

MADISON COUNTY TRANSPORTATION MASTER PLAN AND IMPLEMENTATION PROGRAM

ALDOT PROJECT PL-0011(034)

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Prepared For:
Madison County Commission
100 North Side Square
Huntsville, Alabama 35801

Prepared By:
CDG Engineers & Assoc, Inc.
6767 Madison Pike #240
Huntsville, Alabama 35806

J.R. Wilburn and Assoc., Inc
411 James Store Road
Greenville, Georgia 30222



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1. Introduction

Madison County has experienced steady, strong population growth for more than half a century. Since 2000, the county has added 84,346 residents, a 30.5 percent increase. Madison County accounts for over 19 percent of Alabama's population growth since 2000. Traffic growth in the county reflects the strong population and employment growth trends.

1.1. Purpose

This Madison County Transportation Master Plan reviews the growth trends in the unincorporated parts of the county, reviews the existing condition and operations of the transportation network, and evaluates the availability of other infrastructure to support additional growth.

1.2. Approach

The Huntsville Area Transportation Study (HATS) travel demand forecasting model was used to evaluate traffic trends and to test an alternative growth forecast for the unincorporated county. The travel model was also used to test new roadway connectivity that would fill in missing links in the road network and provide alternative routes in and around congested corridors.

Available Crash data was obtained and evaluated from the Critical Analysis Reporting Environment (CARE) (administered by the University of Alabama) to identify corridors and intersection hot spots with above average crash rates, where various safety improvements should be considered.

2. Existing Conditions

2.1. Population Trends

While the municipalities in Madison County have captured 67.4 percent of the growth since 2000, the unincorporated part of the county still has grown faster than the cities. The cities have added approximately 26 percent to their total populations, but the unincorporated area has grown in population by 40 percent, even as annexation continues to shrink the unincorporated area of the county. Table 1 summarizes the change in city and county populations since 2000.

Map 1 illustrates the distribution of population growth from 2015 through 2045 that was forecast by the Huntsville Area Transportation Study (HATS) MPO for the current Long Range Transportation Plan update. The geographic mismatch between Traffic Analysis zones and City Limits prevents precise calculation of the share of growth forecast for the current city limits versus the share in the county, but the unincorporated area accounts for about 53,000 additional persons by 2045. Of those, approximately 29,000 are projected to reside in northwestern Madison County (Commission District 4), 13,000 in northeastern Madison County (District 1), and 9,000 in southeast Madison County (District 3).

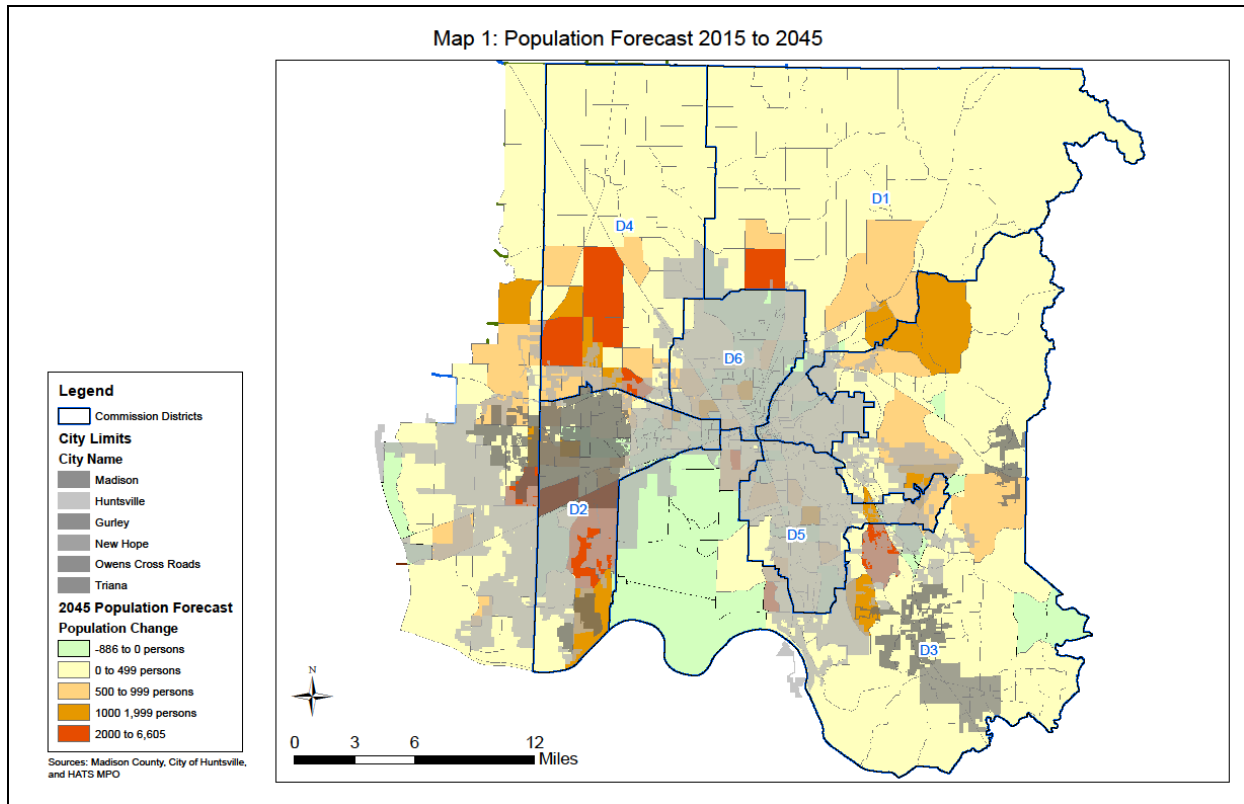
MADISON COUNTY TRANSPORTATION MASTER PLAN

Table 1

Population of Madison County and Municipalities, 2000 to 2017

	Census	Population Estimates (as of July 1)		Pct of County Pop	Net Change 2000 to 2017	Pct Change 2000 to 2017
	2000	2010	2017			
Madison County	276,700	336,102	361,046	100.0%	84,346	30.5%
Gurley town	876	796	781	0.2%	(95)	-10.8%
Huntsville city (pt.)	158,216	179,355	192,637	53.4%	34,421	21.8%
Madison city (pt.)	29,329	39,825	44,444	12.3%	15,115	51.5%
New Hope city	2,539	2,813	2,842	0.8%	303	11.9%
Owens Cross Roads	1,124	1,552	1,939	0.5%	815	72.5%
Triana town	458	512	540	0.1%	82	17.9%
Total municipalities	192,542	224,853	243,183	67.4%	50,641	26.3%
Unincorporated Area	84,158	111,249	117,863	32.6%	33,705	40.0%

Source: U.S. Census Bureau, Population Division, and Center for Business and Economic Research, The University of Alabama, May 2018.



Population growth in unincorporated Madison County has been most intense in northwest Madison County, in part due to good access to employment in the I-565 corridor and at Redstone Arsenal and surrounding areas, and the HATS population forecast reflects these long-term trends. However, more recent subdivision activity in the county suggests that future growth is likely to be more balanced between the northwest and northeast quadrants of the county. For this study, the population growth forecast was modified to shift more of the future population growth to the northeast area of the county

2.2. Economic Profile

Population growth is driven by job growth, and the economic development strategy for Huntsville and

Table 2

2019 Leading Employers
Huntsville/Madison County, Alabama

Company	Industry	Employees
U.S. Army/Redstone Arsenal	Government	38,000
Huntsville Hospital	Health Care	9,228
NASA/Marshall Space Flight Center	Government	6,000
Huntsville City Schools	Education	3,000
The Boeing Company	Research & Development	2,900
SAIC	Research & Development	2,746
Madison County Schools	Education	2,389
City of Huntsville	Government	2,206
Dynetics, Inc.	Research & Development	2,030
University of Alabama in Huntsville	Education	1,660
ADTRAN, Inc.	Telecommunications, Mfg	1,549
Technicolor	Compact Disc, Mfg	1,450
Toyota Motor Manufacturing Alabama, Inc.	Automotive Engine, Mfg	1,350
Hexagon US Federal	Software Development	1,325
Madison County Commission	Government	1,242
Alabama A&M University	Education	1,207
Northrop Grumman Corporation	Research & Development	1,100
KBR	Research & Development	1,020
Madison City Schools	Education	976
Polaris Industries	Utility Vehicle, Mfg	950
Crestwood Medical Center	Health Care	920
Alorica	Customer Service Center	800
Teledyne Brown Engineering	Research & Development	794
Lockheed Martin Corporation	Research & Development	764
PPG Aerospace	Aircraft Glass, Mfg	750
Science and Engineering Services	Aviation Intergration	692
Redstone Federal Credit Union	Finance	681
Sanmina	Electronics, Mfg	643
Huntsville Utilities	Utilities	642
COLSA Corporation	Research & Development	635

Source: Huntsville/Madison County Chamber, December 2019

Madison County has been very effective, leveraging the long-standing Defense and Aerospace industrial base to attract new jobs in Advanced Manufacturing, Bioscience, and Information Technology. Recent major investments in the region include Toyota Motor Manufacturing (engine plant investments and expansion), Toyota-Mazda (joint venture to manufacture compact and crossover vehicles), Polaris (ATV production), Facebook (data center), and an FBI headquarters at Redstone Arsenal. Table 2 highlights major employers in the area, compiled by the Huntsville-Madison Chamber of Commerce.

Table 3 summarizes employment change by sector from 2009 to 2018. While the County has had an overall 35 percent growth in employment,

most of the employment growth has occurred and likely will continue to occur within or be annexed by one of the cities; most industrial, commercial and office employers require public sewer connections, with some exceptions.

Table 3
Industry Sector Employment Trends

Sector	Employment		
	2009	2018	Pct Chg
Professional, Scientific and Technical Services	32,549	36,659	12.6%
Manufacturing	25,761	20,190	-21.6%
Retail	19,036	22,192	16.6%
Health Care and Social Assistance	18,009	24,934	38.5%
Accommodations and Food Services	14,809	17,480	18.0%
Admin, Support, and Waste Management Services	13,511	16,623	23.0%
Educational Services	11,316	11,751	3.8%
Construction	5,009	5,991	19.6%
Wholesale Trade	4,694	4,302	-8.4%

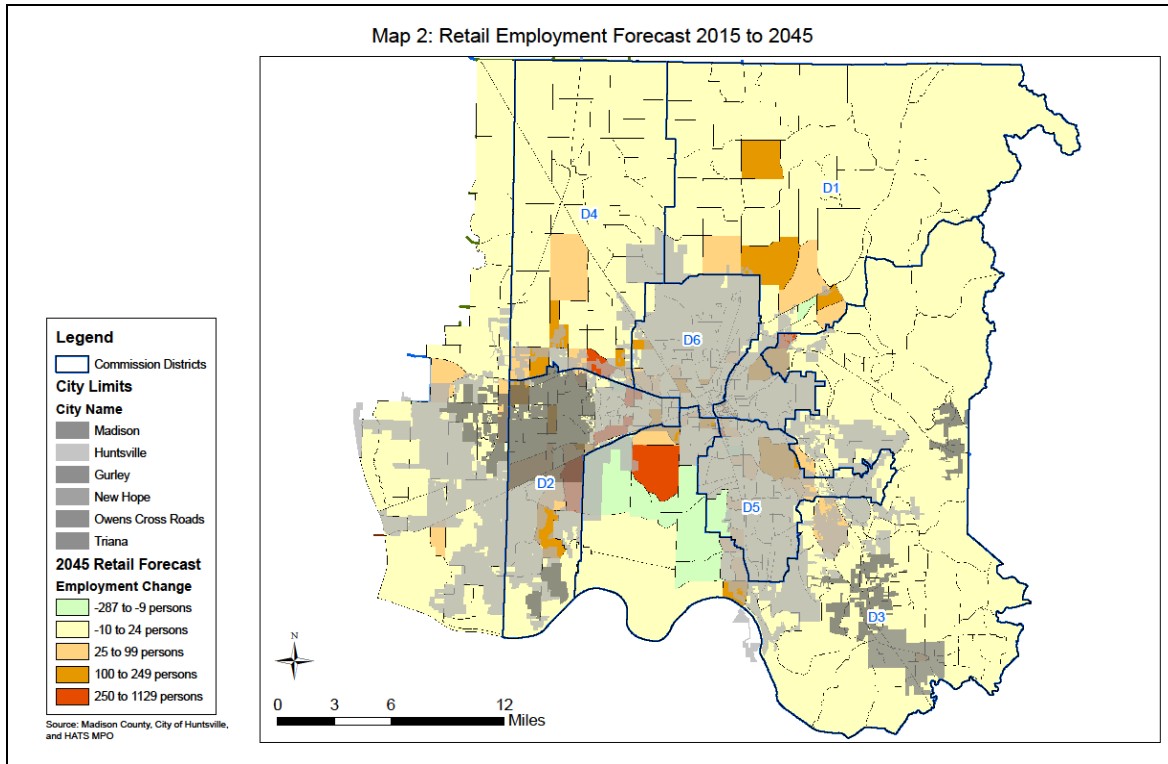
Source: Alabama Department of Labor, Labor Market Information Division

Employment forecasts have been developed for the update of the HATS Long Range Transportation Plan (LRTP) and are shown in Maps 2 and 3.

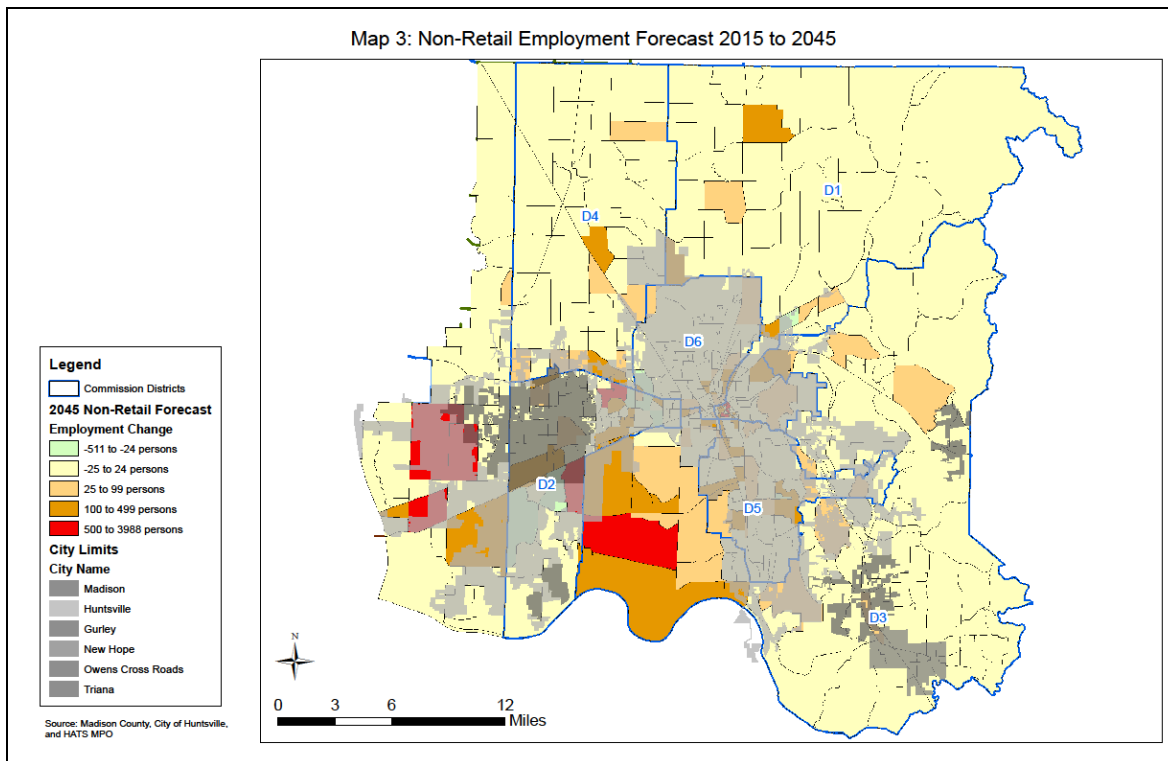
Map 2 illustrates retail employment growth, which is generally low outside of city limits. Relatively higher retail growth is forecast north of Huntsville in the US 231 and the Winchester Road corridors. The area north of Madison between Wall-Triana Road and Jeff Road also shows significant retail growth by 2045. For reference in interpreting the colors on the maps, fast food restaurants typically have about 25 employees, convenience stores and “dollar stores” typically about 10, grocery stores 60 to 80, and “big box” stores generally employ 80 to 200 persons.

Map 3 illustrates the HATS non-retail employment forecast. Non-retail employment growth is forecast to be most intense around Redstone Arsenal south of Huntsville, and west and southwest of Madison in Limestone County. Scattered pockets of non-retail employment growth are forecast in the northern part of Madison County.

Map 2: Retail Employment Forecast 2015 to 2045



Map 3: Non-Retail Employment Forecast 2015 to 2045



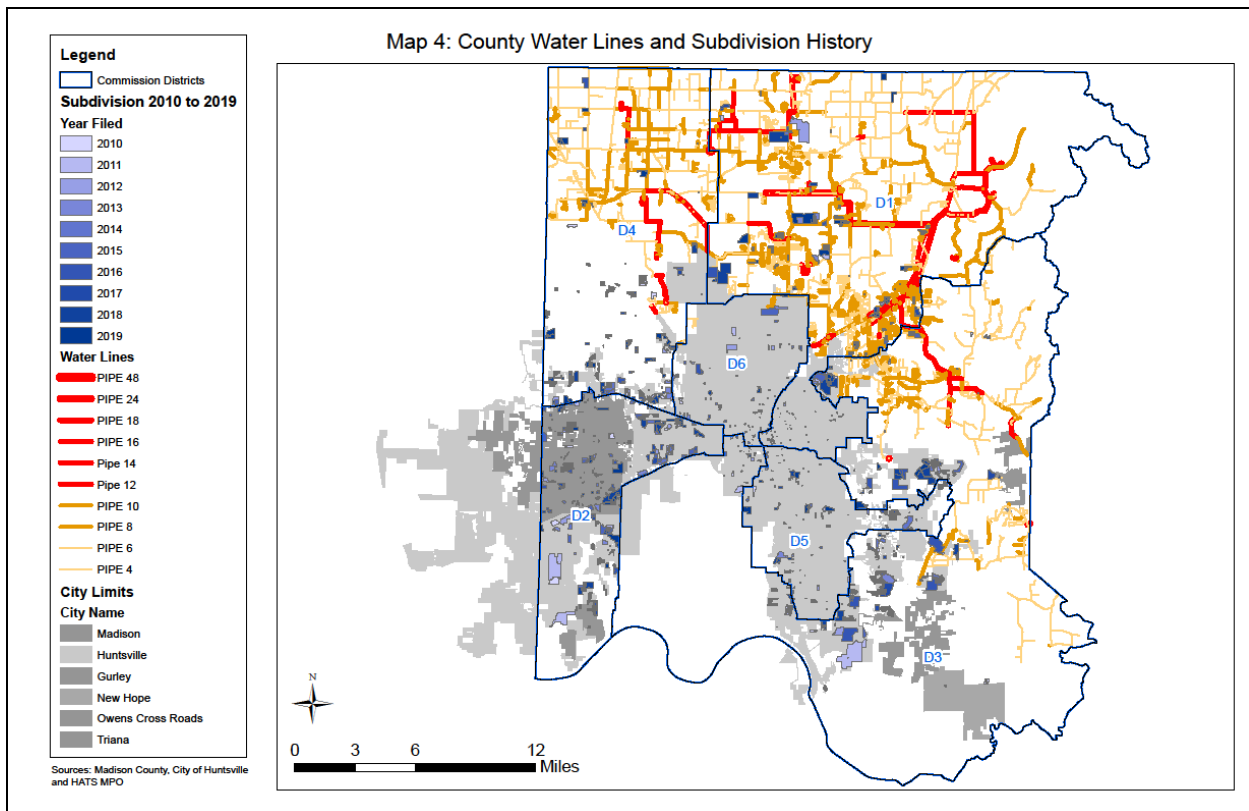
2.3. Development Trends

The pattern of growth in unincorporated Madison County is relatively unconstrained. The county does not regulate zoning. The county’s subdivision ordinance controls key elements of the land development process but is limited in terms of managing driveway access and requiring public road improvements to minimize traffic impacts of new development.

As Map 4 illustrates, the county water system covers virtually the entire county, enabling suburban-density residential development county-wide. The City of Huntsville Utilities and Harvest-Monrovia Water Authority both provide water in the northwestern portion of the county south of State Route 53.

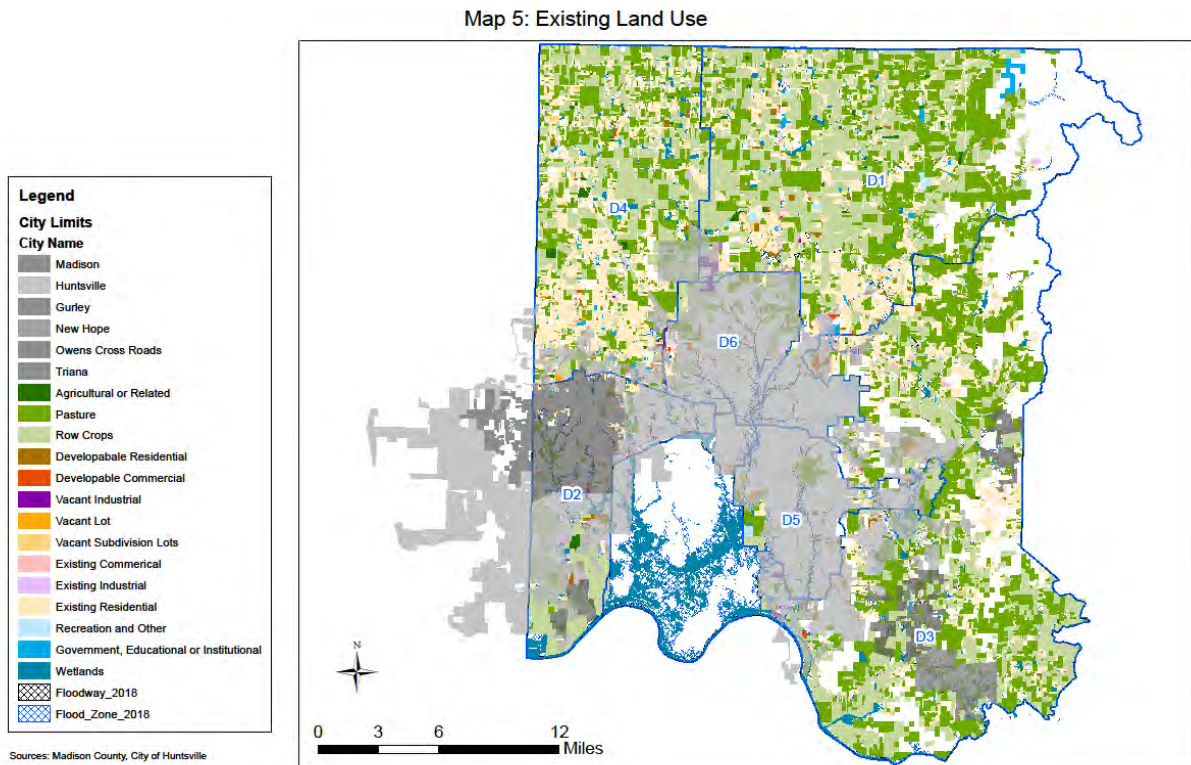
Sewer is very limited outside of the city limits, with service provided in small areas by private sewer providers. Madison County does not provide sewer. Septic tanks are used to handle wastewater in most new subdivisions in the study area.

Map 4 also illustrates the pattern of subdivision growth in the county since 2010, with lighter blue areas corresponding to the 2010 subdivisions, gradually transitioning to darker blue in 2020. Subdivision activity in the unincorporated study area has generally been most intense in the Winchester Road and US 231 corridors. Generally, subdivision activity correlates well with the highest capacity water lines in the county.



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Map 5 depicts existing land use in Madison County based on the County Tax Assessor's classification of land uses. The map illustrates the extensive agricultural land in the northern part of the county, the extensive inventory of available developable land, and the scattered pattern of residential development that is occurring.



Madison County has maintained a very pro-growth policy environment. The current study has been undertaken to ensure that the county can continue to support quality suburban growth and effectively manage the traffic impacts of new development.

Development in unincorporated Madison County can be best described as dispersed, rapid, low-density suburban growth, of predominantly residential nature. The county-wide availability of public water service and apparent ease of permitting septic systems enables residential subdivisions to be developed essentially anywhere in the county.

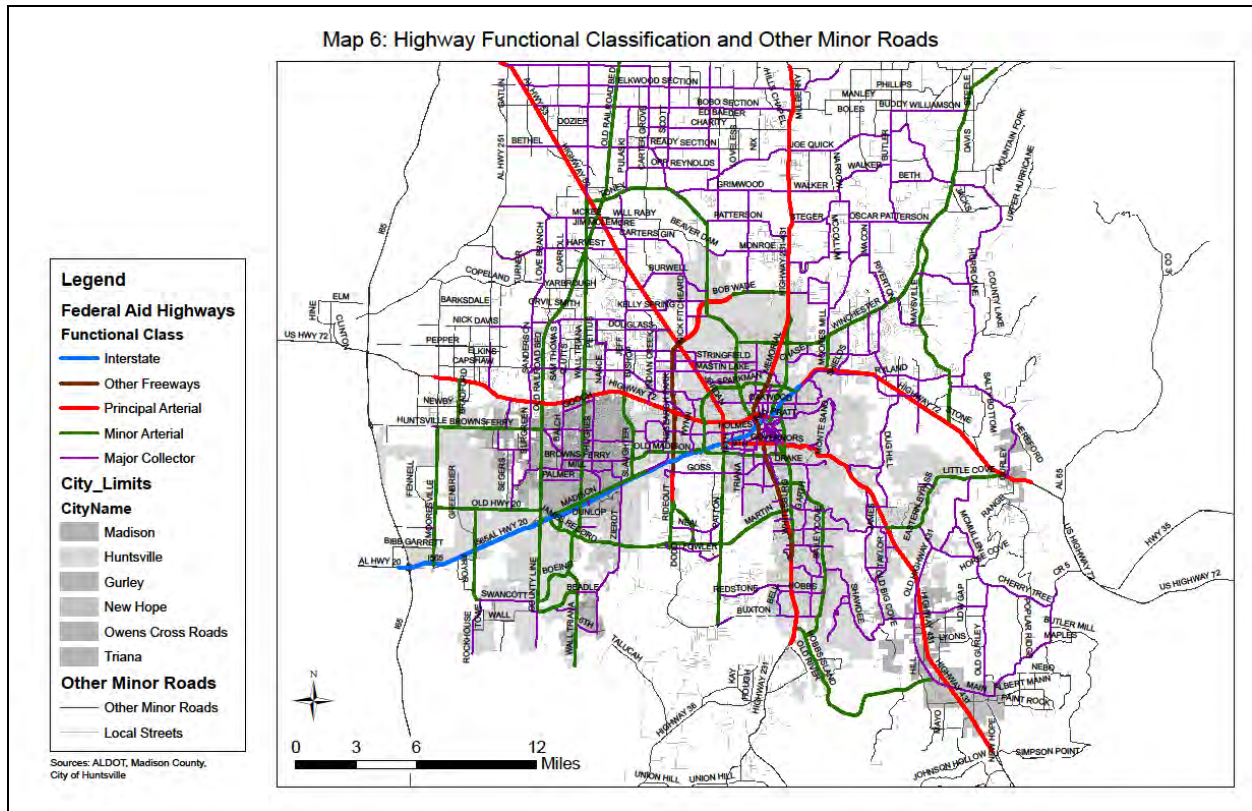
The pattern of employment in the region means that new residents in the unincorporated northern section of the county will be driving generally south to work in Huntsville and Madison, around Redstone Arsenal or in Limestone County.

2.4. Transportation Network

Road Network Conditions

The existing road network in the study area is predominantly two-lane collector roadways. The network is generally a connected grid pattern on the north-south and east-west axes, which provides good distribution of traffic but creates many minor intersections, which may become problematic as traffic volumes increase with suburban development. Principal arterial highways radiate from downtown Huntsville, with minor arterials providing connectivity between the principal arterials.

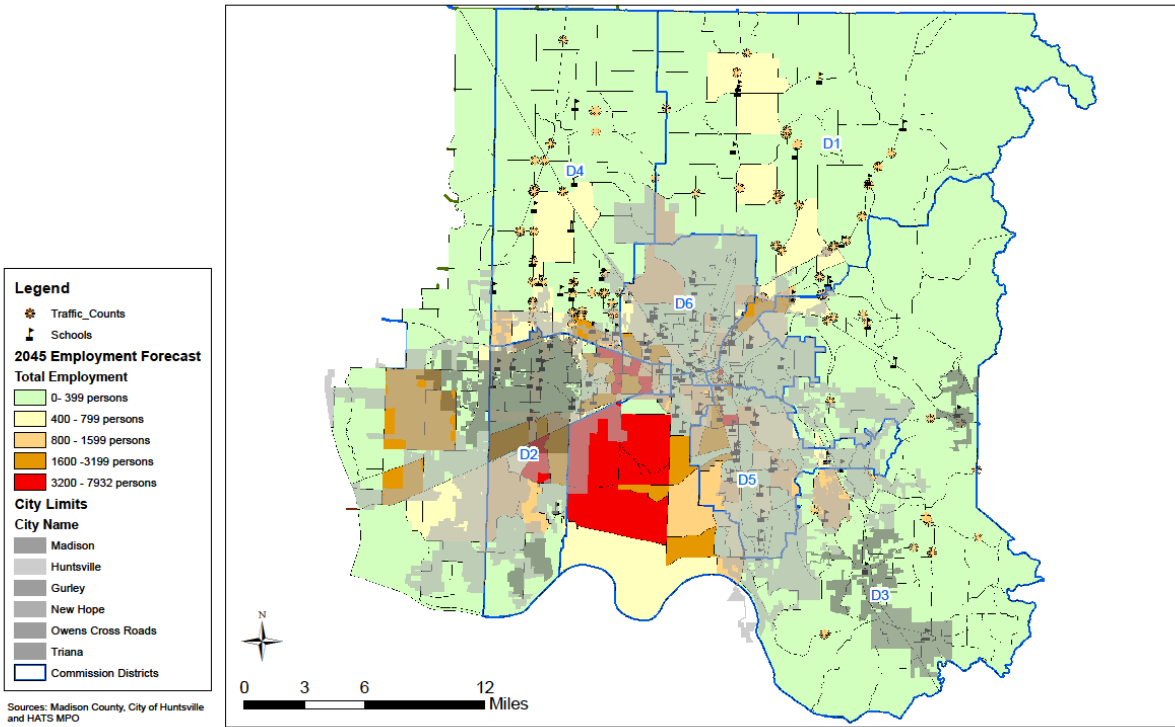
Map 6 depicts the Federal Aid eligible road network in Madison County. The map also illustrates other minor connecting roads identified as important routes for emergency services.



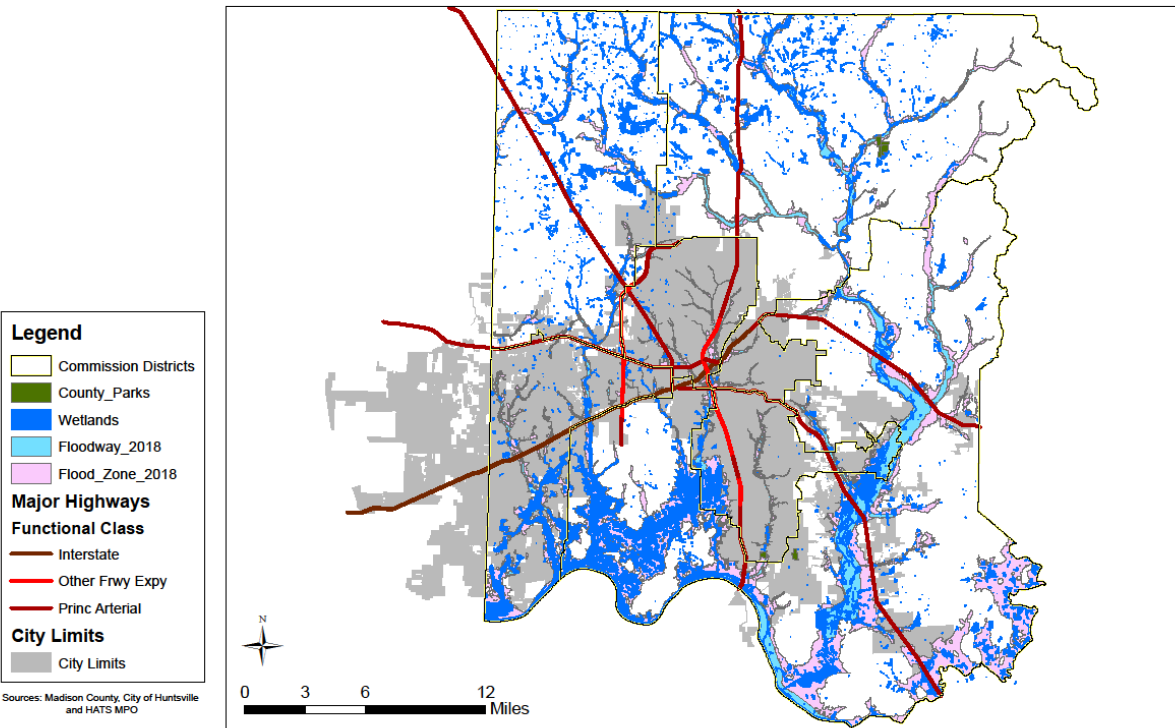
Map 7 illustrates significant traffic generators in the county. In contrast to previous maps illustrating employment growth, Map 7 shows the total employment forecast for each TAZ in the HATS area. Schools are shown on the map, as well as locations where the county engineering staff has collected traffic counts.

Environmental constraints to improvements on the road network are illustrated in Map 8. Best practices will avoid, minimize, or mitigate impacts on flood zones, wetlands and parklands depicted in Map 8.

Map 7: 2045 Employment, Traffic Count Locations, and Schools



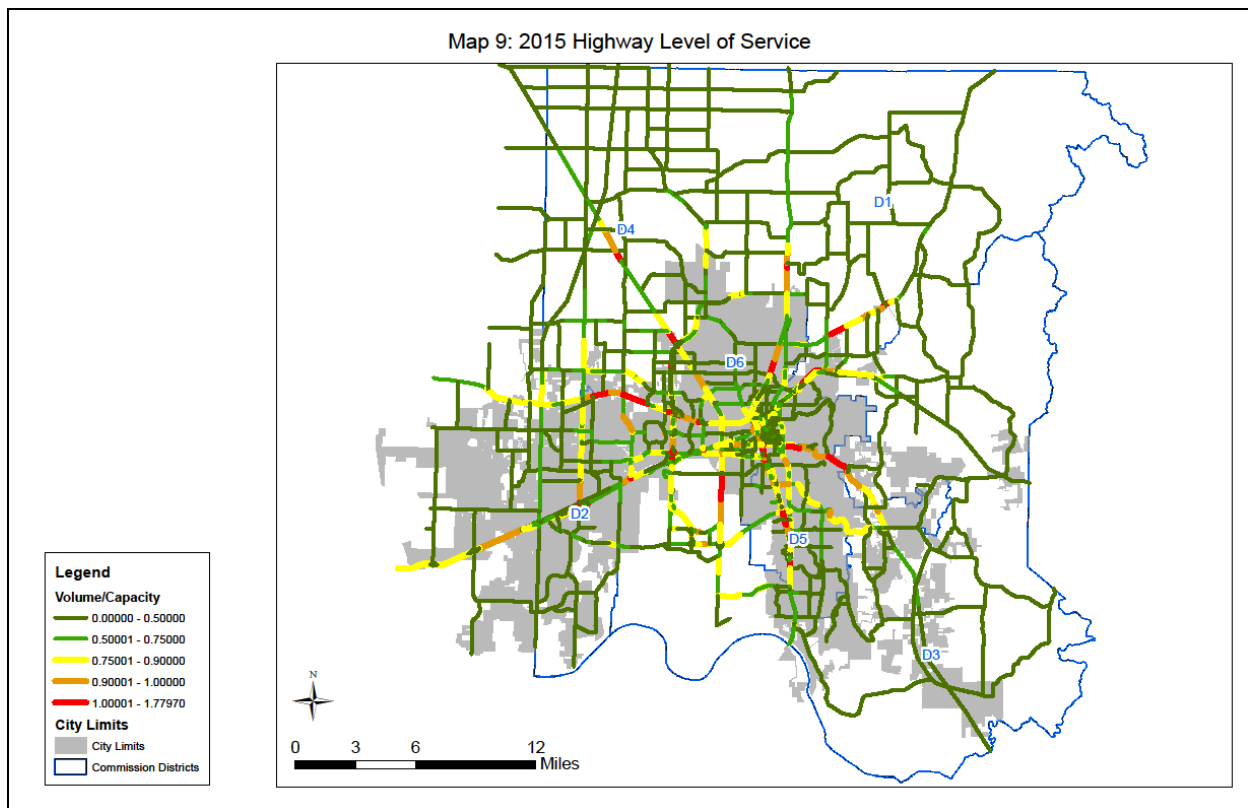
Map 8: Parks, Wetlands, Floodways and Floodplains



HATS Travel Model

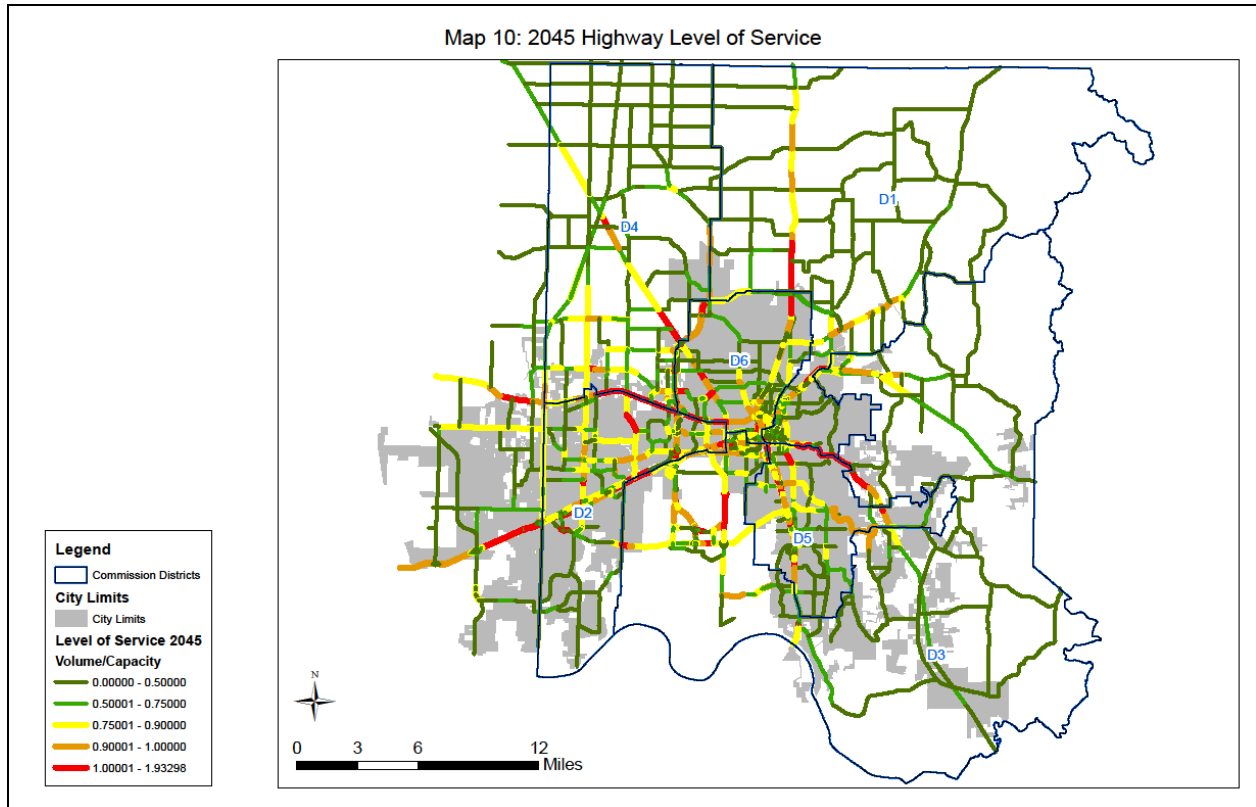
Existing 2015 traffic congestion from the HATS travel model is presented in Map 9. Generally, current congestion levels are low to acceptable in most of the study area. However, all the principal arterial highways are operating at or near capacity, with notable over-capacity traffic conditions along US 72 north of Madison, on East Winchester Road, and on State Route 53 near Harvest Road. Within the study area for this plan, existing congestion is most pronounced in the areas immediately north of Madison, along Capshaw Road and Wall-Triana Highway.

It is important to note that Map 9 is an estimate of congestion levels based on traffic assignment patterns in the HATS regional travel model, which are closely calibrated to match ALDOT traffic counts on the highway network. However, regional models are designed to identify regional traffic flows most accurately and are developed using regional assumptions and procedures that may not fully capture localized traffic congestion issues. In areas with very little non-residential development, a higher percentage of daily traffic occurs in very short peak periods than is the case in areas of mixed development. As a result, the regional model may underestimate peak period traffic congestion in rural residential areas, where 10 to 15 percent of daily traffic often occurs in the peak hour.



The regional travel model does not specifically identify intersection traffic congestion, although generally the volume-to-capacity ratio on the approaches to the intersection will effectively identify problem intersections as well as problem corridors.

Map 10 presents the traffic congestion forecast for 2045, which is based on the population and employment growth patterns presented above. Congestion levels worsen significantly on the principal arterial highway, with the most significant congestion in the study area being focused around Capshaw and Wall Triana Roads north of the City of Madison. This is largely a reflection of the level of population growth forecast for that part of the study area relative to the northeastern part of the study area. However, the residential growth forecast in the study area appears reasonable based on regional highway access and the location of major existing and expanding employment centers in the south and western portion of the HATS region.



Alternative Modes

Within the study area for this plan, alternative modes of transportation are difficult and costly to provide, and generally have little impact on traffic congestion levels. However, alternative modes are important to the least advantaged residents of the area and therefore should not be ignored.

Public transportation service is operated throughout the study area by Transportation for Rural Areas of Madison County (TRAM), is available to the general public, and is an important service to seniors and persons with mobility limitations. Funded with Federal Transit Administration (FTA) funds administered by ALDOT, with matching funds provided by Madison County, the service is an important one to ensure mobility for all county residents.

Bicycle and pedestrian facilities are difficult to provide cost effectively in low density areas. Some general principles should be considered that will improve safety for motorists, bicyclists, and pedestrians.

In commercial areas, pedestrians will be present, often walking to work at entry level jobs, so road improvement projects around restaurants and shopping centers should include sidewalks wherever feasible. Similarly, sidewalks should be considered within a one-mile radius of schools. Cost clearly will be a factor; while the actual concrete sidewalk may cost around \$200,000 per mile, the cost of drainage improvements will often drive costs two to five times higher. Generally, sidewalks in low density areas are most cost effective in projects where drainage improvements and curbs already are present or are necessary elements of a road improvement project.

Bicycle accommodations within the study area should be considered in conjunction with other roadway safety and maintenance improvements. The HATS LRTP identifies a limited network of bicycle routes in the study area, and on these roads bicycle accommodations should be included in future road improvements if possible. A two-foot paved shoulder provides a margin of safety for cyclists and will reduce run-off-the-road crashes by about 20 percent on many roads, while a four-foot paved shoulder can be designated as a bike lane and also will yield even greater reductions in run-off-the-road crashes.

HATS Long Range Transportation Plan Improvements

HATS LRTP projects that will increase highway capacity in the Madison County TMP study area are listed in Table 4. These projects are in the financially constrained listing of projects, which means they can be funded within the 2045 horizon of the plan. Blake Bottom Road has been proposed to be added to the current 2020-2023 HATS TIP; for the other projects a start date is not yet determined. In addition, a corridor study for Wall-Triana Highway from Nick Davis Road to US 72 is funded in the HATS 2020-2023 TIP at \$312,500.

Table 4

HATS Long Range Plan Highway Widening Projects in the Madison County Transportation Master Plan Study Area

Route	From	To	Project Scope	Length (mi)
Jeff Road (CR-19)	SR 53	Douglass Road	Add Lanes	3.2
Blake Bottom Road (CR-47)	Jeff Road	Research Parkway	Add Lanes	2.4
SR-53	Harvest Road	Taurus Drive	Add Lanes	0.8
US 72	County Line Road	Providence Main Road	Add Lanes	5.4

Unfunded needs – projects that would address problems on the highway network but cannot be funded by 2045 with known available funding streams – also are listed in the HATS plan. These needs include widening projects on Old Railroad Bed Road, Wall-Triana Highway, SR 53, US 231 north, eastern Winchester Road, and an Eastern Bypass route near Gurley.

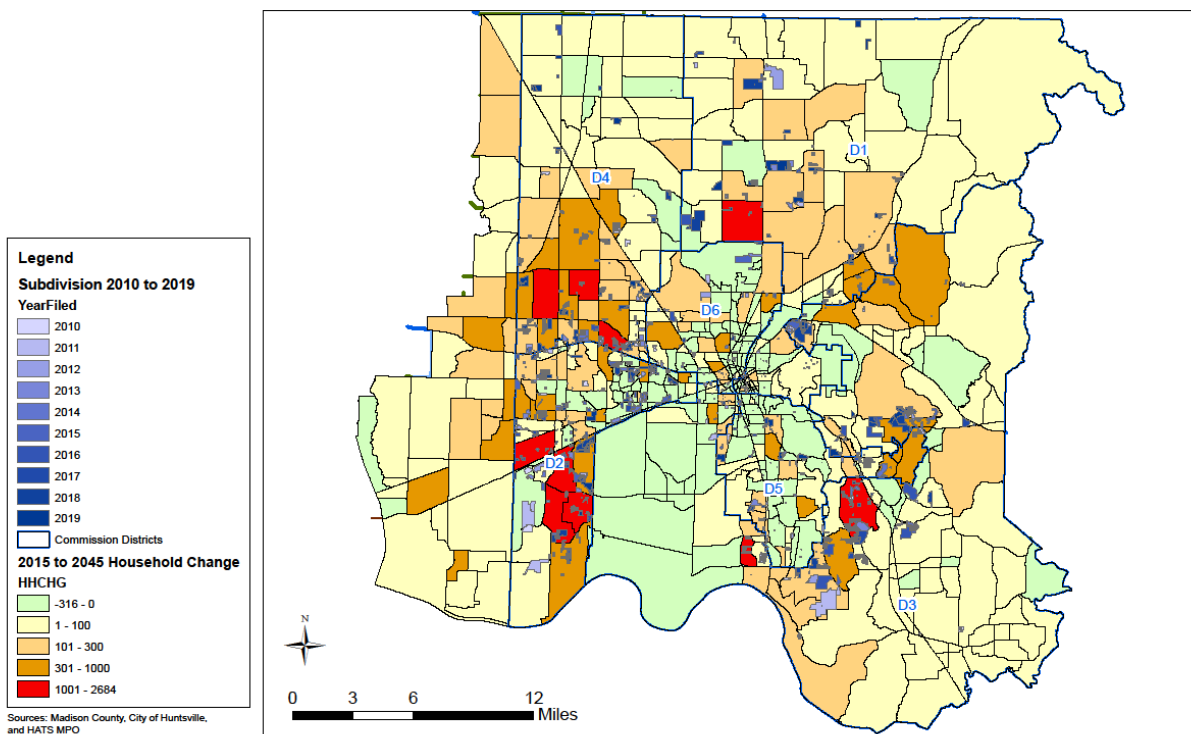
3. Growth Forecast

For the travel demand modelling performed for this study, minor adjustments were made in the population and household growth forecast used for the HATS Long Range Transportation Plan. The total amount of growth was not changed but was reallocated to reflect current subdivision trends in the unincorporated area of the county. Generally, growth is shifted from the northwestern quadrant to the northeastern quadrant of the county.

3.1. HATS Growth Forecast

Map 11 shows the distribution of household growth from 2015 to 2045 that is forecast in the HATS plan. The most intense growth is focused on the western part of the planning area.

Map 11: Household Change 2015 to 2045, CURRENT Model



3.2. Adjusted Growth Forecast

Map 12 shows the distribution of growth as adjusted for this County Transportation Master Plan. While this change is relatively minor in terms of the location of growth, it does have some impacts on the level of congestion that is forecast for some key highway facilities in 2045. Table 5 presents the adjustments in the growth forecast by Commission District.

Map 12: Household Change 2015 to 2045, Alternative Growth

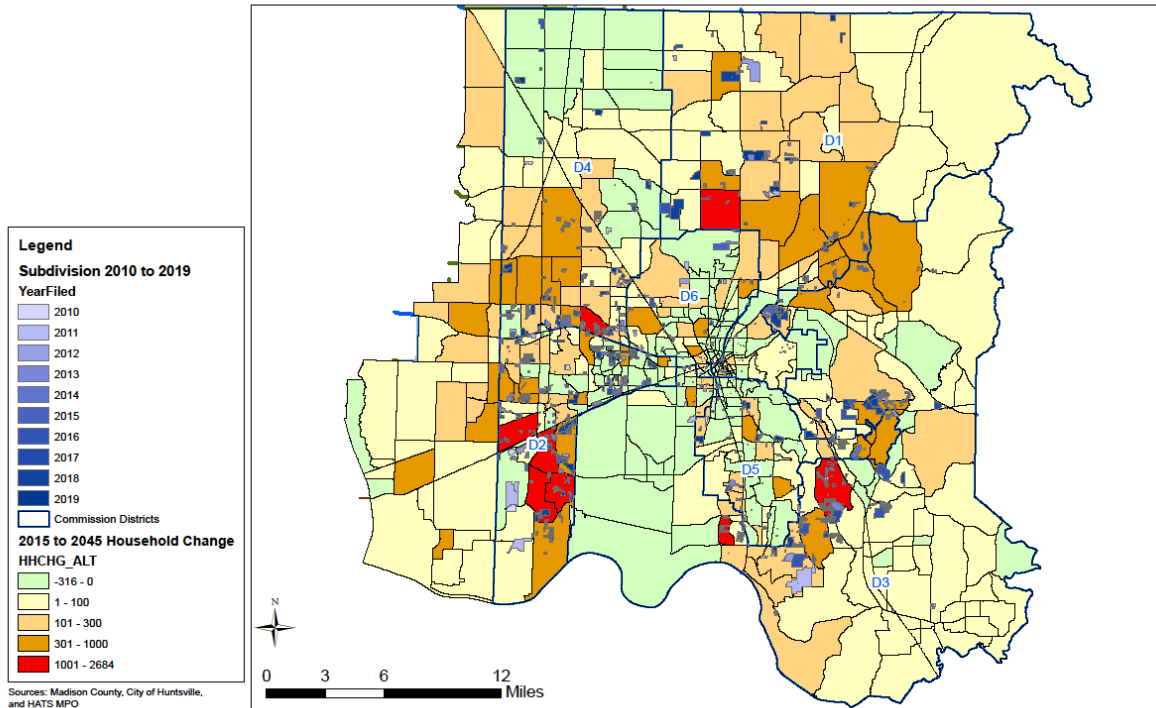


Table 5
2045 Household Forecast in Commission Districts 1 and 4

District	Current HATS Model	Alternative Growth Scenario	Change
District 1	21,322	25,249	3,927
District 4	28,986	25,059	(3,927)
Total	50,308	50,308	(0)

4. Identification of Project Needs

Projects were identified utilizing the following four (4) factors:

- County Official and Staff Input
- Travel Model Analysis
- Connectivity Needs
- Crash Analysis

These factors and their use are discussed in more detail in the following subsections. Identified projects fell into the following three (3) project categories:

- [Widening Projects](#) – Roadway corridors in which additional through lanes and/or center turn lane should be considered either now or in the future.
- [Intersection Projects](#) – Roadway intersections that exhibit travel congestion and/or those that exhibit an elevated accident rate.
- [Connectivity Projects](#) – New roadways that if constructed will provide congestion relief on surrounding and/or parallel routes.

4.1. County Official and Staff Input

The Madison County Commission is divided into six (6) districts covering areas of Madison City, Huntsville City, and the County itself. To take advantage of each County Commissioners knowledge of his or her districts project needs, a questionnaire was developed along with a map and distributed to assist with developing a list of priority projects. The questionnaire included the following five (5) questions to develop a high priority list:

1. If you could improve three roads in your district, which ones would you improve? Also explain what Improvements you would make (add turn lanes, repair pavement, widen the road, improve drainage, etc.?) (Please place the location on the included map.)
2. List five intersections that need improvements (Please place location on included map).
3. Growth in the unincorporated County is very spread out. Would you prefer to see this pattern of growth continue, or should the same amount of growth be focused in a few more compact areas?
4. Some fast-growing regions apply a vehicle registration tax, a road user fee, or a sales tax to generate revenue for transportation improvements. Some areas dedicate general fund revenues to road improvements. Should any of these sources be considered as a potential source of funding for projects in the transportation master plan?
5. In many cases, the greatest future needs for road improvements occur on the edge of an incorporated area and may be annexed into a city in the near future. Should this transportation master plan avoid prioritizing projects in specific areas near existing city limits? E.G., are there areas that are likely to be annexed in the next few years that you are aware of? Please describe below.

The questionnaire was utilized by the County Commissioners and Madison County Engineering staff to discuss project needs internally and develop a list that was then shared with the consultant to start organizing the projects by ranking.

4.2. Travel Model Analysis

The HATS travel model, with the growth adjustments discussed above, was used to identify potential road widening projects based on projected 2045 congestion levels.

4.3. Connectivity Needs

Connectivity projects were identified by reviewing the existing roadway network and looking for potential missing links that may provide appreciable benefit to reducing congestion in the surrounding roadways. Ten potential new minor road connections were evaluated using the HATS travel model. Of the ten projects evaluated, two (2) showed considerable benefits and are included in the list of projects recommended by this plan.

4.4. Crash Analysis

Crash data from CARE portal for 2014 to 2018 was mapped and evaluated to determine crash rates by highway segment. However, the maps used for the analysis cannot be published due to restrictions on the data.

4.5. Combined Evaluation Criteria

Intersection and widening projects were evaluated using the criteria and point system below. Please note that Level of Service (LOS) is a metric used to determine how well a transportation facility is operating from the traveler's perspective. Six (6) levels are defined, and each is assigned a letter designation from A to F, with LOS A representing the best operating conditions and LOS F the worst. The crash rate is expressed as crashes per million vehicle miles traveled (MVMT).

- Congestion – Year 2015 and 2045 Level of Service (LOS) for Each Approach
 - 1 point for LOS C
 - 2 points for LOS D
 - 3 points for LOS E
 - 4 points for LOS F
- Crash Rate for Each Approach
 - 2 points for 1.0 to 3.0 crashes per MVMT
 - 4 points for 3.0 to 5.0 crashes per MVMT
 - 7 points for 5.0 to 10.0 crashes per MVMT
 - 12 points for greater than 10.0 crashes per MVMT

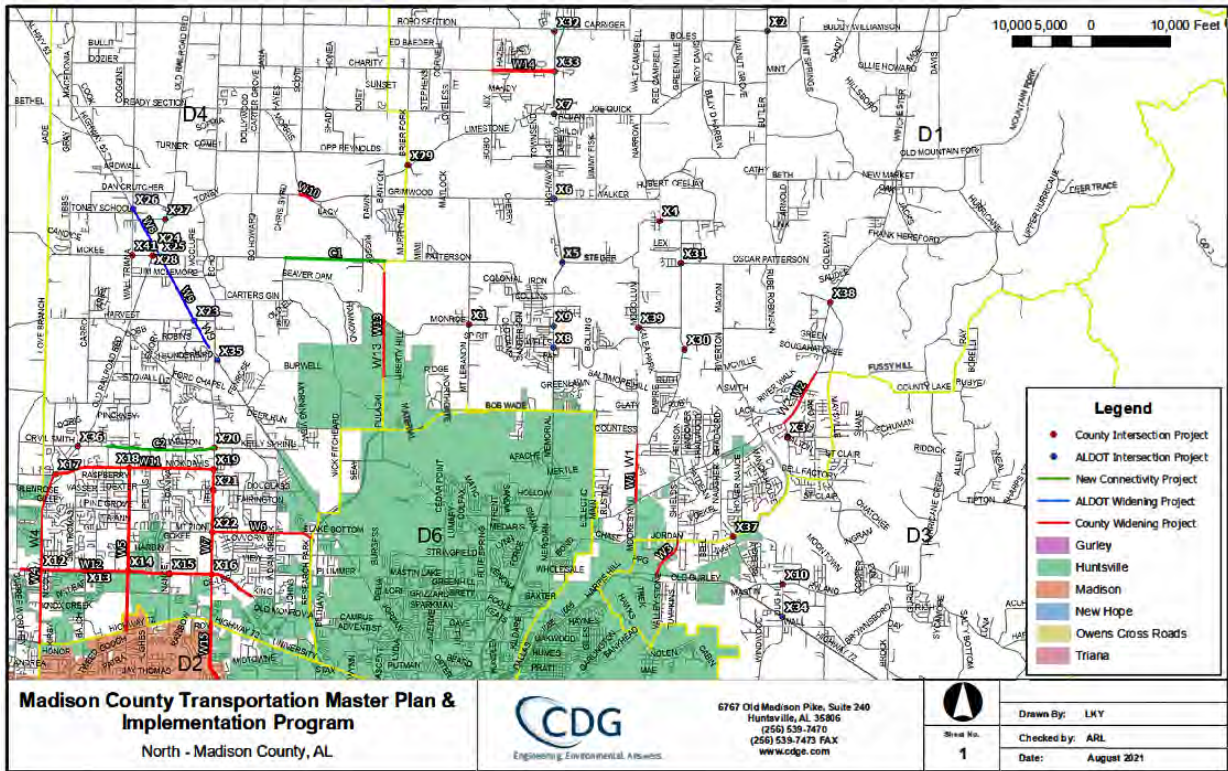
Connectivity projects were evaluated on the basis of the projected traffic volumes and corresponding reduction in volume on adjacent roadways and intersections.

4.6. Projects Identified for Consideration in the Plan

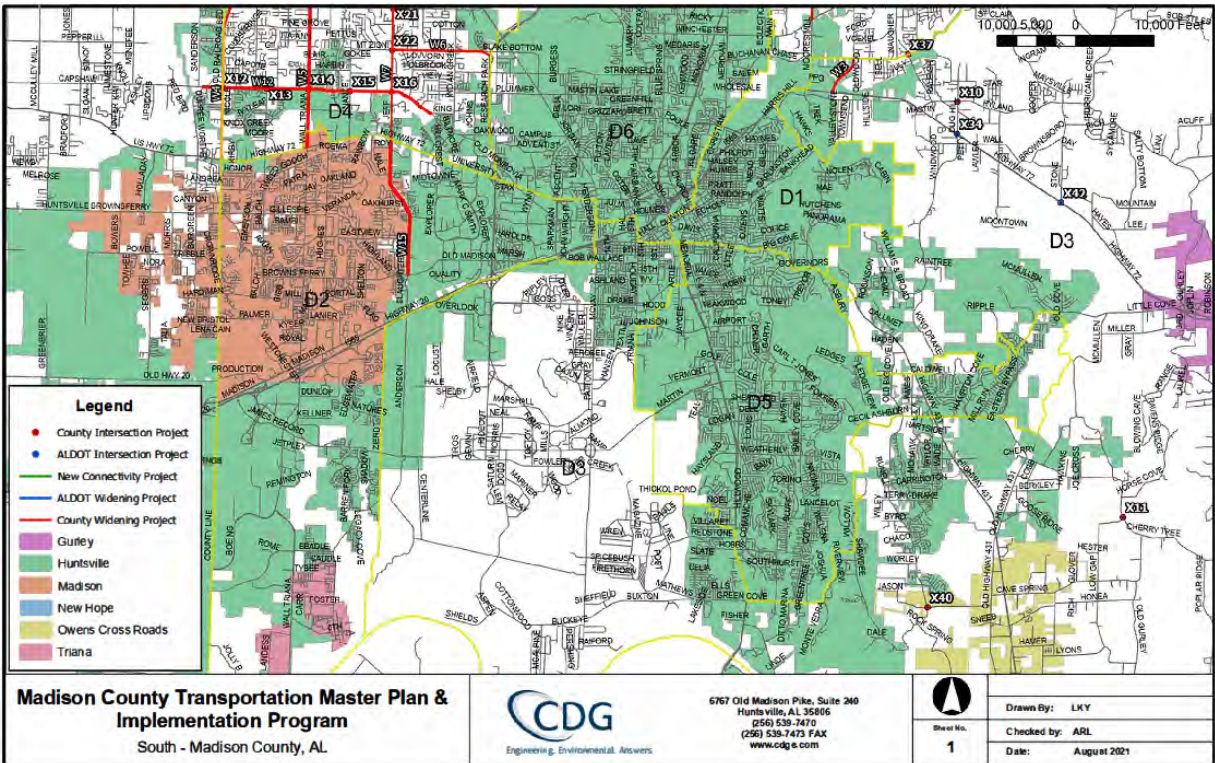
Potential projects were identified based on the factors above and are shown in Maps 13 and 14 below, as well as within Appendix A.

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Map 13
Identified Projects – North



Map 14
Identified Projects – South



4.7. Access Management Recommendations

In addition to the identification of project needs based on the criteria above, access management strategies were weighed to promote not only the safety of the traveling motorists but also the efficiency of travel along the County's transportation network. These access management recommendations are included as Appendix D to this report.

5. Cost Estimates and Identified Projects

Project costs were estimated using a combination of the previously estimated projects in the Huntsville Area Transportation Study Long Range Transportation Plan (HATS LRTP) and ALDOT's preliminary cost estimate chart. Several of the widening projects were equivalent to or coincided with projects that were evaluated and estimated in the HATS LRTP. For these projects, the previously estimated cost was scaled up or down to the portion of the equivalent or comparable project based on the length of the projects. That scaled value was then adjusted using the Bureau of Labor Statistics' consumer price index (CPI). The cost was adjusted from the August 2015 HATS LRTP estimate to the equivalent cost in February of 2021, the latest CPI available at the time of the cost estimation.

For the remainder of the projects, costs were initially estimated using the ALDOT preliminary cost estimate chart. The chart provided preliminary construction, right of way and utility costs per mile of roadway types, and it also provided modification factors to account for number of lanes, types of intersections, and other design characteristics. The rates provided in this chart were applied to the lengths of expected work at each project, along with the modification factors that applied to each specific project.

However, the ALDOT preliminary cost estimate chart was last updated in 2010. So, to calibrate its rates, the ALDOT rates were brought forward to current dollars. Therefore, the projects not found in the HATS LRTP were estimated using the calibrated version of the ALDOT preliminary cost estimate chart.

In addition to the calibrated base rates, standard rates for mobilization, geometric controls and construction fuel were incorporated into the total construction cost for each project not found in the HATS LRTP. Preliminary engineering fees were then calculated as ten percent of the estimated construction costs. The costs for preliminary engineering, construction, utilities and right of way were rounded to the nearest hundred and summed for estimated total costs, which can be seen in Tables 8a, 8b, 8c, 8d and 8e below. Please note that expanded tables can also be found in Appendix B.

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Table 8a
Cost Estimates by Intersection Project in ALDOT Jurisdiction

District	Project #	Primary Route		Secondary Route	Combined Score	Estimated Total Cost
1	X5	US 231	at	Steger Road	5	\$ 1,831,500
1	X6	US 231	at	Walker Lane/Grimwood Road	13	\$ 3,197,200
1	X7	US 231	at	Joe Quick Road	8	\$ 843,700
1	X8	US 231	at	Wells Rd/Meridianville Bottom Rd	9	\$ 1,439,300
1	X9	US 231	at	Monroe Road	9	\$ 554,500
4	X23	AL Highway 53	at	Harvest Road	12	\$ 5,269,500
4	X24	AL Highway 53	at	Old Railroad Bed Road	13	\$ 6,023,700
4	X25	AL Highway 53	at	McKee Road	8	\$ 3,464,000
4	X26	AL Highway 53	at	Wall Triana Highway	9	\$ 1,625,400
1	X33	US 231	at	Charity Lane	9	\$ 42,000
3	X42	AL Highway 72	at	Brock Road		\$ 1,040,700
3	X34	AL Highway 72	at	Dug Hill Road	9	\$ 1,172,700
4	X35	AL Highway 53	at	Jeff Road	7	\$ 746,400

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Table 8b
Cost Estimates by Intersection Project in Madison County Jurisdiction

District	Project #	Primary Route		Secondary Route	Combined Score	Estimated Total Cost
1	X1	Monroe Road	at	Mt. Lebanon Road	2	\$ 2,224,600
1	X2	Butler Road	at	Buddy Williamson Road	2	\$ 32,600
1	X3	Bell Factory Road	at	Steakley Rd	2	\$ 489,100
1	X4	Moore's Mill Road	at	Steger Road	2	\$ 413,300
3	X10	Ryland Pike	at	Dug Hill Road	7	\$ 1,003,300
3	X11	Cherry Tree Road	at	Low Gap Road	4	\$ 728,400
4	X12	Capshaw Road	at	Old Railroad Bed Road	5	\$ 2,109,800
4	X13	Capshaw Road	at	Balch Road/Ramsbrook Road	1	\$ 2,851,500
4	X14	Capshaw Road	at	Wall Triana Highway	10	\$ 5,436,200
4	X15	Capshaw Road	at	Nance Road	6	\$ 3,927,800
4	X16	Capshaw Road	at	Jeff Road	5	\$ 1,658,400
4	X17	Nick Davis Road	at	Old Railroad Bed Road	6	\$ 1,329,600
4	X18	Nick Davis Road	at	Wall Triana Highway	9	\$ 2,109,800

MADISON COUNTY TRANSPORTATION MASTER PLAN

**Table 8b (Cont.)
Cost Estimates by Intersection Project in Madison County Jurisdiction**

District	Project #	Primary Route		Secondary Route	Combined Score	Estimated Total Cost
4	X19	Nick Davis Road	at	Jeff Road	10	\$ 755,600
4	X20	Jeff Road	at	Kelly Spring Rd	4	\$ 957,300
4	X21	Jeff Road	at	Douglass Road	6	\$ 2,109,800
4	X22	Jeff Road	at	Blake Bottom Road	2	\$ 2,664,400
4	X27	Old Railroad Bed Rd	at	Toney Road	7	\$ 1,843,200
4	X28	Old Railroad Bed Rd	at	McKee Road	7	\$ 32,600
1	X29	Limestone Road	at	Brier Fork Road	12	\$ 175,300
1	X30	Moore's Mill Road	at	Darwin Road	4	\$ 533,400
1	X31	Moore's Mill Road	at	Oscar Patterson Road	9	\$ 1,063,900
1	X32	Bobo Section Road	at	Flood Lane	12	\$ 946,800
4	X36	Old Railroad Bed Rd	at	Orvil Smith Rd/Lockhart Rd	0	\$ 559,100
1, 3	X37	Jordan Road	at	Homer Nance Road	2	\$ 925,000
1	X38	Maysville Road	at	Winchester Road	0	\$ 876,600

MADISON COUNTY TRANSPORTATION MASTER PLAN

Table 8b (Cont.)
Cost Estimates by Intersection Project in Madison County Jurisdiction

District	Project #	Primary Route		Secondary Route	Combined Score	Estimated Total Cost
1	X38	Maysville Road	at	Winchester Road	0	\$ 876,600
1	X39	Eakins Road	at	McCollum Road	0	\$ 493,500
3	X40	Old Big Cove Road	at	Knotty Walls Road	0	\$ 292,500
4	X41	Wall Triana Highway	at	McKee Road	0	\$ 1,409,100

MADISON COUNTY TRANSPORTATION MASTER PLAN

Table 8c
Cost Estimates by Widening Project in ALDOT Jurisdiction

District	Project #	Route Name	From	To	Length (miles)	Combined Score	Estimated Total Cost
4	W8	AL Highway 53	Wall Triana Hwy	Old Railroad Bed Road	1.10	6	\$9,303,400
4	W9	AL Highway 53	Old Railroad Bed Road	North of Jeff Road	2.80	9	\$28,751,800

MADISON COUNTY TRANSPORTATION MASTER PLAN

Table 8d
Cost Estimates by Widening Project in Madison County Jurisdiction

District	Prj #	Route Name	From	To	Length (miles)	Combined Score	Estimated Total Cost
1	W1	Moore's Mill Road	Winchester Road	Bob Wade Ext.	1.12	5	\$4,130,100
1	W2	Winchester Road	Bell Factory Road	County Lake Road	1.42	6	\$5,591,800
3	W3	Shields Road	Jordan Road	Lee Highway (US 72)	1.02	4	\$3,464,700
4	W4	Old Railroad Bed Road	Nick Davis Road	Lee Highway (US 72)	4.13	5	\$15,905,600
4	W5	Wall Triana Hwy	Nick Davis Road	Lee Highway (US 72)	3.88	6	\$32,592,400
4	W6	Blake Bottom Road	Jeff Road	Dr. MLK Jr. Hwy (SR 255)	2.41	4	\$9,259,700
4	W7	Jeff Road	Nick Davis Road	North of Lee Hwy	3.18	3	\$27,939,100
4	W10	Pulaski Pike	Morris Road	Grimwood Road	0.38	10	\$2,048,500
4	W11	Nick Davis Road	Jeff Road	Old Railroad Bed Road	3.84	6	\$15,785,300
4	W12	Capshaw Road/Old Monrovia Road	East of King Road	Dupree Worthy Road	5.21	7	\$34,968,200
1, 4	W13	Pulaski Pike	Prosperity Drive	Patterson Lane	2.84	9	\$18,115,300
1	W14	Charity Lane	US 231/431	Nix Rd/Frank Patterson Rd	1.48	N/A	\$9,519,500
2	W15	Slaughter Road	Madison Pike	AL Highway 72	3.38	N/A	\$21,589,300

Table 8e
Cost Estimates by Connectivity Projects in Madison County Jurisdiction

District	Project #	Route	Length (miles)	Notes	Estimated Total Cost
1, 4	C1	Bo Howard Road -- Patterson Lane Connector	2.37	2 lane road, realign Patterson Ln, bridge required	\$ 13,474,600
4	C2	Orvil Smith Road --- Kelly Spring Road Connector	2.65	3 lane or 5 lane section	\$ 22,412,500

6. Financial Plan

Madison County currently has a \$4 million capital improvement program, funded through the Rebuild Alabama Act and a current bond issue, which focuses on county road resurfacing, bridge replacement and pavement marking improvements. Additionally, the Rebuild Alabama Act makes available funding through their ATRIP II and RAA grant programs if qualifying criteria of each program are met.

A consistent source of funding for major roadway capacity improvement projects is Federal Highway Administration (FHWA) funds apportioned by ALDOT to the Huntsville Area Metropolitan Planning Organization (MPO). However, all currently anticipated FHWA funds are identified and associated with projects in the HATS financially constrained plan through year 2045, leaving little available funds for projects that will benefit the Madison County TMP study area for the Madison County TMP are listed above in Table 4.

A federal motor fuel tax increase would presumably increase the level of MPO funding that flows through ALDOT and could be a good source for funding improvements on any of the federal-aid eligible routes in the study area. Other federal infrastructure bills are expected to emerge following the COVID-19 pandemic to help generate economic recovery; it would be strategically wise to develop at least one “shovel ready” project that could be proposed for any stimulus grant funds that may become available in the next year.

Where large subdivisions or commercial developments are proposed, developers may be required to make improvements to adjacent roads that are reasonably related to the traffic impact of the development. These types of developer-funded improvements can be a critical element to preserving acceptable traffic flow and operational safety on the predominantly two-lane road network in the study area.

The Highway Safety Improvement Program (HSIP) is another option for safety-oriented projects that seek to reduce crashes by employment of provision crash reduction countermeasures. This funding may be especially applicable to intersection related projects identified within the Madison County TMP.

The Alabama Industrial Access Road and Bridge Program (IAR) can be pursued for projects that benefit a new or expanding industry.

The Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Transportation Discretionary Grant program could be applied to Madison County TMP projects if they can demonstrate they seek to achieve regional or national objectives.

6.1. Potential Funding Sources

Currently there are about eight (8) potential funding sources that could be beneficial in accomplishing the improvements that have been identified in the previous sections of the document. These funding sources along with a brief description of what they can be used for are as follows:

- **Alabama Transportation Rehabilitation and Improvement Program-II (ATRIP-II)**
 - Rehabilitates and improves transportation infrastructure on ALDOT maintained roadways by funding projects that contribute to state economic growth, safety, and stability.
- **Rebuild Alabama Act (RAA)**
 - Provides maintenance and construction of roads and bridges.
- **Alabama Industrial Access Road (IAR) and Bridge Corporation**
 - Provides adequate public access for new or expanding industries that are committed to new investment and the creation of new jobs.
- **Transportation Alternatives Set-Aside Program (TAP)**
 - A cost reimbursement program that provides new transportation alternatives or enhances existing non-motorized transportation infrastructure.
- **Highway Safety Improvement Plan (HSIP)**
 - AC#1 Reducing Rural Lane Departures
 - AC#2 Intersection Related Projects
 - AC#3 Safe Transportation for Pedestrians
- **High Risk Rural Roads (HRRR)**

A subset of HSIP funding that aims to rehabilitate and improve roadways classified as rural major or minor collectors or rural local roads with significant safety risks. Please note the HRRR program is initiated based on the rolling 5-year average fatality rate on rural roads statewide and therefore may not always be available.
- **Metropolitan Planning Organization (MPO)**
 - Gives funding and procedural requirements for multi-modal transportation planning in metropolitan areas and qualifying states. Results in long-range plans and short-range programs of investment priorities.

- **Rebuilding American Infrastructure with Sustainability and Equity (RAISE)**
 - Invests in road, rail, transit, and port projects that achieve national objectives. Formerly BUILD, TIGER.

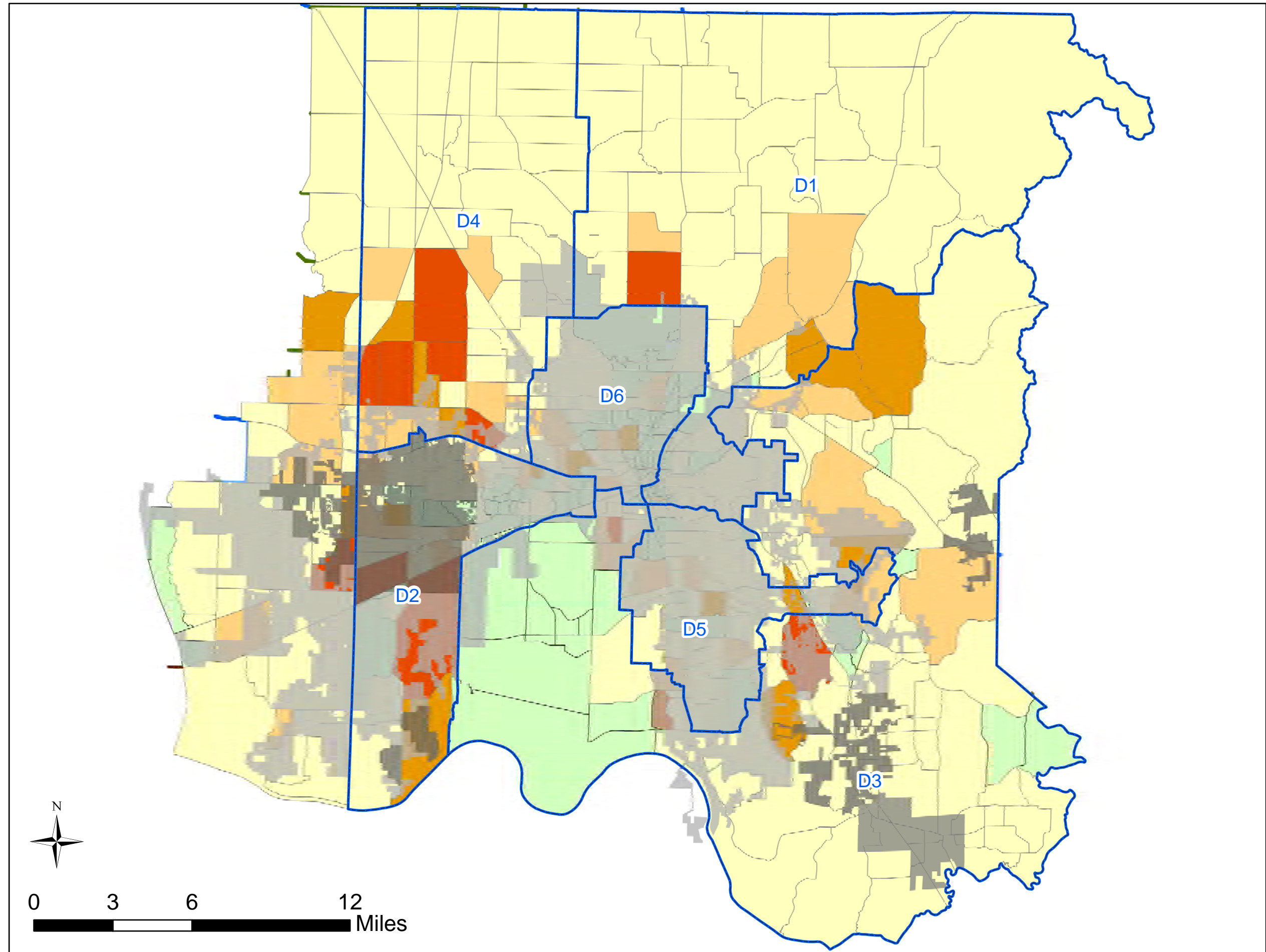
6.2. Funding Availability

Appendix C contains Table 9, which outlines the funding sources and summarizes the responsible agency, amount of funds available, when these funds are available and which project costs are eligible for the funding source. While funding sources are constantly changing, these are the most current funds available at the time of this document.

APPENDIX A: PROJECT MAPS



Map 1: Population Forecast 2015 to 2045



Legend

Commission Districts

City Limits

City Name

Madison

Huntsville

Gurley

New Hope

Owens Cross Roads

Triana

2045 Population Forecast

Population Change

-886 to 0 persons

0 to 499 persons

500 to 999 persons

1000 to 1,999 persons

2000 to 6,605

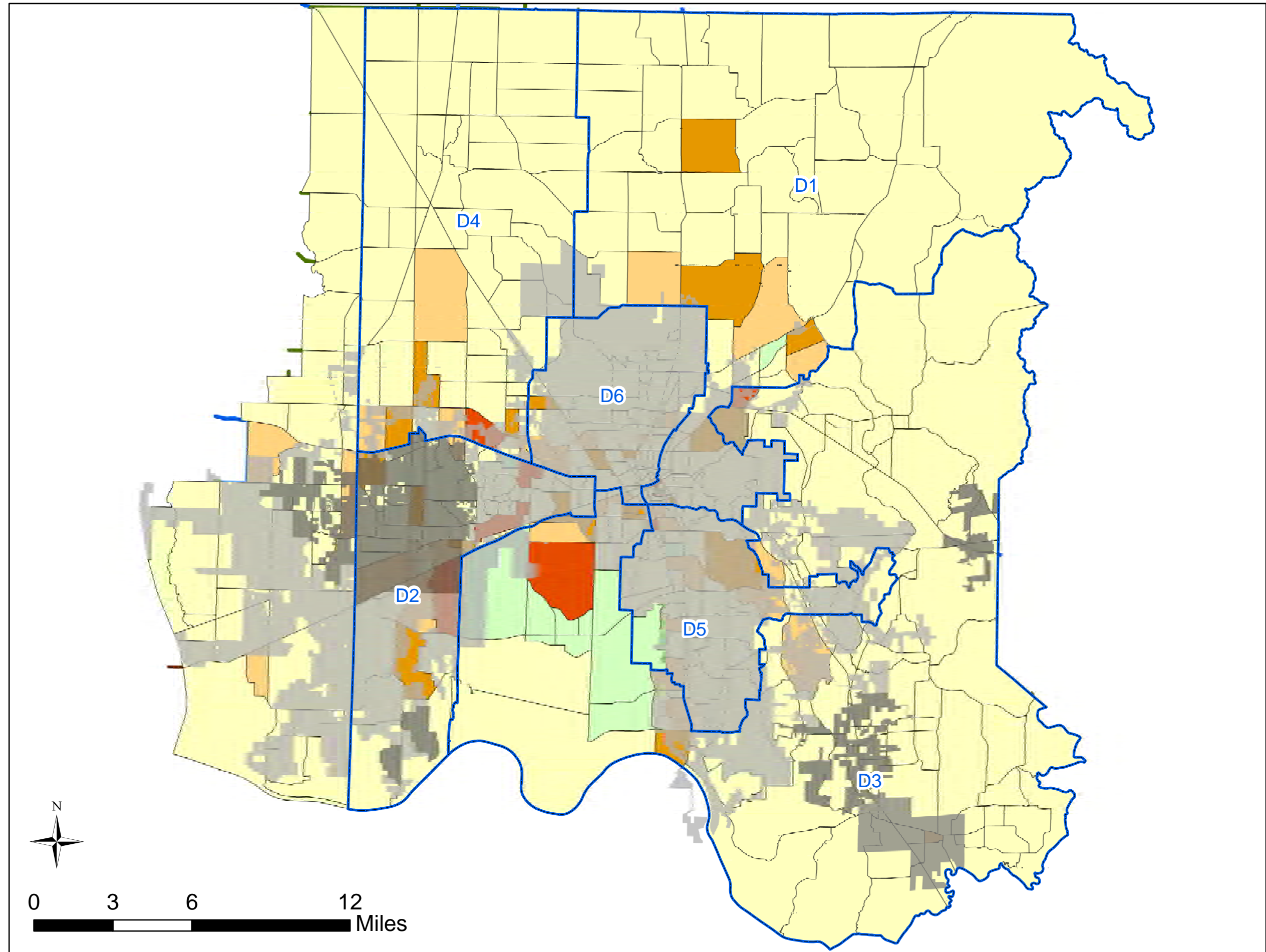
Sources: Madison County, City of Huntsville, and HATS MPO

Table 2
2019 Leading Employers
Huntsville/Madison County, Alabama

Company	Industry	Employees
U.S. Army/Redstone Arsenal	Government	37,000
NASA/Marshall Space Flight Center	Government	6,500
Huntsville Hospital	Health Care	6,341
Huntsville City Schools	Education	3,000
The Boeing Company	Research & Development	2,900
Madison County Schools	Education	2,389
SAIC	Research & Development	2,277
City of Huntsville	Government	2,206
University of Alabama in Huntsville	Education	1,660
ADTRAN, Inc.	Telecommunications, Mfg	1,549
Technicolor	Compact Disc, Mfg	1,450
Toyota Motor Manufacturing Alabama, Inc.	Automotive Engine, Mfg	1,350
Hexagon US Federal	Software Development	1,325
Madison County Commission	Government	1,242
Alabama A&M University	Education	1,207
Northrop Grumman Corporation	Research & Development	1,100
KBRwyle	Research & Development	1,085
Dynetics, Inc.	Research & Development	1,038
Madison City Schools	Education	976
Polaris Industries	Utility Vehicle, Mfg	950
Crestwood Medical Center	Health Care	920
Alorica	Customer Service Center	800
Teledyne Brown Engineering	Research & Development	794
Lockheed Martin Corporation	Research & Development	764
PPG Aerospace	Aircraft Glass, Mfg	750
Sanmina	Electronics, Mfg	702
Science and Engineering Services	Aviation Intergration	692
Redstone Federal Credit Union	Finance	681
Huntsville Utilities	Utilities	642
COLSA Corporation	Research & Development	635

Source: Huntsville/Madison County Chamber, March 2019

Map 2: Retail Employment Forecast 2015 to 2045



Legend

Commission Districts

City Limits

City Name

- Madison
- Huntsville
- Gurley
- New Hope
- Owens Cross Roads
- Triana

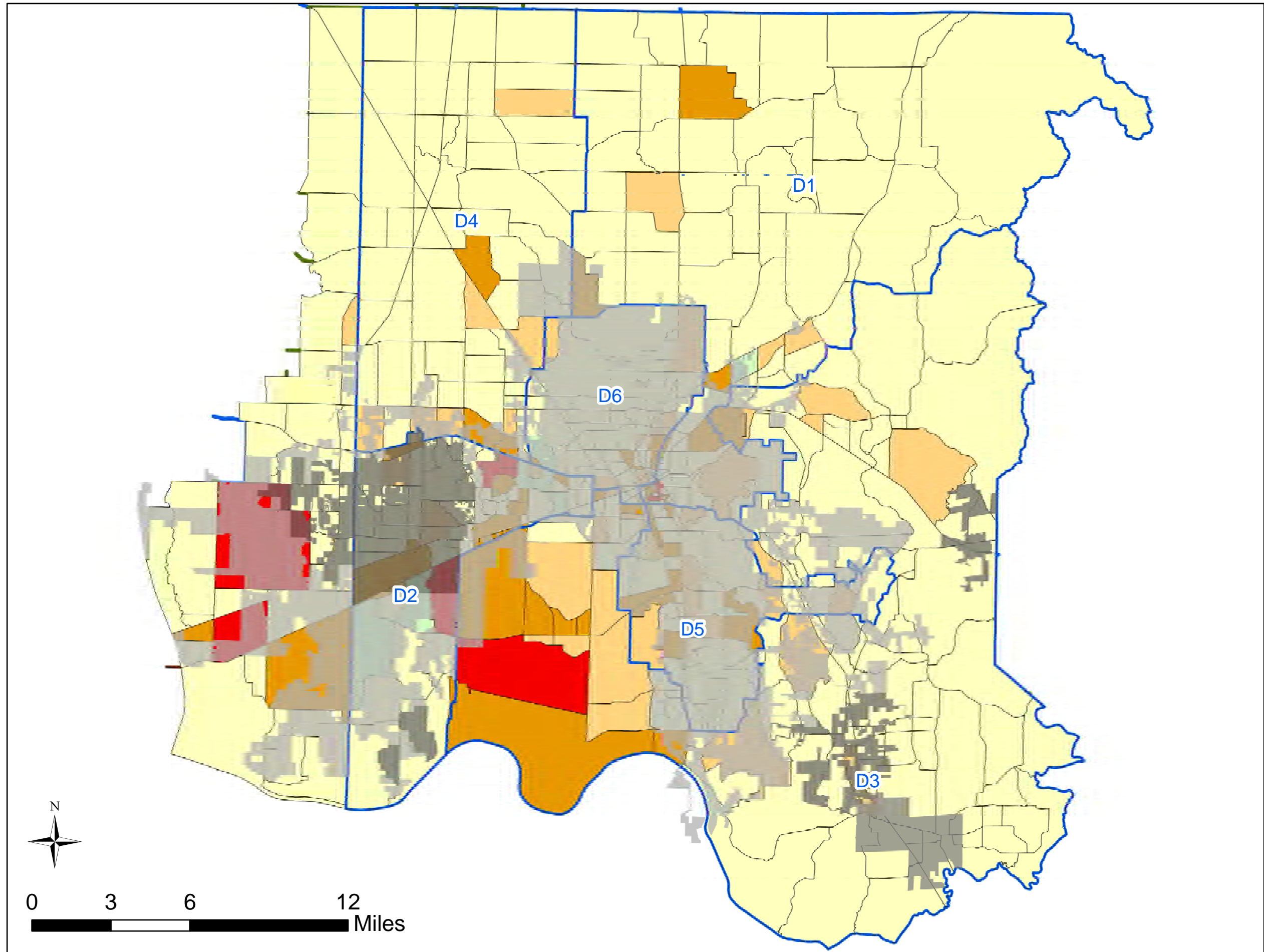
2045 Retail Forecast

Employment Change

- 287 to -9 persons
- 10 to 24 persons
- 25 to 99 persons
- 100 to 249 persons
- 250 to 1129 persons

Source: Madison County, City of Huntsville, and HATS MPO

Map 3: Non-Retail Employment Forecast 2015 to 2045



Legend

Commission Districts

2045 Non-Retail Forecast

Employment Change

- 511 to -24 persons
- 25 to 24 persons
- 25 to 99 persons
- 100 to 499 persons
- 500 to 3988 persons

City Limits

City Name

- Madison
- Huntsville
- Gurley
- New Hope
- Owens Cross Roads
- Triana

Source: Madison County, City of Huntsville, and HATS MPO











Map 4: County Water Lines and Subdivision History

Legend











 Commission Districts

Subdivision 2010 to 2019

Year Filed







-  2010
-  2011
-  2012
-  2013
-  2014
-  2015
-  2016
-  2017
-  2018
-  2019

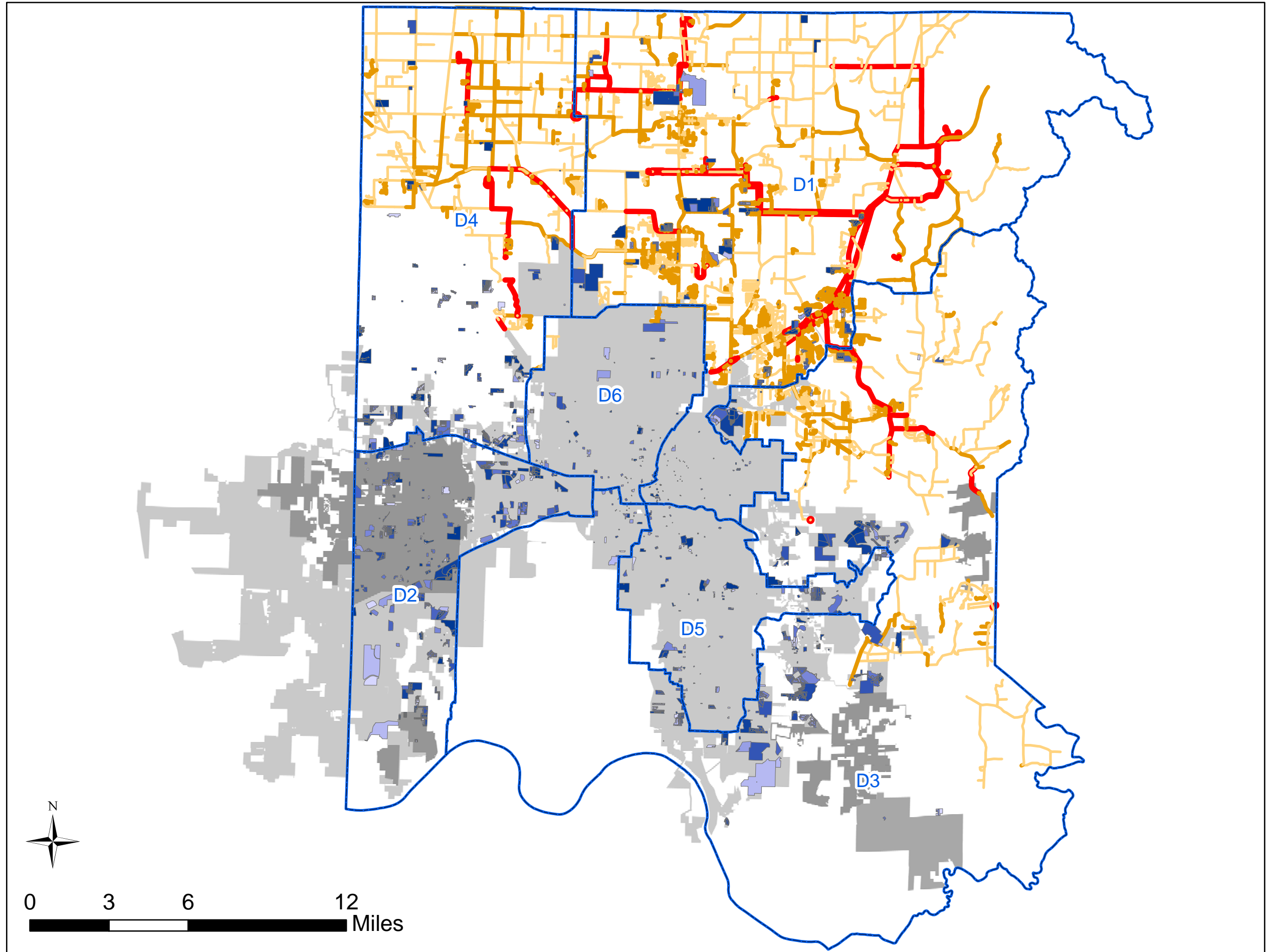
Water Lines

-  PIPE 48
-  PIPE 24
-  PIPE 18
-  PIPE 16
-  Pipe 14
-  Pipe 12
-  PIPE 10
-  PIPE 8
-  PIPE 6
-  PIPE 4

City Limits

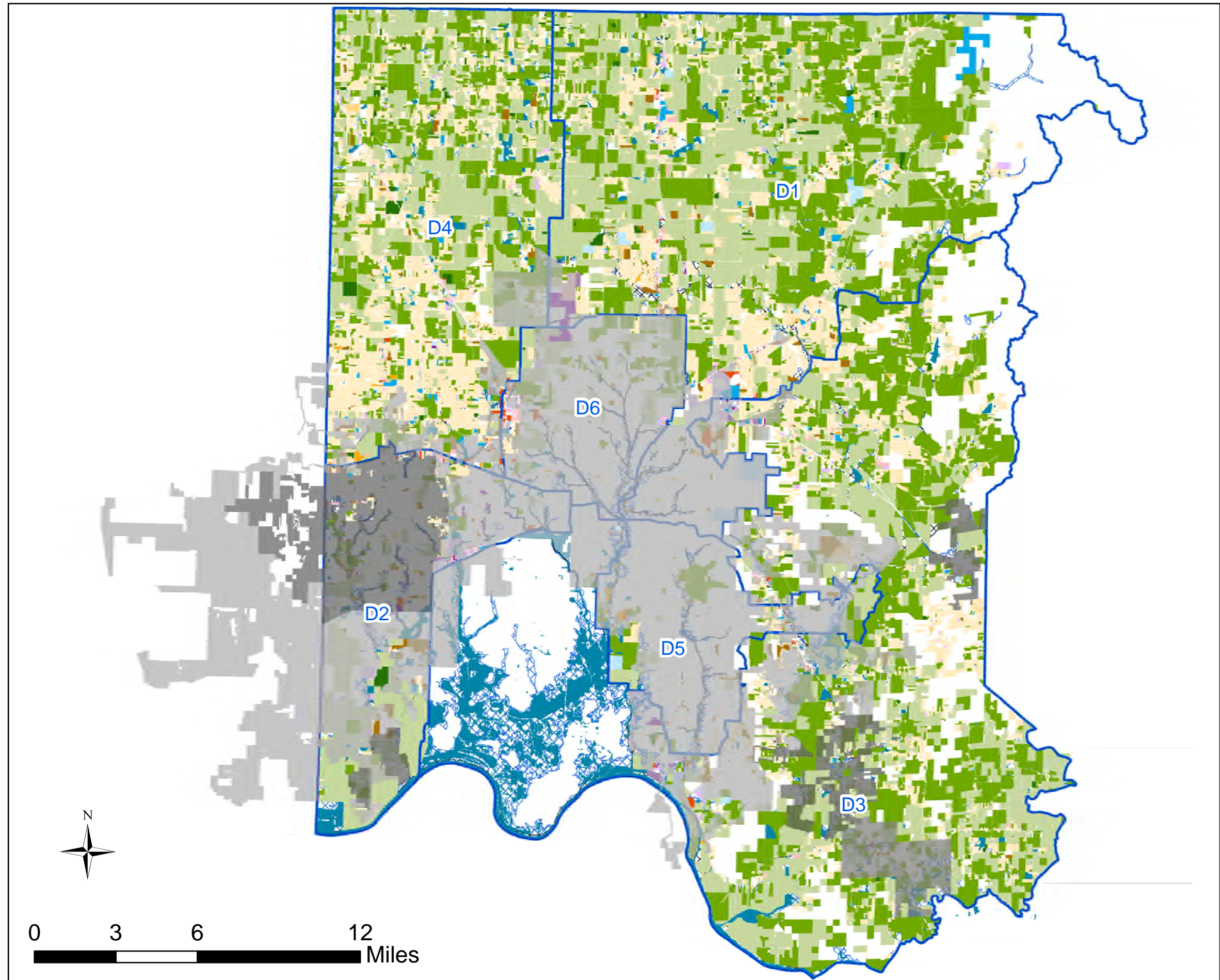
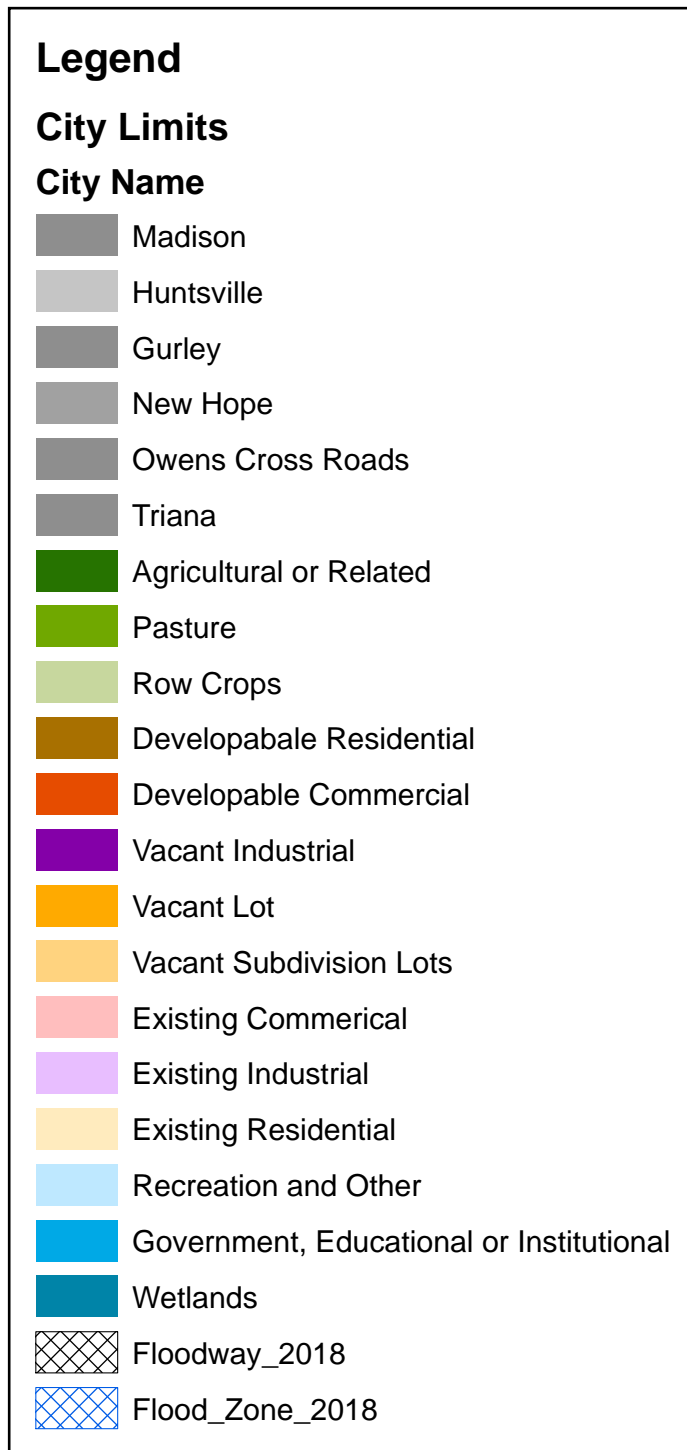
City Name

-  Madison
-  Huntsville
-  Gurley
-  New Hope
-  Owens Cross Roads
-  Triana



Sources: Madison County, City of Huntsville and HATS MPO

Map 5: Existing Land Use



Sources: Madison County, City of Huntsville

Map 6: Highway Functional Classification and Other Minor Roads

Legend

Federal Aid Highways

Functional Class

- Interstate
- Other Freeways
- Principal Arterial
- Minor Arterial
- Major Collector

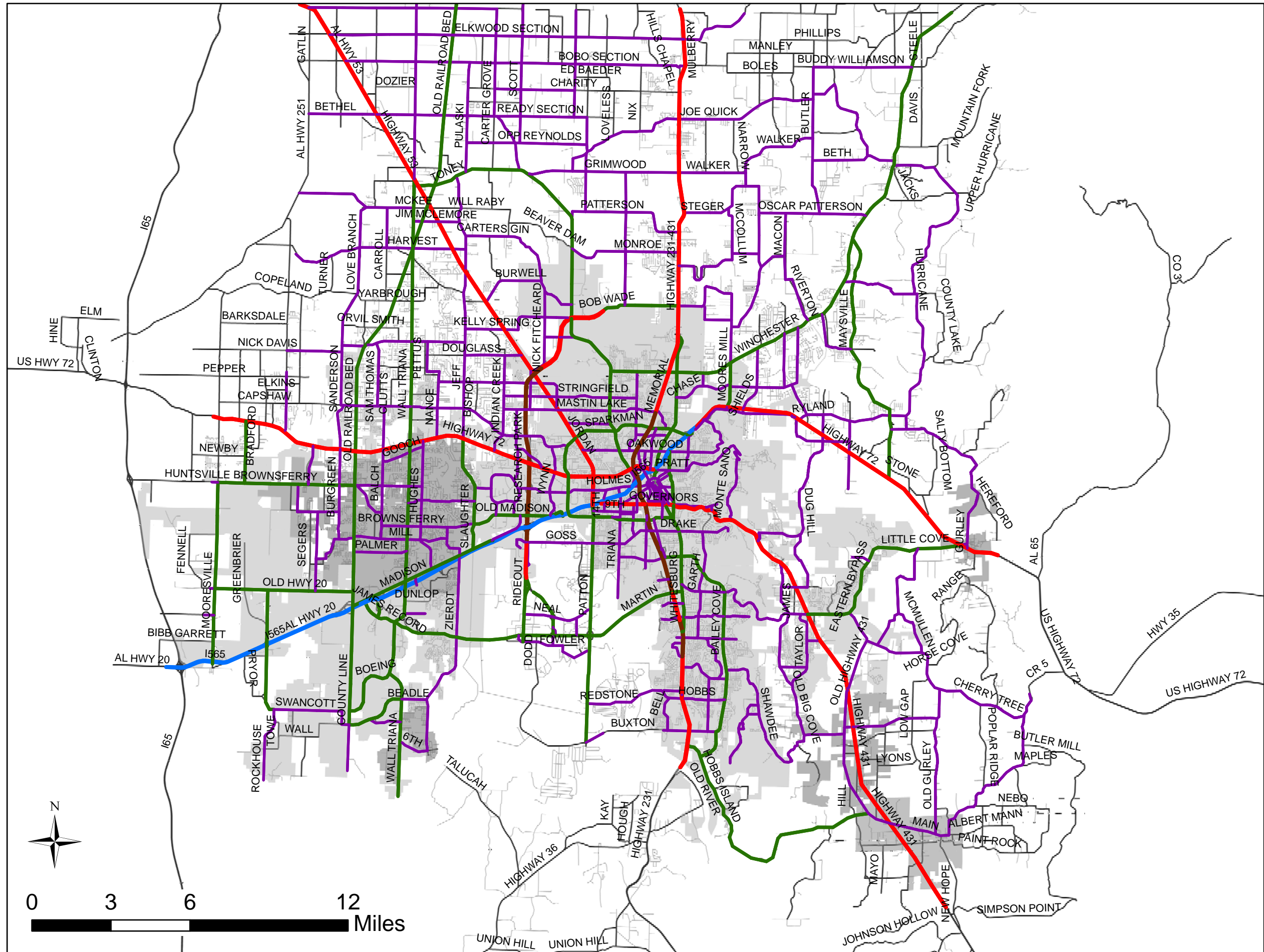
City Limits

CityName

- Madison
- Huntsville
- Gurley
- New Hope
- Owens Cross Roads
- Triana

Other Minor Roads



- Other Minor Roads
- Local Streets



Sources: ALDOT, Madison County, City of Huntsville






Map 7: 2045 Employment, Traffic Count Locations, and Schools

Legend

-  Traffic_Counts
-  Schools







2045 Employment Forecast


Total Employment

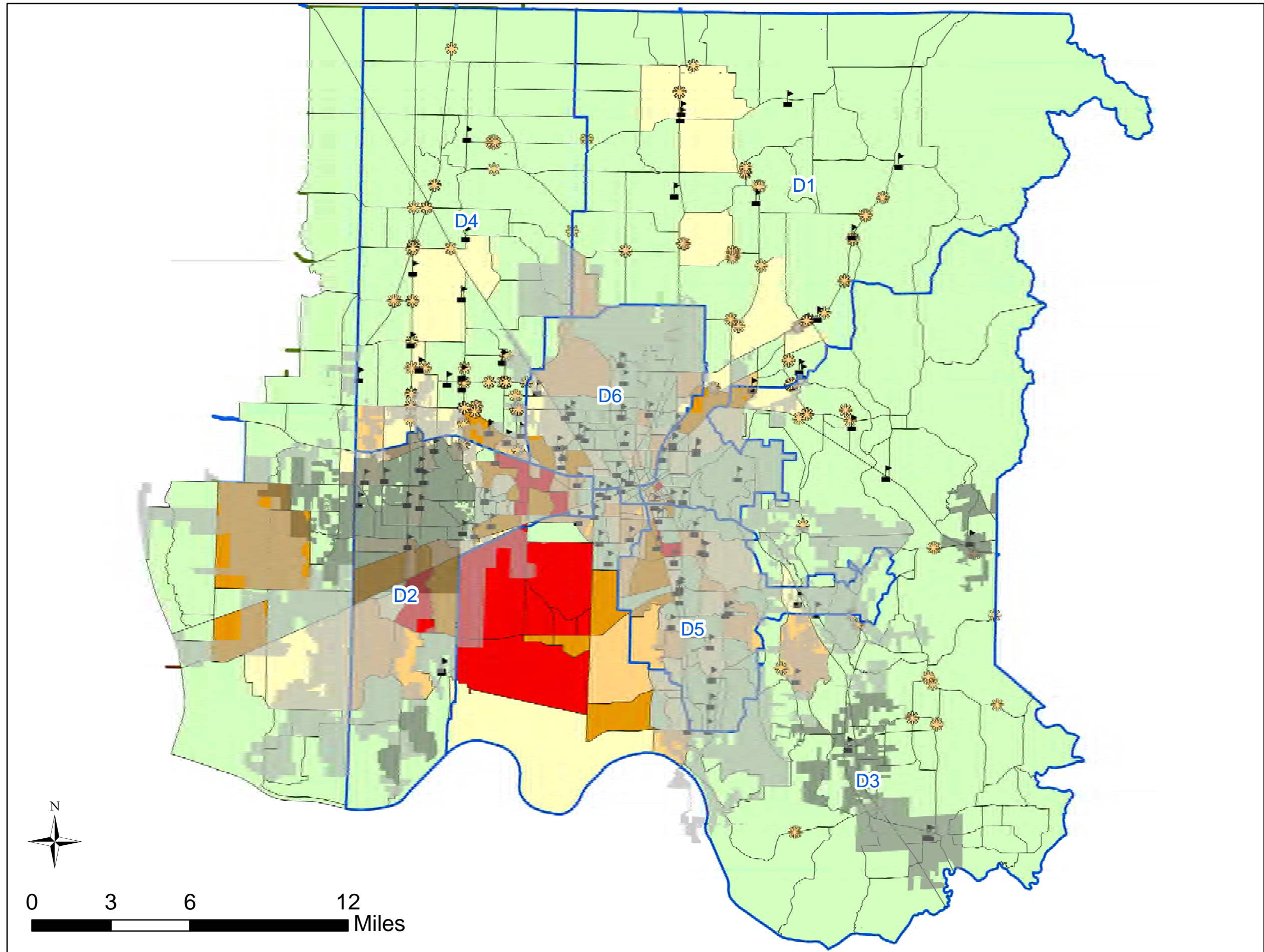
-  0- 399 persons
-  400 - 799 persons
-  800 - 1599 persons
-  1600 -3199 persons
-  3200 - 7932 persons

City Limits

City Name

-  Madison
-  Huntsville
-  Gurley
-  New Hope
-  Owens Cross Roads
-  Triana

 Commission Districts



Sources: Madison County, City of Huntsville and HATS MPO

Map 8: Parks, Wetlands, Floodways and Floodplains

Legend

- Commission Districts
- County_Parks
- Wetlands
- Floodway_2018
- Flood_Zone_2018

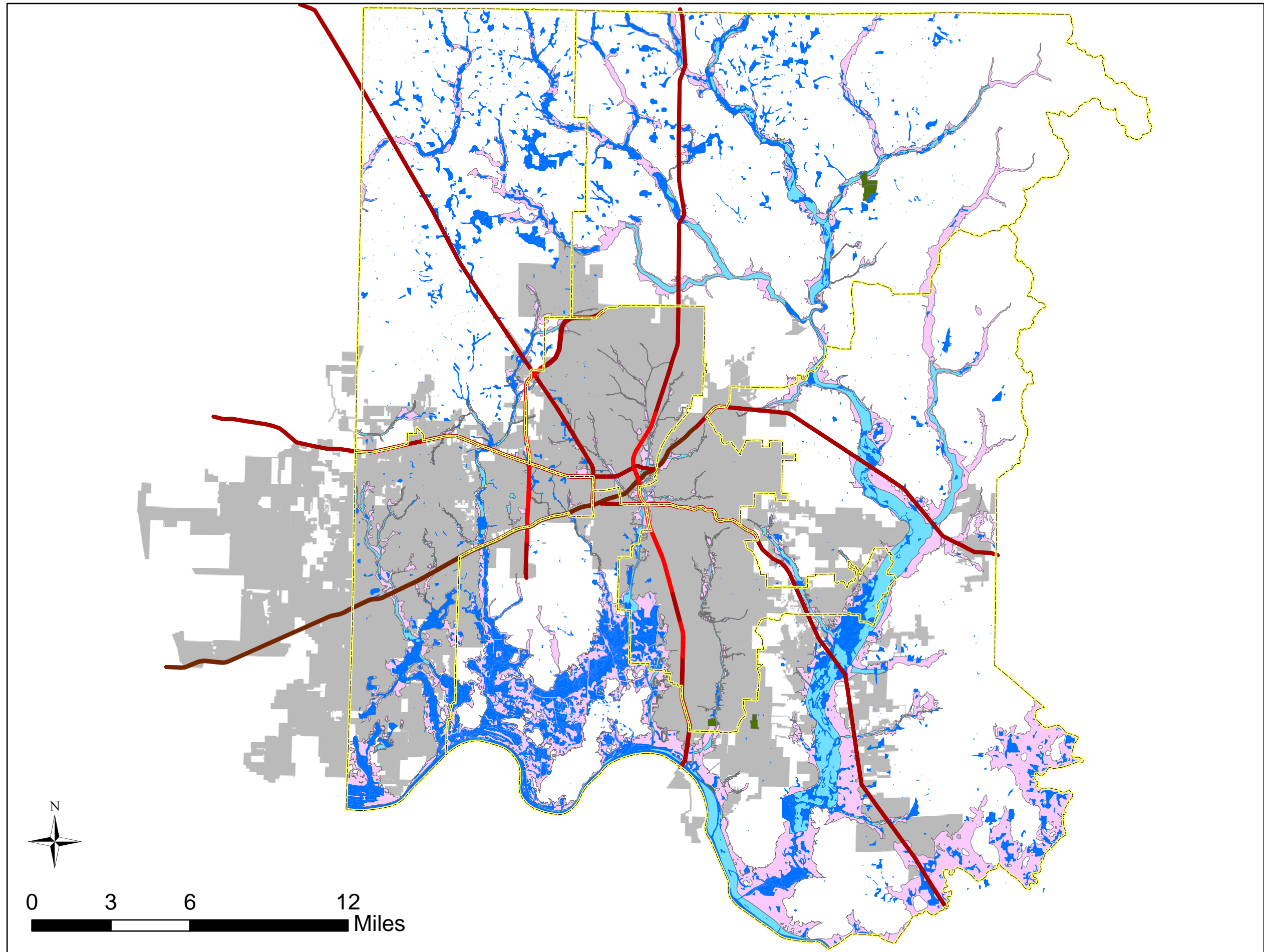
Major Highways

Functional Class

- Interstate
- Other Frwy Expy
- Princ Arterial

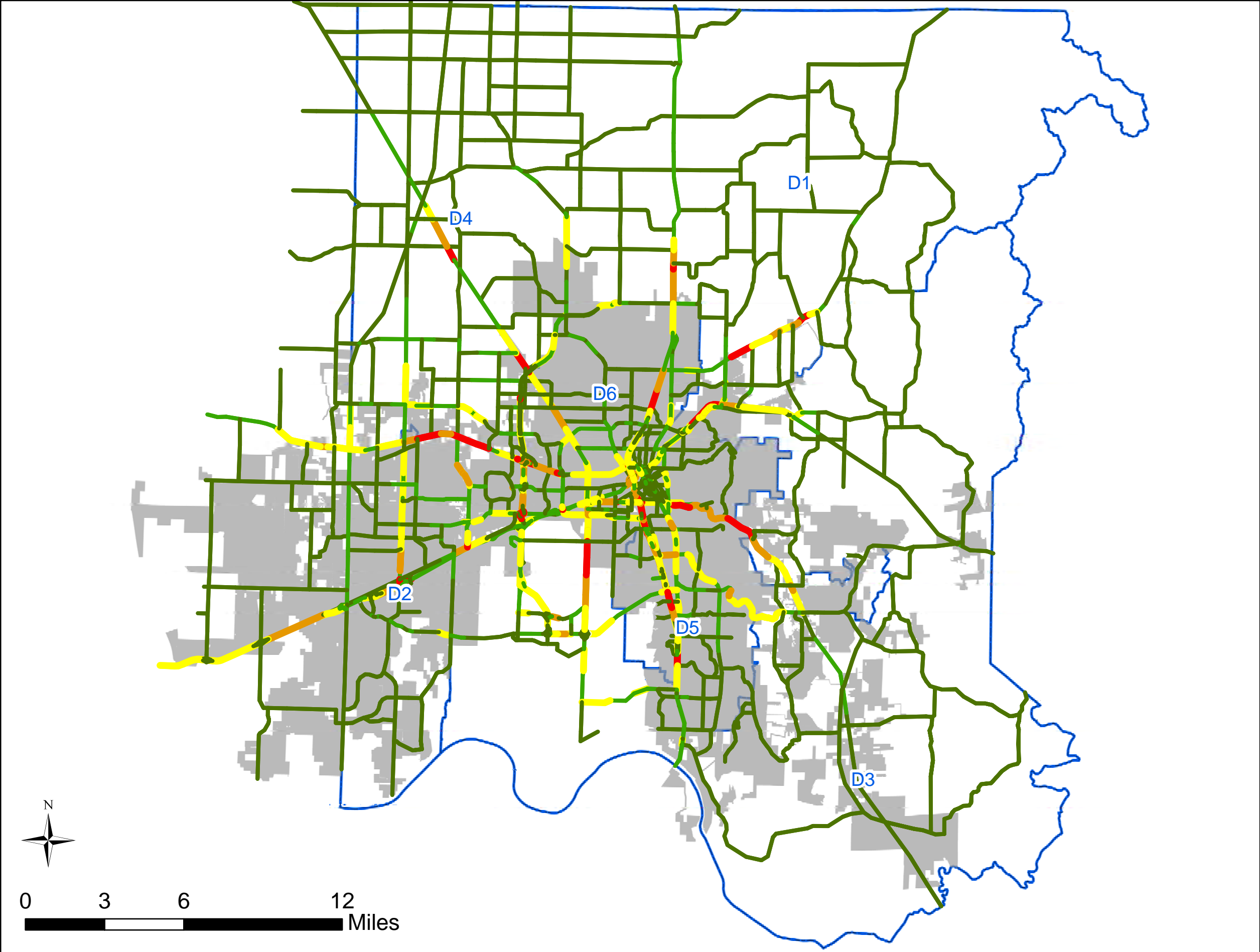
City Limits

- City Limits



Sources: Madison County, City of Huntsville and HATS MPO

Map 9: 2015 Highway Level of Service



Legend

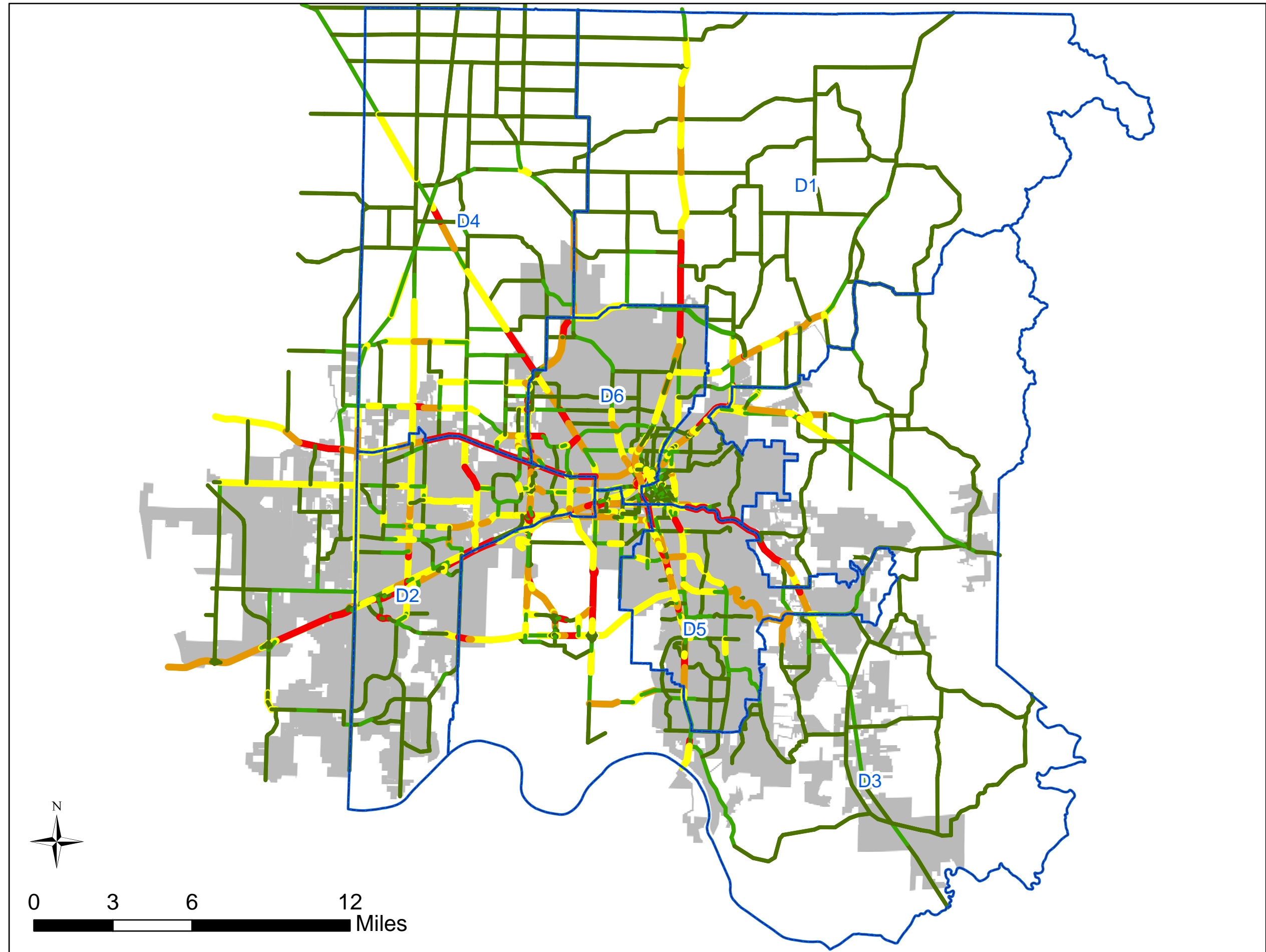
Volume/Capacity

- 0.00000 - 0.50000
- 0.50001 - 0.75000
- 0.75001 - 0.90000
- 0.90001 - 1.00000
- 1.00001 - 1.77970

City Limits

- City Limits
- Commission Districts

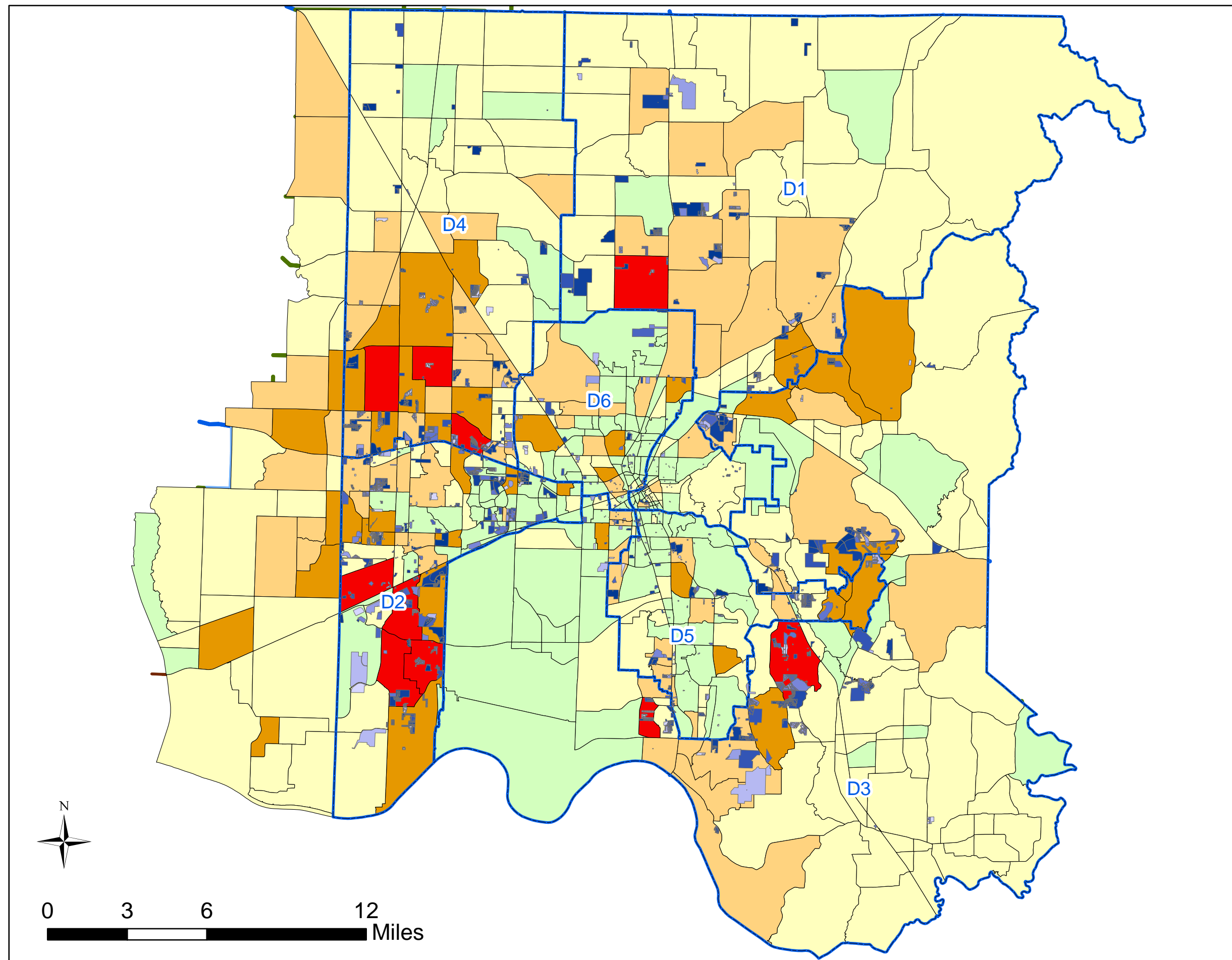
Map 10: 2045 Highway Level of Service



Legend

- Commission Districts
- City Limits**
- City Limits
- Level of Service 2045**
- Volume/Capacity**
- 0.00000 - 0.50000
- 0.50001 - 0.75000
- 0.75001 - 0.90000
- 0.90001 - 1.00000
- 1.00001 - 1.93298

Map 11: Household Change 2015 to 2045, CURRENT Model



Legend

Subdivision 2010 to 2019

YearFiled

- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019

Commission Districts

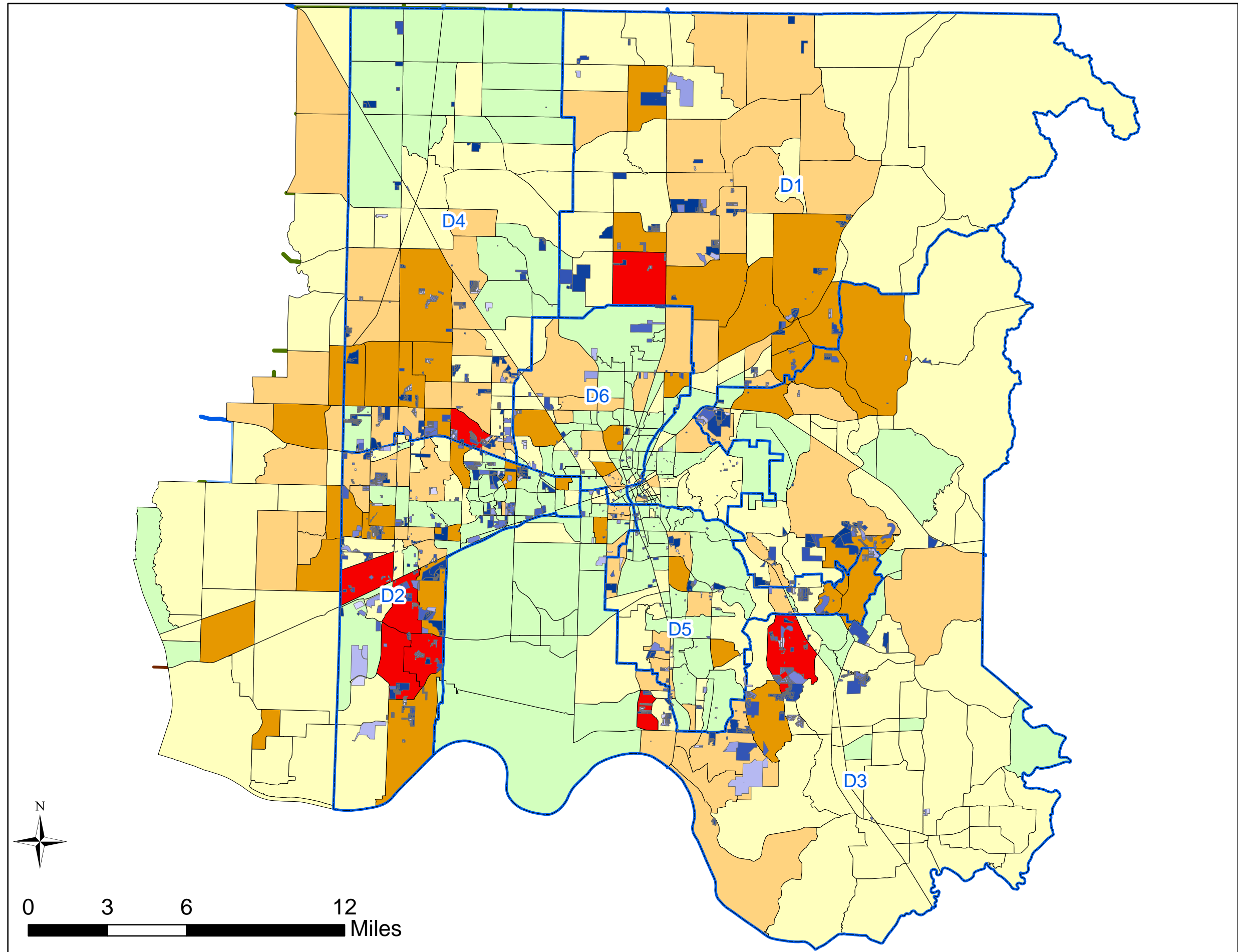
2015 to 2045 Household Change

HHCHG

- 316 - 0
- 1 - 100
- 101 - 300
- 301 - 1000
- 1001 - 2684

Sources: Madison County, City of Huntsville, and HATS MPO

Map 12: Household Change 2015 to 2045, Alternative Growth



Legend

Subdivision 2010 to 2019

YearFiled

- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019

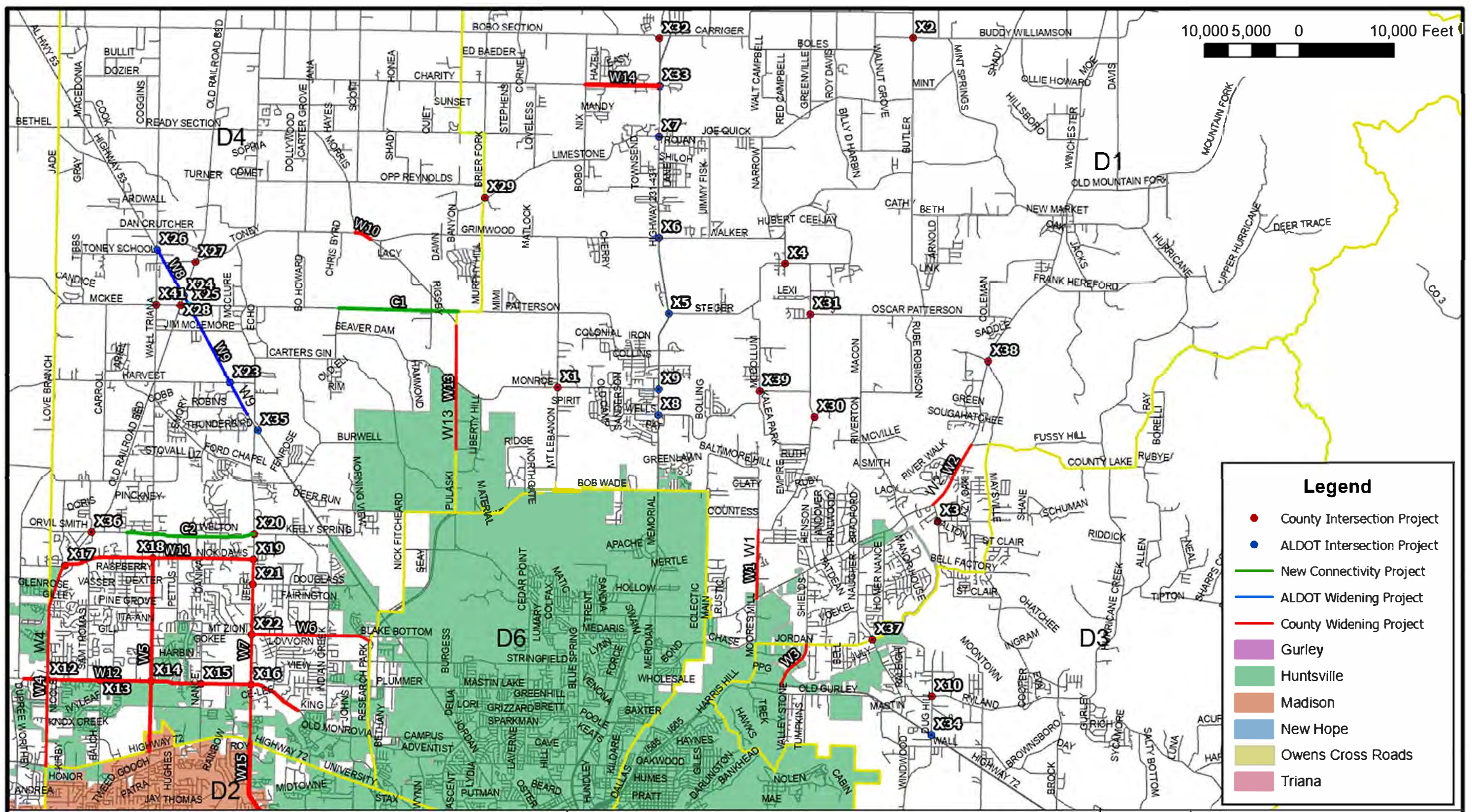
Commission Districts

2015 to 2045 Household Change

HHCHG_ALT

- 316 - 0
- 1 - 100
- 101 - 300
- 301 - 1000
- 1001 - 2684

Sources: Madison County, City of Huntsville, and HATS MPO



Madison County Transportation Master Plan & Implementation Program
 North - Madison County, AL



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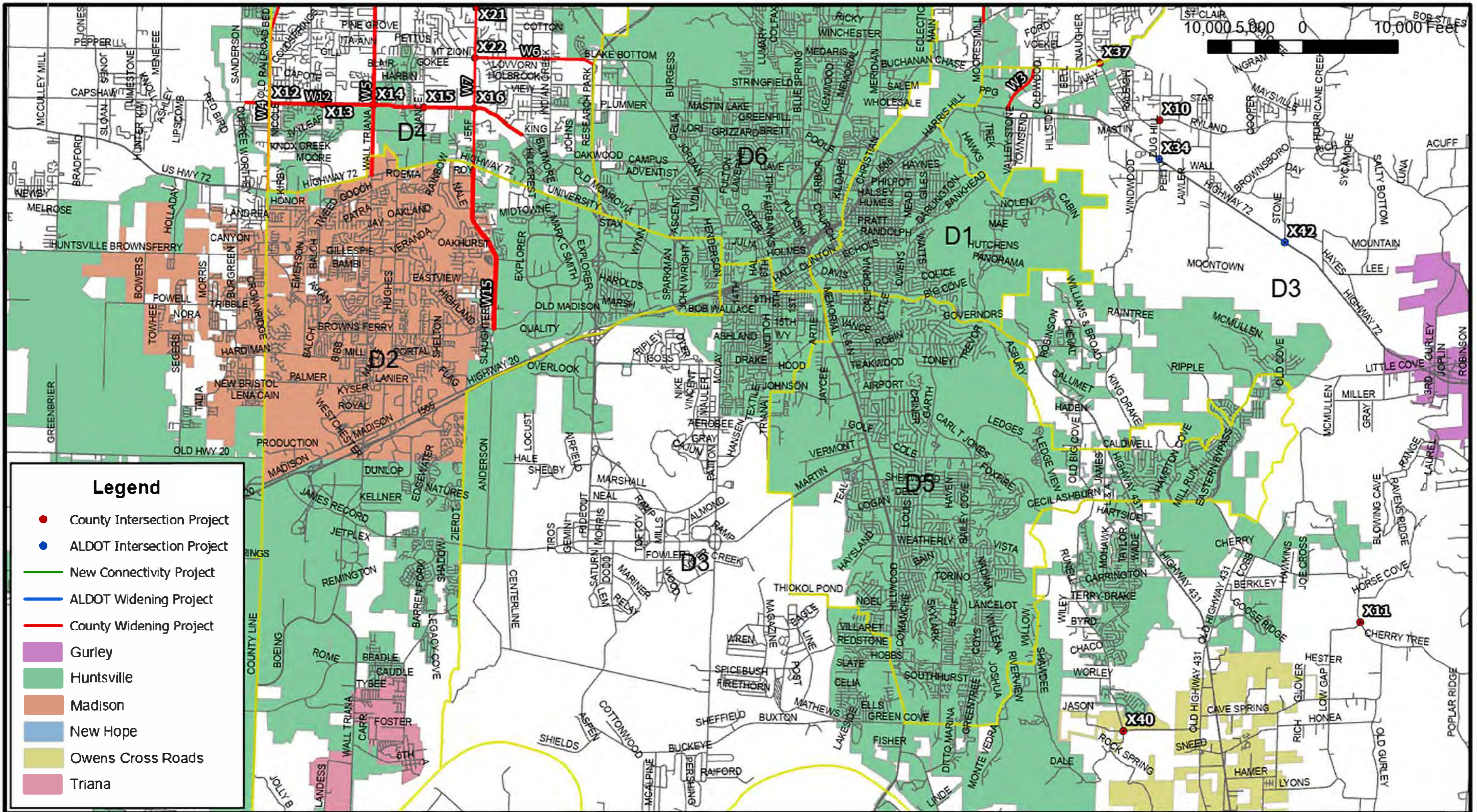
Sheet No.

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Drawn By: LKY

Checked by: ARL

Date: August 2021



Madison County Transportation Master Plan & Implementation Program

South - Madison County, AL



6767 Old Madison Pike, Suite 240
 Huntsville, AL 35806
 (256) 539-7470
 (256) 539-7473 FAX
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1

Drawn By:	LKY
Checked by:	ARL
Date:	August 2021

APPENDIX B: EXPANDED PROJECT LISTS



Expanded Table 8a
Intersection Projects - ALDOT Jurisdiction

District	Project #	Primary Route	at	Secondary Route	HATS LRTP Status	Existing Conditions				Level of Service (from model)				LOS Scores				Total LOS Score	Crash Scores				Total Crash Score	Combined Score	HATS LRTP Notes	Notes/Potential Improvements	HATS LRTP FY	Estimated Total Cost	
						Traffic Control	Primary Rt		Secondary Rt		2015		2045		2015		2045		N	E	S	W							
							RT Lanes	LT Lanes	RT Lanes	LT Lanes	Primary Route	Second Route	Primary Route	Second Route	Primary RT LOS score	Second RT LOS score	Primary RT LOS score												Second RT LOS score
1	X5	US 231	at	Steger Road		2WS	Y	Y	N	N	C	B	D	B	1	0	2	0	3	0	2	0	2	5		Traffic signal (if warranted) with advanced warning flashing beacons on 231, LT and RT on Stegar, SB accel lane on 231		\$ 1,831,500	
1	X6	US 231	at	Walker Lane/Grimwood Road		Signal	N	Y	Y	N	C	B	E	B	1	0	3	0	4	0	7	0	2	9	13		Dedicated LT lanes at Walker and Grimwood, lengthen right turn lane storage/tapers, alter vertical alignment of Walker Ln to increase sight distance		\$ 3,197,200
1	X7	US 231	at	Joe Quick Road		Signal	1	Y	N	1	C	B	E	B	1	0	3	0	4	0	4	0	0	4	8		Dedicated RT eastern Joe Quick, lengthen ex turn lane storage, access mgmt at gas station		\$ 843,700
1	X8	US 231	at	Wells Rd/Meridianville Bottom Rd		Signal	N	Y	N	N	E	B	F	B	3	0	4	0	7	0	0	2	0	2	9		RT lane on US 231 NB, close gas station entrance closest to intersection		\$ 1,439,300
1	X9	US 231	at	Monroe Road		Signal	Y	Y	N	Y	E	B	F	B	3	0	4	0	7	0	0	0	2	2	9		Extend RT storage to Ranier St		\$ 554,500
4	X23	AL Highway 53	at	Harvest Road	Vision	Signal	N	N	N	N	F	B	E	C	4	0	3	1	8	0	0	2	2	4	12	Compare to HATS LRTP Proj. 2 SR-53 from North of Harvest Rd to Old Railroad Bed Rd	LT and RT lanes at all approaches	2048-2049	\$ 5,269,500
4	X24	AL Highway 53	at	Old Railroad Bed Road	Vision	Signal	1	N	1	N	C	B	D	C	1	0	2	1	4	0	0	2	7	9	13	Compare to HATS LRTP Proj. 2 SR-53 from North of Harvest Rd to Old Railroad Bed Rd; Proj. 3 SR-53 from Old Railroad Bed Rd to Pinedale Ln; Proj. 75 Old Railroad Bed Rd from	LT and RT lanes at all approaches, backplates for signal heads	2048-2049; 2048-2052; TBD	\$ 6,023,700
4	X25	AL Highway 53	at	McKee Road	Vision	Flasher	N	N	N	N	D	B	F	B	2	0	4	0	6	0	0	2	0	2	8	Compare to HATS LRTP Proj. 2 SR-53 from North of Harvest Rd to Old Railroad Bed Rd	LT and RT lanes on AL 53	2048-2049	\$ 3,464,000
4	X26	AL Highway 53	at	Wall Triana Highway	Vision	Flasher	N	N	N	N	C	B	D	B	1	0	2	0	3	0	2	0	4	6	9	Compare to HATS LRTP Proj. 3 SR-53 from Old Railroad Bed Rd to Pinedale Ln	Split the Wall Triana Road approaches	2048-2052	\$ 1,625,400
1	X33	US 231	at	Charity Lane		Signal	Y	Y	1	Y	B	A	E	A	0	0	3	0	3	0	2	0	4	6	9		Implement right-in, right-out only access at gas station, extend LT storage at W quadrant of intersection		\$ 42,000
3	X42	AL Highway 72	at	Brock Road																							Add acceleration lane to eastbound HWY 72		\$ 1,040,700
3	X34	AL Highway 72	at	Dug Hill Road		Signal	1	Y	N	N	B	A	C	A	0	0	1	0	1	4	0	4	0	8	9		Add NB RT lane to 72		\$ 1,172,700
4	X35	AL Highway 53	at	Jeff Road		Signal	N	Y	1	Y	A	B	A	C	0	0	0	1	1	0	2	2	2	6	7		Plans in development by CDG Engineers & Associates to address LOS at the intersection as well as access management on SR-53 N and Jeff Rd		\$ 746,400

Expanded Table 8b
Intersection Projects - County Jurisdiction

District	Project #	Primary Route	at	Secondary Route	HATS LRTP Status	Existing Conditions				Level of Service (from model)				LOS Scores				Crash Scores				Total LOS Score	N	E	S	W	Total Crash Score	Combined Score	HATS LRTP Notes	Notes/Potential Improvements	HATS LRTP FY	Estimated Total Cost
						Primary Rt		Secondary Rt		2015		2045		2015		2045																
						RT Lanes	LT Lanes	RT Lanes	LT Lanes	Primary Route	Second Route	Primary Route	Second Route	Primary Rt LOS score	Second Rt LOS score	Primary Rt LOS score	Second Rt LOS score															
1	X1	Monroe Road	at	Mt. Lebanon Road	Vision	2WS	N	N	N	N	B	B	C	C	0	0	1	1	2	0	0	0	0	0	2	2	Compare to HATS LRTP Proj. 60 Mt. Lebanon/Jack Thomas Rd from Grimwood Rd to Northern Bypass	LT lanes at all approaches	TBD	\$ 2,224,600		
1	X2	Butler Road	at	Buddy Williamson Road		Flasher	N	N	N	N	B	B	B	B	0	0	0	0	0	0	2	0	0	2	2		Advanced warning signs, rumble strips		\$ 32,600			
1	X3	Bell Factory Road	at	Steakley Rd		2WS	N	N	N	N	B	B	D	B	0	0	2	0	2	0	0	0	0	0	2		LT lane on Bell Factory		\$ 489,100			
1	X4	Moore's Mill Road	at	Steger Road		2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	0	2	0	2	2	2		Alter vertical alignment of Stegar Rd eastern approach for sight distance, advanced warning signs		\$ 413,300			
3	X10	Ryland Pike	at	Dug Hill Road	Vision	2WS	N	N	N	N	B	B	E	B	0	0	3	0	3	0	0	4	0	4	7		Split the Dug Hill Rd approaches		\$ 1,003,300			
3	X11	Cherry Tree Road	at	Low Gap Road		2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	2	0	2	0	4	4		LT lane on Low Gap, clear quadrant for sight distance		\$ 728,400			
4	X12	Capshaw Road	at	Old Railroad Bed Road	Vision	Signal	N	Y	N	Y	B	D	C	B	0	2	1	0	3	0	0	0	2	2	5	Compare to HATS LRTP Proj. 75 Old Railroad Bed Rd from Capshaw Rd to SR-53; Proj. 74 Old Railroad Bed Rd from US-72 to Capshaw Rd	RT lanes at all approaches	TBD	\$ 2,109,800			
4	X13	Capshaw Road	at	Balch Road/Ramsbrook Road	Funded	Signal	N	N	N	N	B	B	C	B	0	0	1	0	1	0	0	0	0	0	1	Compare to HATS LRTP Proj. 94 US-72 from County Line Rd to Providence Main Blvd in the City Limits of Huntsville	RT and LT lanes at all approaches	2017-2019	\$ 2,851,500			
4	X14	Capshaw Road	at	Wall Triana Highway	Vision	Signal	1	Y	N	Y	D	D	F	D	2	2	4	2	10	0	0	0	0	0	10	Compare to HATS LRTP Proj. 97 Wall Triana Hwy from US-72 to Capshaw Rd; Proj. 98 Wall Triana Hwy from Capshaw Rd Yarborough Rd	LT and RT lanes at all approaches	TBD	\$ 5,436,200			
4	X15	Capshaw Road	at	Nance Road	Vision	Signal	N	Y	N	Y	D	B	E	C	2	0	3	1	6	0	0	0	0	0	6	Compare to HATS LRTP Proj. 61 Nance Rd from McCrary Rd to Capshaw Rd	RT lanes at all approaches, extend storage	TBD	\$ 3,927,800			
4	X16	Capshaw Road	at	Jeff Road	Funded	Signal	1	Y	1	Y	D	B	D	C	2	0	2	1	5	0	0	0	0	0	5	Compare to HATS LRTP Proj. 15 Capshaw Rd from Jeff Rd to Old Railroad Bed Rd; Proj. 35 Jeff Rd from South of Capshaw Rd to Douglass Rd; Proj. 73 Old Monrovia Rd from Hunting Trail to	RT lanes at Capshaw Rd and northbound Jeff Rd	2035-2038; 2016; 2025-2029	\$ 1,658,400			
4	X17	Nick Davis Road	at	Old Railroad Bed Road	Vision	2WS	N	N	N	N	B	C	C	D	0	1	1	2	4	0	2	0	0	2	6	Compare to HATS LRTP Proj. 75 Old Railroad Bed Rd from Capshaw Rd to SR-53	Split the Nick Davis Road approaches	TBD	\$ 1,329,600			
4	X18	Nick Davis Road	at	Wall Triana Highway	Vision	Signal	N	Y	N	Y	C	C	E	D	1	1	3	2	7	0	0	2	0	2	9	Compare to HATS LRTP Proj. 98 Wall Triana Hwy from Capshaw Rd Yarborough Rd	RT lanes at all approaches	TBD	\$ 2,109,800			
4	X19	Nick Davis Road	at	Jeff Road	Funded	Signal	N	1	Y	Y	B	C	D	C	0	1	2	1	4	2	2	2	6	10	Compare to HATS LRTP Proj. 36 Jeff Rd from Douglass Rd to SR-53	Extend LT lane on Nick Davis	2020-2024	\$ 755,600				
4	X20	Jeff Road	at	Kelly Spring Rd	Funded	2WS	N	N	N	N	B	B	C	C	0	0	1	1	2	0	0	2	2	4	4	Compare to HATS LRTP Proj. 36 Jeff Rd from Douglass Rd to SR-53	RT lanes at all approaches	2020-2024	\$ 957,300			
4	X21	Jeff Road	at	Douglass Road	Funded	Signal	N	Y	1	Y	D	B	C	C	2	0	1	1	4	2	0	0	0	2	6	Compare to HATS LRTP Proj. 36 Jeff Rd from Douglass Rd to SR-53	RT lanes at all approaches	2020-2024	\$ 2,109,800			
4	X22	Jeff Road	at	Blake Bottom Road	Funded	Signal	N	Y	Y	Y	B	B	C	C	0	0	1	1	2	0	0	0	0	0	2	Compare to HATS LRTP Proj. 35 Jeff Rd from South of Capshaw Rd to Douglass Rd; Proj. 13 Blake Bottom Rd from Jeff Rd to Research Park Blvd	RT lanes at all approaches	2020-2024; 2027-2031	\$ 2,664,400			
4	X27	Old Railroad Bed Rd	at	Toney Road	Vision	2WS	N	N	N	N	B	B	C	B	0	0	1	0	1	2	0	0	4	6	7		RT lanes at all approaches, advanced warning signs		\$ 1,843,200			
4	X28	Old Railroad Bed Rd	at	McKee Road	Vision	2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	7	0	0	0	7	7	Compare to HATS LRTP Proj. 75 Old Railroad Bed Rd from Capshaw Rd to SR-53	Advanced warning signs, rumble strips	TBD	\$ 32,600			

Expanded Table 8b
Intersection Projects - County Jurisdiction

District	Project #	Primary Route	at	Secondary Route	HATS LRTP Status	Existing Conditions				Level of Service (from model)				LOS Scores				Crash Scores				HATS LRTP Notes	Notes/Potential Improvements	HATS LRTP FY	Estimated Total Cost				
						Primary Rt		Secondary Rt		2015		2045		2015		2045		Total LOS Score	N	E	S					W	Total Crash Score	Combined Score	
						RT Lanes	LT Lanes	RT Lanes	LT Lanes	Primary Route	Second Route	Primary Route	Second Route	Primary Rt LOS score	Second Rt LOS score	Primary Rt LOS score	Second Rt LOS score												
1	X29	Limestone Road	at	Brier Fork Road		2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	0	12	0	0	12	12		Access control at convenience store		\$ 175,300
1	X30	Moore's Mill Road	at	Darwin Road		2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	2	0	2	0	4	4		Between 2016 and 2018, 37 crashes occurred. Between 2018 and 2020, after the high friction surface was installed in 2018, there were 5 crashes. Possibly realign Darwin Rd, warning		\$ 533,400
1	X31	Moore's Mill Road	at	Oscar Patterson Road		2WS	N	N	N	N	B	B	B	B	0	0	0	0	0	2	7	0	0	9	9		Roundabout or mini roundabout, advanced warning signage		\$ 1,063,900
1	X32	Bobo Section Road	at	Flood Lane		Flasher	N	N	N	N	B	B	B	B	0	0	0	0	0	0	0	0	12	12	12		Realign Bobo Section Rd, bridge required		\$ 946,800
4	X36	Old Railroad Bed Rd	at	Orvil Smith Rd/Lockhart Rd		2WS	N	N	N	N	A	A	B	A	0	0	0	0	0	0	0	0	0	0	0		Realign Orvil Smith/Lockhart Road		\$ 559,100
1, 3	X37	Jordan Road	at	Homer Nance Road		Signal	1	N	N	N	A	A	A	A	0	0	0	0	0	0	0	0	2	2	2		Project is currently being bid by the county		\$ 925,000
1	X38	Maysville Road	at	Winchester Road		2WS	N	N	N	N	A	A	A	A	0	0	0	0	0	0	0	0	0	0	0		Realign Maysville Road		\$ 876,600
1	X39	Eakins Road	at	McCollum Road		2WS	N	N	N	N	A	A	A	A	0	0	0	0	0	0	0	0	0	0	0		LT lane at McCollum Road		\$ 493,500
3	X40	Old Big Cove Road	at	Knotty Walls Road		2WS	N	Y	N	N	A	A	A	A	0	0	0	0	0	0	0	0	0	0	0		Realign South Green Mountain Road S, striping and stop bar on Knotty Walls Road		\$ 292,500
4	X41	Wall Triana Highway	at	McKee Road																						Roundabout		\$ 1,409,100	

**Expanded Table 8c
Widening Projects - ALDOT Jurisdiction**

District	Prj #	Route Name	From	To	Length (miles)	HATS LRTP Status	2015 LOS	2045 LOS	2015 LOS Score	2045 LOS Score	Total LOS Score	Crash Score	Combined Score	Scope/Notes	HATS LRTP FY	Estimated Total Cost
4	W8	AL Highway 53	Wall Triana Hwy	Old Railroad Bed Road	1.10	Vision	C	C	1	1	2	4	6	Compare to HATS LRTP Vision Proj. 3 - SR-53 from Old Railroad to Pinedale Ln (CR-117)	2048-2052	\$ 9,303,400
4	W9	AL Highway 53	Old Railroad Bed Road	North of Jeff Road	2.80	Funded/Vision	E	F	3	4	7	2	9	Compare to 2045 Proj. Additional Lanes from N of Taurus Drive to Harvest Road; HATS 2040 LRTP Vision Proj. 2 - SR-53 from North of Harvest Rd to Old Railroad in combination with Funded Proj. 1 - SR-53 from South of Jeff Rd to North of Harvest Rd.	2048-2049/2016	\$ 28,751,800

Expanded Table 8d
Widening Projects - County Jurisdiction

District	Prj #	Route Name	From	To	Length (miles)	HATS LRTP Status	2015 LOS	2045 LOS	2015 LOS Score	2045 LOS Score	Total LOS Score	Crash Score	Combined Score	Scope/Notes	HATS LRTP FY	Estimated Total Cost
1	W1	Moore's Mill Road	Winchester Road	Bob Wade Ext.	1.12	Vision	C	D	1	2	3	2	5	Compare to HATS LRTP Proj. 59 Moores Mill Rd from Winchester Rd to Northern Bypass	TBD	\$ 4,130,100
1	W2	Winchester Road	Bell Factory Road	County Lake Road	1.42	Vision	D	D	2	2	4	2	6	Compare to HATS LRTP Proj. 104 Winchester Rd from Bell Factory Rd to State Line	TBD	\$ 5,591,800
3	W3	Shields Road	Jordan Road	Lee Highway (US 72)	1.02	Vision	B	D	0	2	2	2	4	Compare to HATS LRTP Vision Proj. 83 Shields Rd from Jordan Rd to US 72	TBD	\$ 3,464,700
4	W4	Old Railroad Bed Road	Nick Davis Road	Lee Highway (US 72)	4.13	Vision	D	E	2	3	5	0	5	Compare to HATS LRTP Vision Proj. 74 Old Railroad Bed Rd (Ph 1) from US 72 to Capshaw Rd in combination with Proj. 75 Old Railroad Bed Rd (Ph 2) from Capshaw Rd to SR-53	TBD	\$ 15,905,600
4	W5	Wall Triana Hwy	Nick Davis Road	Lee Highway (US 72)	3.88		D	D	2	2	4	2	6	5 lane section		\$ 32,592,400
4	W6	Blake Bottom Road	Jeff Road	Dr. MLK Jr. Hwy (SR 255)	2.41	Funded	D	D	2	2	4	0	4	Compare to 2045 Financially Constrained Proj. Widening for Additional Lanes on CR-47 (Blake Bottom Road) from CR-19 (Jeff Road) to SR-255 (Research Park Boulevard) as well as HATS 2040 LRTP Funded Proj. 13 - Blake Bottom Rd from Jeff Road (CR-19) to Research Park Blvd (SR-255)	2027-2031	\$ 9,259,700
4	W7	Jeff Road	Nick Davis Road	North of Lee Hwy	3.18	Funded	B	C	0	1	1	2	3	Compare to 2045 Additional Lanes on Jeff Road (CR-19) from Douglass Road to SR-53, HATS 2040 LRTP Proj. 36 Jeff Rd from Douglass Rd to SR-53 (contains Nick Davis to Douglass)	2020-2024	\$ 27,939,100
4	W10	Pulaski Pike	Morris Road	Grimwood Road	0.38		C	D	1	2	3	7	10	4 or 5 lane section, LT lane on Morris, realign Grimwood		\$ 2,048,500
4	W11	Nick Davis Road	Jeff Road	Old Railroad Bed Road	3.84		C	E	1	3	4	2	6	3 lane section		\$ 15,785,300
4	W12	Capshaw Road/Old Monrovia Road	East of King Road	Dupree Worthy Road	5.21		C	F	1	4	5	2	7	5 lane section		\$ 34,968,200

Expanded Table 8d
Widening Projects - County Jurisdiction

District	Prj #	Route Name	From	To	Length (miles)	HATS LRTP Status	2015 LOS	2045 LOS	2015 LOS Score	2045 LOS Score	Total LOS Score	Crash Score	Combined Score	Scope/Notes	HATS LRTP FY	Estimated Total Cost
1, 4	W13	Pulaski Pike	Prosperity Drive	Patterson Lane	2.84	Vision	D	E	2	3	5	4	9	5 lane section		\$ 18,115,300
1	W14	Charity Lane	US 231/431	Nix Rd/Frank Patterson Rd	1.48								N/A	5 lane section		\$ 9,519,500
2	W15	Slaughter Road	Madison Pike	AL Highway 72	3.38								N/A	5 lane section		\$ 21,589,300

Table 8e
Connectivity Projects

District	Project #	Route	Length (miles)	Notes	Estimated Total Cost
1, 4	C1	Bo Howard Road -- Patterson Lane Connector	2.37	2 lane road, realign Patterson Ln, bridge required	\$ 13,474,600
4	C2	Orvil Smith Road --- Kelly Spring Road Connector	2.65	3 lane or 5 lane section	\$ 22,412,500

APPENDIX C: PROJECT FUNDING OUTLINE





PROGRAM	PROJECT TYPES	AGENCY	AMOUNT	LOCAL MATCH	DEADLINES	ELIGIBLE COSTS
Alabama Transportation Rehabilitation and Improvement Program-II (ATRIP-II) Rehabilitates and improves transportation structures by funding projects that contribute to state economic growth, safety and stability.	<ul style="list-style-type: none"> ▶ U.S. or state ROW transportation improvements ▶ Local roads essential to state highway function 	ALDOT	Up to \$2 million	None required Local investment encouraged	New Cycle Oct. 2021	<ul style="list-style-type: none"> ▶ ROW Acquisition ▶ CEI up to 15% performed or overseen by ALDOT ▶ Preliminary engineering performed by ALDOT
Rebuild Alabama Act (RAA) Provides maintenance and construction of state roads and bridges.	<ul style="list-style-type: none"> ▶ Local government public road or bridge project 	ALDOT	Up to \$250,000	None required	Late Fall	<ul style="list-style-type: none"> ▶ Construction only
Alabama Industrial Access Road (IAR) and Bridge Corporation Provides adequate public access for new or expanding industries that are committed to new investment and the creation of new jobs.	<ul style="list-style-type: none"> ▶ New road access on public right-of-way that allows for normal public use to a new or expanding industry 	FHWA ALDOT	Dependent upon project size and funding availability	None required Possible preliminary engineering local match	IAR Committee meets Mar., Jun. & Oct. Applications due 6–8 weeks prior	<ul style="list-style-type: none"> ▶ CEI up to 15% ▶ Construction
Transportation Alternatives Set-Aside Program (TAP) A cost reimbursement program that provides new transportation alternatives or enhances existing non-motorized transportation infrastructure.	<ul style="list-style-type: none"> ▶ Pedestrian and non-motorized trail facilities ▶ Bike infrastructure ▶ Downtown revitalization and sidewalks 	FHWA ALDOT	Up to \$800,000 (\$640,000 federal \$160,000 local)	Sponsor 20% + ineligible items	FY2022 Projected May 2021	<ul style="list-style-type: none"> ▶ CEI up to 15% ▶ Construction up to 80%
Highway Safety Improvement Plan (HSIP) AC#1 Reducing Rural Lane Departures AC#2 Intersection Related Projects AC#3 Safe Transportation for Pedestrians	<ul style="list-style-type: none"> ▶ Highway safety improvements ▶ Installation of vehicle-to-infrastructure equipment ▶ Pedestrian hybrid beacons ▶ Medians and pedestrian crossing islands 	FHWA ALDOT TSOS	Up to \$2.4 billion AC#1: \$2 million AC#2: \$2 million AC#3: \$200,000	90% federal 10% local	Statewide competitive call Jan. 1, Apr. 1, Jul. 1, Oct. 1.	<ul style="list-style-type: none"> ▶ Call submitted through Area Local Transportation Engineer
High Risk Rural Roads (HRRR) Rehabilitates and improves roadways classified as rural major or minor collectors or rural local roads with significant safety risks.	<ul style="list-style-type: none"> ▶ Rural road safety improvements ▶ Roadway and lane departure reduction safety ▶ Cross slope and super-elevation correction 	FHWA ALDOT	Up to \$4 million	90% federal 10% local	June 30, 2021	<ul style="list-style-type: none"> ▶ Utility relocation if minimal cost ▶ Not eligible: Projects involving ROW acquisition
Metropolitan Planning Organization (MPO) Gives funding and procedural requirements for multi-modal transportation planning in metropolitan areas and qualifying states. Results in long-range plans and short-range programs of investment priorities.	<ul style="list-style-type: none"> ▶ Develop a Long-Range Transportation Plan (LRTP) which covers at least a 20-year period ▶ Update a Transportation Improvement Program (TIP) that includes a five-year program of projects 	FHWA ALDOT	Funding from NHPP, STP, HSIP, CMAQ, ATRIP, etc.	N/A	Dependent upon funding source(s)	<ul style="list-style-type: none"> ▶ Must be submitted and approved for the TIP; MPO will fund preliminary engineering, ROW and utilities
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Invests in road, rail transit and port projects that achieve national objectives. Formerly BUILD, TIGER.	<ul style="list-style-type: none"> ▶ Surface transportation including highway, road, bridge, rail, port and intermodal projects 	USDOT	Up to \$25 million Urban Min: \$5 million Rural Min: \$1 million	80% federal 20% local 20% < local rural	July 12, 2021	<ul style="list-style-type: none"> ▶ DOT may obligate funds for ROW acquisition and design completion after planning and environmental approvals are obtained.

APPENDIX D: ACCESS MANAGEMENT
RECOMMENDATIONS



Madison County Access Management Recommendations

August 2021



Engineering. Environmental. Answers.

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1. Introduction

Madison County maintains a significant road network within both rural and urban areas. Furthermore, the County has experienced significant residential and commercial growth in recent years. Therefore, a proactive approach is needed to vehicular access points to the land uses adjacent to their roadways. The recommendations for access management contained within this report aim to promote safety and efficiency along the County's transportation network by effective balance of access vs mobility. Effective access management works to increase roadway capacity, reduce crashes, and shorten travel time for motorists.

2. County Road Classifications

Access management policy should consider roadway network hierarchy to balance vehicular access vs the mobility of motorists. Therefore, the following recommendations are divided by roadway classification, which also makes it straightforward to discuss and enforce in the context of an access management policy. To that end, the following classifications are utilized in conveying the access management recommendations herein. Each classification is defined below:

- A) Arterial
 - A roadway that is of regional importance, and intended to serve high volumes of traffic traveling long distances
- B) Collector
 - A roadway that provides movement between arterials and county roads. It carries moderate volumes and serves local trips. It provides more frequent access than arterials.
- C) Future Collector
 - A roadway that is expected to reach a minimum collector status in the future. Currently, it facilitates shorter trips and provides more frequent access including, in some instances, individual residences. However, due to projected future growth, the volumes on these roadways are expected to grow and should be actively managed according to the criteria applied to current Collectors. These additional collectors were identified through County input as well as the identification of potential development areas and how it could increase traffic volumes along these roadways.
- D) Local Road
 - This category includes all remaining roads in the system. A county road provides the highest frequency of access, connections to the collectors and key county roads, and primarily serves short trips.

3. Traffic Impact Analysis

A Traffic Impact Analysis can be very helpful for reviewing the potential effect of new traffic generators on the adjacent roadways and intersections. Recommendations for when to require a traffic impact analysis are below:

- A) A Traffic Impact Analysis will be required as follows:
 - a) As specified in Tables 5 and 6 herein, as applicable.
 - b) If exception to criteria listed in Table 5 or 6 is requested.
 - c) At the discretion of the County Engineer, when he/she deems it necessary on basis of existing traffic conditions in the surrounding areas and roadways.
- B) Please note that roadway improvements will be determined based on the results and conclusions of the traffic impact analysis.
- C) Traffic Impact Analysis Outline/Required Information
 - a) Title
 - b) Table of Contents
 - c) Overview and Executive Summary
 - d) Existing Conditions
 - e) Future Traffic Conditions
 - f) Conclusions/Recommendations
 - g) Appendices

4. Access Design

Roadway access points such as driveway connections and turn lanes should be designed and constructed to promote safe ingress and egress from the County’s roadway network. Therefore, the County should require new access be constructed of acceptable dimension and spacing. Also new development should construct turn lanes when warranted by existing and/or projected turning traffic volume. Access design recommendations are found below.

4.1. Connections

3.1.1 Terms and Definitions

- A) Residential
 - a) Connection to a residence or undeveloped parcel
- B) Directional
 - a) Directional connections are generally used to provide access to and from commercial and industrial land uses. Directional connections refer to:
 1. right-in/right-out access drives,
 2. right-in-only access drives,

- 3. right-out-only access drives, and
- 4. left & right-in/right-out access drives.

C) Unsignalized Connections

- a) Unsignalized connections refer to full access intersections that operate under side street stop traffic control. Examples include:
 - 1. Minor road intersecting a major road,
 - 2. Minor road intersecting a minor road, or
 - 3. Driveway intersecting a major or minor road.

D) Signalized Connections

- a) Signalized connections refer to intersections that operate under traffic signal control. Examples include:
 - 1. Major road intersecting a major road,
 - 2. Minor road intersecting a major road,
 - 3. Interchange ramp intersecting a major road, or
 - 4. Driveway to a large traffic generator road intersecting a major road.

3.1.2 Connection Spacing Requirements

- A) Requirements for connection spacing is shown in Tables 1.

Table 1: Connection Spacing Requirements (Note 2)

Connection Type	Minimum Required Spacing without Median			Minimum Required Spacing with Median	
	Local Roads	Collectors	Arterials	Collectors	Arterials
Residential Driveway	250 ft	250 ft	Note 1	250 ft	Note 1
Directional Access	250 ft	360 ft	500 ft	360 ft	500 ft
Full Access (unsignalized)	250 ft	400 ft	500 ft	1,000 ft	1,000 ft
Full Access (signalized)	1,320 ft	1,320 ft	2,640 ft	1,320 ft	2,640 ft

- 1. Direct residential driveway access is not permitted.
- 2. If property has been divided prior to the effective date of this policy, one (1) connection per division will be considered, at the discretion of the County Engineer. All new divisions will be required to adhere to the requirements of this policy.

3.1.3 Corner Driveway Clearance

- A) The corner driveway clearance is the distance measured from the closest edge of pavement from the intersecting road measured along the travel way (through lanes) to closest edge of a proposed driveway.
- B) Requirements for corner connection clearance access are shown in Tables 2 and 3.

Table 2: Corner Clearance Connection Spacing Requirements WITHOUT MEDIAN

Connection Type	Minimum Required Corner Clearance WITHOUT MEDIAN		
	Local Road	Collector	Arterial
Right-In (upstream only)	125 ft	250 ft	500 ft
Right-Out (downstream only)	125 ft	250 ft	500 ft
Right-In/Right-Out	250 ft	250 ft	500 ft
Full Access (unsignalized)	250 ft	360 ft	500 ft
Full Access (signalized)	1,320 ft	1,320 ft	2,640 ft

Note: It is desirable to maximize the distance between the corner parcel connection and the adjacent intersection. Minimum connection spacing criteria for corner clearance should only be considered when greater spacing cannot be achieved.

Table 3: Corner Clearance Connection Spacing Requirements WITH MEDIAN

Connection Type	Minimum Required Corner Clearance WITH MEDIAN		
	Local Road	Collector	Arterial
Right-In (upstream only)	125 ft	250 ft	500 ft
Right-Out (downstream only)	125 ft	250 ft	500 ft
Right-In/Right-Out	250 ft	250 ft	500 ft
Full Access (unsignalized)	660 ft	1,000 ft	1000 ft
Full Access (signalized)	1,320 ft	1,320 ft	2,640 ft

Note: Minimum connection spacing criteria for corner clearance should only be considered when greater spacing cannot be achieved.

3.1.4 Driveway Design

A) Driveway Width

- a) The entry width is the most critical component of driveway design because it must serve both right turning and left turning vehicles. It should be sufficient to allow a vehicle to enter without having to slow down excessively and it should allow vehicles to enter and exit simultaneously. Inadequate driveway design creates conflicts that can be detrimental to safety and operations on the mainline. Please see Table 5 for minimum driveway widths on Madison County roadways.
- b) Additionally, the following should be considered when determining the required driveway widths:
 1. AASHTO vehicle turning paths should be evaluated to determine the required width beyond Madison County minimums.
 2. Directional driveways shall provide additional lane width depending on driveway radii, angle of entry, AASHTO vehicle turning paths, and any other specific site conditions.
 3. Multi-lane driveways (undivided or median divided) shall provide a minimum of 11 ft wide lanes on Madison County right of way.

B) Driveway Radii

- a) Driveway radii should be designed to provide safety and ease of vehicle movement for the largest vehicle that will regularly use the driveway.
- b) Table 4 indicates minimum radii for various types of driveways based on the land use served.

Table 4: Minimum Width and Radii by Driveway Type

Driveway Type	Min. Driveway Width (ft)	Max Driveway Width (ft)	Min. Driveway Radius (ft)
Residential	12	20	10
Commercial/Industrial	24	36	50
Truck Access	24	36	75

3.1.5 Turn Lane Requirements

A) Subdivision Development

- a) Requirements for right and left turn lanes are shown in the Table 5 below:

Table 5: Subdivision Development Turn Lane Requirements

Single Family Units	# of Access Points (see Notes below)					
	1	2	3	4	5	6
Up to 20	A	A	A	A	A	A
20 to 50	B	B	A	A	A	A
51 to 100	C	C	B	A	A	A
101 to 150	X	C	C	B	A	A
151 to 200	X	E	C	C	B	A
201 to 250	X	F	E	C	C	B
251 to 300	X	X	F	E	D	D
301 to 350	X	X	F	F	E	E
Over 350	X	X	F	F	F	E

A - No Improvements required to public street, except right of way dedication per Madison County Subdivision Regulations.

B - Right turn lane must be added to ONE Public street in which the new subdivision connects. The public street chosen for improvement shall be per County Engineer's direction.

C - Left and right turn lanes must be added to ONE Public street in which the new subdivision connects. The public street chosen for improvement shall be per County Engineer's direction.

D - Left and right turn lanes must be added to the highest traffic volume public street AND one additional public street per County Engineer's direction.

E - Left and right turn lanes must be added to one point of access on each public street in which the new subdivision connects.

F - Traffic Impact Analysis by Licensed Traffic Engineer Required to determine improvements.

X - Not Permitted.

Note:

[1] Not more than two (2) access points on the same road will be counted as additional access points for this table.

[2] Stub-out streets to adjacent parcels will be counted as an access points subject to Note 1

B) Commercial/Industrial Development

a) Requirements for right and left turn lanes are shown in Table 6 below:

Table 6: Commercial/Industrial Development Turn Lane Requirements

Gross Floor Area (GFA)	# of Access Points (see Notes below)					
	1	2	3	4	5	6
< 10,000	B	B	A	A	A	A
10,000 to 50,000	C	B	B	A	A	A
50,001 to 100,000	X	C	B	B	A	A
100,001 to 200,000	X	X	F	F	E	D
> 200,001	X	X	X	F	F	F

A - No Improvements required to public street, except minimum right of way dedication as requested by the County Engineer.

B - Right turn lane must be added to ONE Public street in which the new development connects. The public street chosen for improvement shall be per County Engineer's direction.

C - Left and right turn lanes must be added to ONE Public street in which the new development connects. The public street chosen for improvement shall be per County Engineer's direction.

D - Left and right turn lanes must be added to the highest traffic volume public street AND one additional public street per County Engineer's direction.

E - Left and right turn lanes must be added to one point of access on each public street in which the new development connects.

F - Traffic Impact Analysis by Licensed Traffic Engineer Required to determine improvements.

X - Not Permitted.

4.2. Geometric Design of Left & Right Turn Lanes

- A) Turn Lane Length and Width
 - a) Minimum Madison County requirements for geometric design elements of left turn lanes are shown in Table 7.
 - b) All turn lanes shall be constructed to match or exceed the width of adjacent travel lanes, but not less than 10’ wide.

Table 7: Minimum Lengths for Left Turn Geometric Design Elements

Design Speed (MPH)	Total Turn Lane Length (ft)	Turn Lane Taper Length (ft)	Transition Taper Length (ft)
25	175	100	10.4 * W
30	225	100	15.0 * W
35	275	100	20.4 * W
40	325	100	26.7 * W
45	375	100	45.0 * W
50	425	100	50.0 * W
55	465	180	55.0 * W
60	500	180	60.0 * W

1. All turn lane lengths shown in Table 8 account for a 10MPH reduction in the through travel lane prior to entering the turn lane.
2. All turn lane lengths are minimums. Vehicle storage requirements shall be verified and turn lanes shall be lengthened where required.
3. W = width of transition (feet).

B) Storage Lengths

- a) Unsignalized - The storage length may be based upon the number of turning vehicles arriving in an average two-minute period within the peak hour. The required vehicle storage length shall be calculated to verify that minimum storage lengths are sufficient. When completing left turn lane storage analysis, special care should be given to accommodate the truck storage requirements of the left turn lane (where required).
- b) Signalized - Storage length at signalized intersections depends upon signal cycle length, signal phasing, and the arrival/departure rate of turning vehicles. The required storage length shall be based upon two times the average number of vehicles that would be expected to queue in the left turn lane per cycle. When completing left turn lane storage analysis, special care should be given to accommodate the queuing of adjacent through lanes.

- C) Turn Lane Tapers
 - a) Madison County requires a straight-line taper for left turn lanes. For median left-turn lanes, a minimum median width of 18 ft (12 ft lane width, 2 ft offset, and a 4 ft median divide) is recommended to accommodate a single left-turn lane. The absolute minimum median width is 14 ft.

5. Minimum Roadway Width to Accept Subdivision Development

- D) Table 8 outlines the minimum design guidelines for standard roadway width and shoulder width to accept subdivision development.
- E) If the minimum roadway width does not exist, the developer shall improve the existing roadway in a minimum one direction to the nearest intersecting roadway of acceptable width.

Table 8: Minimum Roadway Width to Accept Subdivision Development

Existing Road Class	<10% Trucks		>/= 10% Trucks	
	Lane Width (ft)	Shoulder Width (ft)	Lane Width (ft)	Shoulder Width (ft)
Local Road	10	2	11	2
Collector	10	2	11	2
Arterial	11	3	12	3

6. Traffic Calming

- A) Maximum length of tangents on a subdivision roadway shall be 500 feet. Where maximum tangent lengths exceed this length, traffic calming measures must be installed.
- B) The following measures are examples of acceptable traffic calming devices. However, this list is not inclusive and other measures may be required given specific circumstances of each situation:
 1. Chicane
 2. Traffic Circle/Mini Roundabout
 3. Textured Pavement
 4. Neck Down/Curb Extension
 5. Mid-block Median
 6. Lane Narrowing
 7. Choker/Bulb Out

7. Additional ROW dedication

- A) Minimum right-of-way (ROW) widths for each roadway classification are provided in Table 9.
- B) Existing capacity of the roadway or right-of-way is not for exclusive use by the developer, traffic generator, or applicant for an access permit. Therefore, additional right-of-way may be required by Madison County in addition to what is suitable for construction of the required roadway, drainage, or utility improvements. Additional right-of-way requirements will be at the discretion of the Madison County Engineer. The developer or owner is responsible for all costs associated with acquiring additional right-of-way.

Table 9: Minimum Mid-Block Right-of-Way

Roadway	Minimum ROW Requirements	
	Open Shoulder	Curb & Gutter
Arterial (1)	130'	115'
Collector (1)	100'	80'
Key County Road	100'	80'
Local Road	60'	50'
Cul-de-sac	70' radius circle	60' radius circle

(1) An additional 12 ft. is required where right-turn lane is to be provided at an access connection, including intersections.

- C) Right-of-way requirements may be adjusted by the Madison County Engineer for specific roadways involving intersection right-of-way improvements or restrictions of Madison County.