Huntsville Area Regional Commuter Study

REVISED STUDY REPORT

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For

Huntsville Area Metropolitan Planning Organization

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Project Overview

The Huntsville Area Metropolitan Planning Organization (MPO) has previously worked extensively with Longitudinal Employer Household Dynamics (LEHD) data to better understand worker flows within the greater Huntsville region. While LEHD has been shown as an effective approach to mapping commute patterns, the MPO concluded that the data do not adequately account for Federal employees. This is problematic in the region due to the large number of Federal employees working for the Army Garrison at Redstone Arsenal. Similar concerns have been cited with respect to the American Community Survey (ACS) that provides data on the characteristics of work trips reported in the Census Transportation Planning Products (CTPP) 2012-2016 Transportation Profiles.

The MPO recently estimated employment of 225,000 for the 2015 travel demand model, which includes all of Madison County and a small portion of Limestone County. The 2012-2016 CTPP Transportation Profiles estimate 225,000 workers for the two counties combined (198,000 of those with a place of work in Madison County). According to CTPP, a majority of the 27,000 employees working in Limestone County have workplaces in areas of the County outside of the MPO study area. There are nearly 38,000 workers residing in all of Limestone County, meaning that there are about 11,000 residents of Limestone County that work in other counties, most of these in Madison County (largely within Huntsville). The difference between nearly 200,000 employees with a place of work in Madison County versus those residing in Madison County (165,000) shows that a very large percentage of workers commute into Huntsville from adjacent areas beyond Limestone County.

As much of the population growth in northern Alabama has occurred since passage of the 1962 Federal Aid Highway Act, the region was not included in the original spate of household travel surveys conducted in the 1960s and 1970s. According to documentation of the most recent 2009 and 2017 National Household Travel Surveys (NHTS), neither the Alabama Department of Transportation nor any of the state's MPOs participated in the NHTS Add-On program. Thus, only a statistically insignificant number of NHTS records exist for the greater Huntsville region. As a result of these data deficiencies, the MPO funded a Regional Commuter Study to better understand worker travel patterns throughout the MPO area and adjoining counties. Metro Analytics was selected as consultant to lead the technical analyses.

The study is divided into three key tasks, described in subsequent sections of this report:

1. Task 1: Data Collection – the next section of this report describes data sources considered and obtained, along with geographies used to analyze travel patterns, and data obtained from Redstone Arsenal staff.
2. Task 2: Data Presentation – this is followed by a discussion of data analyses and travel patterns identified from these data.
3. Task 3: Data Analysis and Presentation of Conclusions – the report continues with a discussion of study findings and conclusions, with a special focus on congestion management, including potential locations for park-n-ride lots, premium transit routes, and other transportation strategies.

The report concludes with a discussion of next steps and future considerations.

Task 1: Data Collection

The approach to collecting data on worker flows for this study is predicated on using multiple sources for information, understanding the pros and cons of data techniques, and maintaining consistency with resources allocated for project completion. This section of the report describes different data sources considered and obtained, analysis districts used to summarize data and coordination with staff at the Redstone Arsenal on locating workers at both the home end and worksites within the Arsenal.

Data Sources

Available project resources precluded conducting a full-scale household travel survey of regional travel patterns. Roadside travel surveys, license tag matching and aerial tracking of vehicles are also expensive and most appropriate for a small subarea or distinct travel corridor. Based on the number of origin and destination geographies desired for analysis, the study focused on big/passive sources for much of the data collection. Algorithms are used by big data vendors to turn repetitive GPS and other digital signals into market segments such as "work trips." Essentially, repetitive patterns from predominantly residential areas to employment areas are designated as home-based work trips.

Different vendors use alternate technologies and algorithms to identify trip patterns and some vendors "slice and dice" their data into different components. The range of technologies includes navigation systems, location-based services data, other GPS signals, cellular triangulation, Wi-Fi signals, and Bluetooth readers. Select vendors might have a greater coverage than others, depending on sources used for their data. Technologies, costs, algorithms, and data dissemination tools are constantly evolving, even as new vendors enter the market. Data can generally be differentiated by season and periods of the day.

Consideration was given to contacting multiple data vendors for price quotes on providing data on commuter trips. In the end, MPO staff and the consultant team agreed to proceed with purchasing a license with StreetLight InSight Data. StreetLight InSight advantages include extensive data validation efforts to ensure compatibility with daily traffic counts; multiple technologies for data collection; an easy to use dashboard for running different analyses; and recent team experience using the data. It was decided that purchasing data from more than one vendor to compare differences, while interesting, would not be the most effective use of resources for the contract.

Early discussions included supplementing big data with a postcard handout/mail-back survey and/or online survey of Arsenal workers. Arsenal staff indicated that typical traffic volumes at Arsenal gates were such that handing out postcard surveys could result in extreme congestion and delays to worker arrival times at their offices. Instead, as discussed later in this section of the report, Arsenal planning staff was able to provide data on worker home locations by zip code and worksite locations by individual building at the Arsenal property, along with estimated traffic at each gate, and average visitors per day.

Analysis Districts

Standard subscriptions for StreetLight InSight data are limited to 50 activity zones. The MPO wanted 12 of these zones to be reserved for counties outside the MPO area boundary. Two additional zones were reserved for cities outside the MPO area (Athens and Decatur). Of the remaining 36 zones within the MPO area, six of these were assigned to locations within the Redstone Arsenal. Table 1 is a listing of all analysis districts used in the Commuter Study while Figure 1 depicts the locations of these districts.

Table 1. Huntsville Commuter Study Analysis Districts

No.	Zone Name	in MPO	outside MPO	Arsenal
			Location Description	
1	72 East	X		
2	Ardmore	X		
3	Arsenal South	X		X
4	Athens City		X	
5	COLBERT COUNTY		X	
6	CULLMAN COUNTY		X	
7	Decatur City		X	
8	DEKALB COUNTY		X	
9	Downtown	X		
10	East	X		
11	East Central	X		
12	East Limestone	X		
13	Franklin County, TN		X	
14	Gateway	X		X
15	Giles County, TN		X	
16	Goss	X		X
17	Greenbrier	X		
18	Gurley	X		
19	Harvest	X		
20	Hazel Green	X		
21	JACKSON COUNTY		X	
22	Jetplex/Triana	X		
23	LAUDERDALE COUNTY		X	
24	LAWRENCE COUNTY		X	
25	LIMESTONE COUNTY (PART)		X	
26	Lincoln County, TN		X	
27	Madison	X		
28	Marshall	X		X
29	MARSHALL COUNTY		X	
30	Maysville	X		
31	Medical District	X		
32	Meridianville	X		
33	Monrovia	X		
34	Moores Mill	X		
35	MORGAN COUNTY		X	
36	New Hope	X		
37	New Market	X		
38	North	X		
39	Northeast	X		
40	Northwest	X		
41	Owens Cross Roads	X		
42	Patton	X		X
43	Research Park East	X		
44	Research Park West	X		
45	Southeast	X		
46	Southwest	X		
47	Toney	X		
48	Town Madison	X		
49	Von Braun/Sparkman	X		X
50	West Central	X		

Figure 1. Huntsville Commuter Study Analysis Districts
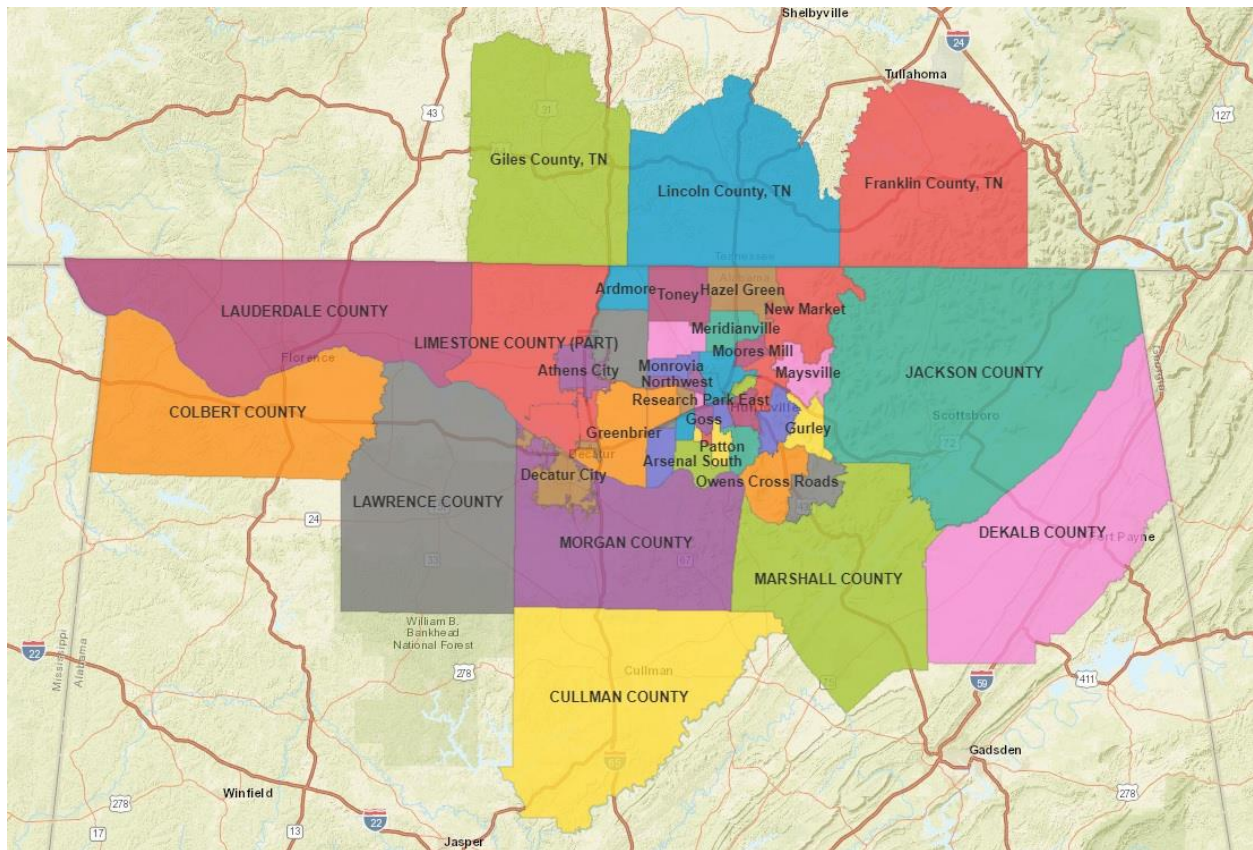
Redstone Arsenal Coordination

It was important to schedule meetings with Redstone Arsenal staff to identify available worker data given the impact of its workers on regional travel patterns and limitations in the accurate reporting of employment at the Redstone Arsenal by Longitudinal Employer Household Dynamics (LEHD), used by the Huntsville Area MPO to estimate employment at the traffic analysis zone (TAZ) level. MPO and consultant staff met onsite with Arsenal staff on January 30, 2020 to present study purpose and needs and request available data on commute patterns to and from the Arsenal. The following data were obtained from Arsenal staff:

- Number of workers by zip code
- Number of workers at each property within the Arsenal
- Average weekday traffic at Arsenal gates
- Average number of daily visitors at Arsenal gates
- Locations of onsite retail activity

Data on the estimated number of workers by zip code was reported for approximately 31 percent (13,230) of all Arsenal employees (43,000 according to Arsenal staff). Thus, the percent of employees by zip code was used to estimate the total number of Arsenal employees in each zip code. Employee locations onsite were provided at 14 different locations and then grouped into the six analysis districts designated for the Redstone Arsenal. Figure 2 is an inset map depicting analysis districts within and nearby the Redstone Arsenal.

Figure 2. Huntsville Commuter Study Analysis Districts: Arsenal Inset
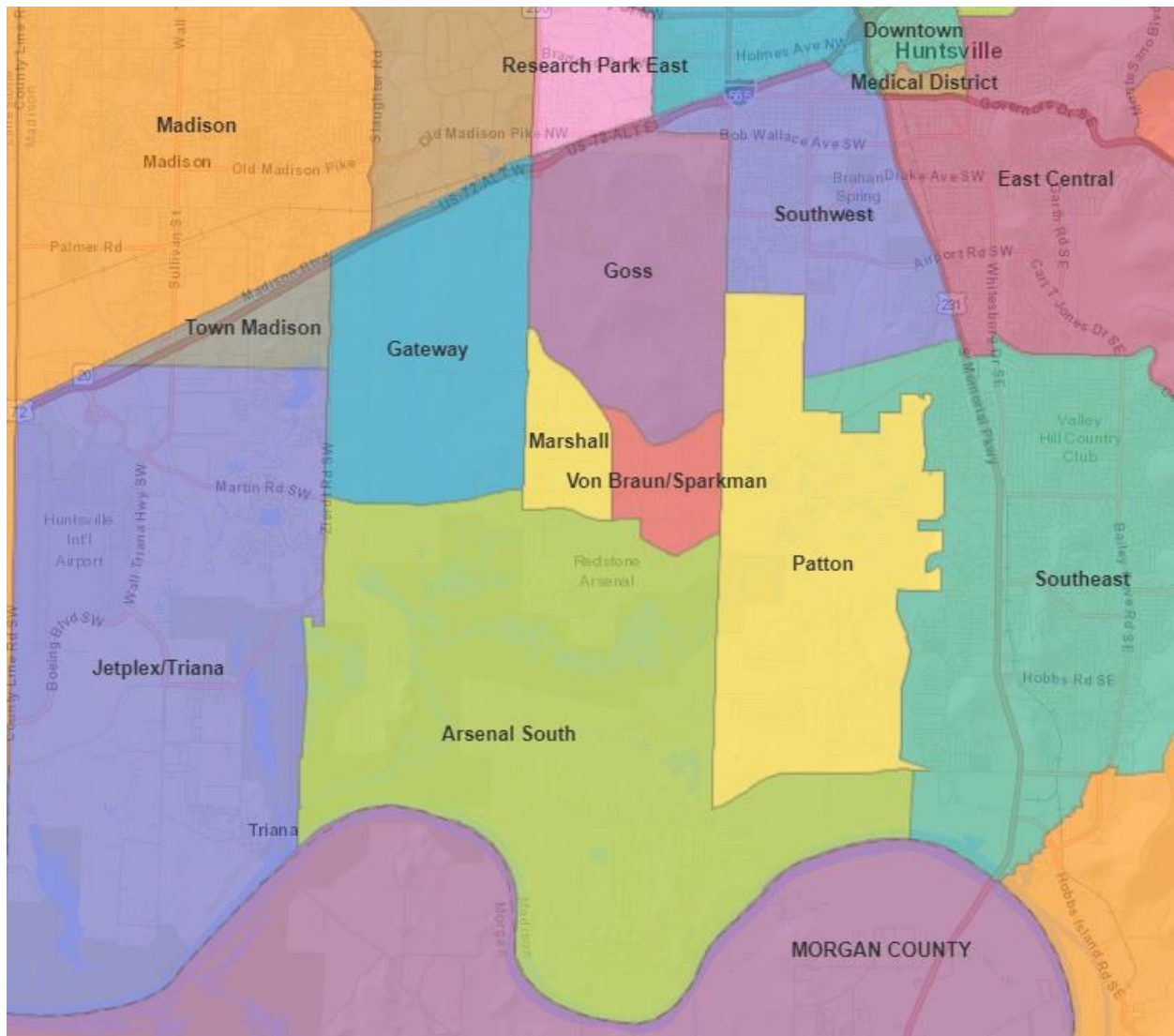
Other Employment Data Sources

Numerous government and proprietary sources are available to estimate employment data at the TAZ level. Each source has its limitations and shortcomings. Several agencies and private companies cross reference other sources in estimating their own estimates of workers by employment site. Sources of employment estimates include, but are not limited to, InfoGroup, Dun & Bradstreet, IMPLAN, ESRI, Chambers of Commerce, and LEHD/LODES (LEHD Origin-Destination Employment Statistics), displayed via OnTheMap applications. Documentation on LEHD/LODES/OnTheMap clearly states that this source does not contain information on all Federal civilian employees because of security concerns and differences in administrative processing, including numerous agencies located at the Redstone Arsenal.

The consultant team did reach out to the Huntsville Area Chamber of Commerce, who shared a sample of their available data; however, a review of these data and discussions with MPO staff concluded that the same sources presently employed by the MPO were also being used by the Chamber for their estimates.

Task 2: Data Presentation

Data collected, obtained, and massaged during Task 1, were further analyzed, summarized, and mapped out during Task 2.   StreetLight InSight includes a dashboard application whereby users can submit "data runs" using the established zone system, described in Task 1. StreetLight InSight runs can include data summaries by activity per zone or origin-destination flows. The data can be further summarized by year, month, date, and time-of-day for autos and/or trucks. Arsenal data required proportionate adjustments to the universe of total Arsenal employment, summary at home location by zip code, and work location into the 6 analysis districts established by the MPO and depicted in previous tables. The following subsections depict key summary statistics produced from data obtained during this study.

Trip Activity by Analysis District

Trip activity, for the calendar year 2019, was summarized by analysis district using the StreetLight InSight dashboard. The purpose of these summaries was to identify where the most trips are being generated across the region. Average daily conditions for the year 2019 were used, in part for consistency across all seasons of the year but also to avoid COVID-19 disruptions that have greatly impacted travel patterns during the calendar year 2020.

Trips were summarized separately by trip start point (origin) and end point (destination). A simplified inference would be that trip origin locations generally reflect home zones while trip destination locations are equated with work and shopping zones. It should also be noted the rank order of a particular zone in terms of trip making is also a function zone size. Thus, with zones outside the MPO study area being represented by whole counties or whole cities, these zones rise to the top of the list in part because of their geographic size. The following tables provide rank order information on trip activity:

- Table 2 – Top 10 zones by trip activity: regionwide
- Table 3 – Top 10 zones by trip activity: MPO study area
- Table 4 – Trip activity by Arsenal zone

Table 2. Top 10 Zones by Trip Activity: Regionwide

Trip Origin Rank	Zone Name	Trip Destination Rank	Zone Name
1	LAUDERDALE COUNTY	1	LAUDERDALE COUNTY
2	MARSHALL COUNTY	2	MARSHALL COUNTY
3	CULLMAN COUNTY	3	CULLMAN COUNTY
4	Decatur City	4	Decatur City
5	COLBERT COUNTY	5	COLBERT COUNTY
6	MORGAN COUNTY	6	MORGAN COUNTY
7	DEKALB COUNTY	7	DEKALB COUNTY
8	JACKSON COUNTY	8	JACKSON COUNTY
9	Franklin County, TN	9	**East Central**
10	Madison	10	Franklin County, TN

Table 3. Top 10 Zones by Trip Activity: MPO Study Area

Trip Origin Rank	Zone Name	Trip Destination Rank	Zone Name
1	Madison	1	East Central
2	East Central	2	Madison
3	Southeast	3	Southeast
4	North	4	North
5	Northwest	5	Northwest
6	West Central	6	West Central
7	Southwest	7	Southwest
8	Research Park West	8	Research Park West
9	Monrovia	9	Monrovia
10	East	10	East

Table 4. Trip Activity by Arsenal Zone

Trip Origin Rank	Zone Name	MPO Rank	Overall Rank Weekdays	
1	Goss	26	40	
2	Von Braun/Sparkman	30	44	
3	Marshall	32	46	
4	Gateway	33	47	
5	Arsenal South	35	49	
6	Patton	36	50	
Destination Rank Order:			23	Total Arsenal Rank
1	Goss	27	41	
2	Von Braun/Sparkman	30	44	
3	Marshall	32	46	
4	Gateway	33	47	
5	Arsenal South	35	49	
6	Patton	36	50	
			23	Total Arsenal Rank

Intra-MPO Origin-Destination Patterns

StreetLight InSight origin-destination patterns were estimated and mapped for daily, morning peak and evening peak periods for autos and trucks separately based on the 50 zones described in Section 1 of this report. Data summaries were downloaded and sorted in numerous ways to properly describe findings. Likewise, mapping of the data required several rounds of displaying the data to be most useful to MPO staff. The following Figures depict origin-destination flows within the MPO study area:

- Figure 3 – average weekday traffic flows

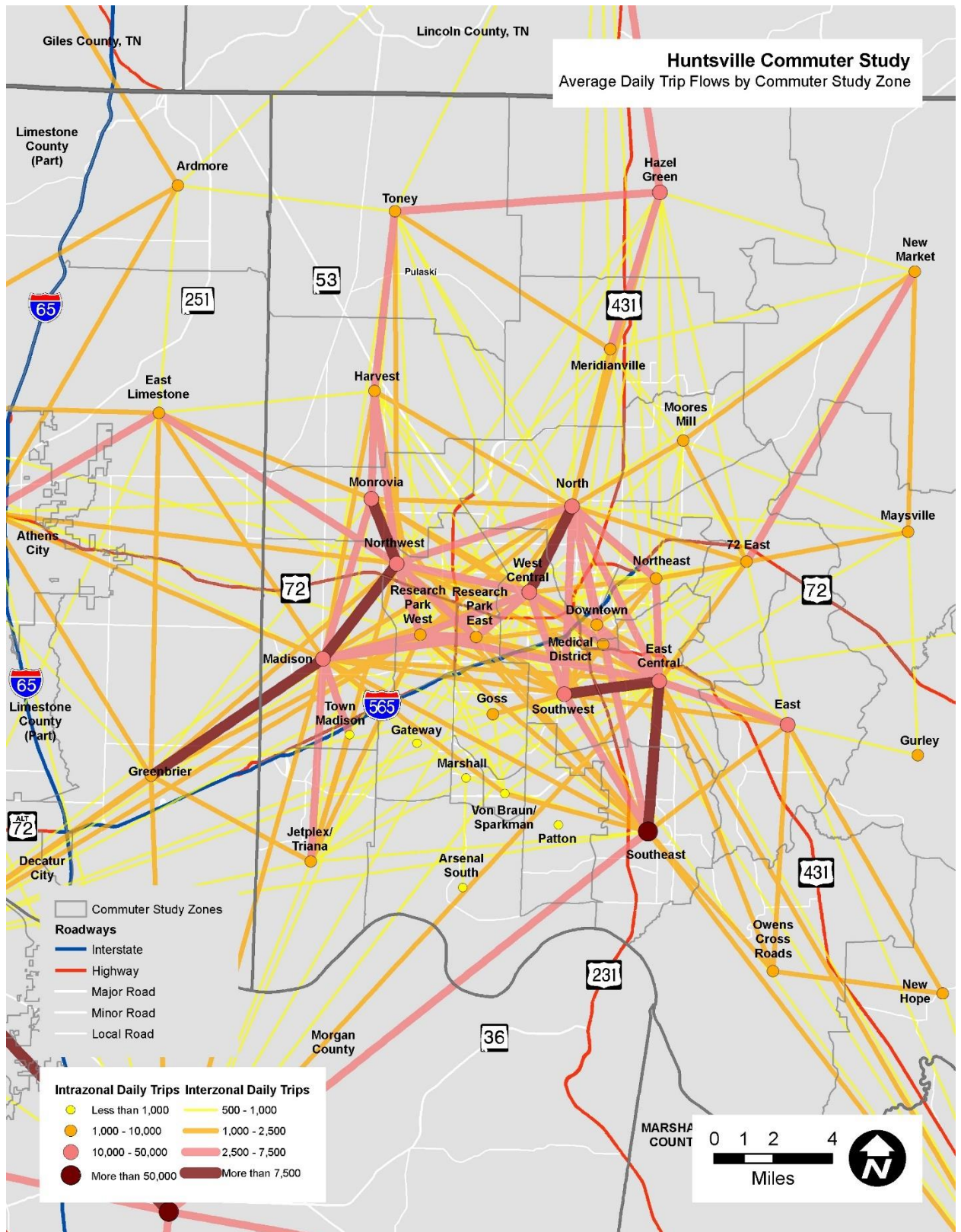Figure 3. Huntsville Commuter Study Average Weekday Traffic Flows within MPO Area
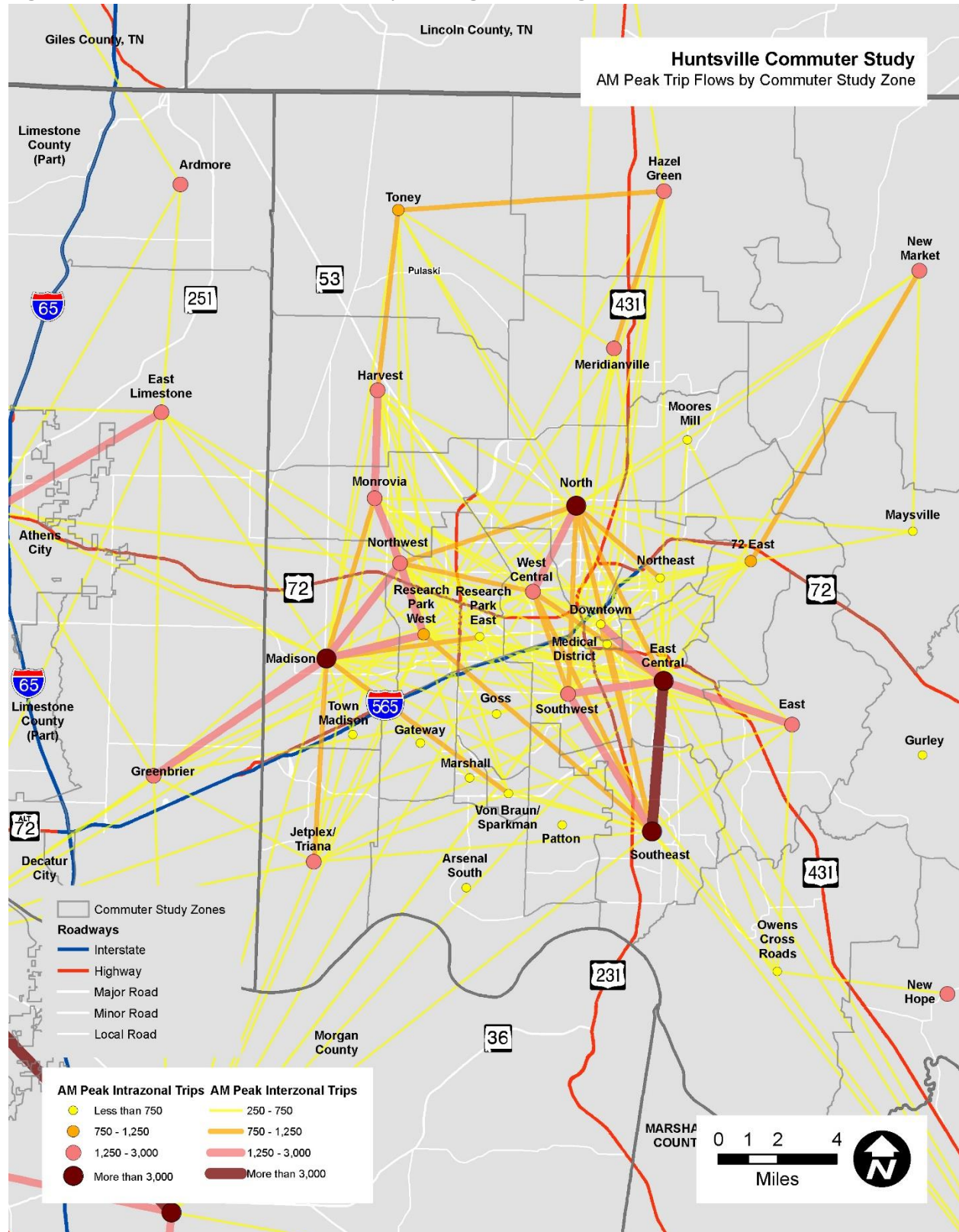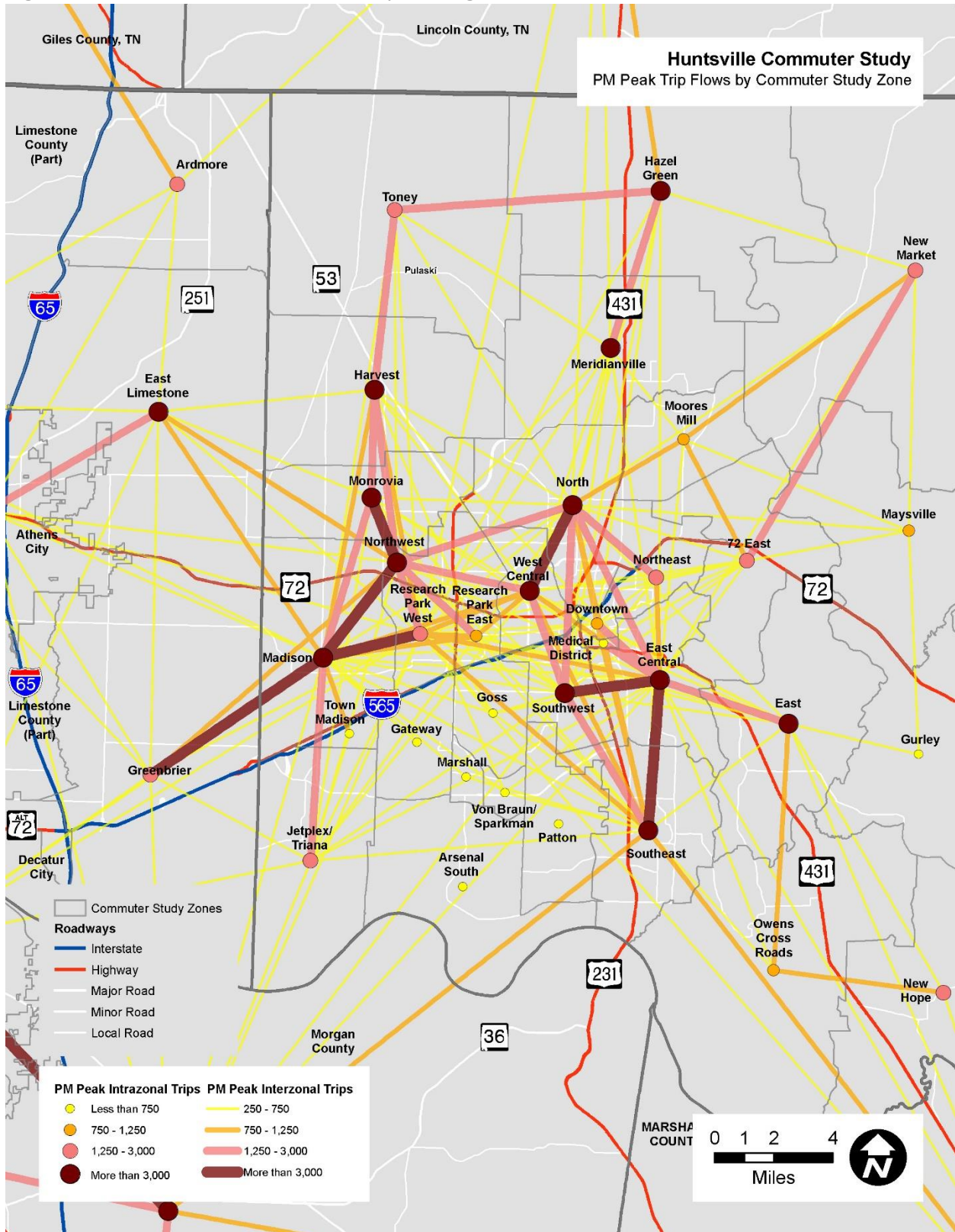

Figure 4 – morning peak period traffic flows

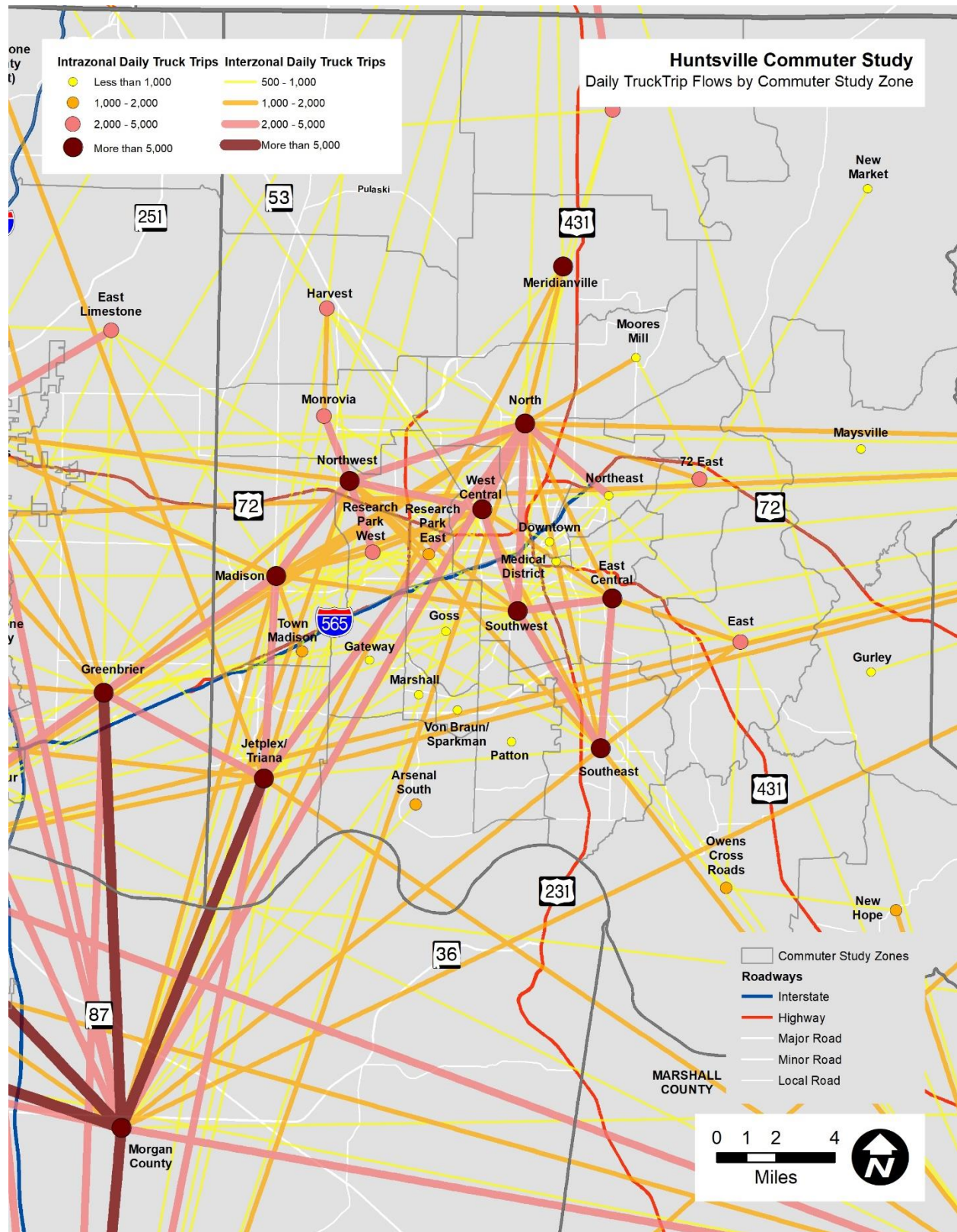Figure 4. Huntsville Commuter Study Average Morning Peak Period within MPO Area

- Figure 5 – evening peak period traffic flows

Figure 5. Huntsville Commuter Study Average Afternoon Peak Period within MPO Area

- Figure 6 – average weekday truck traffic flows

Figure 6. Huntsville Commuter Study Average Truck Traffic Flows within MPO Area

A review of the average weekday traffic flows clearly shows a predominant arc of trips from Greenbrier and Madison on the west, to the East Central and Southeast districts, along with another arc from Madison to Northwest and Monrovia.   The first of these arcs follows the I-565, US 72 west, Memorial Parkway South, and Governors Drive corridors while this second arc follows the Research Park Boulevard corridor and nearby parallel streets. A third major arc is from the North district to West Central, Southwest, and Southeast, roughly approximating the Memorial Parkway corridor. The Southeast district has the largest share of intrazonal trips, due largely to the mix of residential and commercial development found in this area.

In terms of morning and evening peak periods, key flows are similar to those depicted in the daily maps, but with select movements predominating all three maps. An example is the flow of trips between the South Central and Southeast districts, which shows up in the highest category of trip flows for all analysis periods. One noteworthy difference in comparing the peak period flows against the daily flows is that the morning and evening periods exhibit more intrazonal activity than the daily flows. This is a potential indication that commuters are making a significant amount of stops at nearby locations on their journeys to and from work. It could also be an indication that a fair number of workers are residing and working in close proximity.

Truck flows, with the exception of movements into and out of the MPO area (to be discussed in the next subsection), tend to be more intrazonal or largely run between adjacent analysis districts. This pattern is consistent with the logistics of goods movement with many of the same dominant districts showing up as truck trip origins and destinations due to the large amounts of commercial development in these areas. As one would expect, a large number of truck trips with one trip end outside the MPO area have the other trip end in the Jetplex/Triana and Greenbrier analysis districts due to the focus of the Huntsville International Airport and surrounding areas on intermodal freight.

12 Surrounding Counties to MPO Study Area Origin-Destination Patterns

Initial mapping of trips from surrounding counties to the MPO area, included trips between outlying counties; however, discussions with MPO staff indicated a preference to focus on travel flows from outlying counties to and from the MPO area. Likewise, these flows were summarized and mapped for daily, morning peak, afternoon peak, and separately for daily trucks. One difference from the earlier MPO study area maps is that, with the focus solely on flows into and out of the MPO, these maps clearly depict inbound and outbound flows. The following Figures depict origin-destination flows between the MPO study area and surrounding counties:

- Figure 7 – average weekday traffic flows Number of workers by zip code
- Figure 8 – morning peak period traffic flows
- Figure 9 – evening peak period traffic flows
- Figure 10 – average weekday truck traffic flows

Each of these Figures is preceded by a discussion of key takeaways.

The heaviest daily travel flows depicted in Figure 7 are between the MPO area and Athens, Decatur, and Morgan County. Daily flows between the MPO area and Lincoln, Marshall, and Limestone Counties fall into the next category of significance. Trips between the MPO area and Jackson County are somewhat less significant, as are inbound flows from Cullman County to the MPO area and flows to and from Ardmore. The remaining flows, depicted as yellow lines, are of fairly minor consequence.

Figure 7. Huntsville Commuter Study Average Weekday Traffic Flows to/from MPO Area
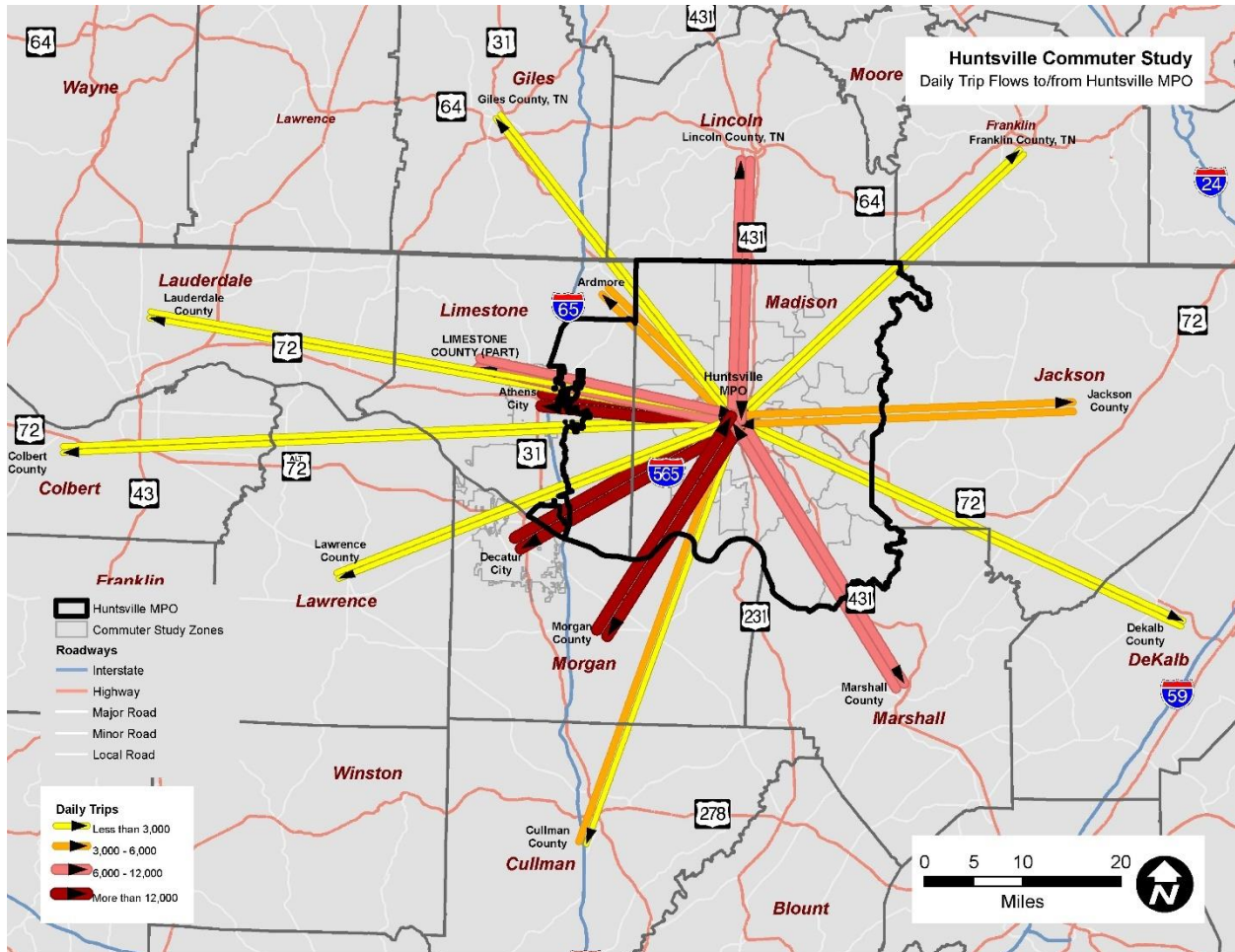
Figure 8 shows that the morning (AM) inbound flows to the MPO area are logically larger than outbound flows from the MPO area including trips from Limestone County, Lincoln County, Marshall County, and Morgan County. AM inbound and outbound trips between Decatur and the MPO area are fairly balanced, which seems reasonable considering that Decatur is the largest city outside the MPO area and is home to several large employers including Haier-General Electric, Wayne Farms, and 3M Company.

Figure 8. Huntsville Commuter Study Morning Peak Period Traffic Flows to/from MPO Area
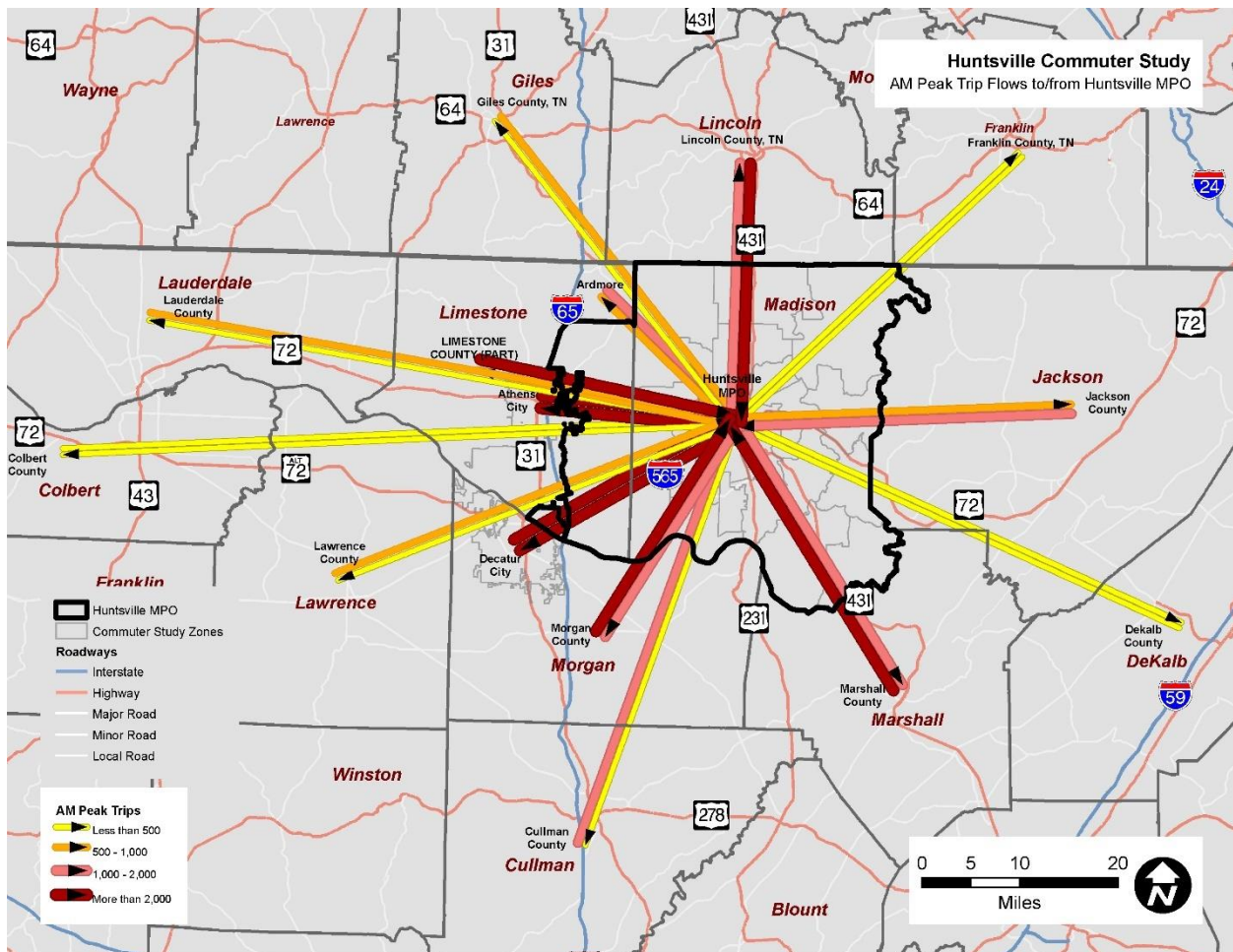
Not surprisingly, afternoon/evening (PM) flows depicted in Figure 9 are more balanced into and out of the MPO area than those for the AM (morning) period. The reason for this is that, in addition to dominating employment numbers in the region, Huntsville remains the area's center for shopping, entertainment and medical care. Many of these non-work trips occur after work hours and for residents of surrounding counties that do not work in Huntsville, this trip is a reverse PM flow to the MPO area.

Figure 9. Huntsville Commuter Study Evening Peak Period Traffic Flows to/from MPO Area
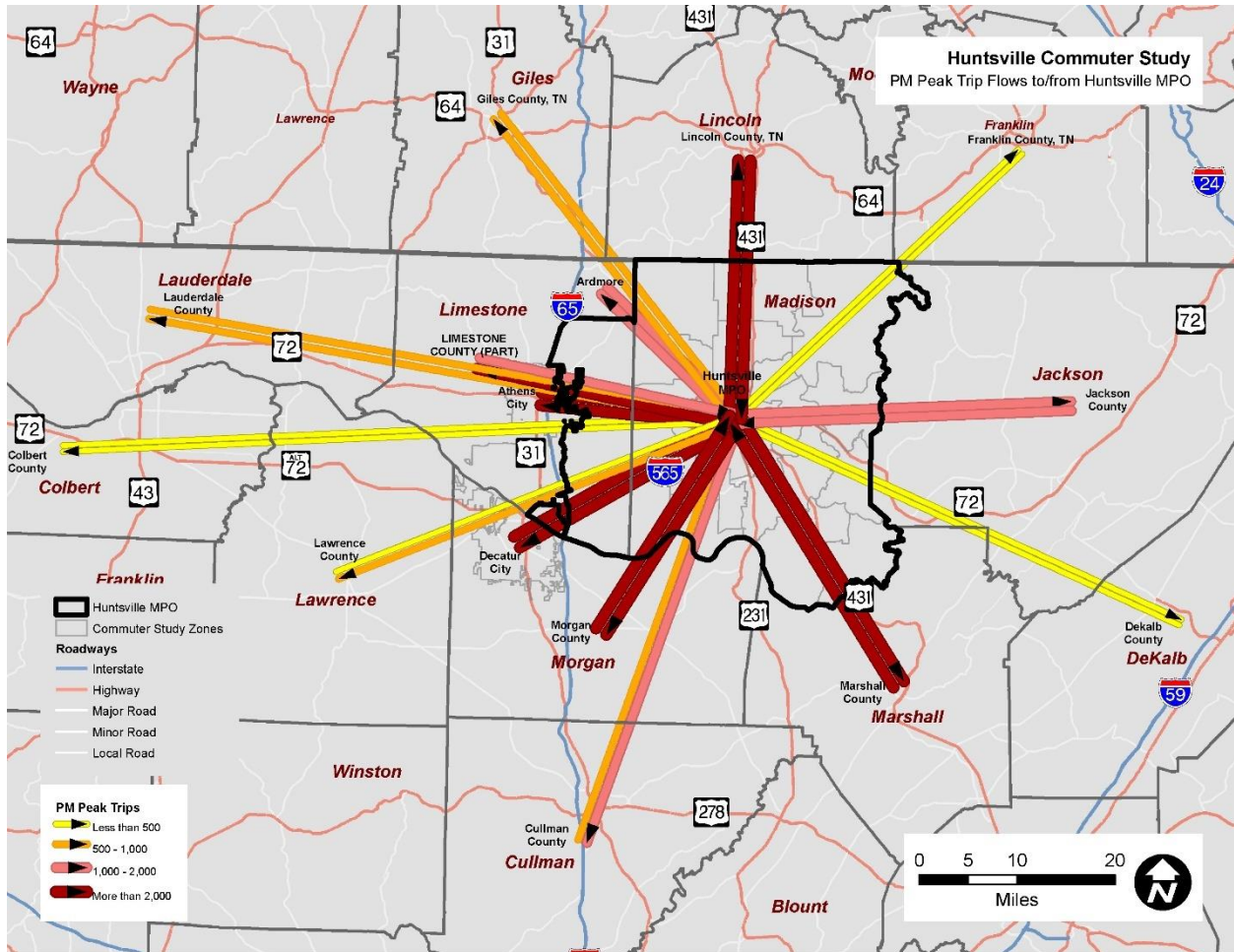
As depicted in Figure 10, truck flows are fairly balanced between inbound and outbound movements, as one would expect on a daily basis. The heaviest flows are between the MPO area and Cullman County, Morgan County, and Decatur as these are locations outside the MPO area that have significant industrial and warehousing employment. Significant flows are also evident between the MPO area and Colbert, Jackson, Lincoln, and Marshall Counties as well. Despite the distance to Colbert County, as home to Muscle Shoals and Sheffield, Alabama, significant industry is located here, fueling the need for truck trips to and from the MPO area.

Figure 10. Huntsville Commuter Study Morning Truck Traffic Flows to/from MPO Area
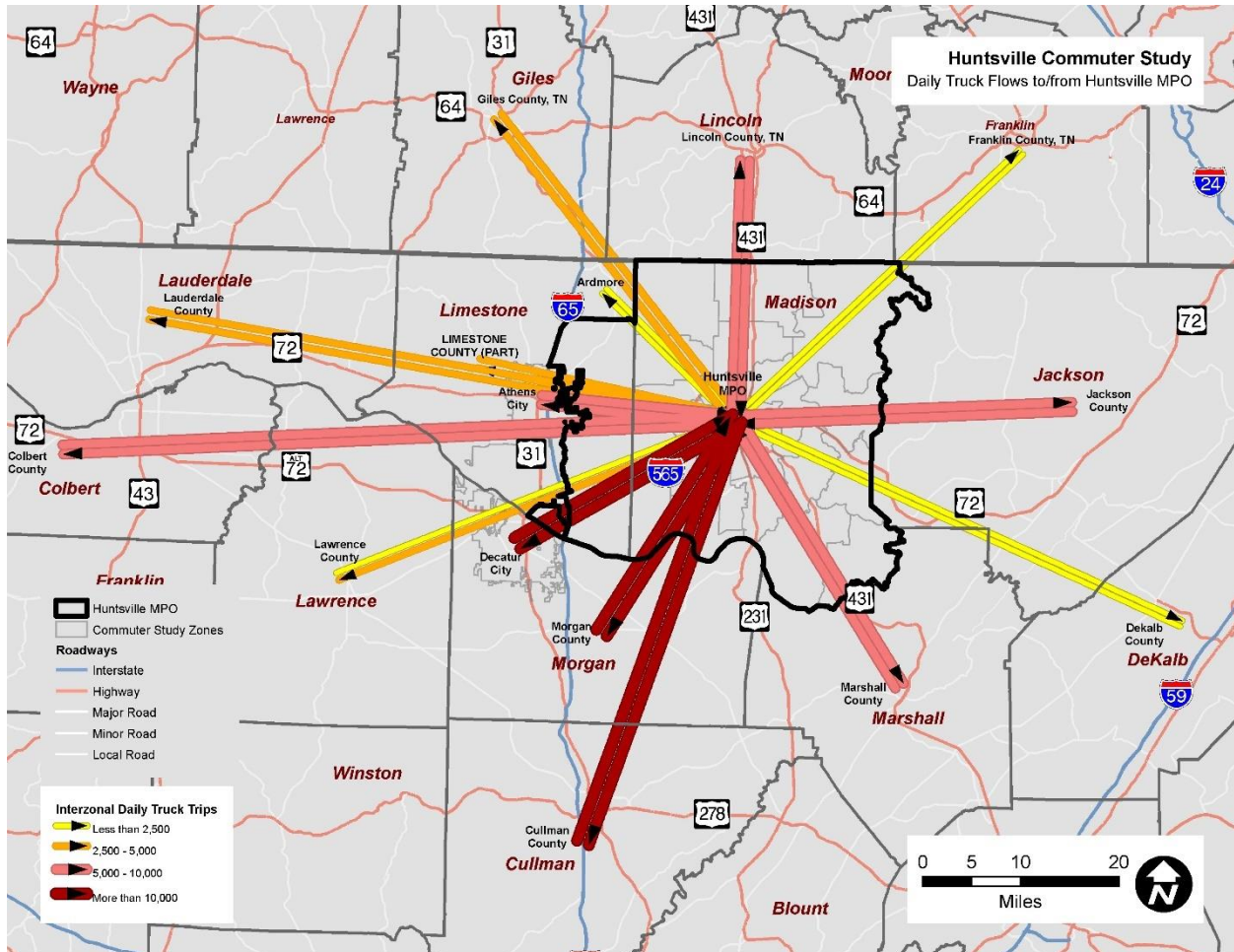

Arsenal Workers from Surrounding Counties to MPO Study Area

As described earlier, the home locations of Arsenal workers were obtained from Arsenal staff, based on a recently conducted survey. The number of workers by zip code was only provided for 31 percent of Arsenal employees. The percent of employees residing in each zip code was used to expand the sample to represent the total employment at the Redstone Arsenal. While an attempt was made by the consultant team to conflate zip codes with analysis districts, the two sets of polygons were dissimilar enough to impact confidence in the resulting map depictions. Therefore, this report provides maps of employment by zip code, with analysis district names and boundaries shown in the background. This information is depicted in Figures 11 (outlying cities and counties) and 12 (MPO study area).

A review of Figure 11 shows that a significant number of Arsenal workers reside in counties outside the MPO study area. Zip codes in western Limestone and Lincoln Counties show the largest number of workers outside the MPO area, followed by a pair of zip codes in Marshall and Morgan Counties. It is somewhat striking that some Arsenal employees reside in counties beyond the 12 counties covered by the analysis districts used in the StreetLight InSight data assessments. This includes Arsenal employees residing in zip codes located within Blount, Cherokee, Etowah, and Winston Counties in Alabama as well as Bedford, Coffee, Lawrence, Marion, Marshall, Moore, and Wayne Counties in Tennessee.

Figure 11. Huntsville Commuter Study Arsenal Workers by Zip Code outside MPO Area
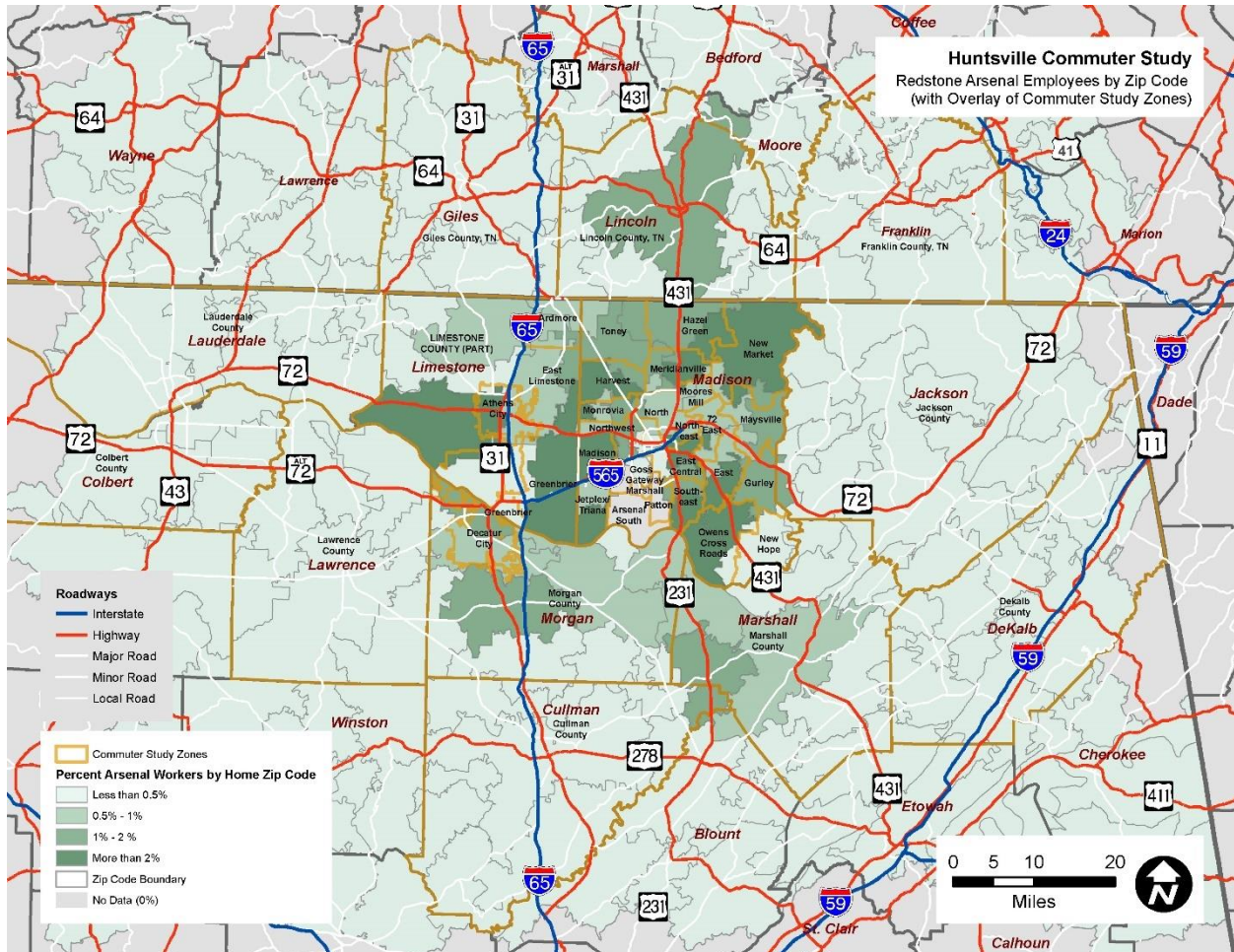
A review of Figure 12 indicates the predominant MPO area zip codes with Arsenal employees are generally outlying suburban residential areas, as opposed to zip codes closer to the urban core of Huntsville. Zip codes in Greenbrier, East, East Central, Hazel Green, Gurley, Harvest, Madison, Meridianville, New Market, Owens Cross Roads, Southeast, and Town Madison are among those with the largest share of Arsenal employees.

Figure 12. Huntsville Commuter Study Arsenal Workers by Zip Code within MPO Area
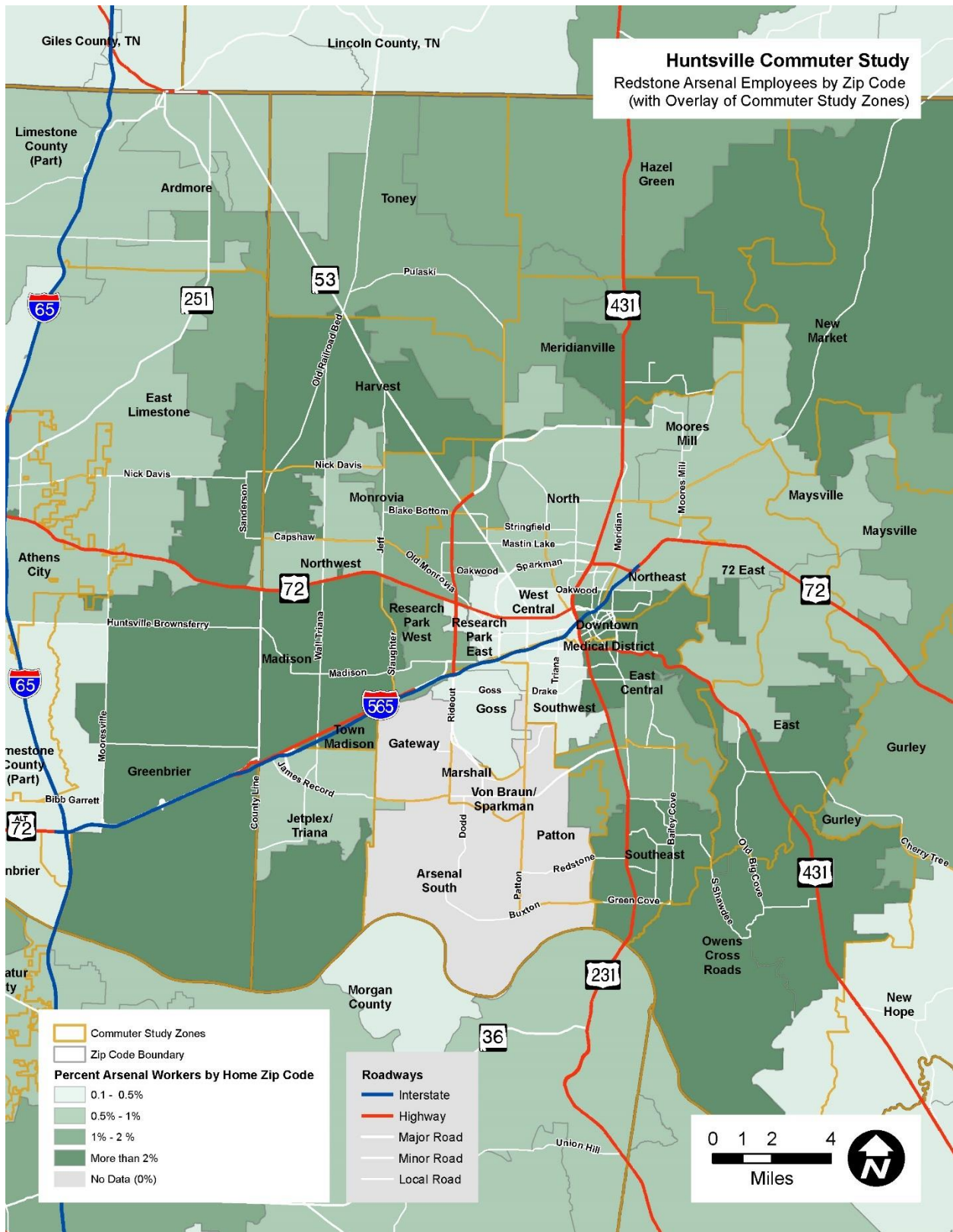
Commuter Routes from Subareas to Arsenal

Analysis using StreetLight InSight indicates that the rank order of weekday trips to Arsenal districts is as follows:

1. Southwest to *Goss*
2. City of Madison to *Gateway*
3. Southeast Huntsville to *Von Braun*
4. City of Madison to *Von Braun*
5. Southeast Huntsville to *Marshall*
6. East Central to *Von Braun*
7. City of Madison to *Goss*
8. East Central to *Goss*
9. East Central to *Goss*
10. City of Madison to *Marshall*

Connections to Madison comprise four of the top 10 flows including commuter routes such as Hughes Road, Madison Pike, Research Park Boulevard, Slaughter Road, US 72, and Wall Triana Highway. The remaining flows in the top 10 are from locations immediately east and northeast of the Arsenal. Key commuter routes from these East Central, Southeast, and Southwest districts would include Airport Road, Bob Wallace Avenue, Drake Avenue, Governors Drive, Johnson Road, Martin Road, Memorial Parkway, and Triana Boulevard. Sections of I-565 would also carry some portion of these trips on route to the Arsenal gates.

Time Leaving Home Patterns

Time of departure for all trip purposes and analysis districts was analyzed using calendar year 2019 StreetLight InSight data to better understand the spread of peak period trips. According to 2019 StreetLight InSight, approximately 21 percent of all trips in the region take place during the time period of 5:00 am to 10:00 am, with the peak hour being 7:00 am to 8:00 am at 7 percent of daily trips.

At the request of MPO staff, this analysis was expanded to compare pre- and post-COVID-19 conditions with respect to peak spreading. For the purposes of this analysis, April 2019 trip patterns were compared against April 2020 numbers. This analysis did show a dramatic shift in trips from both the morning and evening peak periods to off-peak periods. As an example, in April 2020, 7.9 percent of all trips occurred during the peak hour of 7:00 am to 8:00 am, whereas this dropped to 4.6 percent in April 2020, at the height of COVID-19 business and travel restrictions.

Analyzing Congestion

The MPO's recently adopted 2045 long-range transportation plan (LRTP), *TRiP 2045*, includes Chapter 7 titled "Congestion Management, Safety and Security." Additional information on forecasted congestion is found in Chapter 5 titled "Roadway and Traffic Forecasts," including a series of maps depicting estimated congestion using the 2015 base year travel demand model as well as 2045 existing-plus-committed (E+C) and financially constrained model networks. This subsection of the report can be updated to reflect additional discussion or comments from MPO staff on analysis needs.

Task 3: Data Analysis and Presentation of Conclusions

A solid commuter data profile has been achieved using a combination of Arsenal employee locations and StreetLight InSight data flows. This data profile lays the groundwork for supplementing the aforementioned congestion management plan to include the study of park-n-ride lot locations and alternative commuter routes. It is anticipated that these data will prove invaluable in updating and validating future enhancements to the MPO's travel demand model and planning for future transportation needs and strategies.

Data Analysis Summary

Preceding sections of this report provided the results of numerous data analyses conducted using StreetLight InSight data, in combination with information provided on residential and work locations for employees of the Redstone Arsenal. Key findings include the following:

- Size of analysis districts outside MPO study area equate to disproportionately high trip totals
  - Lauderdale, Marshall, Cullman, and Colbert Counties plus Decatur round out top 5
- MPO analysis districts with mix of residential and commercial development have most trips
  - Madison, East Central, Southeast, North and Northwest make up the top 5 in MPO
- Arsenal districts rank lower due to lack of residential mix and focus solely on work trips
  - Rank order is same for origins and destinations with Goss and Von Braun leading all
- Trips to Arsenal districts are greatest from nearby mixed-use zones (nonhome-based trips)
  - Madison, Southwest, Southeast, and East Central are predominant trip origins
- Arsenal workers reside in 14 Alabama counties and 9 different Tennessee counties
  - In MPO area, Arsenal employees are highest in outlying suburban residential areas
- Truck trips are most numerous in non-MPO districts, likewise due to geographic size
  - Cullman, Morgan, Colbert, and Marshall Counties plus Decatur comprise the top 5
- Truck trips in MPO districts dominate zones with most commercial/industrial activity
  - Jetplex/Triana, Greenbrier, North, Madison, and Northwest are the top 5
- Approximately 21 percent of trips depart between 5 am and 10 am; 7 percent depart 7-8 am
  - COVID-19 has not only reduced trip making but also resulted in peak spreading
- Arsenal analysis districts experienced the greatest COVID-19 percent trip reductions
  - Greatest numeric trip reductions in large districts outside MPO study area
- The most significant origin-destination flows in the MPO area crisscross in central Huntsville
  - Key corridors are I-565, US 72, Memorial Parkway and Research Park Boulevard
- Morning peak period flows from areas outside the MPO area are predominantly inbound
  - Evening peak period flows are generally more balanced into and out of MPO area
- Greatest flows from outside to inside MPO area – Morgan County, Athens, and Decatur
  - Second level flows from outside to inside MPO – Limestone, Lincoln, Marshall Counties

Recommended Park-n-Ride Transit Locations along Commuter Routes

MPO staff identified a need to include an assessment of park-n-ride (PNR) lots as a component of this study and a supplement to the congestion management plan (CMP). These efforts were focused on the MPO's list of top 10 congested corridors documented in Chapter 7 (CMP) of the *TRiP 2045* Plan. The traditional use of PNR lots is to provide drive access to transit, thus increasing the capture area for transit ridership. Walk access to transit, the predominant method of accessing bus service in Huntsville, generally

limits transit access to a small buffer area within reasonable walk distance to individual bus stops. The hope is that with PNR access that additional commuters will consider driving to transit and leaving their cars in PNR facilities until their workday is over, allowing for a shorter commute home in their personal vehicles.

Most of the PNR locations recommended in this analysis are presently served by transit service, and several represent existing transfer sites between multiple bus routes. For those locations where bus service does not yet exist, it is anticipated that service would be extended to these at some point in the future. Any PNR lots without existing transit service would likely receive lower priority vs. those located on existing bus routes. PNR lots can also be used as a meet up location for informal carpooling and organized vanpool programs.

It should be noted that PNR lots are most successful when located nearby large residential areas such that a switch to transit, carpool, or vanpool modes is done in advance of incurring the most congested portions of their typical journey to work. The greatest congestion should be the areas where alternate modes are used. If commuters have to travel through congestion to reach a PNR lot, they are more likely to just remain in their personal vehicle for the remainder of the journey to work.

Appendix A is comprised of a detailed technical memorandum on recommended locations for PNR lots, including aerial depictions of individual sites. Table 5 provides an overview of the recommended PNR locations and how these relate to current transit services, transportation plans, traffic volumes, and forecasted traffic patterns. Potential PNR facilities outside the MPO area have also been recommended. Appendix A should be consulted for additional details.

Table 5. Congested Corridors and Recommended Park-n-Ride Facilities

#	Roadway Corridor Description	Potential Park-N-Ride Facility(ies)	Comments	LRTP Corridor	Existing Transit?	Existing Traffic	Major Flow?	2045 Traffic
1	Memorial Parkway from Bob Wallace to Clinton Avenue	None proposed	Urban core… not ideal for park-n-ride facility	None	Y	119,258	3	102,147
2	US 72 West from Hughes Road to Providence Main Street	US 72 West and Wall Triana Highway	Abundance of surface parking though beyond corridor terminus	FC	N*	46,414	3	61,153
3	Research Park Boulevard from I-565 to US HWY 72	Mid-City Center	Could serve as an interior stop to US 72 West Express	EC	Y	63,192	4	81,178
4	I-565 from I-65 to Wall Triana Highway	I-565 West and Wall Triana Highway	Heavily-traveled corridor, potential linkage to Airport	EC	N	72,855	4	101,895
5	US 231 (Memorial Parkway) from Whitesburg Drive to Martin Road	US 231-S/Martin Road	Proximity to nearby residential, vacant parcels approaching RR	EC	Y	75,126	3	88,178
		US 231-S/Green Cove Road	Long stretch of congested roadway, large tracts at intersection	EC	N*	26,513	3	58,354
6	US 231 from Mastin Lake Road to Winchester Road	US 231-N/Winchester Road	Abundance of vacant property or at Showers Transit Center?	EC, FC	Y	37,723	4	98,802
7	US 72 East (ARC Corridor V) from Maysville Road to Moores Mill Road	Already present	Lot located at Technicolor Facility off of Moores Mill and US 72	Visionary	Y	55,236	2	63,233
8	Governors Drive from California Street to Monte Sano Boulevard	US 431-S/Sutton Road	Proposed location beyond conges	EC	N	28,728	4	40,177
9	Winchester Road from Moores Mill Road to Henson Drive	Long-Term at Homer Nance Road	Potential extension of demonstration route to Winchester and Homer Nance Road	None	N*	20,896	2	30,506
10	Bradford Drive from Explorer Boulevard to Wynn Drive	Bridge Street Town Center	Orbit transfer location with route that traverses Bradford Drive	None	Y	19,813	3	25,278

* *Transit service along portions of the overall corridor closer to Huntsville CBD*

Recommendations for Alternative Commuter Routes

MPO staff plans to develop a Comprehensive Regional Transit Plan during the 2020-2021 fiscal year. As stated in the MPO Unified Planning Work Program, "this proposed Comprehensive Regional Transit Plan will explore options beyond the five-year window of the Transit Study and determine the feasibility of mass transit such as Bus Rapid Transit (BRT) and Light Rail. Using results from the Commuter Study and the TRiP 2045 LRTP, it will identify transit corridors and highlight sites for potential transit-oriented development (TOD) opportunities." This study will look at potential future transit corridors and data from the Regional Commuter Study will be key to identifying potential corridors for future study.

Mapping of StreetLight InSight origins and destinations indicates that a large share of the region's trips crisscross in the area bounded by the Redstone Arsenal on the south, Monrovia to the north, Greenbrier to the west, and downtown/medical center to the east. These flows form several "arcs" of travel that follow major corridors such as I-565, US 72, Research Park Boulevard, and Memorial Parkway. Several

PNR lots have also been proposed to serve traffic along these corridors, all of which are included in the top 10 congested corridors in the CMP/*TRiP 2045* Plan. The Cummings Research Park and University of Alabama-Huntsville are located in the midst of this same area and accessed via these same corridors.

Alternative commuter routes that address demand in this area and along these corridors should be a priority for further analysis during the Comprehensive Regional Transit Study. These corridors could possibly support bus rapid transit (BRT) service in the future. There might even be long-term potential for the Norfolk-Southern rail line parallel to I-565 to serve as a corridor for commuter rail, with connections beyond the current MPO study area. Additional study during development of the Comprehensive Regional Transit Plan can further analyze the prioritization and service options for these corridors in the future.

List of Opportunities for Additional Studies and improvements

At this point in time, the CMP/*TRiP 2045* Plan already identify many roadway projects for which long-term funding is not yet available. The Madison County Transportation Master Plan, currently underway, is also identifying potential traffic operational improvements, roadway connectors/extensions, and solutions to future traffic bottlenecks in unincorporated areas of Madison County.

Long-term study and completion of the Appalachian Regional Commission's Corridor V, as part of the Appalachian Development Highway System (ADHS), might have potential to route additional traffic through Northern Alabama, in conjunction with potential for an Atlanta-Huntsville-Memphis corridor that includes much of Corridor V. Expansion of the Huntsville MPO model to include Morgan County, the remainder of Limestone County, and possibly other counties in Northern Alabama and Southern Tennessee would help capture a larger share of the population commuting to major employment areas within the Huntsville MPO area, further enabling study of long-range highway corridors, outlying PNR lots, and commuter rail potential.

Next Steps and Future Considerations

Following delivery of this draft report, the Regional Commuter Study will enter a 45-day review and comment period. The outcome of this review and comment period might include additional future considerations not yet documented elsewhere in this report. Recommendations will also be made on potential PNR locations outside the existing MPO area. Preliminary recommendations on changes to the existing MPO travel demand model are also provided in Appendix B, and might be revised in the final report, pending discussions with MPO staff.

Appendix A:

Park and Ride Lot Analysis

Technical Memorandum

Huntsville Area Commuter Study
Technical Memorandum

To: Shontrill Lowe – Huntsville MPO
James Vandiver – Huntsville MPO
Dennis Madsen – Huntsville MPO

From: Wade Carroll - Metro Analytics

Cc: Rob Schiffer – Metro Analytics

Date: August 25, 2020

Subject: Park-n-Ride (PNR) Lot Analysis

Introduction

A commonly implemented strategy to reduce the number of single-occupant vehicles along congested corridors is promoting carpooling and, eventually, transit use targeted for travelers along these roadways. Successful carpooling market areas are often in high population growth areas not directly served by transit or without transit facilities along major transportation corridors.

In order to assess the potential park-n-ride (PNR) lots throughout the Huntsville region, the following steps were undertaken:

- Identification of Key Corridors
- Assessment of Corridor Locations
- Identification of Potential Sites
- Considerations for Prioritization

Identification of Key Corridors

Since the purpose of this analysis is to supplement the recommendations of the Congestion Management Plan (CMP) for the Huntsville MPO, a key criterion was the potential to relieve congested corridors throughout the region. The Top 10 most congested corridors are listed below and are depicted in **Figure A-1** (shown on page E).

1. Memorial Parkway from Bob Wallace Avenue to Clinton Avenue
2. US 72 West from Hughes Road to Providence Main Street
3. Research Park Boulevard from I-565 to US 72
4. I-565 from I-65 to Wall Triana Highway
5. US 231 (Memorial Parkway) from Whitesburg Drive to Martin Road
6. US 231 from Mastin Lake Road to Winchester Road
7. US 72 East (ARC Corridor V) from Maysville Road to Moores Mill Road
8. Governors Drive from California Street to Monte Sano Boulevard
9. Winchester Road from Moores Mill Road to Henson Drive
10. Bradford Drive from Explorer Boulevard to Wynn Drive

Of the segments listed above, most are located closer to employment centers than to the residences of their respective workforces. Therefore, the connections between the congested segments and the commuters were identified as the primary routes for carpooling (and, eventually, commuter-based transit services). Table A-1 is a listing of Regional Commuter Corridors and the CMP segments served by each regional corridor.

Table A-1: CMP Segments Served by Identified Regional Commuter Corridors

Regional Commuter Corridors	CMP Segments Served
US 72 West	• US 72 West from Hughes Road to Providence Main Street • Research Park Boulevard from I-565 to US 72
US 72 East / Moores Mill Road / Winchester Road	• US 72 East (ARC Corridor V) from Maysville Road to Moores Mill Road • Winchester Road from Moores Mill Road to Henson Drive
Research Park Boulevard	• Research Park Boulevard from I-565 to US 72 • Bradford Drive from Explorer Boulevard to Wynn Drive
I-565	• I-565 from I-65 to Wall Triana Highway
US 231 North	• US 231 from Mastin Lake Road to Winchester Road
US 231 South	• US 231 (Memorial Parkway) from Whitesburg Drive to Martin Road
US 431 South	• Governors Drive from California Street to Monte Sano Boulevard

Assessment of Corridor Locations

When considering potential locations for park and ride facilities, it is important to recognize the larger corridor served by the segments listed above. In order to help relieve congestion along these segments, commuter lots need to be located closer to the commute shed beyond the limits of congested segments providing access to the region's employment centers. Furthermore, some of the corridors are best served by both an "outer" and "inner" location given their levels of congestion and corridor length. The criteria for identifying potential PNR locations include:

- Location of congested segments along the corridor (based on 2045 RTP results)
- Presence of abundance of surface parking (from aerial surveys)
- Major cross street to promote accessibility
- Potential to access transit routes (inner locations)

Table A-2 shows the PNR locations identified along the regional commuter corridors and the rationale behind their recommendation. It should be noted that the segment of Memorial Parkway from Bob Wallace Avenue to Clinton Avenue was not specifically addressed given its central location near the Huntsville downtown core. The locations below are depicted in Figure A-1.

Table A-2: Recommended Park and Ride Locations and Rationale for Selection

Label	Regional Commuter Corridors	Rationale
A	US 72 West and Wall Triana Road	• Highly congested corridor, widening project on hold • Proximity to growing areas of suburban development • Abundance of surface parking
B	I-565 West and Wall Triana Road	• Potential utility for airport • Abundance of surface parking/available lots • Transit recommended along Wall Triana in Madison CTP.
C	US 231 North and Winchester Road (Showers Transit Center)	• Proximity to growing areas of suburban development • Potential connections to transit (Existing facility)
D	US 231 South and Martin Road	• Highly congested corridor, widening project on hold • Proximity to growing areas of suburban development • Abundance of surface parking
E	US 231 South at Green Cove Road (Longer Term)	• Proximity to growing areas of suburban development • Abundance of surface parking and vacant land
F	US 431 South and Sutton Road	• Proximity to growing areas of suburban development • Abundance of surface parking
G	Bridge Street Town Centre	• Serves both the Bradford Drive and Research Park corridors • Potential connections to transit • Abundance of surface parking
H	Winchester Road and Homer Nance Road	• Serves Winchester and potentially US 72 East • Proximity to growing areas of suburban development • Abundance of surface parking
I	Mid-City Center	• Serves both the US 72 West and Research Park corridors • Potential connections to transit • Abundance of surface parking
J	US 72 and Moores Mill Road	• Seasonal park and ride service established • Abundance of surface parking

Figure A-1: Potential Park and Ride Lot Locations
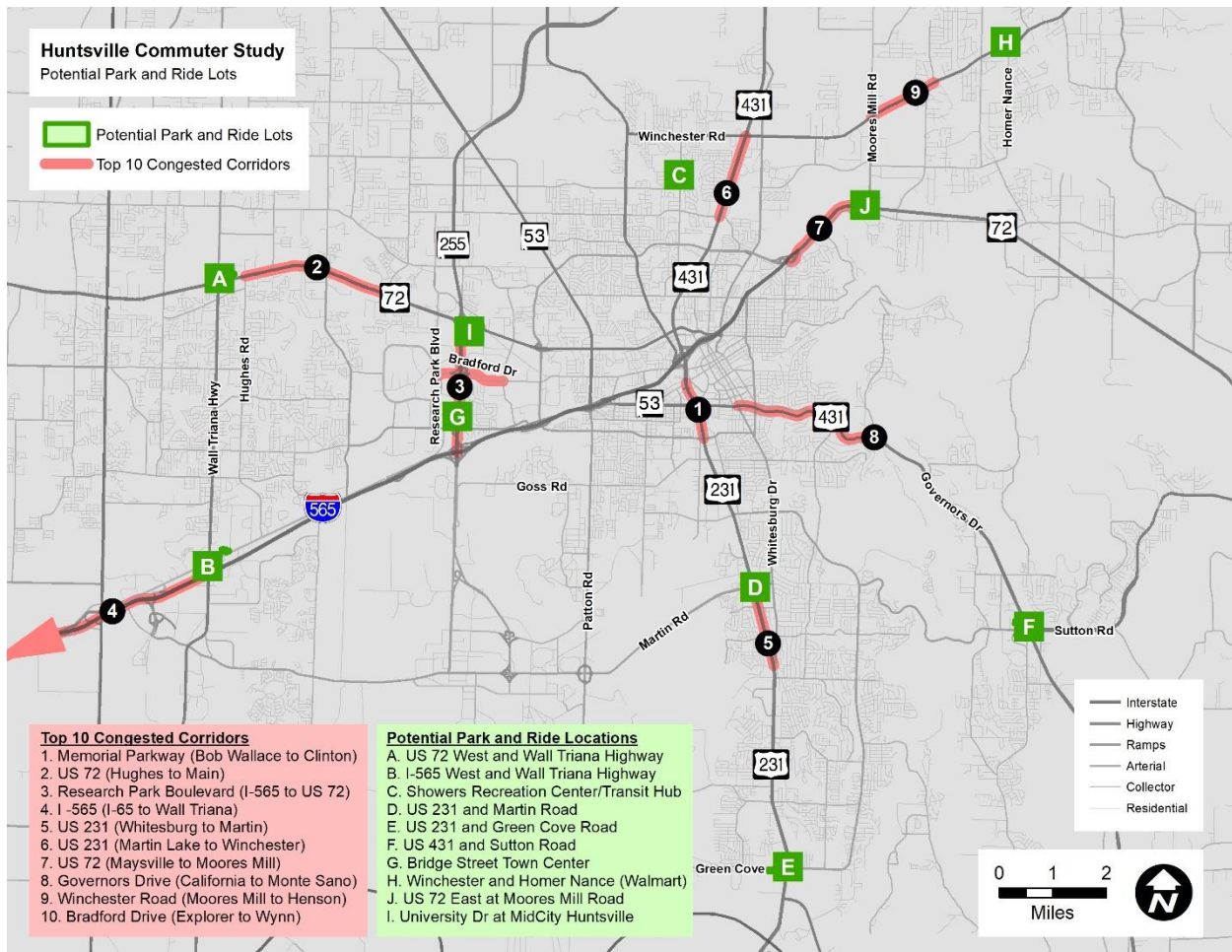
Identification of Potential Sites

The third step in the process is to identify potential sites that may be appropriate for the PNR facilities. *Please note the sites presented in this analysis should be viewed as preliminary since no direct coordination has taken place with any respective landowners or property managers.*

In order to identify potential sites, established PNR location criteria for the Minneapolis St. Paul MPO were cited for this effort, including both essential and preferred criteria, as noted below.

Essential Criteria

- **Convenient Vehicle Access** - Facilities should be located to optimize vehicle travel (transit and personal) into and out of the facility. In addition, connections to external bicycle and pedestrian networks should be included as design elements to provide equivalent access.
- **Minimum Capacity/ Anticipated Demand** - Facilities should be sized to accommodate a minimum of three exclusive, peak-period, express bus trips. For starter services, this translates to a need for at least 50 spaces, though specific sizes may depend on site factors and corridor service design. A small facility should not be located near a large facility, as increased service at the large facility will likely outcompete the smaller facility for nearby users.

- **Local Area Factors** - There are three groups of local area factors that need to be acknowledged, considered, and satisfied for local consent of a potential park-and-ride site: community or land use compatibility, environmental constraints, and economic implications.

Preferred Criteria

- **Good Visibility from primary roadway(s)** - Facilities should be oriented to ensure good visibility among potential users. Anchor facilities, those located on the end of a travel corridor, should be visible from the adjacent highway (i.e., interstate) while intermediate facilities, those located between an anchor facility and a major activity center, should be visible from the cross-roadway (i.e., county road).
- **Located on Inbound Side** - Access and egress to the facility should be located on the right side of the roadway in terms of the inbound direction to the primary activity center (destination). This allows the arriving commuter to make a right turn into the facility with minimum delay. Access to the facility from feeder arterials, rather than the primary one, is preferable. This location advantages morning commute times, which are typically more critical to attract and retain transit customers.
- **Future Expansion Potential** - Expanding successful sites is often easier and faster than building entirely new facilities. A market area analysis may inform an initial land purchase that accommodates future demand but balances current needs and resources against uncertain usage projections.
- **Surface Lots** - Surface lots should be constructed where reasonably feasible. Structured ramps could be constructed in areas with high land acquisition costs, high potential park-and-ride demand or where a complementary, shared parking joint-use venture is feasible. A thorough economic analysis should be conducted when evaluating construction of a parking structure, including initial capital costs and ongoing maintenance costs

Draft Potential Sites

The potential sites identified for park-n-ride locations are depicted on the following pages along with an indication of which criteria listed above are met. As can be expected, not all sites meet all criteria given their presence in a built environment and more dialogue will need to take place as commuter services are considered.

Lot A: US 72 West and Wall Triana Road

Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	
Future Expansion (from 50)	X
Surface Lots	X

Lot B: I-565 and Wall Triana
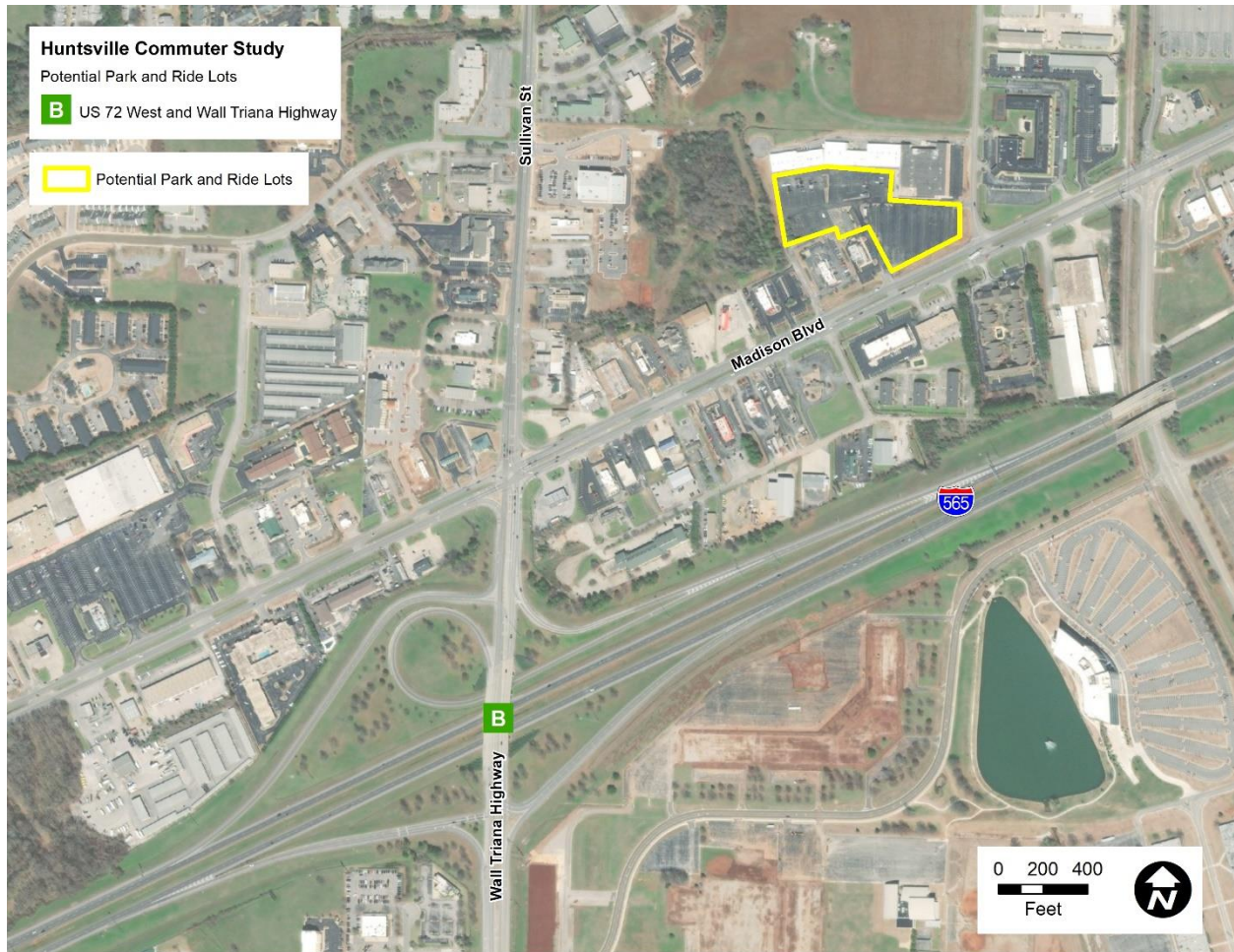
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	
Future Expansion (from 50)	X
Surface Lots	X

Lot C: US 231 North and Winchester Road (Showers Recreation Center/Transit Hub)
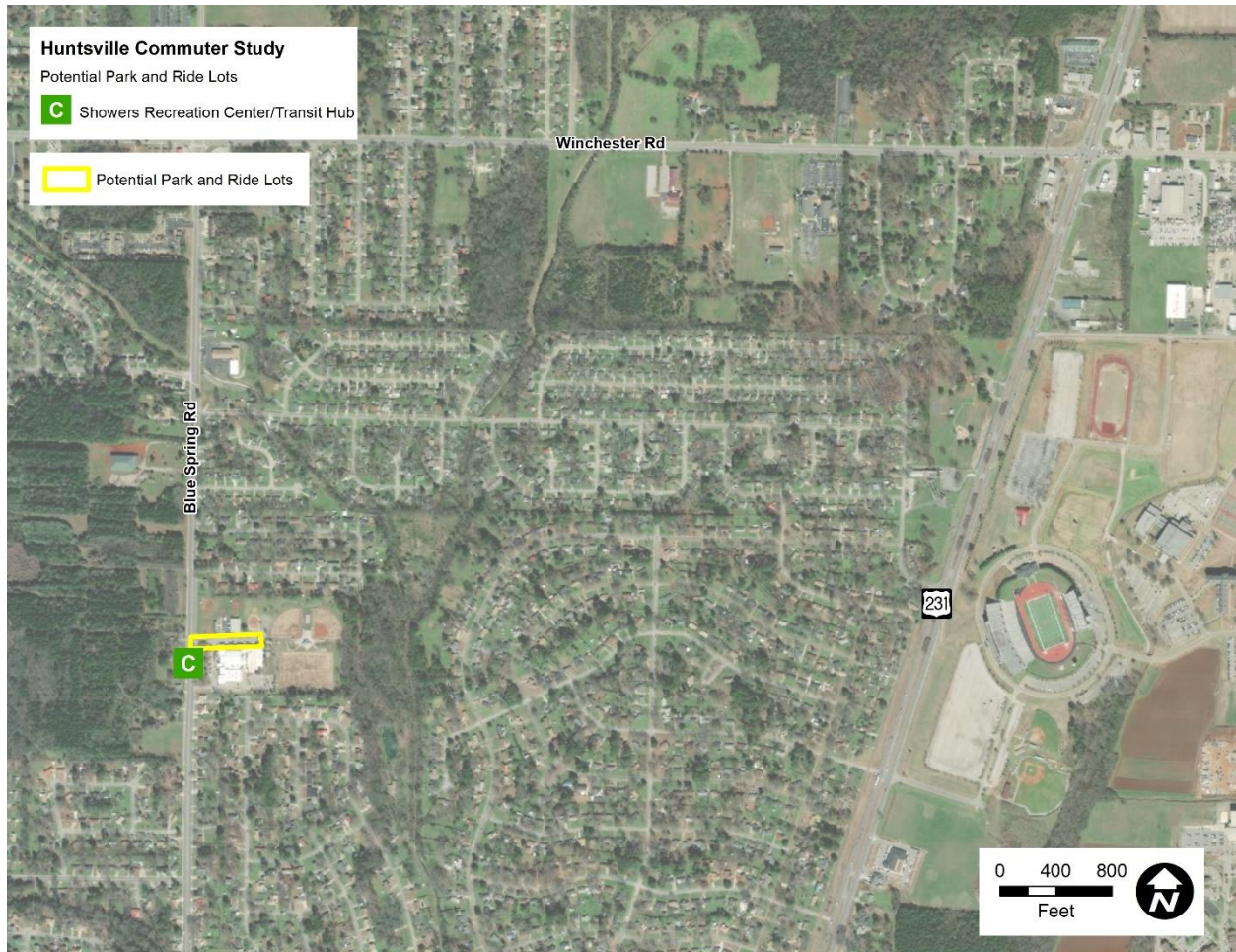
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	
Future Expansion (from 50) – Across the Street	X
Surface Lots	

Lot D: US 231 South and Martin Road

Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	X
Future Expansion (from 50)	X
Surface Lots	

Lot E: US 231 South at Green Cove Road (Longer Term)
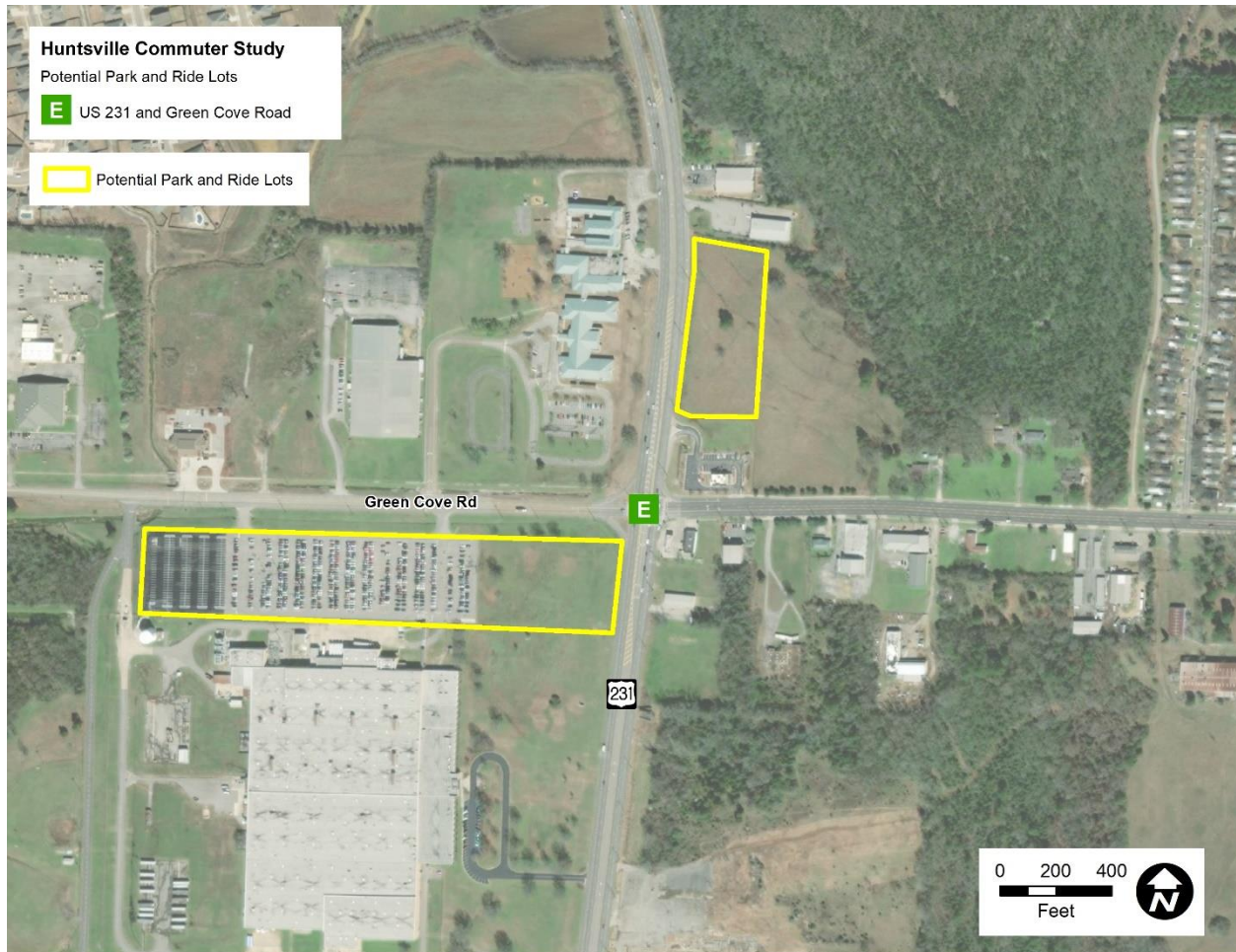
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	
Future Expansion (from 50)	X
Surface Lots	X

Lot F: US 431 South and Sutton Road
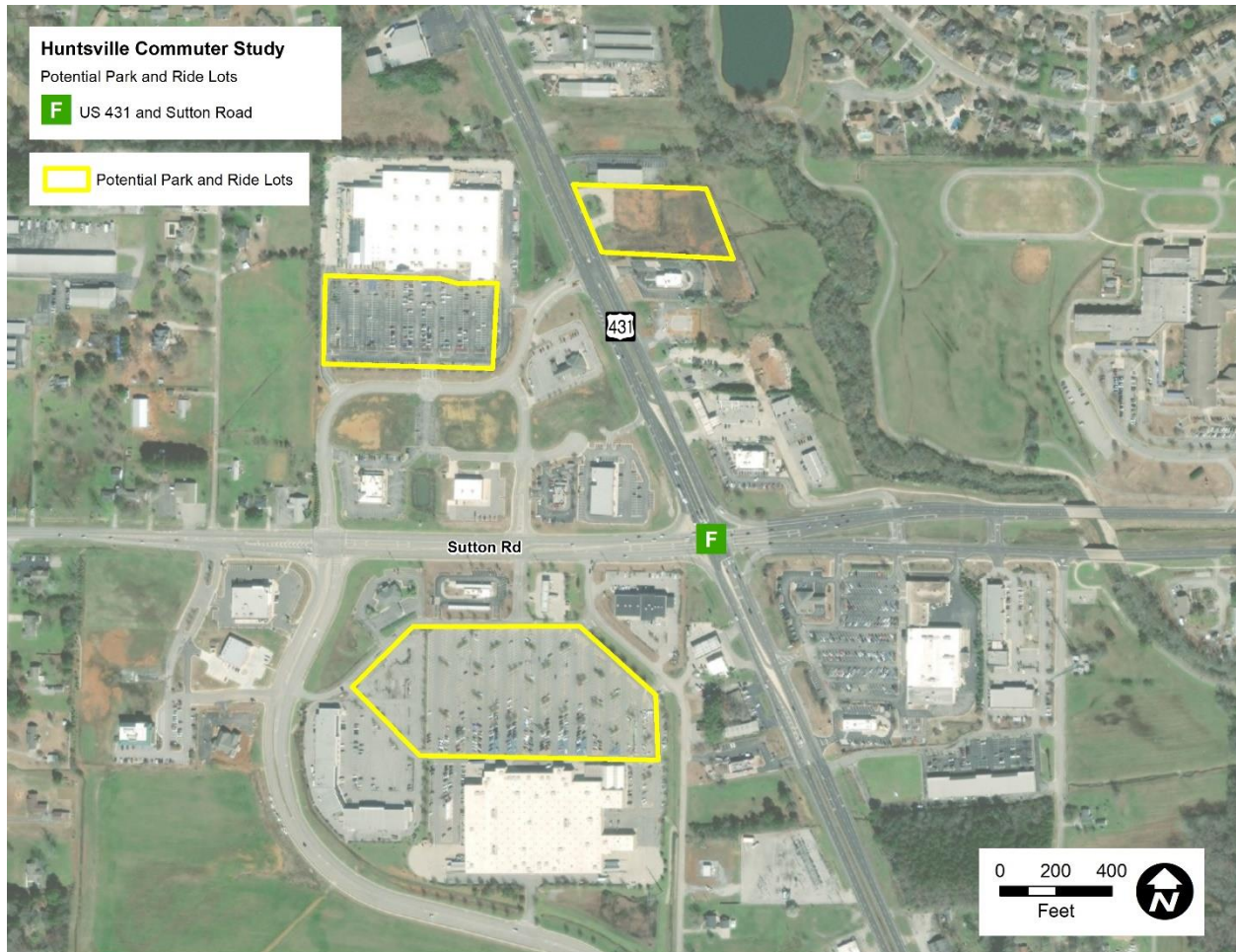
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	**X**
Minimum Capacity/ Anticipated Demand	**X**
Favorable Local Area Factors	**X**
Good Visibility	**X**
Inbound Side	
Future Expansion (from 50)	**X**
Surface Lots	**X**

Lot G: Bridge Street Town Centre
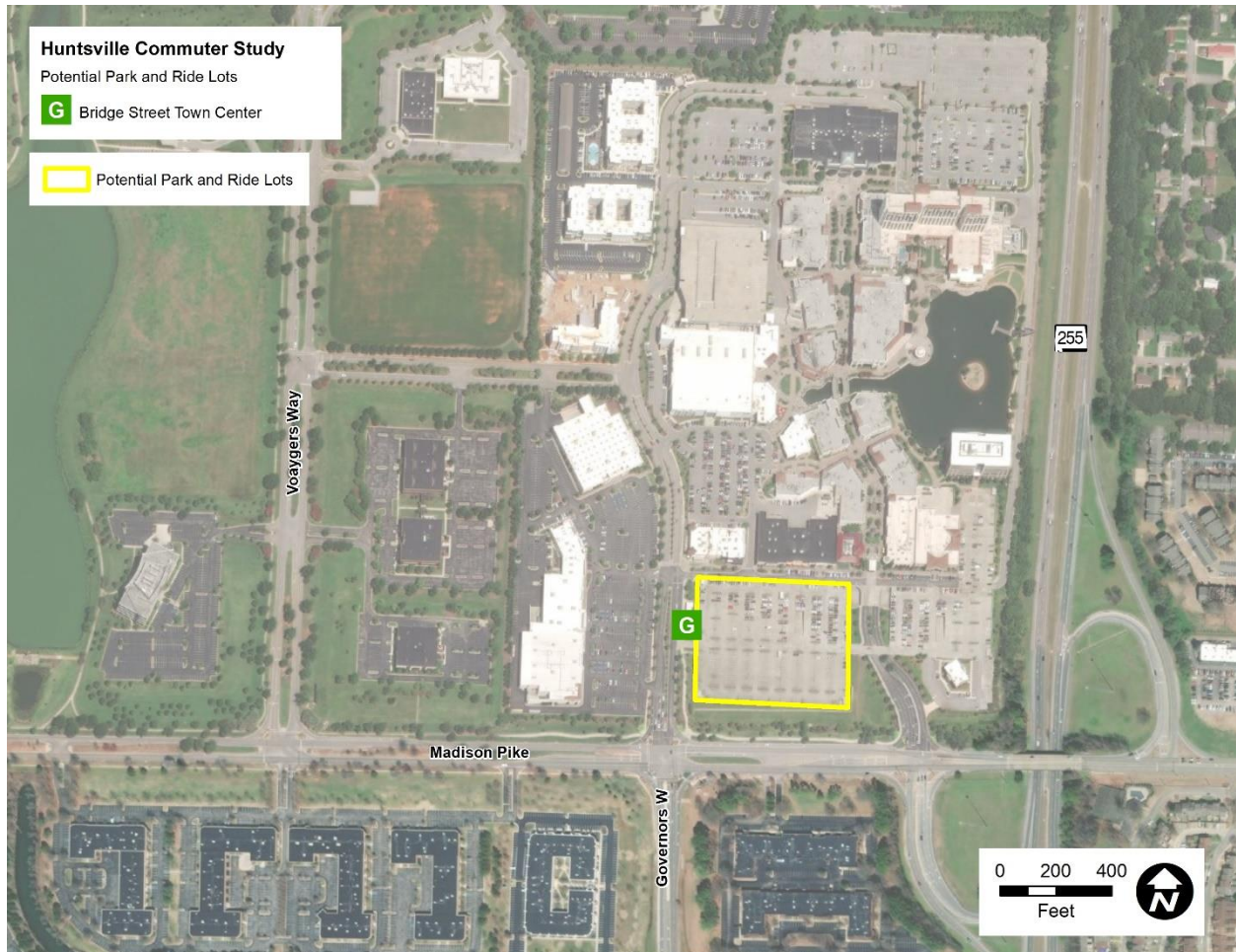
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	
Future Expansion (from 50)	X
Surface Lots	X

Lot H: Winchester Road and Homer Nance Road
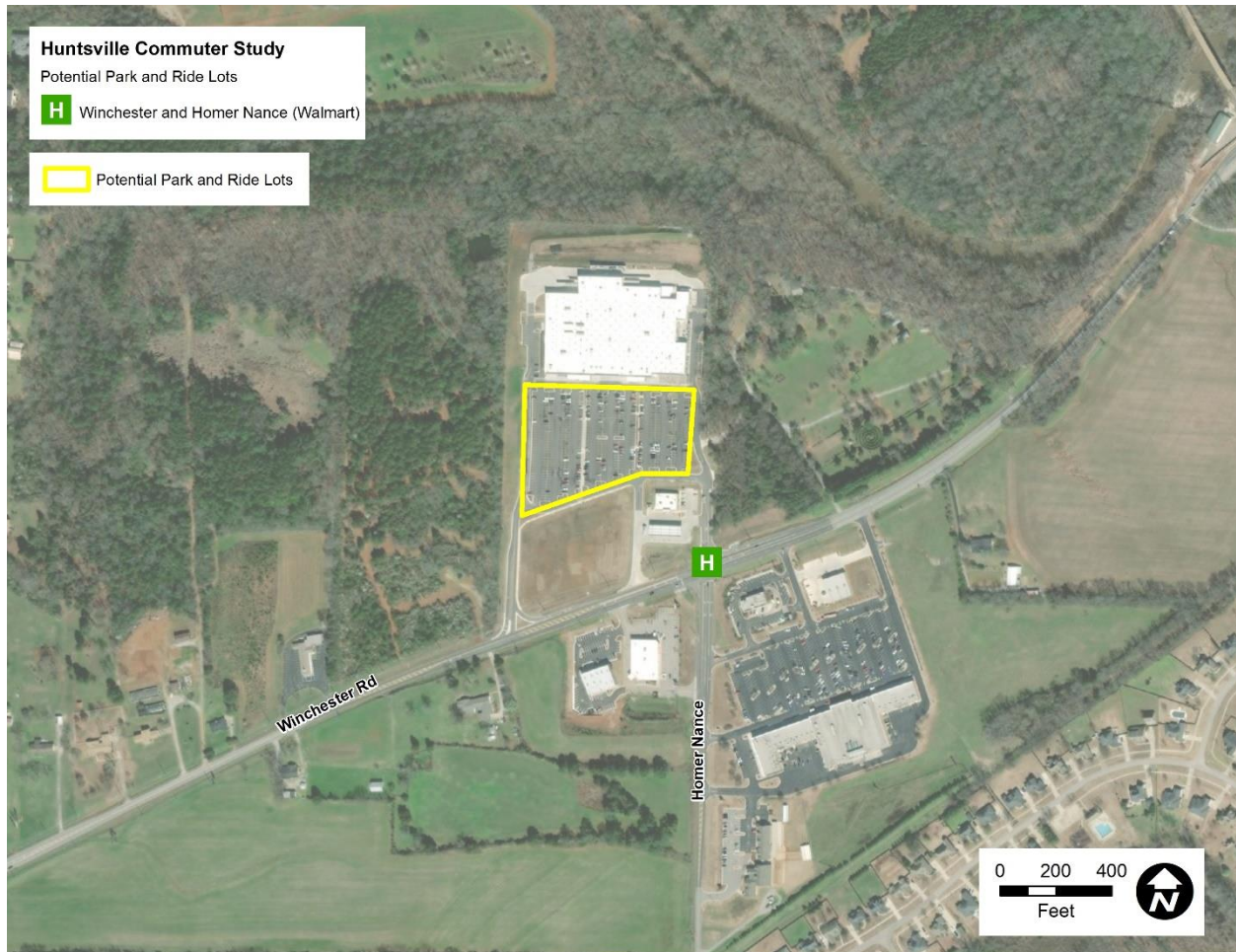
Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	X
Inbound Side	X
Future Expansion (from 50)	X
Surface Lots	X

Lot I: Mid-City Center

Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	
Inbound Side	X
Future Expansion (from 50)	X
Surface Lots (Assumed)	X

Lot J: US 72 and Moores Mill Road

Assessment of Site Criteria

Criteria	
Convenient Vehicle Access	X
Minimum Capacity/ Anticipated Demand	X
Favorable Local Area Factors	X
Good Visibility	
Inbound Side	X
Future Expansion (from 50)	X
Surface Lots	X

Other Potential Considerations for Prioritization

In addition to the Minneapolis criteria noted for the location of potential lots, there are other mobility and programmatic measures that should be considered when prioritizing implementation of the lots identified in this analysis. These considerations include:

- **Are there funded capacity projects along the corridor within the LRTP?** The lack of funded capacity projects along congested corridors would indicate a potential higher demand for commuter services.
- **Is there transit service along the corridor?** The presence of transit service offers opportunities to implement drive access transit and access more employment centers throughout the region.
- **What are the existing and projected traffic counts along the corridor?** The overall travel demand along a potential corridor is an indicator of the potential market for commuter services.

Table A-3 provides background information on LRTP projects, existing transit services, existing traffic and forecasted traffic on corridors adjacent to recommended PNR sites.

Table A-3: Other Potential Considerations for Prioritization

Lot ID	Potential Park-N-Ride Facilities	LRTP Corridor*	Existing Transit?	Existing Traffic	2045 Traffic
A	US 72 West and Wall Triana Highway	FC	N*	46,414	61,153
B	I-565 West and Wall Triana Highway	EC	N	72,855	101,895
C	US 231-N/Winchester Road (Showers)	EC, FC	Y	37,723	98,802
D	US 231-S/Martin Road	EC	Y	75,126	88,178
E	US 231-S/Green Cove Road	EC	N*	26,513	58,354
F	US 431-S/Sutton Road	EC	N	28,728	40,177
G	Bridge Street Town Center	None	Y	19,813	25,278
H	Winchester Road at Homer Nance Road	None	N*	20,896	30,506
I	Mid-City Center	EC	Y	63,192	81,178
J	US 72 East and Moores Mill Road	V	Y	55,236	63,233
*	EC - Existing plus Committed project in LRTP; FC -Financially Constrained project in LRTP; V - Visionary project in LRTP				
**	Transit service along portions of the overall corridor closer to Huntsville CBD				

Potential PNR Locations Outside MPO Study Area

Appendix B:

Preliminary 2020 Model Updates

To: Shontrill Lowe, James Moore and James Vandiver, Huntsville MPO

From: Rob Schiffer, FuturePlan Consulting

cc: Dan Dobry and Houston Matthews, Croy Engineering

Date: April 8, 2020

Re: Recommended 2020 Model Updates

_____

As part of the Huntsville MPO 2045 Long-Range Transportation Plan (LRTP) Update, FuturePlan Consulting made a series of revisions to the MPO's travel demand forecasting model. This effort was completed under an accelerated schedule aimed at meeting Federal deadlines for plan adoption. Prior to initiating consultant efforts, MPO staff updated socioeconomic estimates, external trips and highway network characteristics from the previous 2010 base year model to represent 2015 conditions. Early discussions with MPO staff indicated a general discomfort with the complexity of the previous 2010/ 2040 model structure. Thus, a key goal of the 2015/2045 model update was to pare down some of the previous model's more complex features while updating assumptions using the best available data.

While revising the model, several potential improvements came to light that could not be accommodated during the 2045 LRTP Update, due to the accelerated schedule. This memorandum outlines some refinements to be incorporated into the next base year (2020) model update. Efforts underway as part of the Huntsville Regional Commuter Study will provide some of the information needed to enhance the MPO's model and additional discussion and documentation of this will occur.

The first enhancement would be to expand the western model boundary to include, at a minimum, the US 31 and I-65 corridors from the Tennessee River to the Tennessee State Line. This would include the addition of internal traffic analysis zones (TAZs) in Athens, Ardmore, and other small communities in the east-central portions of Limestone County. This will enable the model to capture the route selection of travelers entering the MPO study area from the west, such as when to choose I-565 over US 72 or even AL 53. A better option would be to include the entirety of Limestone County in the MPO model, as many population and employment related statistics are only available at the County level, thus making it easier to validate socioeconomic assumptions within the model. The best option would be to, not only add the remainder of Limestone County to the model, but to also add the entirety of Morgan County as well, allowing the capture of trips traveling I-65, US 31, Alt US 72, and US 231 crossing the river. Ultimately, the regional model might be expanded to include all counties bordering Madison County in the future, although this is not necessary at this time.

The second model enhancement would be to prevent through trips from using roadways internal to the Redstone Arsenal. For the 2015/2045 model update, a series of travel time penalties were added to the network at each Arsenal gate to decrease the likelihood of vehicles passing through the Arsenal to reach their destinations. While this was a somewhat effective approach for the short term, travel time penalties add some level of bias to the model by artificially inflating travel times. For the 2020 model update, consideration should be given to designating a special trip purpose for Arsenal trips such that trips not destined for the Arsenal will not be able to proceed through the property's restricted gates. Since truck trips are accounted for separately in the model, prohibitors can also be added to the 2020 base year model network to exclude through truck trips from traveling Arsenal roadways.

On a related note, the Regional Commuter Study has already resulted in new data on employment by Arsenal zone. Previous employment data assumptions in the model should be replaced with new employment numbers provided by Arsenal staff. Some follow-up might be needed on retail employment at the Arsenal and home locations of workers. While it would appear that updated Arsenal employment data includes on-site retail employees, this assumption should be confirmed, and the locations of retail employees should be requested.

StreetLight Insight data purchased for the Regional Commuter Study can inform the model in several additional ways, such as the following:

- Use as secondary/comparative source for demographic characteristics used as input to model
- Potentially adjust trip purpose splits in trip generation model per StreetLight Data averages
- Validate trip distribution flows in model aggregated to StreetLight Data zones
- Validate regional truck flows in model relative to StreetLight Data
- Conduct average trip length comparisons between model and StreetLight Data
- Compare route selection between assignment model and StreetLight Data GPS tracking

External trips are captured using StreetLight Insight by designating "pass through" zones. These zones identify trips passing through a specific point in the roadway system, regardless of origin or destination point, thereby including long-distance travel to and from locations outside a specific study area (e.g., trips from Midwest US to the Gulf Coast. There were no "pass through" zones designated for the Commuter Study StreetLight analysis, due to zone number limitations and the focus of data analysis on trips between specific areas located entirely in north Alabama and south-central Tennessee. Even in its current form, the Huntsville StreetLight Data can still provide useful information on county-to-county flows that could influence the splits between internal-external and external-external trips.

Finally, there are some mechanics related to the model that should be refined, including the following:

- Obtain data on household size, number of workers, and income groupings (or auto availability) from Census 2020 and include this information in the socioeconomic data for the model
- Revise trip generation model scripts to incorporate these additional data items
- Consider use of special generators at UAH and Huntsville International Airport
- Revise external trip model to remove ambiguities that require iterative runs to achieve targeted numbers of trips at each external zone
- Remove unnecessary highway network attributes from the final loaded highway network to make it easier to locate and view essential data items