner of the urban area. Commercial passenger air service is provided by Northwest Airlink with daily connections to Memphis, Tennessee. The airport has one runway which is 6,693 feet long and 150 feet wide and a second runway which is 4,000 feet long and 100 feet wide. The longest runway has ILS approach capabilities which permit operations with only a 200 foot ceiling and one-half mile visibility. The airport has 14 “T” hangers, 12 aerial ports and tie-downs for over 75 general aviation aircraft.

SOCIOECONOMIC DATA

The interrelationship between land use and a transportation system is used to determine the demand for travel on a roadway network. Each land use (residential, retail, non- retail, etc.) generates and attracts traffic dependent on the nature of the development and the amount of land developed. In order to identify this demand for travel, inventories of existing land uses must be accomplished. This information is used in conjunction with the physical location of the adjacent land uses, constraints of the roadway network and other related factors to develop the interrelationship between land use and the transportation system.

Base Year (2000) Socioeconomic Data

Each traffic analysis zone within the study area was inventoried to determine the existing primary land use within its boundary. Factors used to characterize land use within each TAZ are listed below:

- Households
- Mean Income of Households
- Retail Employment
- Non-Retail Employment
- School Enrollment

There were 101,093 people and 41,774 households within the study area in 2000. The average mean income for these households was $38,305. There were 7,750 retail jobs and 33,162 non-retail jobs reported within the study area in 2000. There were 23,175 persons enrolled in school within the study area in 2000. It should be noted that the household and mean income data is collected at the location of the home. The employment data is collected at the work site, and the school enrollment is collected at the school site. The 2000 socioeconomic data by TAZ is shown in Appendix A.

Socioeconomic Data Forecast

The generation of future traffic is based on a forecast of the socioeconomic data used to develop the base year model. The target year for this plan update calls for a long-range forecast to 2030. The Northwest Alabama Council of Local Governments prepared the data forecast using historic trends in development patterns and census figures. Other considerations included the density of development in each TAZ and the suitability of vacant land for development in each TAZ. The socioeconomic forecasts were projected to the planning district level and then refined to the TAZ level. The base year and forecast year study area totals for each data variables are shown in the following:

	2000	2030	% Change
Population	101,093	113,940	12.7%
Households	41,774	47,674	14.1%
Mean Income	$38,305	$38,305	0.0%
Retail Employment	7,750	9,863	27.3%
Non-retail Employment	33,162	39,228	18.3%
School Enrollment	23,175	28,730	24.0%

It should be noted that the mean income was assumed to remain constant over the 25-year period. It is fully recognized that there will be a significant increase in income in most, if not all, of the traffic analysis zones through the year 2030. However, most of this increase in income will be the result of inflation and not increased buying power. It can be assumed that income growth due to inflation does not yield a corresponding change in the number of trips generated by a household. The trip generation rates used in this model are based on 2000 income data. Therefore, in order to discount the affects of inflation and eliminate the need for adjustments to the trip generation rates, it was decided to hold mean income by traffic analysis zone constant. The 2030 socioeconomic data by TAZ is shown in Appendix B.

TRANSPORTATION MODELING PROCESS

Travel demand models are developed to predict future traffic on the street and highway system. The models are initially developed using estimates of existing socioeconomic data to duplicate travel for the base year, which, for this study was 2000. How well the model duplicates for the base year is taken as an indication of how well it will predict future travel. If the model cannot produce traffic volumes similar to those observed on existing streets and highways, then the model is reevaluated and adjustments are made. This adjustment or calibration process continues until the model is adequately simulating base year traffic conditions. The process of building and modifying the model to simulate base year travel is called calibration. After the model is calibrated, forecasts for the future year socioeconomic data are used as input into the model to predict future travel demand.

Roadway travel demand in the study area was analyzed using a standard travel demand modeling process. The standard modeling process is defined by a four-step analysis procedure:

Step 1	Trip Generation
Step 2	Trip Distribution
Step 3	Mode Split
Step 4	Assignment

As the standard transportation demand modeling process in the State of Alabama deals only with private transportation, (i.e., not public transit), Step #3, mode split, is ignored.

The Alabama Department of Transportation has adopted a transportation demand modeling package known as TRANPLAN, developed by the Urban Analysis Group, for use in modeling in the State of Alabama. TRANPLAN performs the various steps required in the modeling process. The following sections address the modeling process in more detail.

Roadway Network

The network file is an abstract, computerized representation of the actual roadway network. The network file is created by transferring a roadway map to a form that can be processed by the computer program. The roadway network includes all roadways that are classified as a collector or higher grade. At each intersection node numbers are assigned. These node numbers are used to define individual links in the roadway network. The length, carrying capacity, and average speed of each link in the network is coded as part of the roadway network description. TAZ's are connected to the roadway network by imaginary lines through which the trips produced in or attracted to each TAZ may gain access to the roadway system. This entire abstract description of the actual roadway network is coded, entered into the computer, and becomes the network file for the study area.

Trip Generation

The trip generation program translates estimates of the socioeconomic data into numbers of trips. Given estimates of the socioeconomic data for a TAZ, the trip generation program predicts the number of trips that will be produced by that TAZ and the number of trips that will be attracted to that TAZ from all other TAZ's in the study area.

To perform trip generation, the relationships between observed travel and the socioeconomic data are defined through the use of mathematical equations and ratios. To determine the total number of trips that a TAZ may produce or attract, the number of households or employees within that TAZ are multiplied by the appropriate trip generation rate. Using this process productions and attractions are produced for each TAZ.

The Alabama Department of Transportation has developed a stand-alone program to be used to calculate productions and attractions on a per-traffic analysis zone basis. The purpose of the program is to take seven data files prepared by the user to calculate productions and attractions by zone for each of six trip purposes. The seven data files which must be supplied by the user are:

1. automobile ownership by income range
2. trip generation rate by household by automobile ownership by income range
3. trip purpose percentages

4. trip attraction rates
5. socioeconomic data set
6. percent external-external trips to total trips for five classifications of roadways
7. external zone numbers, counts, and road types

The trip generation program produces production and attraction data files for six trip purposes. These six trip purposes are:

Trip Purpose 1	Home Base Work (HBW)
Trip Purpose 2	Home Base Other (HBO)
Trip Purpose 3	Non-Home-Based (NHB)
Trip Purpose 4	Truck-Taxi (T-T)
Trip Purpose 5	Internal-External (I-X)
Trip Purpose 6	External-External (X-X)

The Alabama DOT trip generation program calculates productions and attractions using the socioeconomic data set and the data files containing the automobile ownership and trip rate information. Calculation of productions is a three-step process. First, the number of households in the zone are subdivided into four automobile ownership groups (0, 1, 2, 3+) according to the percents included in the automobile ownership file. The income of the zone is used to choose the line of the automobile ownership file to use. Second, the number of households in the zone, previously divided into automobile ownership categories, are multiplied by trip rates to generate productions. Once again, the income of the zone is used to select the line of the trip generation file to be used in the calculation. Third, the productions are divided into the six trip purposes according to the data in the trip purpose percentage file.

Trip attractions are calculated in a one-step process. The trip attraction file contains factors by which to multiply data from the socioeconomic data file to produce trip attractions for the various trip purposes.

The trip generation program allows for the input of external zone counts, roadway types, and percent external-external trips to produce internal-external and external-external production and attraction files.

The trip generation program requires six income ranges. The income ranges selected for use in the State of Alabama are shown below.

$0 - $9,999
$10,000 - $19,999
$20,000 - $29,999
$30,000 - $39,999
$40,000 - $49,999
$50,000 +

The automobile ownership curve is a four-by-six matrix. The columns represent the four automobile ownership categories (0, 1, 2, 3+). The rows represent the six income ranges. The data in each cell of the matrix represents the percent of households in the income range which own that number of automobiles. Each row of the matrix sums to 100%. Table 2 Matrix 1 shows the automobile ownership curve for the Shoals study area.

The trip generation curve is also a four-by-six matrix. The four columns are the automobile ownership categories and the six rows are the income ranges. The data in each cell of the matrix represents the trips per household in the income range which own that number of automobiles. Table 2 Matrix 2 shows the trip generation rate curve for the Shoals study area.

The trip purpose percent file is a five-item file that contains the percent of total trips that are: home base work, home base other, non-home base, truck and taxi, and internal-external. The first three trip purposes must add to 100%. The trip purpose percents for the Shoals study area are shown below.

TABLE 2
TRIP PRODUCTION CROSS-CLASSIFICATION MATRICES

Matrix #1 - Automobile Ownership Curve

Income Range	Automobile Ownership			
	0 Autos	1 Auto	2 Autos	3+ Autos
$0 - $9,999	34.3%	47.2%	13.7%	4.9%
$10,000 - $19,999	8.2%	51.5%	31.2%	9.1%
$20,000 - $29,999	3.1%	32.1%	46.9%	17.8%
$30,000 - $39,999	1.1%	19.9%	52.1%	26.9%
$40,000 - $49,999	0.5%	11.9%	51.2%	36.5%
$50,000 +	0.0%	4.2%	40.1%	55.7%

Matrix #2 - Trip per Household Curve

Income Range	Automobile Ownership			
	0 Autos	1 Auto	2 Autos	3+ Autos
$0 - $9,999	0.304	2.583	4.179	4.874
$10,000 - $19,999	0.646	4.103	5.508	6.201
$20,000 - $29,999	1.192	5.533	6.384	7.108
$30,000 - $39,999	2.381	10.319	11.112	12.483
$40,000 - $49,999	1.242	8.298	9.088	9.991
$50,000 +	0.593	8.693	9.766	10.330

Home Base Work (HBW)	22%
Home Base Other (HBO)	53%
Non-Home Base (NHB)	25%
Truck-Taxi (TT)	15.4%
Internal-External	0%

The trip attraction file is an eleven-item file that contains factors to multiply against the socioeconomic data file to produce trip attractions. The eleven attraction factors and associated weights are shown below.

Home Base Work per Employee	1.230
Home Base Other per Household	0.700
Home Base Other per Student	0.580
Home Base Other per Retail Employee	5.540
Home Base Other per Non-Retail Employee	1.240
Non-Home Base per Household	0.350
Non-Home Base per Retail Employee	3.160
Non-Home Base per Non-Retail Employee	0.620
Truck-Taxi per Household	0.210
Truck-Taxi per Retail Employee	1.940
Truck-Taxi per Non-Retail Employee	0.380

Internal-external attractions at each internal zone are calculated by a ratio of the total employment in each internal zone to the total internal-external productions at the external zones.

A methodology separate from the Alabama Department of Transportation trip generation program was used to determine internal-external productions and external-external productions and attractions for each external zone.

Total base year productions and attractions for each of the six trip purposes are shown below.

Home Base Work	Productions	57,373
	Attractions	57,373
Home Base Other	Productions	138,227
	Attractions	138,227
Non-Home Base	Productions	65,206
	Attractions	65,206
Truck-Taxi	Productions	40,159
	Attractions	40,159
Internal-External	Productions	29,436
	Attractions	29,436
External-External	Productions	61,569
	Attractions	61,569
Total	Productions	391,970
	Attractions	391,970

Trip Distribution

After trip generation has been completed, the productions and attractions for each TAZ are calculated. Trip distribution is the process by which the trips originating in one TAZ are distributed to other TAZ's throughout the study area. The output from trip distribution is a set of tables called trip tables that show travel flow between each pair of zones.

The method used to distribute trips throughout the Shoals study area was the gravity model. In the gravity model, the number of trips between two areas is directly proportional to the amount of activity in the areas and inversely proportional to the separation between the areas (represented as a function of travel time). In other words, the areas farther from each other will tend to exchange fewer trips. The generalized formula for the gravity model relates the desire for travel to three factors: 1) trip productions; 2)trip attractions; and 3) friction factors. The formula is:

$$Trips_{ij} = \frac{Prods_i \times Attrs_j \times FF_{ij}}{\sum Attrs_j \times FF_{ij}}$$

where $Prods_i$ = productions at origin zone i

$Attrs_j$ = attractions at destination zone j

FF_{ij} = friction factor between origin zone i and destination zone j

The effect of travel time on the exchange of trips between two zones is represented by a friction factor. Simply stated, a friction factor represents the level of accessibility between each zone, with higher value meaning greater accessibility and lower travel time. Each trip purpose must have a set of friction factors. The maximum time value of friction factors used in the Shoals model was 45 minutes.

Traffic Assignment

In trip generation, the number of trips by zone were forecast. Those forecast trips were then given destinations by trip distribution. Assigning these trips to specific routes and establishing traffic volumes is the last phase of the forecasting process. In the assignment process the existing trip tables that are produced in the trip distribution step of the modeling process is used to assign base year trips to the base year network. Trips between any two zones will generally follow the path (roadway links) between zones that require the least amount of travel time. In determining time to go from one zone to another, delays due to congestion are taken into consideration.

The equilibrium assignment process which was used in this study considers demand in relation to capacity. The equilibrium assignment technique consists of a series of all or nothing loadings with an adjustment of travel time according to delays encountered in the associated iteration. The assignment from each iteration is combined with the assignment for the previous iteration in such a way as to minimize the travel time of each trip. As a result of these time adjustments, the loadings of different iterations may be assigned to different paths. By combining information from various iterations, the number of iterations required to reach equilibrium is reduced. Equilibrium occurs when no trip can be made by an alternate path without increasing the total travel time of all trips on the network.

Model Calibration

Trips cannot be merely assigned to the roadway network. The model has to be calibrated to assure that it is replicating existing traffic volumes. Travel demand models are run to predict link volumes which are then compared to actual traffic counts at selected locations along screenlines and cutlines. Screenlines are imaginary lines established to intercept traffic flows through a study area and are usually located along physical barriers such as rivers or railroads. Cutlines are shorter than screenlines; they measure traffic volumes in a corridor. Seven screenlines were developed for the calibration process. The location of these screenlines is shown in Figure 5. The base year model assignment was compared to actual traffic volumes crossing the screenlines, and adjustments were made to the input model data set until assigned traffic volumes approximated actual screenline traffic volumes. When all of the reasonable adjustments and factors were included in the model, a final assignment was made. The final assignment was compared to performance measures based on national averages from studies of other urbanized areas. The total of the ground counts compared to the total of the model assignments for all of the screenlines should not be more than five percent. The error for the Shoals model was less than four percent. The final screenline volume result is shown in Table 3.

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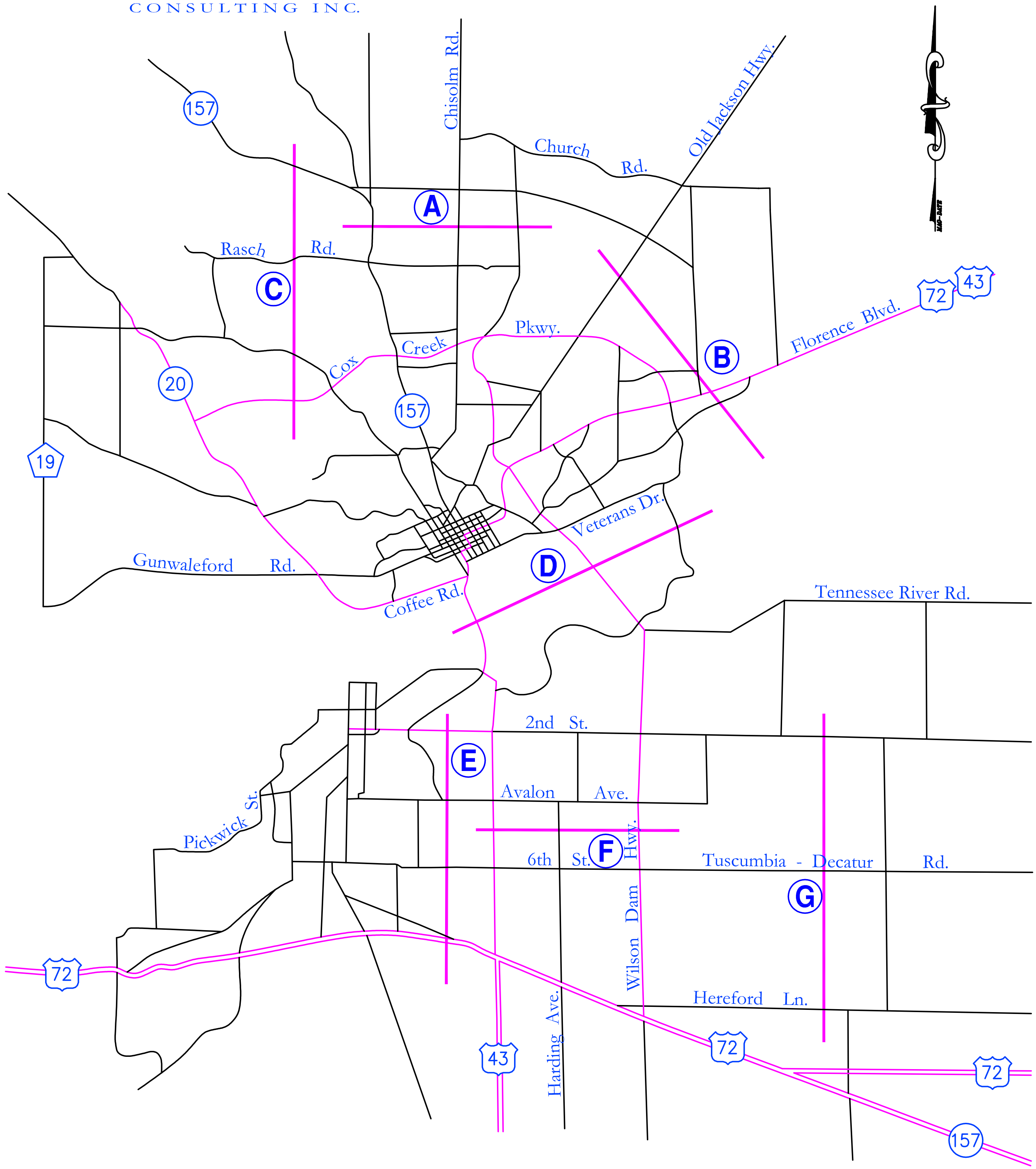

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72 U.S. HIGHWAY

157 STATE ROUTE

19 COUNTY ROAD

DRAWING NOT TO SCALE

FIGURE 5

SCREEN LINES

SHOALS AREA LRTP

AUGUST 2005

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TABLE 3

SCREENLINE ASSIGNMENT ANALYSIS

SCREENLINE	STATION	LOCATION	COUNT	ASSIGNMENT	DIFFERENCE
A	1	Wood Avenue	10,000	11,200	12.0%
	2	Chisolm Road	6,700	6,700	0.0%
	3	Helton Drive	2,600	2,900	11.5%
		Screenline A Total	19,300	20,800	7.8%
	1	Old Jackson Hwy	5,800	6,400	10.3%
B	2	Hough Road	2200	2200	0.0%
	3	Florence Blvd	33,000	30,000	-9.1%
		Screenline B Total	41,000	38600	-5.9%
	1	Rasch Road	2,300	2,700	17.4%
C	2	Mitchell Blvd	900	1,300	44.4%
	3	Cox Creek Pkwy	6,200	7,100	14.5%
		Screenline C Total	9400	11100	18.1%
	1	O'Neil Bridge	35,800	38,400	7.3%
D	2	Wilson Dam	12,900	13,700	6.2%
		Screenline D Total	48700	52100	7.0%
	1	2nd Street	9,200	6,600	-28.3%
E	2	Avalon Avenue	16,000	13,800	-13.8%
	3	6th Street	6,400	10,200	59.4%
	4	SR 157	15,500	16,700	7.7%
		Screenline E Total	47100	47300	0.4%
	1	US 43	23,500	24,400	3.8%
F	2	Harding Ave	900	500	-44.4%
	3	SR 133	7,300	8,300	13.7%
		Screenline F Total	31700	33200	4.7%
	1	SR 184	9,400	10,600	12.8%
G	2	Tuscumbia-Decatur Rd	2,000	1,800	-10.0%
	3	Hereford Ln	1,700	2,100	23.5%
		Screenline G Total	13,100	14,500	10.7%
		GRAND TOTAL	201,000	208,000	3.5%

TRAVEL DEMAND FORECASTS

Future Year Productions and Attractions

The Alabama Department of Transportation trip generation program was used to calculate future year (2030) productions and attractions in the same manner as base year productions and attractions were calculated. 2030 socioeconomic data, presented in an earlier section of this report, was used to calculate the future year productions and attractions. Internal-external productions and external-external productions and attractions were calculated using historical traffic growth patterns at each external zone. The productions and attractions for future year 2030 conditions are shown below.

Home Base Work	Productions	65,196
	Attractions	65,196
Home Base Other	Productions	157,084
	Attractions	157,084
Non-Home Base	Productions	74,093
	Attractions	74,093
Truck-Taxi	Productions	45,643
	Attractions	45,643
Internal-External	Productions	60,536
	Attractions	60,536
External-External	Productions	121,772
	Attractions	121,772
Total	Productions	524,313
	Attractions	524,313

Future Year Trip Table

Future year 2030 productions and attractions were distributed using the gravity model according to the methodology used to distribute the existing year productions and attractions. Resultant trip tables for each of the six trip purposes for 2030 were produced. These trip tables were then added and then converted to origin-destination format.

Future Year No Build Assignment

Before any roadway improvements are added to the network, the future year 2030 trip table is assigned to the "no build" network using the assignment methodology and criteria cited previously. The "no build' network, also known as the "existing plus committed" network, includes the 2000 roadway network as presented earlier, plus any significant projects (in terms of capacity addition) include in the Transportation Improvement Program (TIP) through Fiscal Year (FY) 2000. The purpose of this step is to identify where future year deficiencies might occur. The project added to the base year network to from Existing Plus Committed network was the widening of Florence Boulevard from four to six lanes. The results of the 2030 no-build assignment are shown in Figure 6.

Projected Deficiencies

Roadways which show a projected volume/capacity (v/c) ratio of greater than 1.00 should be considered deficient. Emphasis should be placed on those areas where the v/c ratio is greater than 1.20. Based on those ratios, the roadways estimated to be deficient by 2030 are shown in Figure 7.

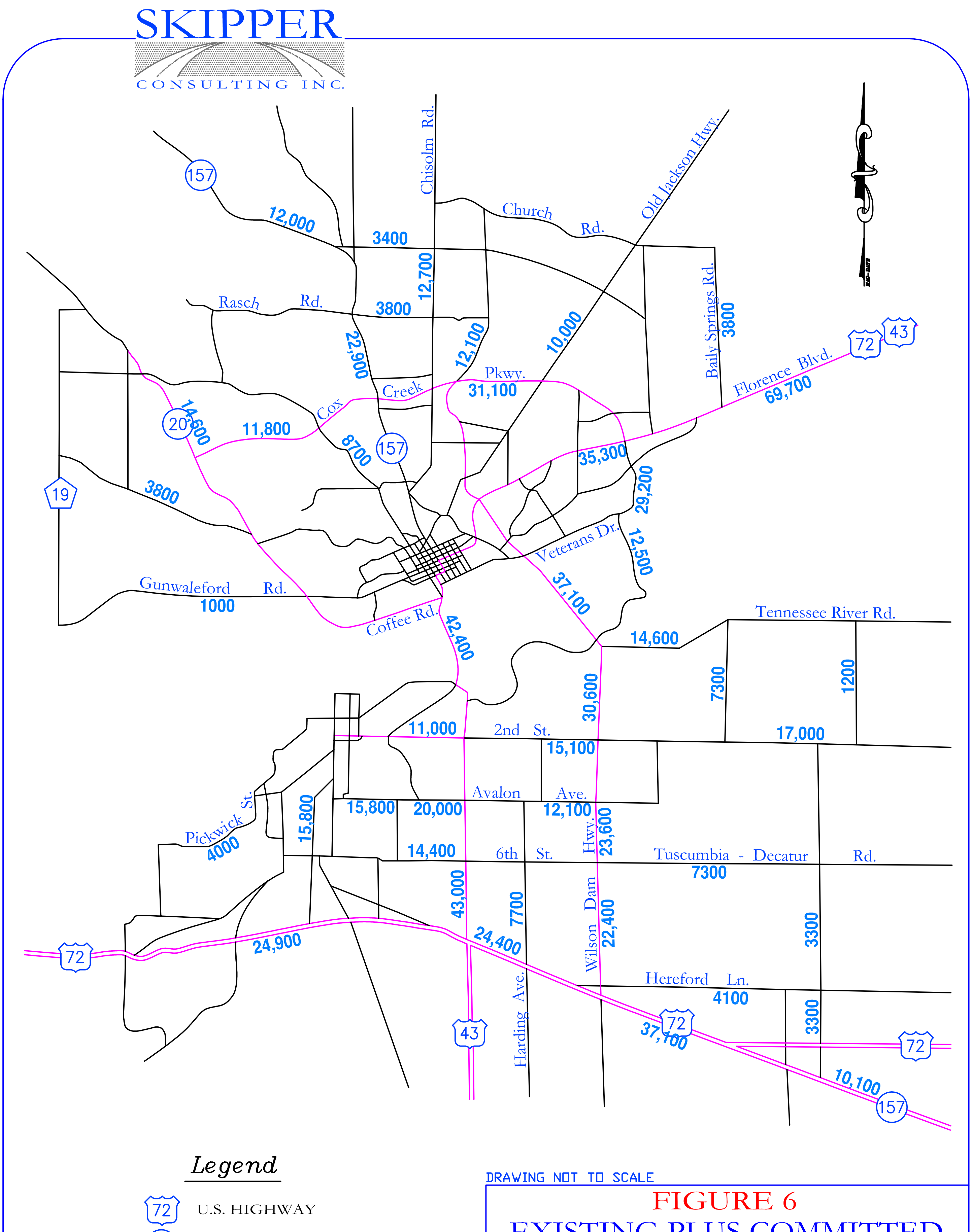

FIGURE 6

EXISTING PLUS COMMITTED VOLUMES

SHOALS AREA LRTP

AUGUST 2005

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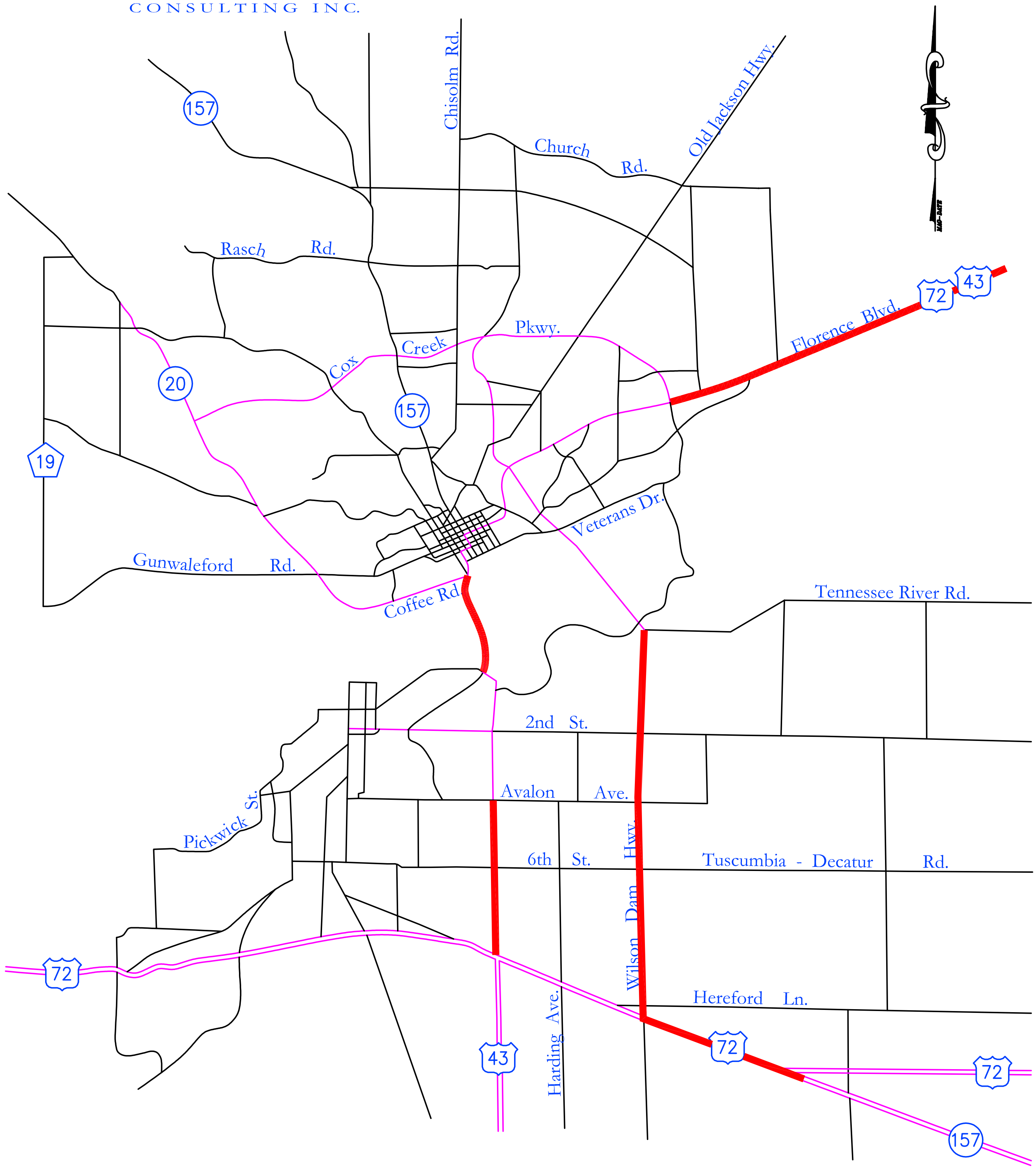

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72 U.S. HIGHWAY
157 STATE ROUTE
19 COUNTY ROAD

DRAWING NOT TO SCALE

FIGURE 7
EXISTING PLUS COMMITTED DEFICIENT LINKS

SHOALS AREA LRTP

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FINANCIAL PLAN

Federal regulations require long range transportation plans to be financially constrained. Projected revenues based on historic funding must be adequate to fund the projects included in the 2030 Long Range Transportation Plan. The Financial Plan was developed to demonstrate the implementation strategy of the long range transportation plan. Multiple federal funding sources were considered in developing the financial position of the Shoals Area MPO. These included National Highway System (NHS) funds, Surface Transportation Program - Attributable to Any Area (STP-AA) funds, Surface Transportation Program - Attributable to Other Areas (STP-OA) funds, Congressional Demonstration Project/High Priority Projects, Maintenance Funds and Federal Transit Administration (FTA) funds.

The NHS and the STP-AA funds are matched at the state level and are available to the entire state. The Maintenance Allocation outlines the ability of the involved governments and agencies to maintain their existing transportation systems as well as any new facilities built under the 2030 Long Range Transportation Plan. FTA funds are for transit projects in the area and are matched on a local basis. STP-OA funds are currently allocated to each of the smaller urbanized areas that do not receive designated Surface Transportation Program funding. The Shoals Area Metropolitan Planning Organization (MPO) currently receives a yearly STP-OA allocation of approximately $1.208 million per year. This money is provided on a 20% local match basis. Therefore, for the 25 year period the total STP-OA allocation for the Shoals Area Metropolitan Planning Organization (MPO) will be approximately $37,750,000.

To develop the financial plan, for other funding categories the MPO staff and ALDOT constructed a framework of annual funding benchmarks for all relevant funding categories. An annual average was calculated for each of the appropriate funding categories. The annual average funding marks were developed from a ten year historic funding trend for each funding categories. These averages are the basis for the projected 25 year funding marks which are detailed in Table 4. The only exception to this methodology were the (FTA) funds which were based on past trends and information provided by ALDOT.

Table 4
25 Year Funding Projections

	NHF	STP-AA	STP-OA	DPI/HPP	Maintenance	FTA
10 Year Total	$14,003,750	$20,807,737	$15,100,000	$35,405,000	$10,000,000	$5,005,000
1 Year Average	$1,400,375	$2,080,773	$1,510,000	$3,540,500	$1,000,000	$500,500
25 Year Total	$35,009,375	$52,019,343	$37,750,000	$88,512,500	$25,000,000	$12,512,500

Estimated Implementation Costs

The total estimated cost of each project identified in the Shoals Area 2030 Long Range Transportation Plan was provided by ALDOT or local officials using an average estimated cost of approximately $2.0 million per lane mile. The total estimated costs of LRTP by funding category and the available funds for each funding category for the 25 year planning period are illustrated in Table 5.

Table 5
LRTP Project Costs and Available Funds

	NHF	STP-AA	STP-OA	DPI/HPP
LRTP Project Costs	$34,692,785	$49,251,263	$38,207,107*	$28,660,000
Available Funds	$35,009,375	$52,019,343	$37,750,000	$88,512,500

*** $10,000,000 are in state STP-OA funds and does not count against local funds.**

TRANSPORTATION PLAN DEVELOPMENT

The MPO followed a five-step process to develop the long range transportation plan. The steps included data collection , data projection, data review, project selection and plan review and approval.

Data Collection

The data collection effort involved the compilation of socio-economic data, transportation system inventory, environmental data, historic trends and financial data. The data was collected by the staff of the Northwest Alabama Council of Local Governments, and reviewed by the MPO and the Alabama Department of Transportation for accuracy.

Data Projections

To plan for the future the MPO must make assumptions of what the study area will be like in the future. To accomplish this, existing data were projected forward to the year 2030. The forecasted data included households, retail employment non-retail employment and school enrollment. The forecasted data was allocated to the TAZ level to show future land use and emphasize the growth areas that should be addressed in the plan.

The socio-economic data that were collected and projected were used in the transportation demand modeling process to calibrate the model to base year conditions and to forecast future traffic volumes on the study area roadways.

Data Review

The data review process involved examining the results from the transportation demand model runs, socio-economic data and environmental factors. The MPO used the results of the transportation demand model to identify segments of the roadway network that were expected to exceed their design capacities by the year 2030. The MPO reviewed the socio-economic data and the environmental factors to determine if there were any transportation deficiencies that were not identified in the transportation demand modeling process.

Project Selection

When the MPO began selecting projects for inclusion in the transportation plan, projects that would help to alleviate transportation deficiencies were identified in the data review step. Projects that addressed capacity problems, safety concerns, traffic management issues, economic development and social services activities were selected. The selected projects were analyzed using the transportation demand model to determine their effects on future traffic flow.

The final task in the project selection process was to determine if sufficient funds were available to construct the proposed projects. Based on the Financial Plan described in a previous section of this report it was determined that sufficient funds would be available over the 25 year planning period to construct the projects that were identified for inclusion in the Shoals Area 2030 Long Range Transportation Plan.

ROADWAY PLAN

Using the five step process outlined in the Transportation Plan Development chapter of this document and the Financial Plan the roadway plan was developed. The goals of the roadway plan were to relieve traffic congestion and increase mobility throughout the study area while providing a safe and efficient transportation system for the year 2030. No additional project beyond those included in the 2025 Long Range Transportation Plan were identified for inclusion in the 2030 Long Range Transportation Plan.

Roadway projects identified in the 2025 Long Range Transportation Plan that had not been completed were brought forward to develop the 2030 Roadway Plan. 2030 roadway plan is described in Table 6 and illustrated in Figure 8.

Future Year Daily Traffic Volumes

Future year trips were assigned to the roadway plan network using the TRANPLAN model to determine the benefit of the 2030 Roadway Plan. The results of the assignment are illustrated in Figure 9.

Table 6
2030 Roadway Plan Projects

Project Description	Status	Length	Lanes Before	Lanes After	Estimated Cost
DPI/HPP					
1) Construct the North approaches to the Patton Island Bridge including an interchange at Florence Boulevard	TIP	1.1 miles	N/A	6	$23,000,000
2) Construct a railroad overpass at Montgomery Avenue	LRTP	0.5 miles	N/A	4	$5,660,000
				Total	**$28,660,000**
				Available Funds	**$88,512,500**
				Balance	**$59,852,500**
NHF					
3) Construct an interchange at the intersection of SR 20 and SR 157	LRTP	0.5 miles	N/A	4	$3,500,000
4) Widen U.S. Highway 43 North of Killen to the Study area Bounddry	LRTP	5.1 miles	2	4	$31,192,785
				Total	**$34,692,785**
				Available Funds	**$35,009,375**
				Balance	**$316,590**
STP-AA					
5) Widen 2nd Street (SR 184) from Wilson Dam Road to Woodward Avenue	LRTP	1.8 miles	4	5	$5,000,000
6) Relocate U.S. Highway 43 South of SR 157	LRTP	3.8 miles	N/A	4	$20,000,000
7) Widen Wilson Dam Road (SR 133) from SR 157 to 2000 feet south of the railroad	TIP	0.6 miles	2	4	$6,758,250
8) Widen Wilson Dam Road (SR 133) 2000 feet south of the railroad to 700 feet south of Avalon Avenue	LRTP	2.1 miles	2	4	$13,789,513
9) Widen Florence Boulevard (SR 2) from Indian Springs to East of Harris Road	LRTP	1.5 miles	4	6	$3,703,500
				TOTAL	**$49,251,263**
				Available Funds	**$52,019,343**
				Balance	**$2,768,080**

STP-OA					
10) Widen Huntsville Road from Patton Island Bridge to US 72	LRTP	2.6 miles	3	4	$3,200,000
11) Replace the bridge at Hermitage Drive	TIP	0.2 miles	2	2	$2,000,000
12) Widen Cloyd Avenue	TIP	1.9 miles	2	3	$1,995,000
13) Widen Huff Road from the existing three lane east to Middle Road	LRTP	0.7 miles	2	3	$800,000
14) Widen Middle Road from CR 47 to U.S. Highway 72	LRTP	0.5 miles	2	3	$1,100,000
15) Construct a connector road from Parkway Drive to CR 47	TIP	3.0 miles	2	2	$1,450,000
16) Construct a connector road from Parkway Drive to CR 47	LRTP	2.2 miles	N/A	2	$5,300,000
17) Replace the Spring Creek Bridge	TIP	2.4 miles	2	3	$1,921,103
18) Widen and realign 8th Street from Hook Street to Downtown Tuscumbia	LRTP	0.3 miles	2	2	$483,896
19) Widen Hook Street from 6th Street to West Montgomery Avenue	LRTP	1.1 miles	2	3	$1,007,108
20) Widen West Montgomery Avenue from Hook Street to South Montgomery Avenue	LRTP	0.9 miles	2	3	$1,100,000
21) Widen Avalon Avenue from Cox Boulevard to Helen Keller Hospital	LRTP	1.1 miles	2	5	$3,000,000
22) Widen Avalon Avenue from Cox Boulevard to Woodward Avenue	TIP	0.7 miles	4	5	$450,000
23) Widen Avalon Avenue from Northwest Regional Airport to Wilson Dam Road	TIP	0.9 miles	2	5	$2,600,000
24) Extend Gnat Pond Road from its Current end to SR 157	LRTP	1.5 miles	N/A	2	$1,800,000
				TOTAL	**$28,207,107**
				Available Funds	**$37,750,000**
				Balance	**$9,542,893**

STP-OA (State)					
25) Widen Chisholm Road from Rash Road to Section Line Road	TIP	1.1 miles	2	3	$6,000,000
26) Widen Helton from Hermitage Drive to Cox Creek Parkway	TIP	1.6 miles	2	3	$4,000,000
				TOTAL	**$10,000,000**
				Available Funds	**$10,000,000**
				Balance	**$0**

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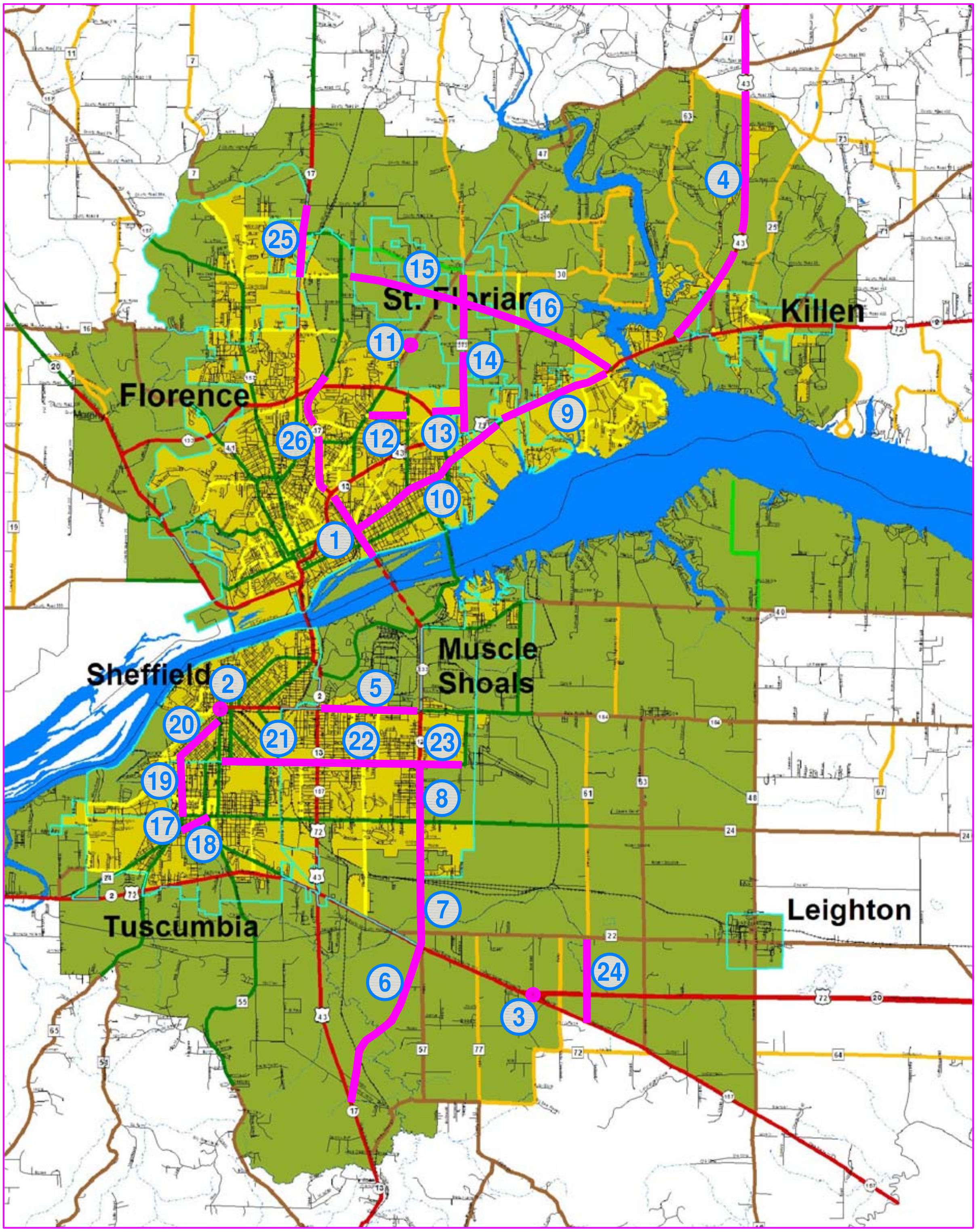

DRAWING NOT TO SCALE

FIGURE 8
2030 LONG RANGE PLAN PROJECTS
SHOALS AREA LRTP

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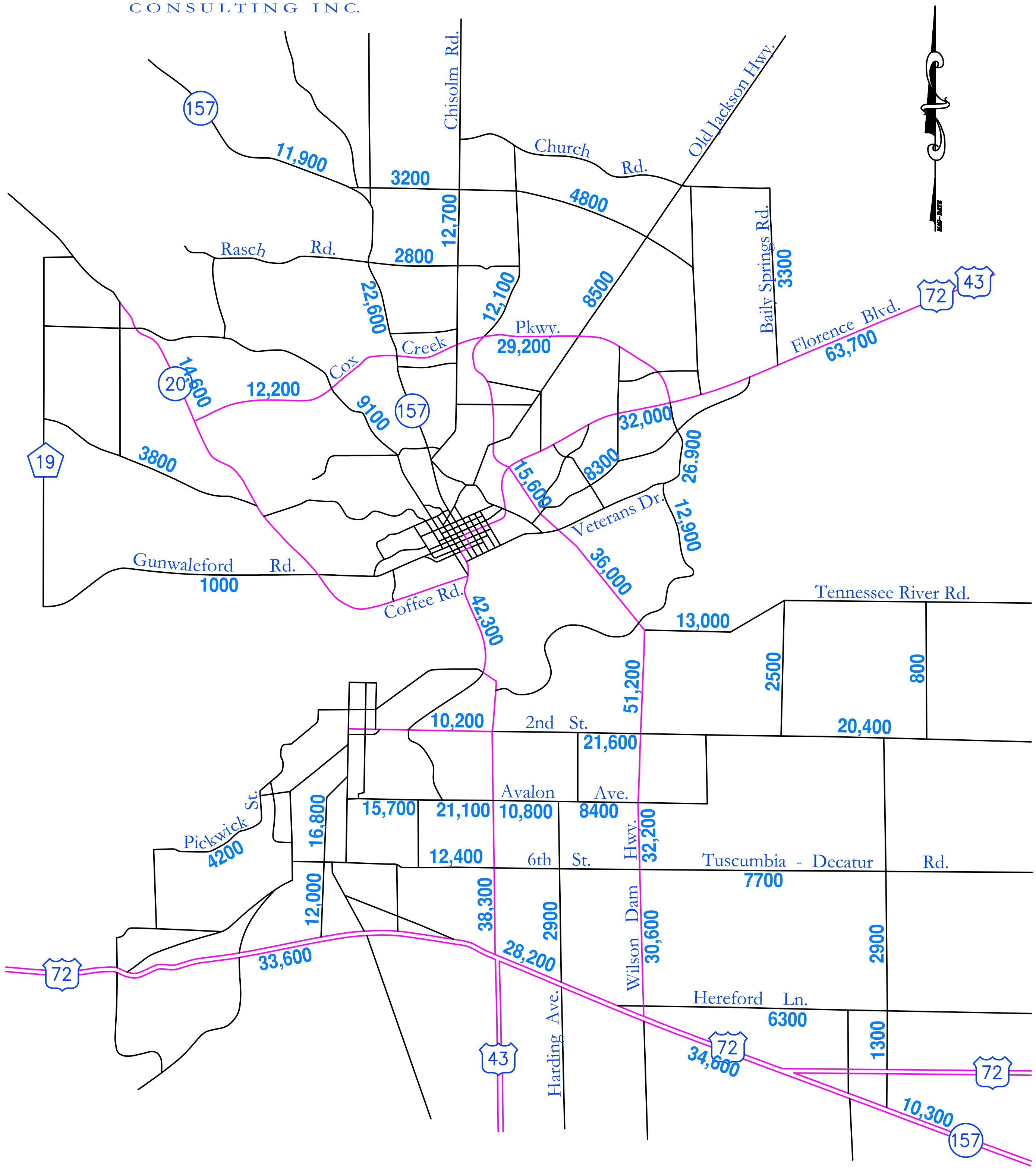

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72 U.S. HIGHWAY

157 STATE ROUTE

19 COUNTY ROAD

DRAWING NOT TO SCALE

FIGURE 9

2030 FORECASTED VOLUMES

SHOALS AREA LRTP

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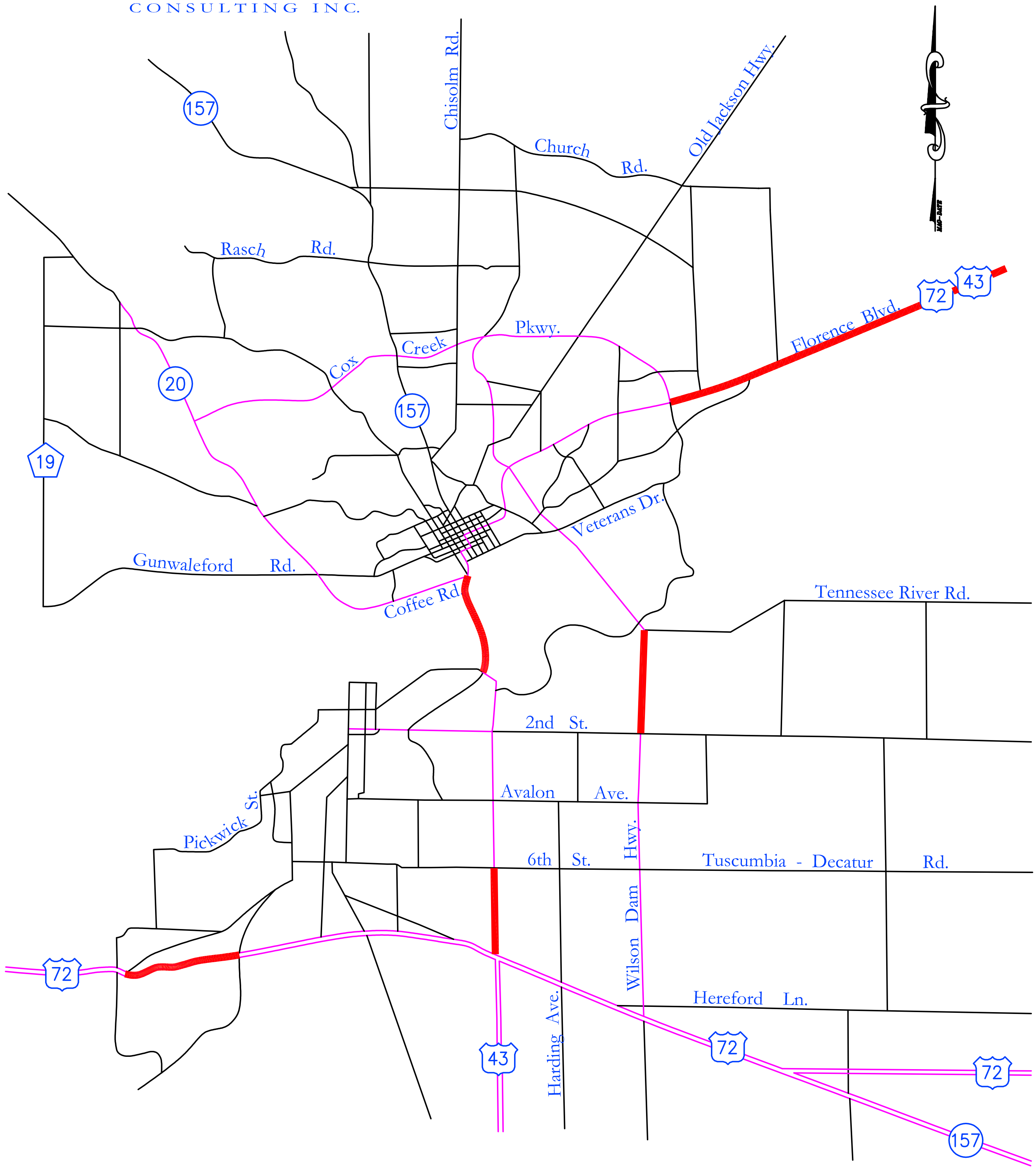

Legend

72	U.S. HIGHWAY
157	STATE ROUTE
19	COUNTY ROAD

DRAWING NOT TO SCALE

FIGURE 10

2030 DEFICIENT LINKS

SHOALS AREA LRTP

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PEDESTRIAN AND BICYCLE PLAN

Pedestrian and bicycle facilities enhance urban design and improve the quality of life while relieving traffic congestion. Pedestrian and bicycle projects are relatively low cost projects that offer great benefit. Through the process of the preparation of the long-range transportation plan several pedestrian and bicycle projects were identified. Among these projects were: Phase 2 of the Florence Bicycle and Pedestrian Trail, the Reservation Road Bicycle and Pedestrian Trail which would continue along Wilson Dam Corridor and include Avalon Avenue from Wilson Dam Highway to Woodward Avenue, and the development of bicycle plans for each city in the urbanized area. In addition to these projects, the following recommendations are proposed:

- Establish a regional bicycle/pedestrian plan for the Shoals area that would identify deficiencies, outline solutions, identify funding sources, prioritize major origins and destinations for non-motorized traffic, and recommend improvement projects. The plan should also address safety concerns such as rail crossings, drainage grates, lane striping, curb ramps, signage and other traffic control devices;
- Encourage designed bicycle parking at all public facilities and major destinations;
- Design roads to accommodate bicyclist safely when possible;
- Create a bicycle route network that will provide safe routes between desired destinations;
- Use American Association of State Highway and Transportation Officials (AASHTO) standards for construction;
- Encourage bicycle safety programs; and
- Promote efforts to provide intermodal connections between non-motorized activities and other modes of transportation.

PUBLIC TRANSIT PLAN

The process of preparing the public transit plan portion of the long range transportation plan was performed using the following steps:

1) An analysis of the existing operational conditions of the current public transit system.
2) Soliciting public input regarding the existing public transit operation.
3) Soliciting public input regarding the public transit needs in the study area.
4) Performing a traffic analysis zone (TAZ) level analysis to determine the demand for public transit in the study area.

Public transit helps increase the mobility of an area while decreasing traffic congestion and reducing the demand for parking. Transit projects should be viewed as providing a service to an area instead of being expected to make a profit.

The Shoals Area should continue to expand the current demand response transit system by expanding the hours of operation , providing subscription scheduling and extending the service area approximately four miles outside the corporate limits of each city. As the demand for public transit increases consideration should be given to developing fixed route transit system with complimentary paratransit services for qualified persons with disabilities.

INTERMODAL PLAN

The intermodal plan for the Shoals study area is based on the current intermodal system, which is made up port of facilities along the Tennessee River, an airport and facilities of the Norfolk-Southern Railroad and Tennessee Southern Rail Company. Two projects were identified as intermodal projects during the planning process. A relocation of the Norfolk-Southern tracks, which extend through the southern portion of the study area and an access road to the state docks were identified as intermodal projects during this update. The railroad relocation would reduce the number of at-grade crossing in traffic congested areas. The railroad relocation would potentially improve both auto and rail efficiency in the Shoals Area. The dock access road would extend from Mitchell Boulevard to the state docks. This project would enhance intermodal activity between trucks and barges.

PUBLIC INVOLVEMENT PROCESS

In an effort to facilitate public participation, the 2030 LRTP for the Shoals Urbanized area was available for review and comments from June 13, 2005 to July 31, 2005 at the NACOLG Planning offices. In addition to the review opportunities public involvement meetings were held as follows:

- June 13,2005 12:00 noon to 1:00 pm Northwest Alabama Council of Local Governments (NACOLG)
- June 13,2005 2:00 pm – 3:00 pm Sheffield Recreation Center
- June 13,2005 3:00 pm – 6:00 pm The Handy Recreation Center

All review opportunities and public involvement meetings were advertised in the Times Daily on May 25, 2005 and June 12, 2005. Copies of the public involvement advertisements as well as public comments are provided in Appendix C.

CONCLUSIONS

The Shoals Area Transportation Plan has been carefully designed to accommodate existing as well as future transportation needs. Federal legislation makes it imperative that the study be continued if area governments are to continue receiving federal funds for transportation improvements. With the cooperation and coordination of the continuing study organization, it will be possible to maintain a plan, which meets the needs of the urban area for the next twenty-five years, while retaining the flexibility to accommodate unanticipated growth.