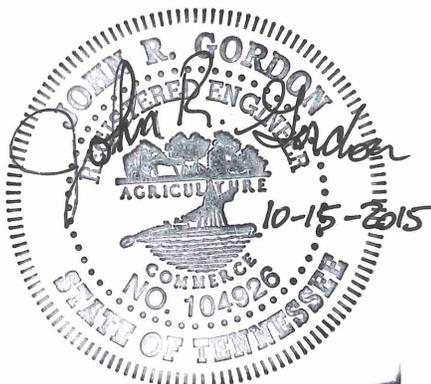


**BURNETT ROAD SITE
(ROCK QUARRY AND
ACCESSORY USES)**

**TRAFFIC IMPACT
STUDY**

October 15, 2015

Performed by:



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The format of this report is based on the Recommended Report Outline provided as Appendix A of the CITY OF NASHVILLE and DAVIDSON COUNTY TRAFFIC STUDY REQUIREMENTS, FINAL DOCUMENT, endorsed 08/12/04.

Traffic Study Report: Burnett Road Site

A. Executive Summary

□ Summary of project scope

The purpose of this study is to analyze the traffic impacts caused by the Burnett Road Site development at 771 Burnett Road in Old Hickory, Tennessee. The planned Burnett Road Site facility includes Mineral Extraction (rock quarry) and accessory uses such as such as an asphalt plant, concrete plant, and a concrete block plant. The rock quarry will be developed first, and the accessory uses expected to be operational is within two years (2017). The single unit dump truck will be the main vehicle type to transport quarry product from the site, with asphalt and concrete trucks to support the accessory uses.

□ A brief description of the proposed development

The proposed facility will be a rock quarry with accessory uses at 771 Burnett Road. The office, utility building, and scales are on the east side of the site near Burnett Road. The site layout was developed using dimensions and circulation patterns that have been successful at similar sites. All traffic will enter and exit at the entrance at 771 Burnett Road. The initial quarry staff is expected to be 5-7 employees. The Burnett Road Site is expected to employ a staff of 23 once all uses are operating.

□ Identification of the proposed development site

The site is located in an industrial zone (IG) in the Hadley Bend area. The site was formerly DuPont property, and takes up the undeveloped property bounded by Burnett Road, Swinging Bridge Road, Cinder Road, and the park at Old Hickory Lake. The preferred truck access route follows Burnett Road, Swinging Bridge Road, Old Hickory Boulevard, and Industrial Drive to Robinson Road. Once trucks reach Robinson road, they will disperse toward the delivery locations.

□ Summary of the major findings of the analysis

Expected employee and quarry truck traffic is expected to generate 124 trips per day. For the fully developed site (including accessory uses), the calculated total trip generation is 364 trips with AM and PM peak hour volumes of 46 and 40 trips respectively.

HCS analysis of future peak hour traffic volumes at the signalized and stop condition intersections along the access route did not find significant reductions in the Level of Service. Review of traffic counts, intersection geometrics, sight distance, turning radius, and other traffic related criteria did not show a need for improvements to accommodate the additional traffic.

□ Identification of mitigation measures and recommendations

Analysis of the site and the access route found the proposed facility is not expected to have significant impacts to the traffic along Burnett Road, or along the access route to Robinson Road. This is a result of several factors, including low existing traffic volumes, a relatively small number of new trips, and a mature industrial roadway system. Based on the traffic study and analysis, several recommendations can be made and mitigation measures suggested.

Recommendations:

1. A new left-turn lane is recommended on Burnett road at the site entrance to separate the truck turning movement from other Burnett Road traffic.
2. The developer should provide a repair bond for the roadways along the access route. Although the roads along the access route appear to have adequate pavement thickness, and have held up to existing truck traffic, a bond would provide a reduction of risk for Metro.
3. Metro should consider providing Transit Route signs at the intersections of Industrial Drive at Old Hickory Boulevard/pgi Driveway and Industrial Drive at Robinson Road (State Route 45).
4. The STOP BAR for Bridgeway Avenue eastbound should be relocated. The new location should place the driver's line of sight looking north beyond the clutter to improve sight distance.
5. Additional investigation is needed to address the problem of trucks travelling through residential areas. Residents have noted a GPS issue of routing trucks through the neighborhood, and onto dead-end streets. This might be addressed by restricting truck traffic through neighborhoods by actions of the Parking and Traffic Commission. The access route proposed for this site does not pass through the areas of concern.

B. Background

- A vicinity map showing the location of the proposed development in relation to the study area's transportation system

The site is located on Burnett Road, which begins at Swinging Bridge road and ends at the lake. The site access route will be from Robinson Road to Industrial Drive, Old Hickory Blvd, Swinging Bridge Road, and Burnett Road (Figure 3). This access route brings the site traffic out to a 5-lane roadway where the trucks will then disperse toward the various delivery locations.

- A complete project description

The proposed development is for mineral extraction with accessory uses, including rock crushing, screening, storage of explosives, block plant, concrete batching and asphalt/cement mixing plants. The property is located in the IG zoning district, and the use of this property for mineral extraction is permitted by the district regulations, in particular the Land Use Table, MetZo § 17.08.030. The property is approximately 155 acres in size, of which 134.4 is included in the permitted mining area, and up to 64.2 acres in the initial 5 year plan development. Accessory uses are planned, but the beginning of those operations will depend on market factors and interest of those companies/supplies in locating at this site.

Description of expected facility operation:

Initial quarry staff is expected at 5-7 employees. Open hours for sales are expected to be up to 10 hours on weekdays, and Saturday mornings (depending on demand.) Work may be occurring on-site at other times as well, but the on-site work is not expected to generate additional trips except for staff. The on-site staff are

expected to arrive closely timed in the morning, and leave at the end of the day. Staff generally stays on-site for lunch.

Trucks will arrive empty, and leave the site loaded. Haul trucks are expected to be dump trucks (GVW 74tons), and are generally from trucking companies located offsite. Peak hour truck traffic is expected in the initial hour as the trucks arrive for the first load of the day. The timing of arrivals and departures throughout the day will be varied based on the location of the deliveries. The cost of hauling material is a significant part of the price of the material, and serves to limit the feasible distance of travel.

Description of expected accessory uses and their facility operation:

Accessory uses are planned, but the start date for those operations will depend on market factors, local demand, and the interest of those companies/suppliers in locating at this site. The accessory uses would follow the quarry development, and could be in place by 2017. Planned accessory uses include an asphalt plant, a concrete plant, and a block plant. Other uses permitted by the IG zoning could also be developed. Site access for the accessory uses is planned at the single entrance at 771 Burnett Road.

For an asphalt plant, it is expected that the asphalt material will be delivered to construction sites by independently owned haul trucks. These trucks will arrive at the Burnett Road site empty, load, and depart loaded for the construction sites. Based on similar sites, approximately 65 trucks per day could be expected, with trucks and staff creating 138 daily trips.

For a concrete plant, the concrete trucks are generally owned and operated by the concrete company, and stay on site after hours. The concrete trucks will load, leave the site to travel to the construction sites, and return empty. Based on similar operations, a concrete plant could have 6 trucks, taking loads on a 2 to 3 hour cycle, for up to 30 loads per day, with trucks and staff generating up to 82 trips per day.

For other potential accessory uses, the expected trips are more difficult to predict. For block plant operations, the trucks to deliver blocks would be relatively infrequent, potentially only 1 per day, or less. Figure 4 shows the Trip Generation Summary for the Quarry and accessory uses.

- o The proposed site plan, Includes the existing uses
The property was previously vacant. Site work for the office, utility building, scale, drives and parking is underway.
- o Proposed site uses complete with size, land uses, and phasing.
The proposed development will be a rock quarry and accessory uses. Phase 1 is to develop the site access, office, utility building, parking, etc. This part of the development is on approximately 2 acres of the site. The site Plan for these facilities is shown in Figure 1. Phase 2 includes preparation of the site for mineral

extraction uses (excavation and site preparation). Once the site is prepared, the mineral extraction and processing activities will begin, and sales of material begin. At that time trucks will be entering and leaving the site. Later, accessory uses such as concrete plants, asphalt plants, block plants, etc. are planned. The concept plan for these facilities is shown in Figure 2.

- The proposed location and traffic control of all proposed access points
Access to the site will be at 771 Burnett Road. Quarry trucks entering the site will be empty, and leaving the site will be loaded. The available stacking on-site site will allow the arriving trucks to queue on-site and not in the roadway.
- A brief description of the current (and proposed, if applicable) land uses adjacent to the site.
To the east: across Burnett Road, DuPont property, industrial use
To the south: ADESA automotive, commercial use
To the south: across Swinging Bridge Road, residential use
To the north: Old Hickory Lake, Metro park property, recreational use
To the west: across Cinder Road, residential and agricultural use
- A description of the study area (as defined during the Pre-Study Scope Determination Conference)
Initial discussion between Wisser Consultants and Metro Public Works Engineering Staff included phone and email discussions of the project. Later, at a meeting at the Public Works office on Wednesday, August 25, 2015, Metro and Wisser staff discussed the Burnett Road Site project in person. Metro staff requested the traffic study scope should extend to the intersection of Robinson Road/State Route 45 at Industrial Drive. Using Robinson Road as the limit of the traffic study, two access routes to the Burnett Road Site are available. The first is the preferred access route and will be required by the developer. From the site, the preferred route is Burnett Road to Swinging Bridge Road to Old Hickory Boulevard to Industrial Drive to Robinson Road. This route will be recommended to all drivers and required of all employees and contract drivers.
The second potential route is for truck traffic coming from or going to the north, toward I-65. This route is Burnett Road to Swinging Bridge Road to Bridgeway Avenue to Robinson Road. It is the intent of Industrial Land Developers to recommend to drivers the truck route of Burnett Road to Swinging Bridge Road to Old Hickory Boulevard to Industrial Drive to Robinson Road. Even though the southerly route is more circuitous, some truck drivers with origins and destinations to the north will choose this route due to the convenience of traffic signals for assignment of right of way onto Robinson Road. For the distribution of Burnett Road Site traffic, the shortest travel route between the site and northerly destinations was used.

The description of the study area shall include:

- All proposed site access points
Site access will be at 771 Burnett Road.

o Roadway names, locations, and functional classifications

All the roadways in the study area have been functionally classified in the Metro Major and Collector Street Plan. A portion of the Street Plan that shows the roadways that are part of the traffic study is included in the Appendix. The roadway network in the study area serves mature land uses. The roadways and intersections have been geometrically improved in past decades. The roadway lane widths are 10 to 12 feet. The past roadway improvements were necessary to support the employee and truck traffic generated by the industrial land uses that access the roadways. Traffic signals have been installed at Robinson Road at Industrial Drive, Old Hickory Boulevard at Industrial Drive and Swinging Bridge Road at Bridgeway Avenue. Geometric improvements including intersection channelization have been added at the intersections at Robinson Road at Industrial Drive, Industrial Drive at Old Hickory Boulevard, and Swinging Bridge Road at Bridgeway Avenue. Auxiliary left turn lanes have been added on some approaches at the signalized intersections at Robinson Road at Industrial Drive and Industrial Drive at Old Hickory Boulevard. Both of these intersections have right turn channelization on one or more of the approaches. This is a high type intersection design that allows the right turn to be under YIELD control rather than SIGNAL control. Five railroad grade crossings exist on streets in the study area. All the railroad grade crossings have passive sign and marking highway-grade crossing devices and four have flashing-light signals in addition to the passive devices. The following paragraphs provide a brief description of the primary components of the study area roadway network. Figure 05 shows the Existing Transportation System for the area.

Robinson Road:

State Route 45, (Robinson Road) is a four lane roadway. It is classified as an Arterial-Boulevard in the Street Plan. At its intersection with Industrial Drive the cross section includes curb and gutter on the west side and a paved shoulder on the east side. Sidewalks and bike lanes do not exist along this section of Robinson Road. Street lights are installed on Robinson Road. The speed limit on Robinson Road is posted at 50mph.

Industrial Drive:

Industrial Drive is a four lane roadway. It is classified as a Collector-Avenue in the Street Plan. Past improvements include curb and gutter and sidewalk on a portion of both sides of the road between Robinson Road and Old Hickory Boulevard. There is street lighting at the intersection of Industrial Drive at Robinson Road and Industrial Drive at Old Hickory Boulevard. Street lights are not installed for the remainder of the roadway. The speed limit on Industrial Drive is not posted. A railroad grade crossing with cantilever mounted flashing light signals is located just west of the intersection with Old Hickory Boulevard.

Old Hickory Boulevard:

Old Hickory Boulevard is a two lane roadway from Industrial Drive to Bridgeway Avenue. It is classified as a Collector-Avenue in the Street Plan. A shoulder of varying width and grass lined ditches exist on both sides of the road. Street lights are not installed for this section of Old Hickory Boulevard. The speed limit on Old Hickory Boulevard is posted at 35 mph. A railroad grade crossing with post mounted flashing light signals is located approximately midway between the intersections of Old Hickory Boulevard at Industrial Drive and Old Hickory Boulevard at Bridgeway Avenue.

Bridgeway Avenue:

Bridgeway Avenue is a two lane roadway from Robinson Road to Old Hickory Boulevard. It is classified as a Collector-Avenue in the Street Plan. A shoulder of varying width exists on both sides of the roadway. This is the main street through Rayon City. Street lights are not installed on Bridgeway Avenue. The speed limit on Bridgeway Avenue is posted at 30 mph. Two railroad grade crossings exist just west of the intersection of Swinging Bridge at Bridgeway Avenue. The crossing closest to Swinging Bridge Road has post mounted flashing light signals and automatic gates. The crossing further west has passive sign and marking warning devices.

Swinging Bridge Road:

Swinging Bridge Road is a two lane roadway from Bridgeway Avenue to Burnett Road. It is classified as a local street in the Street Plan. A shoulder of varying width exists on both sides of the roadway and grass or concrete paved ditches exist. There is no street lighting on Swinging Bridge Road. The speed limit on Swinging Bridge Road is posted at 40 mph. A railroad grade crossing with cantilever mounted flashing light signals is located north of the intersection with Bridgeway Avenue.

Burnett Road:

Burnett Road is a two lane roadway from Swinging Bridge Road to the Burnett Road Site Driveway. A shoulder of varying width exists on both sides of the roadway along with grass lined swales. A left turn lane has been added on eastbound Burnett Road at the driveway to the ADESA Corporation driveway. The speed limit on Burnett Road is not posted.

Pavement core samples were taken on Burnett Road and Swinging Bridge Road (Figure 06). The five core samples on Burnett Road from the Burnett Road Site entrance to Swinging Bridge Road had pavement thicknesses of 3 to 4.5 inches. The four pavement core samples on Swinging Bridge Road between Burnett Road and the railroad crossing had pavement thicknesses of 3 to 4 inches. These samples indicate that the pavement thickness only meet minimum requirements of the Metro Public Works Street Design Standards.

A review of the Transportation Improvement Program was made. There were no ongoing, funded, or proposed public works capital road improvements projects identified along the study route.

Existing site traffic at the site entrance on Burnett Road is from recreation uses at the park to the north. From the site travelling out to Robinson Road, additional traffic is added on Burnett road from: the ADESA site (commercial use) and the Superior Oil site (commercial/industrial use). Both of these sites have auto and truck traffic.

Along Swinging Bridge Road traffic is added from residential and commercial uses, including entrances to the DuPont facility. Once on Old Hickory Blvd. traffic is added from another DuPont entrance.

At Industrial Drive traffic is added from another DuPont/pgi entrance as well as from the residential area the south (from Old Hickory Blvd.).

Burnett Road (2 lanes) but is not shown on the Major and Collector Street Plan. It is shown on the Community Plan as a collector (and as a proposed collector).

Swinging Bridge Road, (2 lanes)

Old Hickory Blvd (2 lanes) is shown as a collector-avenue on the Plan.

Industrial Drive (4 lanes) is shown as a collector-avenue on the Plan,

Robinson Road (5 lanes) is shown as an arterial-boulevard on the Plan.

Roadway lane widths and turning radii along the route appear adequate for the expected truck traffic.

o Existing roadway conditions, intersection locations

Traffic coming to the site is expected to be from surrounding areas, from both directions of Robinson Road. The local route will then be to Industrial Drive, left on Old Hickory Blvd., straight along Swinging Bridge Road, and a right onto Burnett Road. The intersections at Robinson Road and Industrial Drive, Industrial Drive and Old Hickory Blvd, and where Old Hickory Blvd changes to Swinging Bridge Road are signalized. The intersection of Swinging Bridge and Burnett Road is a "T" with Burnett Road at a stop condition. Swinging Bridge traffic does not stop.

Traffic leaving the site will stop at the intersection with Swinging Bridge Road, then turn left onto Swinging Bridge Road. Then it will travel straight through one signalized intersection where the road name changes to Old Hickory Blvd, then turn right onto Industrial Drive. There is an existing right turn lane (yield) for traffic turning onto Industrial Drive. At the signalized intersection with Robinson Road, there is an existing right-turn lane and a combined through-left lane.

The access route to the site from Robinson Road is the same as for the existing DuPont site for some of the route, including Industrial Drive, Old Hickory Blvd, and part of Swinging Bridge Road.

Past the intersection with Burnett Road, Swinging Bridge Road is signed for a weight limit of 5000lbs, but that is not along the access route.

- o Intersection lane configurations and traffic control

The site entrance is on the existing two-lane Burnett Road.

- o Pedestrian, bicycle, and transit facilities

There are few pedestrian facilities and no bicycle facilities in the study area. There are sidewalks on both sides of a portion of Industrial Drive between Robinson Road and Old Hickory Boulevard. However, there are very few pedestrian and bicycle movements in the study area.

Nashville Metropolitan Transit Authority (MTA) Route 27 is in the study area from the intersection of Old Hickory Boulevard at Industrial Drive, along Industrial Drive to the intersection of Industrial Drive at Robinson Road, and then along Robinson Road north of Industrial Drive. Transit stops are not signed. Transit riders can go to an intersection along the route and flag the bus down when it comes into view. The Metro Donelson Hermitage Community Plan (amended 4-10-2014) shows proposed bicycle lane around the block of Burnett Road, Swinging Bridge, and Cinder Road.

- o Anticipated nearby land development (approved, permitted or under construction) and the associated traffic

There are approved plans for the two tracts on the northeast and southeast corners of the intersection of Robinson Road at Industrial Boulevard. The traffic anticipated from these two projects is included in the background traffic volumes. Figure 08 and Figure 09 show the trip distribution and assignment for these projects.

The US Army Corps of Engineers operates Old Hickory Lake Park which has access from Burnett Road and Cinder Road. This is a popular day use recreation area for boating, swimming and picnicking. The DRAFT Old Hickory Lake Master Plan includes recommendations to enhance the park user's experience. The DRAFT Master Plan reports there are some days when park visitors park along both sides of the access road. The draft Master Plan recommendations include improving and adding parking spaces for a total of 170, improving vehicle circulation by connecting the existing parking lots, adding a picnic shelter and picnic sites, and improving the boat launching and parking area increasing the number spaces from 55 to 75 car/trailer spaces. Plate No 5-01 dated June 2015 from the DRAFT Old Hickory Master Plan shows the location of the proposed improvements and is included in the Appendix. A left turn lane is recommended on Burnett Road eastbound at the Burnett Road Site to separate eastbound park recreational traffic from eastbound Burnett Road Site traffic at the new driveway.

o Overall traffic growth trends in the area

Three TDOT Count Stations are located in the area and provide information to determine the traffic growth trends for the study area. The count station locations are as follows and the 2014 traffic volumes are shown on a Map in the Appendix.

1. Swinging Bridge Road East of Rayon City [Station 000025]
2. Industrial Drive [Station 000532]
3. Robinson Road (State Route 45) North of Old Hickory [Station 000026]

The average 5 year and 10 year traffic volume growth rate at the Swinging Bridge Road station is -0.2% and -2.1%.

The average 5 year and 10 year traffic volume growth rate at the Industrial Drive station is +2.1% and -0.5%.

The average 5 year and 10 year traffic volume growth rate at the Robinson Road station is +1.4% and -0.4%.

The 5 year historic traffic volume growth rate trend for the three stations near the study area ranges from -0.2 % to +2.1%. The 10 year historic traffic volume growth rate trend for the study area ranges from -2.1% to -0.4%. For this study, a yearly traffic growth rate of 2% was used to forecast existing traffic volumes to the project horizon year. The year 2017 is the project horizon year when all uses at the Burnett Road Site will be in operation. A compound growth factor model was used to determine the 2017 background traffic.

The site property is expected to develop industrially for mineral extraction. Residential areas to the south include some new subdivision development. This area is surrounded by the lake and the Cumberland River, with the nearest bridge at Old Hickory Blvd. Although there is a large area of agricultural land, the floodplain from the river limits the development potential. Along Burnett Road, the DuPont property is not expected to have new access drives. There is space for additional parking at the Metro Park, but even a large percentage increase in available parking would be unlikely to cause access concerns along Burnett Road.

C. Existing Conditions Assessment

- Existing traffic volumes (measured within the previous two years) and operational analysis for all study intersection and roadway segments including:

- o Signal timing cycles

Existing traffic signal timing and phasing information was provided by Metro Public Works Engineering staff. This information is included in the Appendix.

- o Level of Service (include vehicle delay/failing approaches for unsignalized intersections)

Existing traffic along Burnett Road at the site entrance is from visitors to the park. Burnett Road ends at the park, which has approximately 23.8 acres. The park's parking area has 42 spaces, and gravel parking for approximately 50 truck and trailers at the boat ramp areas. The other side of the park is accessed from

Cinder Road and has 123 spaces. Visual review of the roadway did not indicate any traffic capacity concerns.

Existing traffic conditions were reviewed using turning movement counts collected during September 2015. Analysis of the peak hour counts showed LOS C or better. None of the intersections appeared have long delays, long queues, or other problems (except for Robinson Road). See the following section on Background Traffic Assessment for an explanation of LOS calculations.

The turning movement count included heavy vehicles. Figure 07 is a Summary of the Peak Hour Percent Heavy Vehicles for Existing, Background, and Future traffic. The turning movement counts and tabular summarization are included in the Appendix.

o Queue length analysis

During the traffic counts, none of the intersections showed long queues, except for the through traffic on Robinson Road. Some short queues were observed, but all vehicles were able to pass through the intersection in one cycle (except for Robinson Road). A review of the intersection analysis showed short queues under 7 vehicles.

o Transit accessibility

MTA Route 27 runs from the intersection of Old Hickory Boulevard at Industrial Drive, along Industrial Drive to the intersection of Industrial Drive at Robinson Road, and then along Robinson Road north of Industrial Drive. There are opportunities for the customers and workers at the proposed developments on the northeast and southeast corners of Robinson Road at Industrial Drive to utilize Nashville MTA service. It is appropriate from the Congestion Management Plan (CMP) to continue Route 27 service anticipating that this development will occur. While opportunities exist for vehicle trip reduction due to transit ridership, the trip generation and distribution for the northeast and southeast corner development sites was not reduced. Few, if any, of the workers at the Burnett Road Site will use transit service due to the 1.5 mile distance between the current transit route along Industrial Drive and the Burnett Road Site.

o Identification of bicycle and pedestrian facilities

Wiser Consultants conducted Turning Movement Counts (TMC) at four intersections along the study route on weekdays during September, 2015. The count locations were as follows:

- Burnett Road at Swinging Bridge
- Swinging Bridge Road at Bridgeway Avenue
- Old Hickory Boulevard at Industrial Drive/pgi Driveway
- Industrial Drive at Robinson Road (State Route 45)

The weekday counts were during school days on Tuesday, Wednesday and Thursdays. These counts were made 6 to 9 am in the morning, 11am to 1 pm in the afternoon, and 3 to 6 pm in the evening. There were 3 pedestrians and no

bicycles observed at the Swinging Bridge Road at Burnett Road intersection. At Swinging Bridge Road and Bridgeway Avenue there were 3 pedestrians and no bicycles observed. At Old Hickory Boulevard and Industrial Drive there were 0 pedestrians and 4 bicycles observed. There were 3 pedestrians and 0 bicycles observed at the Robinson Road at Industrial Drive intersection.

A truck route and pedestrian conflict review was conducted for the four intersections where turning movement counts were made. The northbound right turn at Swinging Bridge Road and Burnett Road and the southbound right turn at Swinging Bridge at Bridgeway Avenue will require visual and sound recognition between the pedestrian and the truck for the pedestrian to safely cross the street. The other conflict locations between the pedestrian and truck will have traffic control devices such as STOP or YIELD signs or traffic signals to create gaps in traffic for the pedestrian to cross the street. Bicycles operators will be expected to negotiate the roadway under the same rules of the road as vehicular traffic. There were no pedestrian and truck conflicts identified that required mitigation.

- o High crash/accident locations
None known along the access route.

D. Background Traffic Assessment

This traffic study includes analysis at three signalized and four STOP controlled intersections. The Highway Capacity Software (HCS) used for analysis is HCS 2010 developed and maintained by McTrans. The analysis was done for the following traffic conditions:

- Existing traffic condition using turning movement counts collected during September 2015.
- Background traffic condition which includes applying a 2% growth rate to the existing traffic volumes (Horizon volumes) plus adding traffic generated from two future developments on the northeast and southeast corners of Industrial Drive at Robinson Road.
- Future traffic condition which is the Background traffic plus the traffic generated by the Burnett Road Site.

Wiser Consultants obtained turning movement counts on Tuesdays, Wednesdays, and Thursdays in September, 2015 at the following intersections.

- Swinging Bridge Road at Burnett Road
- Swinging Bridge Road at Bridgeway Avenue
- Old Hickory Boulevard at Industrial Drive/pgi Driveway
- Robinson Road (State Route 45) at Industrial Drive/Claudia Drive

Signalized Intersection Traffic Analysis:

The following three intersections were reviewed to determine the Existing, Background and Future signalized intersection traffic conditions:

Burnett Road Site

- Swinging Bridge Road at Bridgeway Avenue
- Old Hickory Boulevard at Industrial Drive/pgi Driveway
- Robinson Road at Industrial Drive/Claudia Drive

Midday Existing condition LOS was calculated for the three intersections. Swinging Bridge Road at Bridgeway operates at LOS B, Old Hickory Boulevard at Industrial Drive/pgi Driveway operates at LOS C and Robinson Road at Industrial Drive/Claudia Drive operates at LOS B. There were no findings in the Midday analysis that indicates a need for additional investigation.

Swinging Bridge Road at Bridgeway Avenue operates at LOS A during the AM Peak and LOS B during the PM peak for the Existing conditions. These same operating conditions continue to exist for the Background and Future conditions. The reason for this is that the 2% Background traffic growth rate and traffic added from the Burnett Road site has minimal increase in traffic volumes. The Overall Intersection delay increases slightly, but it is within the limits for LOS A and B respectively.

Old Hickory Boulevard at Industrial Drive/pgi Driveway operates at Level of Service C for the Existing, Background, and Future traffic conditions during the AM and PM peak hours. The overall intersection delay does increase when the Background and Future traffic is added. However, the LOS remains at C for the AM and PM peak hours.

Robinson Road at Industrial Drive/Claudia Drive operates at LOS C for the Existing, Background, and Future traffic conditions during the AM peak. During the PM peak, when the Background traffic is added the LOS moves to LOS to D. When the Future Traffic from the Burnett Road Site is added the LOS remains at D. The overall intersection delay does increase when the Background and Future traffic is added during the AM and PM peak.

The standard for urban traffic operations is generally Level of Service D or better. Since none of the intersection LOS values fall below LOS D, no mitigation actions are recommended. Figure 11 provide summaries of the Signalized Intersection Level of Service for the Existing, Horizon, Background, and Future Conditions.

STOP Controlled Intersection Traffic Analysis:

The following four intersections were reviewed to determine the Existing, Background and Future STOP controlled intersection traffic conditions:

- Swinging Bridge Road at Burnett Road
- Swinging Bridge Road westbound at Bridgeway Avenue
- Swinging Bridge Road at Bridgeway Avenue eastbound
- Burnett Road at Burnett Road Site driveway

Existing, Background, and Future condition LOS was calculated for the three STOP controlled intersections and is shown on Figure 12. For the midday peak, all three intersections operate at LOS A. There were no findings in the Midday analysis that indicates a need for additional investigation.

Swinging Bridge Road at Burnett Road operates at LOS A for all approaches during the Existing, Background, and Future traffic conditions during the AM and PM peak. The approach delay does increase when the Background and Future traffic is added during the AM and PM peak.

Two STOP conditions exist at the intersection of Swinging Bridge Road at Bridgeway Avenue. For clarification, the first intersection is identified as Swinging Bridge Road westbound at Bridgeway Avenue with a STOP sign on westbound Swinging Bridge Road. The second intersection is identified as Swinging Bridge Road at Bridgeway Avenue with a STOP sign on eastbound Bridgeway.

Swinging Bridge Road westbound at Bridgeway Avenue operates at LOS B during the Existing, Background, and Future AM peak. Swinging Bridge Road westbound at Bridgeway operates at LOS A during the AM and PM peak. The approach delay does increase when the Background and Future traffic is added during the AM and PM peak.

Swinging Bridge Road at Bridgeway Avenue eastbound operates at LOS A during the AM and PM peak for the Existing, and Background traffic conditions. The LOS moves to B when the Future traffic is added. The calculated delay increase between the Background and Future is 9.2 sec to 10.1 sec for the AM peak and 9.6 sec to 10.1 sec for the PM peak. This is a short vehicle delay and no mitigation is recommended.

Burnett Road at the Burnett Road Site driveway was evaluated. The AM and PM peak hour LOS was calculated to be LOS A.

- Background traffic volumes shall be forecast to the project horizon. Forecasts may utilize a straight-line regression of historic traffic volumes or apply a compound growth factor model i.e. $existing\ volume \times (1 + growth\ rate)^{horizon}$. The horizon traffic volumes were obtained by applying a 2% growth rate to the existing traffic volumes.
- Background traffic volumes shall incorporate existing traffic volumes that have been measured within the previous two years, and traffic generated from anticipated nearby land development i.e. projects approved/permitted within the past 5-years, or currently under construction. Background traffic volumes were obtained by using the horizon volumes and adding traffic generated from two future developments on the northeast and southeast corners of Industrial Drive at Robinson Road.
- Background traffic shall be forecast to the project's horizon for completion (if the project is phased, then forecasts shall be to each of the phase horizons) For this study, the horizon year in which all uses of the Burnett Road Site are expected to be in operation is 2017. The uses include the quarry, asphalt plant, concrete plant, and the block plant. These additional trips were added to the background hour traffic volumes to obtain the total projected future peak hour traffic volumes for the year 2017.

- Operational analysis for all study intersection and roadway segments shall include: Visual review of the traffic along Burnett Road and other local roads during site visits did not indicate problems with traffic capacity or LOS. Expected peak traffic for the new site is expected early in the morning. At that time opposing traffic is expected to be low, because the only site from the north along Burnett Road is a recreational use.

The route to the site from Robinson Road is the same as for the existing DuPont site for some of the route, including Industrial Drive, Old Hickory Blvd, and part of Swinging Bridge Road. Along this part of the route, the additional traffic volumes are not expected to be significant.

- Level of Service (include vehicle delay/failing approaches for unsignalized intersections)
Analysis of the peak hour counts showed the LOS to be the same as for Existing, except for LOS D at Robinson Road during the PM peak.
- Queue length analysis
Queue lengths were similar to Existing conditions.
- Transit accessibility
Conditions for transit are similar to those discussed for the Existing conditions.
- Identification of bicycle and pedestrian facilities
Conditions for transit are similar to those discussed for the Existing conditions.

E. Trip Generation

- Complete trip generation estimates for all phases and land uses of the proposed development. Trip generations estimates shall be developed with the following requirements:
 - The most recent edition of the ITE *Trip Generation* manual
- If the consultant or the Metro Transportation Manager feels that the *Trip Generation* manual does not contain adequate data or that the land use is unique in its trip generation characteristics, a trip generation study can be conducted and its results used in place of the ITE manual

Trip generation for heavy industrial or other uses in the ITE Trip Generation Manual do not represent the expected quarry and accessory use operations. Traffic generation was based on experience with similar operations

Background traffic includes the Horizon traffic plus approved future development in the study area. A plan has been approved for development on the Northeast Corner Site at Robinson Road and Industrial Drive. The site plan shows Industrial and Commercial/Mixed Uses on a 27.81 acre site. The source used for trips generated for the Industrial use was General Light Industrial (110) from ITE Trip Generation 8th edition Vol 2.

Page 100 and page 101 was used to generate trips for the AM and PM peak hours respectively.

Studies have shown that most new commercial and mixed use projects have no significant impact on increasing peak hour volumes and generally do not contribute to generating new traffic during other hours. Commercial and mixed use sites attract existing pass by traffic or traffic already on the site that may move to another use to do business. For this study the Commercial/Mixed use peak Hour trip impact is negligible and no assignment of generated trips were added to the Background traffic volumes.

In addition to the Northeast Corner Site, a development plan has been approved for the Southeast Corner Site at Robinson Road and Industrial Drive. This plan includes Office/Retail and Residential uses on a 15.99 acre site. For trip generation, this study used 50% office and 50% retail for the proposed 56,750SF of Office/Retail development. As noted previously, studies have shown retail trips are negligible during AM and PM peak hours. The source used for generating AM and PM peak hour Office trips was from ITE Trip Generation 8th edition Volume 2 pages 1204 and 1205 respectively. Low rise Residential Condominium/Townhouse (231) pages 418 and 419 was used to generate traffic volumes for the AM and PM peak hours.

The site plan for the Northwest Corner Site shows access driveways on Hickory Industrial Road and Industrial Drive. The site plan for the Southeast Corner Site shows access driveways on Industrial Drive and Robinson Road. The site plans are provided in the Appendix. Figures 13 and 14 shows the peak hour trips for the future development sites at the Northeast Corner, and Southeast Corner of the Industrial Drive and Robinson Road intersection.

ITE Trip generation data was not available for generating trips for the Burnett Road Site. The uses are a quarry, asphalt plant, concrete plant and block plant. Trips were generated for each use.

The quarry trip generation was based on an expected production of 300,000 tons of aggregate per year. It is expected the quarry will supply stone to construction sites by independently owned haul trucks. Trucks will begin to arrive in the morning when the quarry opens. The calculation for trip generation used 250 working days Monday through Friday and 50 half days on Saturday. The operating hours used were ten hours on Monday through Friday 6 AM to 4 PM and five hours on Saturday 7 AM to Noon. The AM peak hour used an adjustment factor of 1.5 x the Average Loads per hour and the PM peak hour used an adjustment factor of 1.2 x the Average Loads per hour.

The asphalt plant is expected to have a production capacity of 180 tons of asphaltic concrete per hour and operate at 80 of capacity due to cost and efficiency. Like the quarry, it is expected the asphalt will be supplied to construction sites by independently owned haul trucks. These trucks will pick up loads in the morning when the plant opens. The calculation used for trip generation used 20 ton truck loads, plant production and sales for 9 hours each day. The AM peak hour used an adjustment factor of 1.5 x the Average Loads per hour and the PM peak hour used an adjustment factor of 1.2 x the Average Loads per hour.

The concrete plant distribution plan includes 6 trucks owned by the concrete company. These trucks will stay on site after hours. The trucks will load, leave the site and travel to the construction project location and return to the site empty. Based on similar concrete plant operations, the 6 trucks will operate on a 2 to three hour cycle. The calculation used for trip generation used a ten hour work day and a two hour cycle. There was no adjustment factor used for the AM and PM peak hours to increase the truck volume.

The concrete block plant is expected to deliver blocks with a truck owned by the company. It is expected the trips will be infrequent, potentially only 1 trip per day or less. This trip was not included in the AM or PM peak hour.

It is expected that 23 employees will work at the Burnett Road Site and there will be other trips to the site to support the operations. The other trips generated at the site are estimated to be 1 trip in and 1 trip out per hour between the hours of 10 AM and 2 PM.

Figure 04 is the Burnett Road Site Trip Generation Summary for all uses including the quarry, asphalt plant, concrete plant, and block plant. Figures 15a and 15B provide the peak hour volumes and distribution for the traffic from the Burnett Road Site.

F. Trip Distribution and Assignment Assessment

For background traffic, two known site plans were included in the study. The site plan for the Northwest Corner Site shows access driveways on Hickory Industrial Road and Industrial Drive. The site plan for the Southeast Corner Site shows access driveways on Industrial Drive and Robinson Road (Appendix) The trip distribution for all sites was assigned to be reasonable, logical and orderly. The trip assignments are along the shortest route and maximize right turning movements. The Northeast Corner Site was distributed 50/50 north and south of the site since access is good from all approaches. Figure 13 shows Peak Hour Traffic Volume Generated by Northeast Corner Site. The Southeast Corner Site was distributed 60/40 with 60 percent of the trips south of the site. Access to the Southeast Corner Site is more difficult when compared to the Northeast Corner Site especially for left turning vehicles. Figure 14 shows Peak Hour Traffic Volume Generated by Southeast Corner Site.

The location of the Burnett Road Site within the bend of the Cumberland River and the location of bridges over the river will result in most of the truck traffic first traveling an access route to Industrial Boulevard before dispersing to various delivery routes. Then at Robinson Road the trucks will turn left or right. From the intersection of Robinson Road at Industrial Drive, Interstate 40 (I-40) is 8 miles southeast and I-65 is 5 miles west. The anticipated market area for products produced at the Burnett Road Site will be Metro wide and assumed distributed evenly north and south of the Burnett Road Site. Figure 15B is Distribution of Peak Hour Volume Generated by Burnett Road Site.

The Burnett Road Site will be competing with other stone, asphalt, concrete, and block producers in the area. The distance to the construction site for delivery is an important

factor in determining the potential market area for the site, as this determines the transport cost. Size of the construction project, funding sources, type and quality of aggregate, certifications, contract or bid requirements, and other factors also enter into the selection of suppliers. Although there are rules of thumb for efficient delivery distance, there are many variables that result in overlapping market areas and competition.

- Trip distribution of the trip generation information shall be performed using the existing distributional patterns. Trip distribution may be conducted using surrogate methodology. Such methodologies could include the use of market analysis studies, population and/or employment distributions within buffered area around the project site. A figure of the trip distribution shall be provided.

Trips to the site are expected to be from staff arrival and departures, deliveries, and from dump truck arrivals and departures. The facility is expected to be open weekdays 10 hours per day, and half days on Saturdays. The hours of operation are subject to production and project needs. The peak site traffic is expected early in the morning when trucks are arriving for the first loads of the day. Distribution throughout the rest of the day is expected to be more random.

- Trips shall be assigned to roadway network based on the trip distribution. Assignment of trips to project access points shall be logical and assume that trips will take the shortest and/or most direct route to destinations within the project site and adjacent roadways and trips will seek to maximize right turning movements. A figure of the trip assignment shall be provided.

The on-site staff is expected to arrive early in the morning (up to 7 staff, 14 trips per day). Based on expected production and truck loads, approximately 55 trucks per day are expected (110 trips/day). These trips will be throughout the day, and timing will be varied based on the location of the material deliveries. The peak traffic is expected to be during the morning as trucks arrive for the first loads of the day, with 9 trucks at peak hour am.

Asphalt trucks are expected to have a similar pattern of arrival and departure as the quarry trucks, with 11 trucks arriving in peak am hour. The peak for the concrete trucks is expected to be in the morning as all 6 of the trucks depart for the first delivery of the day at approximately the same time, then return for additional trips through the day.

- The *SimTraffic* model for the Central Business District shall be utilized for all studies within the area modeled.

Not Applicable; project is not in the CBD.

G. Future Traffic Assessment

- Analysis of future traffic conditions shall include project traffic (not reduced unless approved by the Metro Transportation Manager) added to background project traffic.

Future traffic from the site includes the Background volumes plus the projected site traffic. The traffic from quarry operations is expected to increase only slightly with increasing quarry production over time. Increases in quarry production are not expected to cause significant increases in on-site staff trips, but the number of trucks will increase based on increased production to meet market demand. The site will also have accessory uses, such as asphalt and concrete plants. If these sites come into operation as planned, those future operations would cause an increase in trips. The total site trips may increase to well over twice the initial trip generation from the quarry operations alone.

- Operational analysis for all study intersection and roadway segments shall include:
 - Level of Service (include vehicle delay/failing approaches for unsignalized intersections)
LOS for all but one of the locations was the same as for the Background conditions. The location that had a lower LOS was a stop condition movement at the Swinging Bridge Road intersection. The delay exceeded 10 seconds and thus changed the LOS from A to B.
 - Queue length analysis
Queue length was reviewed for the unsignalized intersections, but the volumes were low enough that the queue lengths were less than 1. For the signalized intersections, the queue on Robinson Road was significant at over 20. However, the other queue lengths were short and similar to the Background and Existing.
 - Queue length analysis
Queue lengths were similar to Existing conditions.
 - Transit accessibility
Conditions for transit are similar to those discussed for the Existing conditions.
 - Identification of bicycle and pedestrian facilities
Conditions for transit are similar to those discussed for the Existing conditions.
- Capacity Analysis outputs for each project phase (if more than one) shall be included in the appendix to the study document.
The capacity analysis calculations are included in the Appendix.

H. Site Access Analysis

Stopping sight distance and intersection sight distance was analyzed for the following intersections:

- Burnett Road Site southbound at Burnett Road
- Burnett Road westbound at Swinging Bridge Road
- Bridgeway Avenue eastbound at Swinging Bridge Road

The intersection sight distance for a driver stopped for eastbound Bridgeway Avenue at Swinging Bridge Road looking to the north is through a clutter of signs and posts and

control cabinets. It is recommended that the STOP BAR be relocated at this intersection to place the driver line of sight beyond the clutter. Stopping sight distance and intersection sight distance for the other approaches does not require mitigation. A copy of the sight distance review drawings is in the Appendix.

A turning path review was conducted for the following turning movements:

1. Burnett Road Site driveway southbound right turn onto at Burnett Road
2. Burnett Road eastbound left turn into Burnett Road Site driveway
3. Burnett Road westbound left turn onto Swinging Bridge Road
4. Swinging Bridge Road northbound right turn onto Burnett Road
5. Swinging Bridge Road southbound right turn onto Bridgeway Avenue
6. Bridgeway Avenue eastbound left turn onto Swinging Bridge Road
7. Old Hickory Boulevard southbound right turn onto Industrial Drive
8. Industrial Drive eastbound left turn onto Old Hickory Boulevard
9. Industrial Drive westbound left turn onto Robinson Road
10. Industrial Drive westbound right turn onto Robinson Road
11. Robinson Road southbound left turn onto Industrial Drive

Dump trucks will be the vehicle type frequently used to distribute product from the Burnett Road Site. Most truck operators choose trucks with shorter wheel bases that will allow easy access to confined spaces. An internet search indicates these trucks can be configured different ways but the wheel bases are typically in the range of 169 to 235 inches. The AASHTO publication, A Policy on Geometric Design of Highways and Streets 2011 edition, identifies two single unit truck design vehicles. The AASHTO SU-30 design vehicle has a 240 inch wheelbase and was used as the design vehicle for the turning path review.

Two locations along the access route showed indications that trucks might be having difficulty making the turning movements. Movements 6 and 8 show encroachment. Bridgeway Avenue eastbound left turn onto Swinging Bridge appears to have the truck tires track off the edge of pavement. This was observed with WB-50 trucks during the traffic counts. Industrial Drive eastbound left turn onto Old Hickory Boulevard appears to have the truck tires track onto the raised traffic island. At both of these locations, it appears from field observation and the radius drawing that a dump truck vehicle can make the turn successfully. The turning path for the other locations is adequate and do not require mitigation. A copy of the turning path review drawings is in the Appendix.

- Safety analysis of the proposed site access points, including sight distance (both stopping sight distance and intersection sight triangle) and operational characteristics shall be conducted.
Site distance for left turn from Burnett Road: over 1200 ft to the north
Site distance for vehicle exiting the site: over 500 ft each direction
- Analysis of right and left-turn lane warrants, queue lengths, storage/throat lengths, acceleration and deceleration lanes, channelization, and other characteristics of site-access driveways as appropriate.

Initial quarry operation: Using an expected 8 trucks and 7 staff arrivals for the peak hour is 15 left-turns. For future conditions, adding the concrete plant and asphalt plant traffic increases the expected peak hour left turns to 24. Assuming a worst case volume from the park traffic of 92 vph, and using the left-turn warrant charts, a left turn lane is not initially warranted at the site entrance. This is partly because of low entry volume, and partly because of low opposing traffic volume. A left-turn lane is recommended for safety and to separate the truck turning movement from the recreational traffic on Burnett Road.

I. Safety Analysis

There are no schools with access to roadways along the traffic study route. School buses were observed on Swinging Bridge Road, Old Hickory Boulevard, Industrial Drive, and Robinson Road during the morning and evening turning movement counts. A school bus was observed on Swinging Bridge Road southbound at Burnett Road at 6:30 am and at Swinging Bridge at Bridgeway Avenue southbound at 4:20 pm. Seven school buses were observed during the morning turning movement counts between 6:45 am and 8:30 am at Old Hickory Boulevard at Industrial Drive. The school bus turning movement counts recorded were a southbound through, northbound through (2), northbound left turn (3), and eastbound right turn (2). There were no school route issues identified that require mitigation.

Local residents have expressed a concern for safety based on assumptions for possible truck routes that would pass through residential areas. The areas of concern are not along the proposed access route. Their concern is for trucks travelling through the residential and local commercial areas of the Old Hickory Village area, particularly along Hadley Avenue. Their concerns were expressed based on trucks which travel that route currently. Also, concerns were expressed based on trucks that appear to follow GPS directions into the Old Hickory Village area and onto dead-end streets such as Fowler Street. Online map programs were used to try to re-create the unwanted routes. Using Bing maps, the listed routes from the south followed the proposed access route from Robinson Road to Industrial Drive and to the site. Google maps also showed this preferred route, but showed a secondary route along Hadley Avenue with a longer travel time. Neither Bing nor Google maps routed to the dead-end streets. The residents' concerns might be addressed by limiting truck traffic through that area to deliveries only, and specifying that trucks travelling to the industrial areas use Industrial Boulevard. However, that would be an issue for Metro Traffic and Parking, and is out of the scope of this study.

Railroad Grade Crossing Review:

There are five railroad grade crossings owned by the Nashville and Eastern Railroad (NERR) on streets within the study area. The NERR is a short line railroad that provides on call freight service to the area. The track class on which it operates is Class 1 and Class 2 which carries maximum authorized train speeds of 10 and 25 miles per hour

respectively. The locations of the crossings are as follows and are shown on Figure 05, Existing Transportation System.

1. Swinging Bridge Road 890 feet north of traffic signal at Bridgeway Avenue.
2. Old Hickory Boulevard 940 feet south of traffic signal at Bridgeway Avenue and 890 feet north of traffic signal at Industrial Drive.
3. Industrial Drive 210 feet west of Old Hickory Boulevard.
4. Bridgeway Avenue 100 feet west of Swinging Bridge Road
5. Bridgeway Avenue 280 feet west of Swinging Bridge Road

An investigation of the grade crossing traffic control devices in use for the crossings was conducted on Tuesday, September 8, 2015. All the crossings have passive highway-grade crossing devices that include regulatory and warning signs along with supplemental pavement markings. The crossing on Old Hickory Boulevard has post mounted flashing-light signals in addition to the passive devices. The crossings on Swinging Bridge and Industrial Drive have cantilever flashing-light signals in addition to the passive devices. The crossing on Bridgeway 100 feet west of Swinging Bridge Road has post mounted flashing-light signals and automatic gates in addition to the passive devices.

The level of passive and active highway-grade crossing traffic control devices in use at these five crossings indicates significant past engineering investigation, design, and construction to establish an appropriate level of grade crossing safety. The future traffic from the Burnett Road Site does not justify changes or additions to the current highway-grade crossing plan for the five locations. No railroad grade crossing mitigation actions are recommended.

- High accident locations shall be evaluated when adequate information for analysis is readily available. The analysis shall include collision diagrams and accident rates, and use at least two-years of accident data.
No high accident locations known along the access route.

J. Analysis of the parking needs of the proposed development

- The adequacy of the proposed facilities to meet parking needs
The parking at the site office and utility building is adequate for the on-site staff and visitors. Space is available if haul trucks need to park for drivers to visit the office.
- The conformance of the proposed parking facilities to applicable standards,
The number of parking spaces meets Metro requirements.
And
- The opportunities to modify and/or utilize the proposed facilities to reduce trips.
Opportunities for trip reduction are limited, because of the type of operations. Truck traffic to the site will be based on the need to deliver aggregate, asphalt, concrete, and block to off-site users. Facility staff generally remain at the site through lunch. Visitors to the site will be coming specifically to this location.

K. Mitigation Analysis

- The mitigation analysis shall evaluate the future traffic conditions with proposed mitigations to improve operations and/or deficiencies (if any)

The site layout was developed to provide adequate on-site stacking for trucks arriving at the facility. Additional area is available if necessary.

The access route to and from the site appears adequate for the expected traffic. The route has a signalized intersection at Robinson Road where traffic is expected to arrive from and depart to offsite locations. Along the local access route, the existing roadway and intersections appear adequate for the additional traffic without significant adverse effect to the capacity (existing right-turn lanes and existing signals). Since none of the intersection LOS values fall below LOS D, no mitigation actions are recommended.

- Operational analysis for all study locations shall include:
 - Level of Service (include vehicle delay/failing approaches for unsignalized intersections)
Level of service is not reduced significantly by the addition of the traffic from the Burnett Road site to the Background traffic.
 - Identification of revised lane geometry/lane configuration (include diagram)
The existing intersection geometry is adequate for the expected truck traffic.
 - Queue length analysis
Queue lengths for the future traffic conditions were short, and no problems with stacking were noted (except on mainline Robinson Road).
 - Signal timing cycles
Neither the LOS analysis nor visual inspection of the signal operation indicated issues with the signal timing.
 - Identification of bicycle and pedestrian facilities
There are no specific bicycle or pedestrian facilities except along Industrial Drive. The pedestrians and cyclists did not appear to have issues navigating their route.
 - Analysis of new connections opportunities/issues
The access route to the site follows existing roadways through an established industrial area. No new connections are proposed.
- Capacity Analysis output for each of the assessment scenarios shall be included in the appendix to the study document.
HCS Analysis of the Future conditions are included in the Appendix.

L. Conclusions and Recommendations

For the existing conditions, the level of service at the intersections are LOS C or better. For the Background conditions, the Intersection at Robinson Road and Industrial Drive drops to LOS D for the PM peak only. The only intersection to drop in LOS when the future Burnett Road traffic is added is the stop condition at Swinging Bridge and Bridgeway eastbound. The difference in delay was less than one second, but went over the 10 second limit for LOS A.

Based on expected traffic volumes, Burnett Road is adequate to carry the existing traffic, initial project traffic, and projected future combined traffic. This includes traffic from the Metro park as well as the proposed facility.

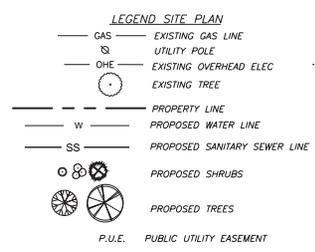
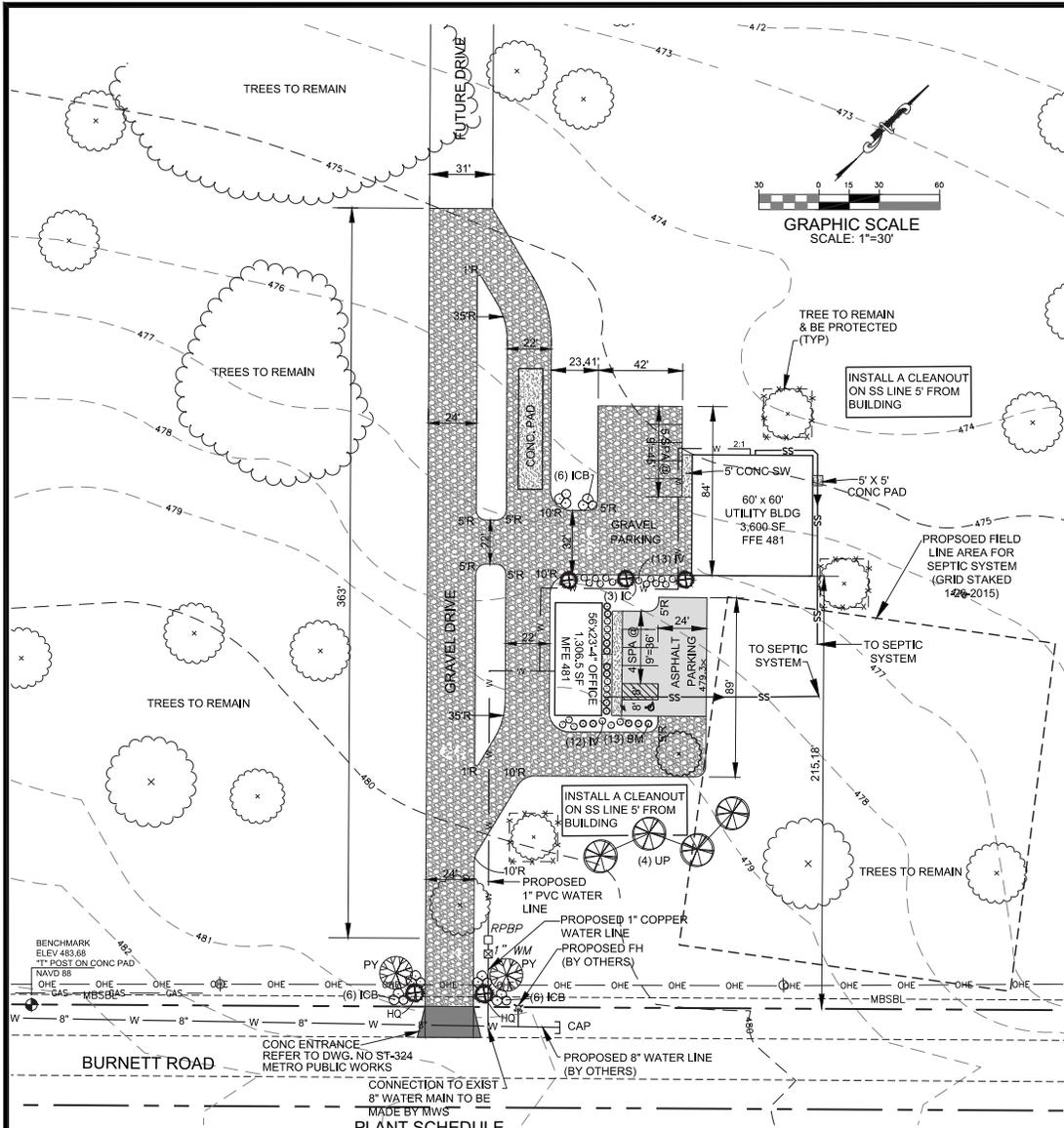
- Description and summary of mitigation measures necessary to bring the study intersections and roadway segments into compliance with acceptable levels of service in accordance with Metro transportation policies. Included in the analysis shall be the identification of signals, turn lanes, and other warrants as appropriate.

Existing roadways and intersection configurations appear adequate for the expected additional traffic. Analysis of the site and the access route found only a few recommendations and mitigation measures. This is a result of several factors, including the following:

- relatively low existing traffic volumes along the route
- a relatively small number of trips generated per acre, in comparison to other uses
- a local roadway system that has been developed or modified to serve existing industrial and manufacturing uses, which also serves fewer vehicles than in the past. The site is located in an industrially zoned area, so to some extent the roadway conditions can be expected to be adequate for industrial uses.

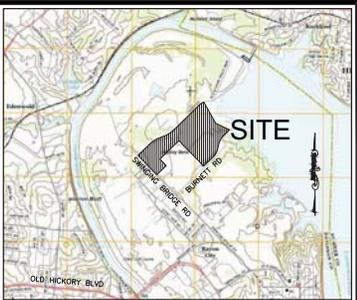
Based on the traffic study and analysis, several recommendations can be made and mitigation measures suggested.

1. A new left-turn lane is recommended on Burnett road at the site entrance to separate the truck turning movement from other Burnett Road traffic.
2. The developer should provide a repair Bond for the roadways along the access route. Although the roads along the access route appear to have adequate pavement thickness, and have held up to existing truck traffic, a bond would provide a reduction of risk for Metro.
3. Metro should consider providing Transit Route signs at the intersections of Industrial Drive at Old Hickory Boulevard/pgi Driveway and Industrial Drive at Robinson Road (State Route 45).
4. The STOP BAR for Bridgeway Avenue eastbound should be relocated. The new location should place the driver's line of sight looking north beyond the clutter to improve sight distance.
5. Additional investigation is needed to address the problem of trucks travelling through residential areas. Residents have noted a GPS issue of routing trucks through the neighborhood, and onto dead-end streets. This might be addressed by restricting truck traffic through neighborhoods by actions of the Parking and Traffic Commission. The access route proposed for this site does not pass through the areas of concern.



- GENERAL NOTES**
- IN TENNESSEE, IT IS A REQUIREMENT FOR THE UNDERGROUND UTILITY DAMAGE PREVENTION ACT THAT ANYONE WHO ENGAGES IN EXCAVATION MUST NOTIFY ALL KNOWN UNDERGROUND UTILITY OWNERS, NO LESS THAN 3 WORKING DAYS TO WORKING DAYS OF THEIR INTENT TO EXCAVATE. THE TENNESSEE ONE CALL SYSTEM CAN BE NOTIFIED BY CALLING 1-800-351-1111.
 - THE DEVELOPER AND CONTRACTOR SHALL CONSULT A GEOTECHNICAL ENGINEER AND SHALL CONSTRUCT ALL FILL AND IMPROVEMENTS OVER SHIMHOLES IN ACCORDANCE WITH A GEOTECHNICAL ENGINEERED PLAN.
 - THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO ADJACENT PROPERTIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGE TO ADJACENT PROPERTIES OCCURRING DURING CONSTRUCTION.
 - PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PLANS AND OTHER DOCUMENTS APPROVED BY ALL APPLICABLE PERMITTING AGENCIES.
 - THE DESIGNS REPRESENTED IN THESE PLANS ARE IN ACCORDANCE WITH ESTABLISHED ENGINEERING PRACTICES FOR THE DESIGN FUNCTIONS AND USES INTENDED BY THE DEVELOPER. AT THE TIME HOWEVER, NEITHER ENGINEER CONSULTANTS, LLC, NOR ITS PERSONNEL, CAN OR DO WARRANT THESE PLANS TO BE CONSIDERED COMPLETELY ACCURATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ENGINEER PERFORMING FIELD INSPECTION AND CONTROL OF CONSTRUCTION TEMPORARILY ON SITE. THE ORIGINAL DRAWINGS WILL BE MAINTAINED ON FILE FOR VERIFICATION OF CHANGES IF ANY ALTERATIONS ARE MADE TO THE PLANS WITHOUT WRITTEN APPROVAL OF WISER CONSULTANTS.
 - THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE CONDITIONS, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS.
 - AFTER COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL CLEANUP THE SITE TO REMOVE ALL TRASH, DEBRIS, EXCESS MATERIALS, EQUIPMENT, AND OTHER MATERIALS ASSOCIATED WITH THE CONSTRUCTION.
 - PARKING STRIPES ARE TO BE 4" WIDE, PANTED WHITE.
 - TRAFFIC CONTROL, INCLUDING ANY SIGNAGE AND BARRICADES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND NO EXTRA PAYMENT SHALL BE MADE BY THE OWNER.
 - NO TREES ARE TO BE REMOVED AND/OR VEGETATION DISTURBED EXCEPT AS NECESSARY FOR GRADING PURPOSES.
 - DIRTWORK IS TO BE STRIPPED FROM ALL CUT AND FILL AREAS, STOCKPILED IN LOCATIONS DESIGNATED BY THE CONTRACTOR, AND REDISTRIBUTED OVER UNGRADED AREAS AS DIRECTED TO A MINIMUM DEPTH OF 3".
 - BEFORE INSTALLATION OF STORM OR SANITARY SEWER, THE CONTRACTOR SHALL EXCAVATE AND VERIFY ALL PIPE INTERSECTIONS AND CROSSINGS AND NOTIFY THE ENGINEER OF ANY CONFLICTS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR CHANGES IF ANY ALTERATIONS ARE MADE TO CONFLICTS PRIOR TO CONSTRUCTION.
 - THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL UNDERGROUND UTILITIES WITH HIS WORK. ALL UNDERGROUND UTILITIES, INCLUDING CONSULT AND PROTECTION SERVICES AND OTHER DEVICES AND STRUCTURES, SHALL BE IN PLACE PRIOR TO THE PLACEMENT OF BASE COURSE MATERIAL.
 - CLEARING AND GRUBBING LIMITS SHALL INCLUDE ALL AREAS DISTURBED BY GRADING THE SITE.
 - EXISTING UTILITIES SHOWN FROM SURFACE LOCATION: CONTRACTOR TO CONFIRM LOCATION PRIOR TO CONSTRUCTION.
 - THIS DRAWING REPRESENTS A UNIQUE DESIGN AND HAS BEEN PREPARED EXCLUSIVELY FOR USE FOR THIS PROJECT AND NO OTHER USE SHALL BE MADE WITHOUT THE WRITTEN CONSENT OF THE OWNER AND THE DESIGN ENGINEER PRIOR TO STARTING CONSTRUCTION.
 - ANY CHANGES OR ALTERATIONS MADE TO THESE CONSTRUCTION DRAWINGS WITHOUT THE WRITTEN APPROVAL OF WISER CONSULTANTS VOID THE SEAL, SIGNATURE, AND ANY LIABILITY ASSOCIATED WITH THIS PROJECT. THE ORIGINAL DRAWINGS ARE MAINTAINED ON FILE FOR VERIFICATION OF CHANGES.
 - THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ALL DEBRIS, MATERIAL AND RUBBISH RESULTING FROM PREVIOUS AND CURRENT CONSTRUCTION OPERATIONS. DISPOSAL PROCEDURES SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS. THE CONTRACTOR SHALL TAKE CARE TO PROTECT ANY UTILITIES, TREES, ROADS, OR OTHER FACILITIES INTENDED TO REMAIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES TO SUCH PROPERTY. THE CONTRACTOR SHALL MAINTAIN CONTROL OVER THE PROJECT SITE UNTIL ACCEPTANCE BY THE OWNER, AND WILL BE HELD RESPONSIBLE FOR SAFETY AT THE SITE UNTIL ACCEPTANCE.
 - THE CONTRACTOR SHALL FURNISH, INSTALL AND MAINTAIN ALL NECESSARY TEMPORARY WORKS FOR THE PROTECTION OF THE PROJECT AND THE PUBLIC, INCLUDING BARRICADES, FENCING, WARNING SIGNS, ETC.
 - FOUND ITEMS DURING CONSTRUCTION ARE THE PROPERTY OF THE OWNER. THIS INCLUDES, BUT IS NOT LIMITED TO, PREVIOUS METALS, COINS, PAPER CURRENCY, AND MEMORABILIA.
 - NOTHING IN THE PLANS OR NOTES SHALL RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITIES TOWARD THE SAFETY AND CONVENIENCE OF THE GENERAL PUBLIC AND THE RESIDENTS ADJACENT TO THE PROPOSED CONSTRUCTION AREA.
 - THE CONTRACTOR SHALL VERIFY ALL MEASUREMENTS, CLEARANCES, ETC. BEFORE ORDERING MATERIAL AND BEFORE BEGINNING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR THE SAFETY OF SURVEY CONTROL AND EXISTING MONUMENTS. ANY DAMAGED MONUMENTS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

- LANDSCAPING NOTES**
- ALL PLANT MATERIAL MUST MEET THE STANDARDS FOR SIZE, FORM AND QUALITY SET OUT IN THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1 - LATEST EDITION).
 - ALL TREES MUST HAVE STREETSCAPE QUALITY.
 - ALL PLANT SIZE SHOWN OR SPECIFIED ARE MINIMUMS.
 - WHEN BOTH CALIPER AND HEIGHT SIZES ARE SPECIFIED, BOTH SPECIFICATIONS MUST BE MET OR EXCEEDED.
 - NO SUBSTITUTIONS WILL BE ALLOWED WITHOUT PRIOR WRITTEN CONSENT OF THE OWNER.
 - THE QUANTITIES INDICATED ON THE PLANT SCHEDULE AND PLAN ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HIS/HER OWN QUANTITY CALCULATION AND THE LIABILITY WHICH PERTAINS TO THESE QUANTITIES. ANY DISCREPANCY SHALL BE CALLED TO THE ATTENTION OF THE OWNER.
 - IF ROCK IS ENCOUNTERED, CONTRACTOR TO REMOVE ROCK AND PROVIDE DRAINAGE AWAY FROM EACH TREE PIT.
 - SCAFFRY ALL TREE PITS BEFORE PLANTING. VERIFY THAT ALL TREE PITS ARE ADEQUATELY DRAIN BEFORE PLANTING TREES.
 - SHRUBS AND GROUNDCOVER BEDS ARE TO BE PLANTED IN A TRIANGULAR SPACING. SEE PLANT SCHEDULE FOR SPACING.
 - TREAT ALL GROUNDCOVER BEDS WITH PRE-EMERGENT HERBICIDE PRIOR TO PLANTING.
 - ALL TREES OF A SIMILAR SPECIES TO BE MATCHED IN SIZE AND DENSITY.
 - CONTRACTOR TO WARRANT ALL PLANTINGS FOR A PERIOD OF ONE YEAR AFTER DATE OF FINAL ACCEPTANCE BY THE OWNER. WARRANTS TO INCLUDE ALL DEFECTS INCLUDING DEATH OR UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM LACK OF ADEQUATE MAINTENANCE OR WATERING, NEGLECT OR ABUSE BY OWNER, OR SUBSTANTIAL WEATHER CONDITIONS UNUSUAL FOR BARRANTY PERIOD. CONTRACTOR IS RESPONSIBLE FOR ALL WEEDING AND MAINTENANCE UNTIL FINAL ACCEPTANCE.
 - CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE OF PLANTS UNTIL FINAL ACCEPTANCE BY OWNER.
 - PROVIDE NEW TOP SOIL WHICH IS FERTILE, FRABLE, NATURAL LOAM, SURFACE SOIL THAT IS REASONABLY FREE OF SUBSAL, CLAY, AND OTHER UNDESIRABLE MATERIALS. PROVIDE MULCH AND FRESH OF ROOTS BRUSHES LARGER THAN 2" IN ANY DIMENSION, AND OTHER EXTRANEOUS OR TOXIC MATTER HARMFUL TO PLANT GROWTH.
 - MULCH IS TO BE PLACED IN ALL PLANTING BEDS.
 - ALL SERVICE AREAS, MECHANICAL EQUIPMENT, TRASH CONTAINERS, AND FIELD SET ABOVE-GROUND UTILITY BOXES MUST BE SCREENED FROM THE PUBLIC R.O.W. ON 3 SIDES (LAWYER DOOR ACCESS) WITH REQUIRED EXTERIOR PLANT MATERIAL. PLANT MUST BE IDENTIFIED AND MUST NOT EXCEED THE HEIGHT OF THE STRUCTURE THAT IS TO BE SCREENED.



LOCATION MAP
NOT TO SCALE

PROJECT INFORMATION:
OWNER:
 Industrial Land Developers, LLC
 (formerly) ABC Nashville, LLC
DEED REFERENCE:
 Property Address: 771 Burnett Road
 Old Hickory, TN 37138
 Tax Map 35
 Parcel 10
 Owner Document: 20141104-0101883

FLOOD NOTE:
 No portion of this site lies within the 100 year floodplain per FEMA Map No. 47037C0141G dated Nov. 21, 2002 and Map No. 47037C0141F dated Apr. 20, 2001

LAND USE DATA:
 Land Area: 155.61 Acres
 Zoning: IG (General Industrial)
 Setbacks: 5' Front, 0' Side, 20' Rear
 Parking:
 Required Spaces: Office, 4; Shop, 4
 Spaces Provided: Office: 4 + 1ADA; Shop: 5
 Buildings:
 Office: 1306.5 SF
 Utility Bldg: 3600 SF
 Impervious Area:
 31,301 S.F.
 Disturbed Area:
 Initial Project Area (2 Bldgs):
 0.93 Acres (bldgs, parking, drives)
 1.58 Acres (including ditches and pond)

REVISIONS

2-18-15	REMOVE CONTOURS/ EROSION CONTROL CHANGE ENTRANCE INTO SITE
3-13-15	ADD DISTURBED AREA NOTE

SITE PLAN
BURNETT ROAD SITE
PARCEL 10, MAP 35
DAVIDSON COUNTY, TENNESSEE

DATE 2-10-15
 DRAWN BY DKH
 CHECKED BY JRG
 SCALE 1"=30'
 PROJECT NO. 14-01-0204
 FILE 14-01-0204 DRAWINGS/SITE PLAN

wiser
 CONSULTANTS
 1427 Kensington Square Ct.
 Murfreesboro, Tennessee 37130
 Telephone: (615) 278-1500
 Facsimile: (615) 217-8130
 www.wiserc consultants.com

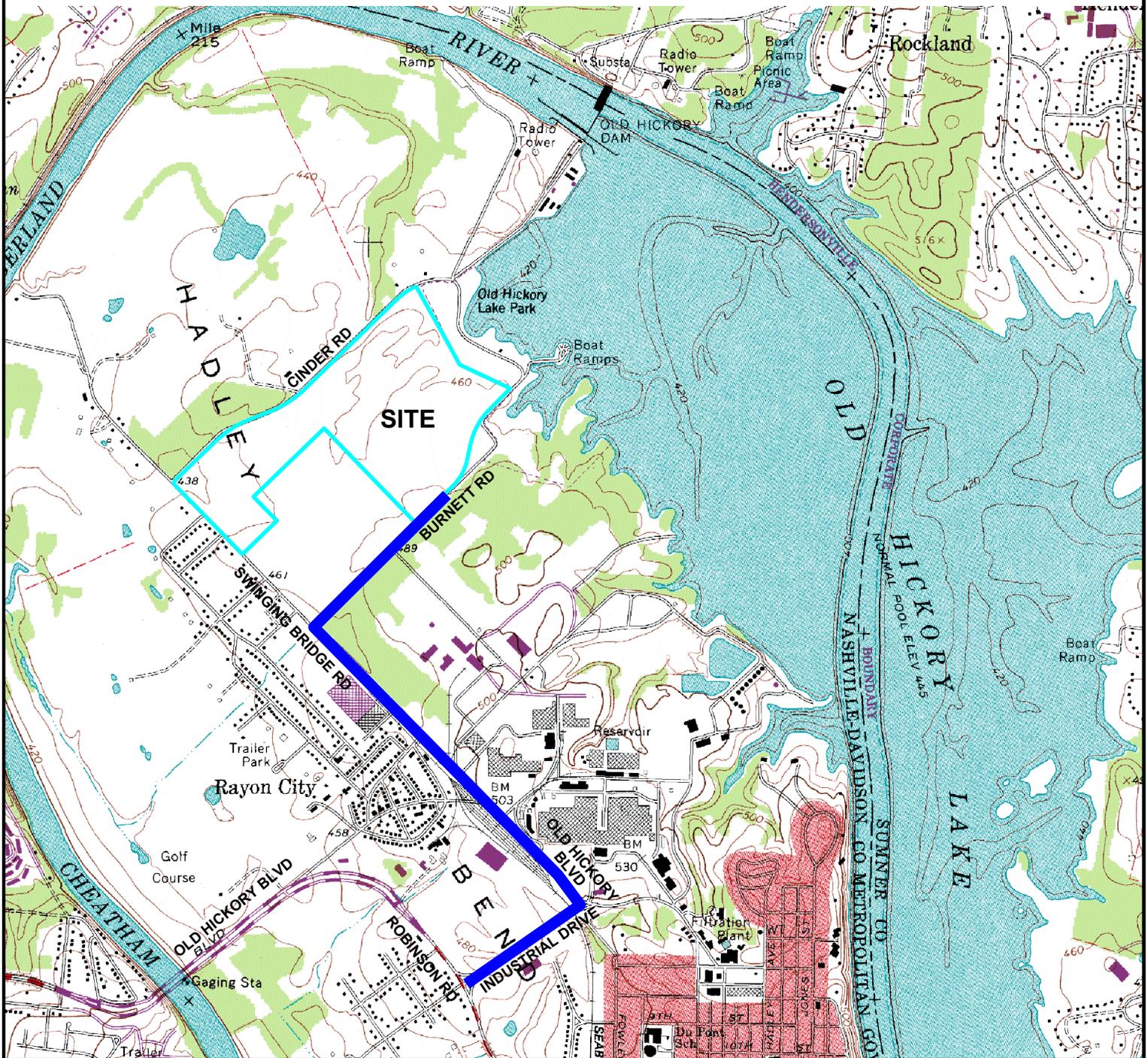
Tennessee 811
 Know what's below. Call before you dig.
 1-800-368-8888
 3-3-2015

SHEET NO. 1 OF 7

PLANT SCHEDULE

TREES	SYM	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	NOTES
	TR	2	FRAXINUS WEDDINGII	WEDDINGII CHERRY	2-2.5"	AS SHOWN	STRONG CENTRAL SINGLE LEADER, 4 CLEAR TRUNK, FULL CANOPY
	UP	4	ULMUS PARVIFOLIUS 'EMER II'	ALLEE LACERNAK ULM	2-2.5"	20' O.C.	STRONG CENTRAL SINGLE LEADER, LIMBED TO ST. FULL CANOPY
SHRUBS	SYM	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	NOTES
	BU	11	BUXUS MACROPHYLLA WINTERGREEN	BOXWOOD	24" HT	5' O.C.	B&B, FULL & MATCHING
	HO	4	HYDRANGEA QUERCIFOLIA SNOW QUEEN	DAKLEAF HYDRANGEA	30" HT	AS SHOWN	B&B, FULL & MATCHING
	ICB	15	ILEX CORNUTA BURGERDORF NANA	DWARF BURGERDORF HOLLY	24" HT	2' O.C.	B&B, FULL & MATCHING
	HO	25	ILEX VOMIFOLIA	JAPANESE YALPORN HOLLY	18" HT	2' O.C.	B&B, FULL & MATCHING
	IC	3	ILEX CORNUTA	CHINESE HOLLY WELLS R. STEVENS	8" HT	AS SHOWN	B&B, FULL TO BASE, MATCHING

Burnett Road Site Location Map



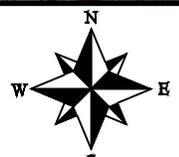
Burnett Road Site

MAP SOURCE: USGS GOODLETTSVILLE, TN QUAD

SITE ENTRANCE AT 771 BURNETT ROAD
Davidson County, Tennessee

TRAFFIC ROUTES
FROM ROBINSON ROAD TO SITE

LEGEND



Graphic Scale
1" = 2000'

DATE:	06-11-2015
DRAWN BY:	DKH
CHECKED BY:	JRG

SCALE:	1" = 2000'
FILE NAME:	LOCATION MAP TRAFFIC ROUTES.DWG

NOTES: ROUTES INCLUDE INDUSTRIAL DRIVE, OLD HICKORY BLVD., SWINGING BRIDGE ROAD AND BURNETT ROAD

Figure 03

Trip Generation Summary

Burnett Road Site (All Uses)

Time Period		QUARRY SITE		ASPHALT PLANT		CONCRETE PLANT		BLOCK PLANT		OTHER TRIPS		TOTAL	
		IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
6:00 - 7:00	T											0	0
	A	5		3		10		1				19	0
7:00 - 8:00	T	9	8	11	8		6					20	22
	A	2		1		1						4	0
8:00 - 9:00	T	8	9	10	7	6						24	16
	A											0	0
9:00 - 10:00	T	4	4	5	7		6					9	17
	A											0	0
10:00 - 11:00	T	4	4	6	7	6				1	1	17	12
	A									1	1	1	1
11:00 - 12:00	T	7	7	8	7		6			1	1	16	21
	A									1	1	1	1
12:00 - 1:00	T	6	6	6	7	6				1	1	19	14
	A									1	1	1	1
1:00 - 2:00	T	4	4	5	7		6		1	1	1	10	19
	A									1	1	1	1
2:00 - 3:00	T	6	6	6	7	6		1				19	13
	A											0	0
3:00 - 4:00	T	7	7	8	8		6					15	21
	A		2		1		1					0	4
4:00 - 5:00	T					6						6	0
	A		4		1		10		1			0	16
5:00 - 6:00	T											0	0
	A		1		2							0	3
TOTAL		62	62	69	69	41	41	2	2	8	8	182	182

Σ ALL TRIPS	364	trips / day
Σ PEAK HOUR TRIPS (AM+MID+PM)	125	trips
Σ PEAK HOUR TRIPS (AM+PM)	86	trips

Figure 04: Trip Generation for Burnett Road Site (All Users)

NOTE: T = Trucks
A = Auto



TOTAL (vph)	
AM	19
	46
	40
	26
MID	31
	39
	35
	31
PM	32
	40
	22
	3

Peak Hour Volume	
PHV =	46
PHV =	39
PHV =	40

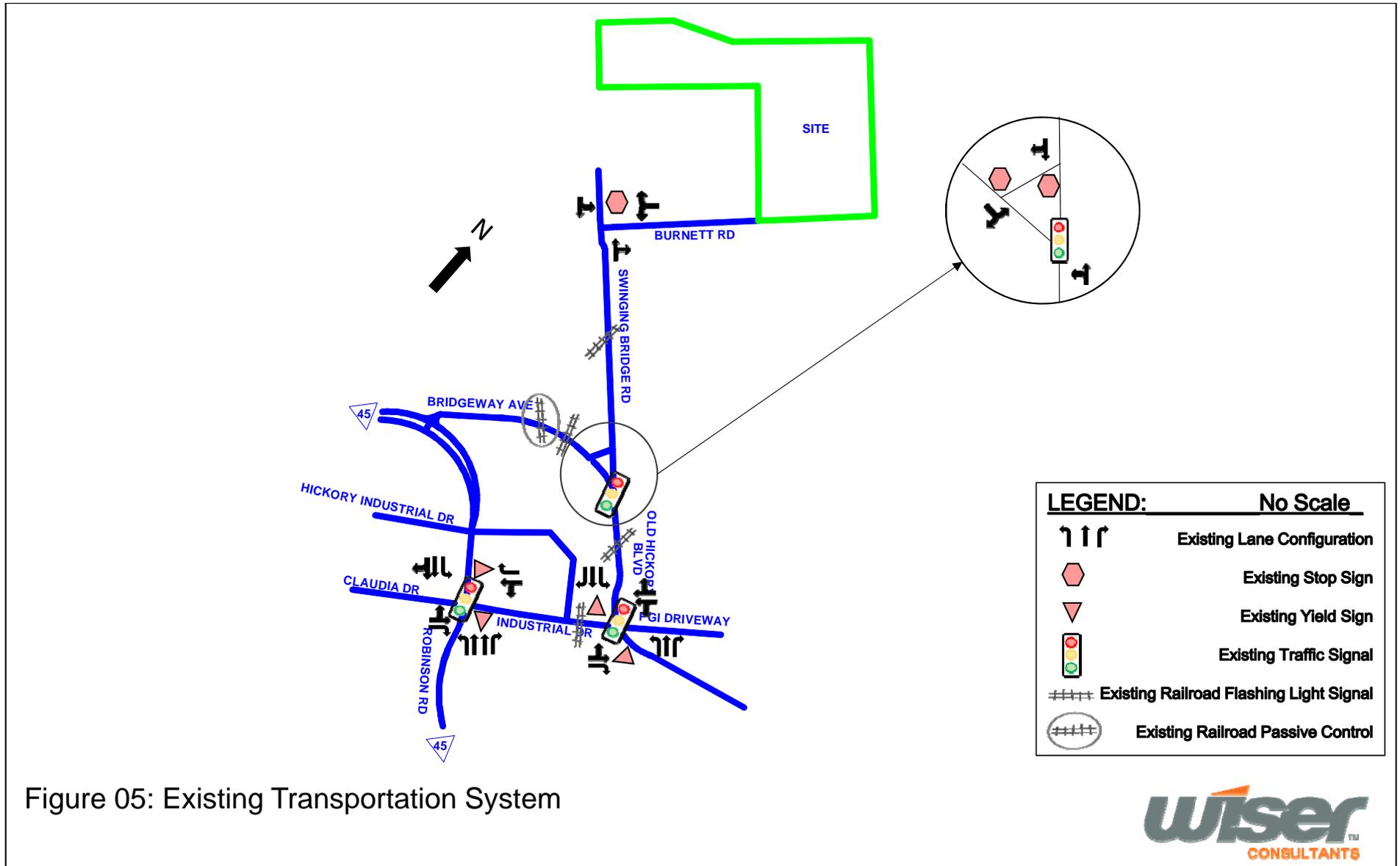


Figure 05: Existing Transportation System

MEMO

Burnett Road Site
Additional traffic information
Pavement thicknesses

The pavement thickness were measured along the access route for the Burnett Road site, including along Burnett road and Swinging Bridge Road. The pavement thicknesses ranged from 3” to 4 ½” as follows:

Swinging Bridge Road: starting at the stop sign at the intersection with Burnett Road, and going back east towards the railroad crossing.

Core 1- 4”

Core 2- 4”

Core 3- 3”

Core 4- 3 ¼”

Burnett Road: starting at the project entrance and going south to the stop sign at Swinging Bridge Road.

Core 1- 3 ½”

Core 2 -3 ⅝”

Core 3- 4 ½”

Core 4- 3 “

Core 5- 3 ½”

Peak Hour Percent Heavy Vehicle Summary

Intersection	TRAFFIC CONTROL	AM			MIDDAY			PM		
		E	B	F	E	B	F	E	B	F
Swinging Bridge Road at Burnett Road	STOP	0	0	32	1	NC	NC	0	0	18
Swinging Bridge Road Westbound at Bridgeway Avenue	STOP	3	3	12	NC	NC	NC	3	3	15
Swinging Bridge Road at Bridgeway Avenue Eastbound	STOP	3	3	41	15	NC	NC	4	4	20
Swinging Bridge Road at Bridgeway Avenue	SIGNAL	3	3	10	15	NC	NC	4	4	12
Industrial Drive at Old Hickory Boulevard and Pgi Driveway	SIGNAL	2	2	5	4	NC	NC	3	3	6
Robinson Road at Industrial Drive and Claudia Drive	SIGNAL	5	5	6	5	NC	NC	5	5	6
Burnett Road at Site Driveway	NO CONTROL	0	0	44	NC	NC	NC	0	0	30

Figure 07: Peak Hour Percent Heavy Vehicles
Existing / Background / Future

NOTE: E = Existing
 B = Background
 F = Future
 NC = Not Calculated
 Use Existing = Background



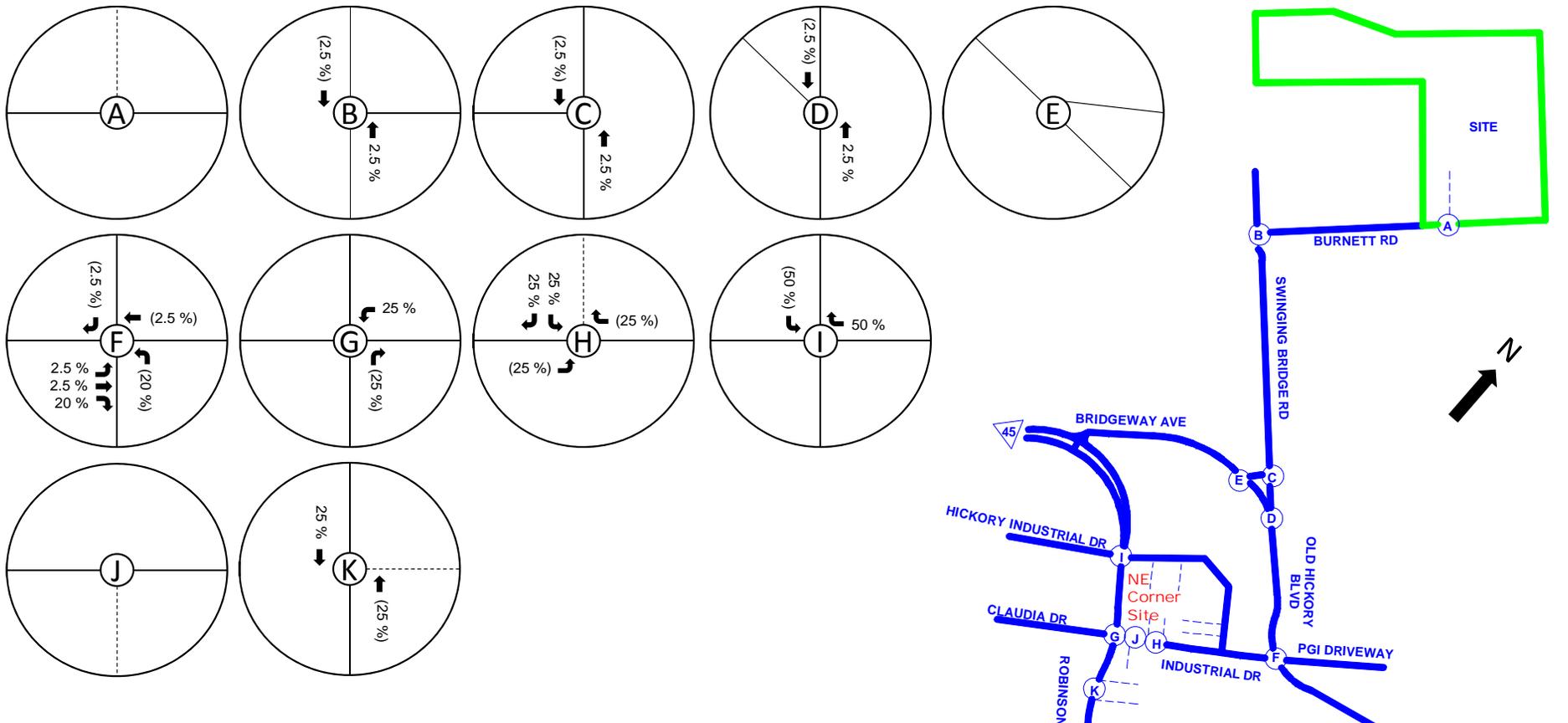


Figure 08: Distribution Peak Hour Traffic Volume Generated by Northeast Corner Site

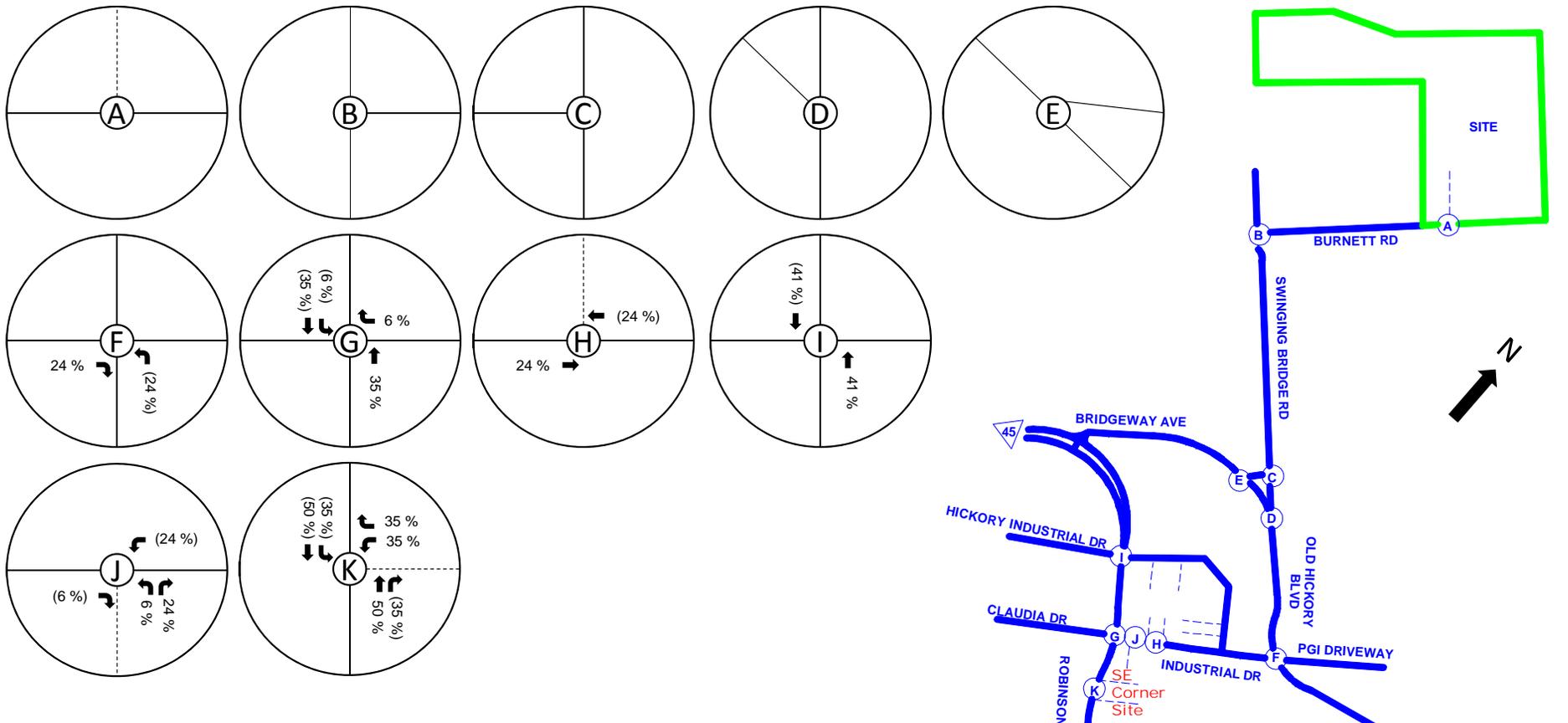
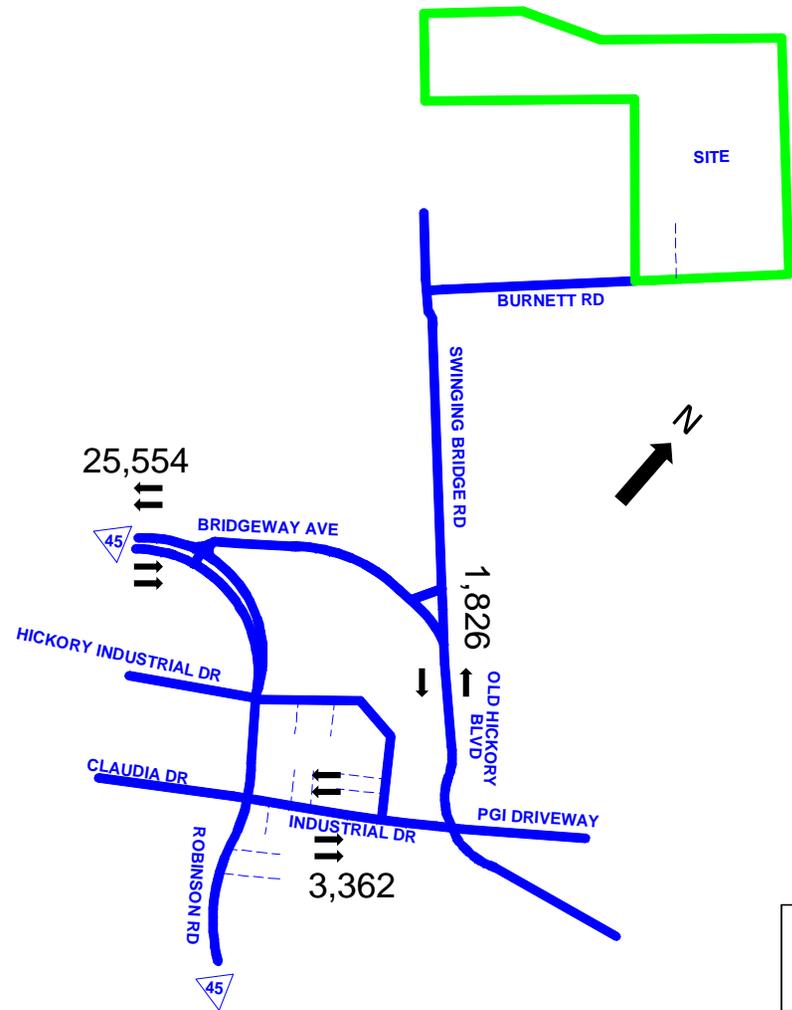


Figure 09: Distribution Peak Hour Traffic Volume Generated by Southeast Corner Site



LEGEND:	No Scale
↑↑	Existing Lanes
-----	Future Driveways

Figure 10: 2014 AADT Volume and Existing Lanes

Source: TDOT Count Station



Signalized Intersection Level of Service

HCS+ Signal Summary

Study Information

Study Summary	Analyst	Notes	E = EXISTING CONDITION B = BACKGROUND CONDITION F = FUTURE CONDITION
	Kaitlyn T Thayvy		
	Agency		
	Wiser Consultants		
	Project		
	14-01-0204 Burnett Road Site		
	Date		
	Thursday, October 01, 2015		

Intersection	PEAK HOUR	Cycle Length (sec)			Overall Intersection Delay (sec/veh)			Overall Intersection LOS		
		E	B	F	E	B	F	E	B	F
Swinging Bridge Road at Bridgeway Avenue	AM	64.0	64.0	64.0	7.4	7.5	8.3	A	A	A
	MIDDAY	64.0			11.4			B		
	PM	64.0	64.0	64.0	11.7	11.8	12.6	B	B	B
Old Hickory Boulevard at Industrial Drive / Pgi Driveway	AM	115.0	115.0	115.0	24.9	25.5	26.1	C	C	C
	MIDDAY	115.0			22.2			C		
	PM	115.0	115.0	115.0	22.7	22.7	23.3	C	C	C
Robinson Road at Industrial Drive / Claudia Drive	AM	90.0	90.0	90.0	21.5	22.3	22.5	C	C	C
	MIDDAY	90.0			19.9			B		
	PM	90.0	90.0	90.0	35.0	42.3	44.1	C	D	D

Figure 11: Signalized Intersection Level of Service for Existing, Background, and Future Conditions



Two-Way STOP Control Level of Service

HCS+ Unsignal Summary

Study Information

Study Summary	Analyst	Notes	E = EXISTING CONDITION B = BACKGROUND CONDITION F = FUTURE CONDITION
	Kaitylyn T Thayvy		
	Agency		
	Wiser Consultants		
	Project		
	14-01-0204 Burnett Road Site		
	Date		
	Thursday, October 01, 2015		

Intersection	PEAK HOUR	Approach Delay (sec/veh)												Approach LOS														
		Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound					
		E	B	F	E	B	F	E	B	F	E	B	F	E	B	F	E	B	F	E	B	F	E	B	F			
Swinging Bridge Road at Burnett Road	AM				8.9	8.9	9.5										A	A	A									
	MIDDAY				9.1												A											
	PM				9.2	9.2	9.7										A	A	A									
Swinging Bridge Road Westbound at Bridgeway Avenue	AM	11.5	11.8	13.5													B	B	B									
	MIDDAY	8.6															A											
	PM	8.6	8.6	8.8													A	A	A									
Swinging Bridge Road at Bridgeway Avenue Eastbound	AM	9.2	9.2	10.1													A	A	B									
	MIDDAY	9.5															A											
	PM	9.5	9.6	10.1													A	A	B									
Burnett Road at Burnett Road Site Driveway	AM												8.9															A
	MIDDAY																											
	PM												9.0															A

Figure 12: STOP Control Level of Service for Existing, Background, and Future Conditions



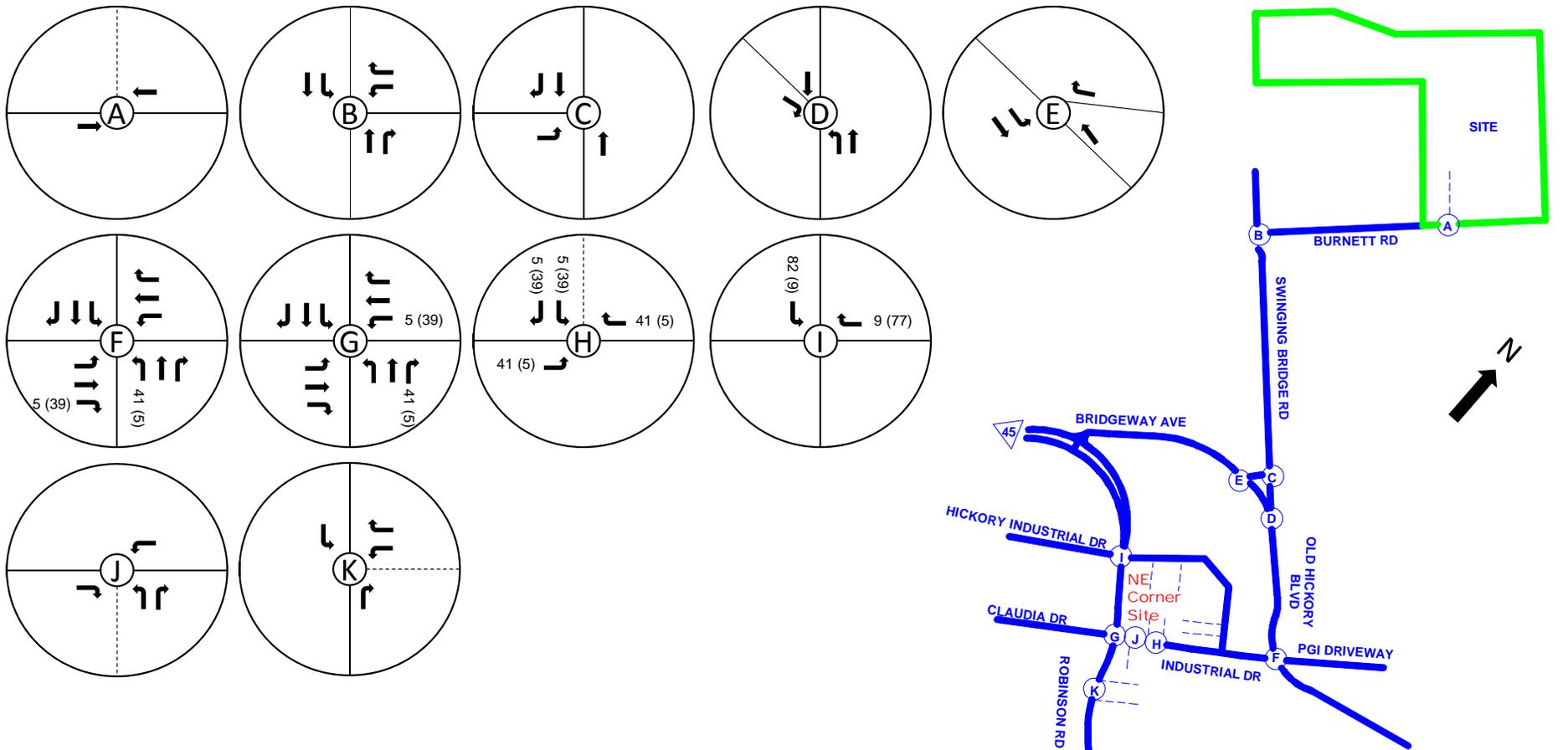


Figure 13: Background Peak Hour Traffic Volume 2017
 - Northeast Corner Site (Rayon City Investors)

LEGEND: No Scale

AM (PM) Peak Hours

↑↑↑ Turning Movements

----- Future Driveways



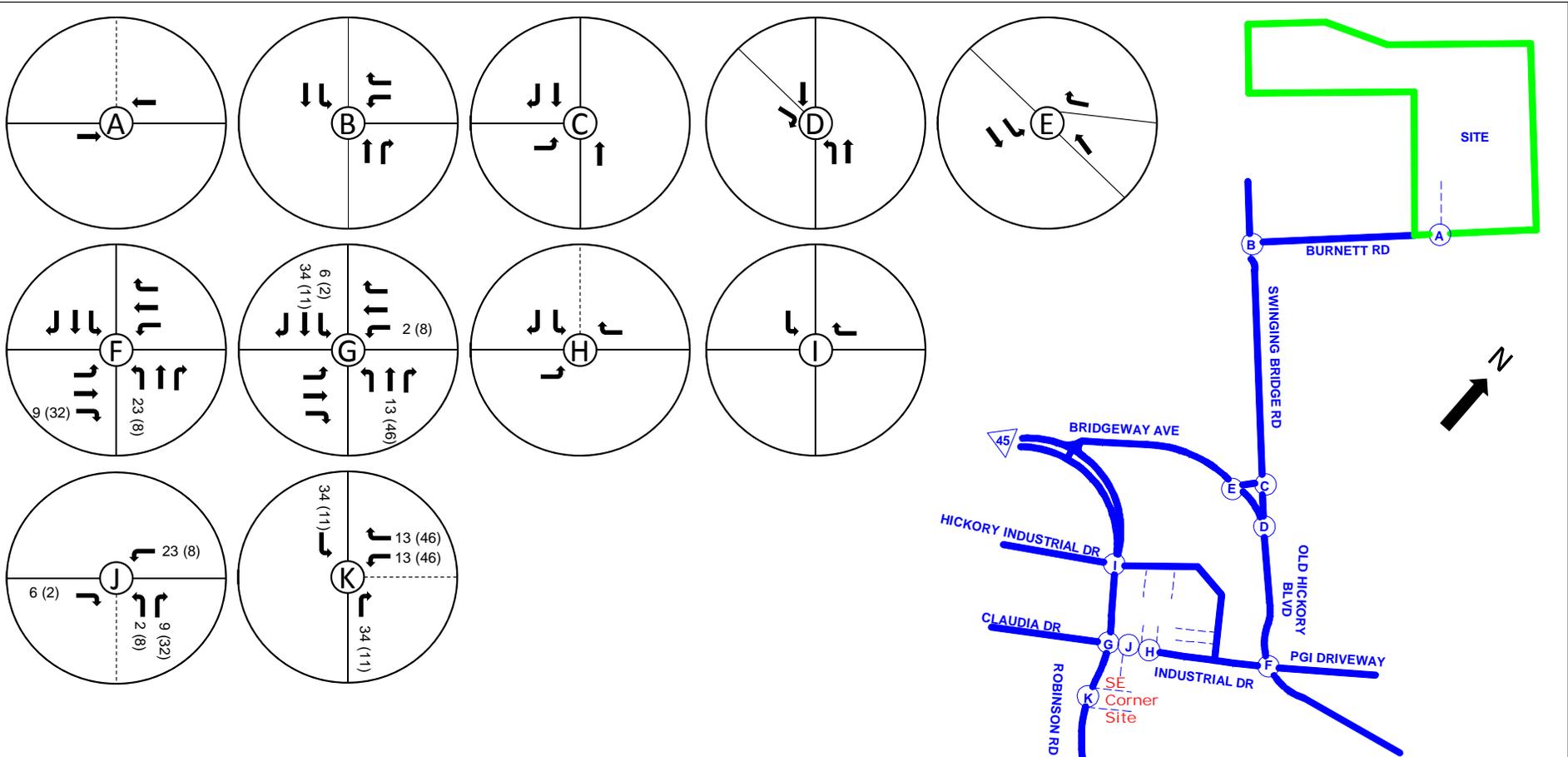


Figure 14: Background Peak Hour Traffic Volume 2017
 - Southeast Corner Site

LEGEND: No Scale
 AM (PM) Peak Hours
 ↑↑↑ Turning Movements
 - - - - Future Driveways



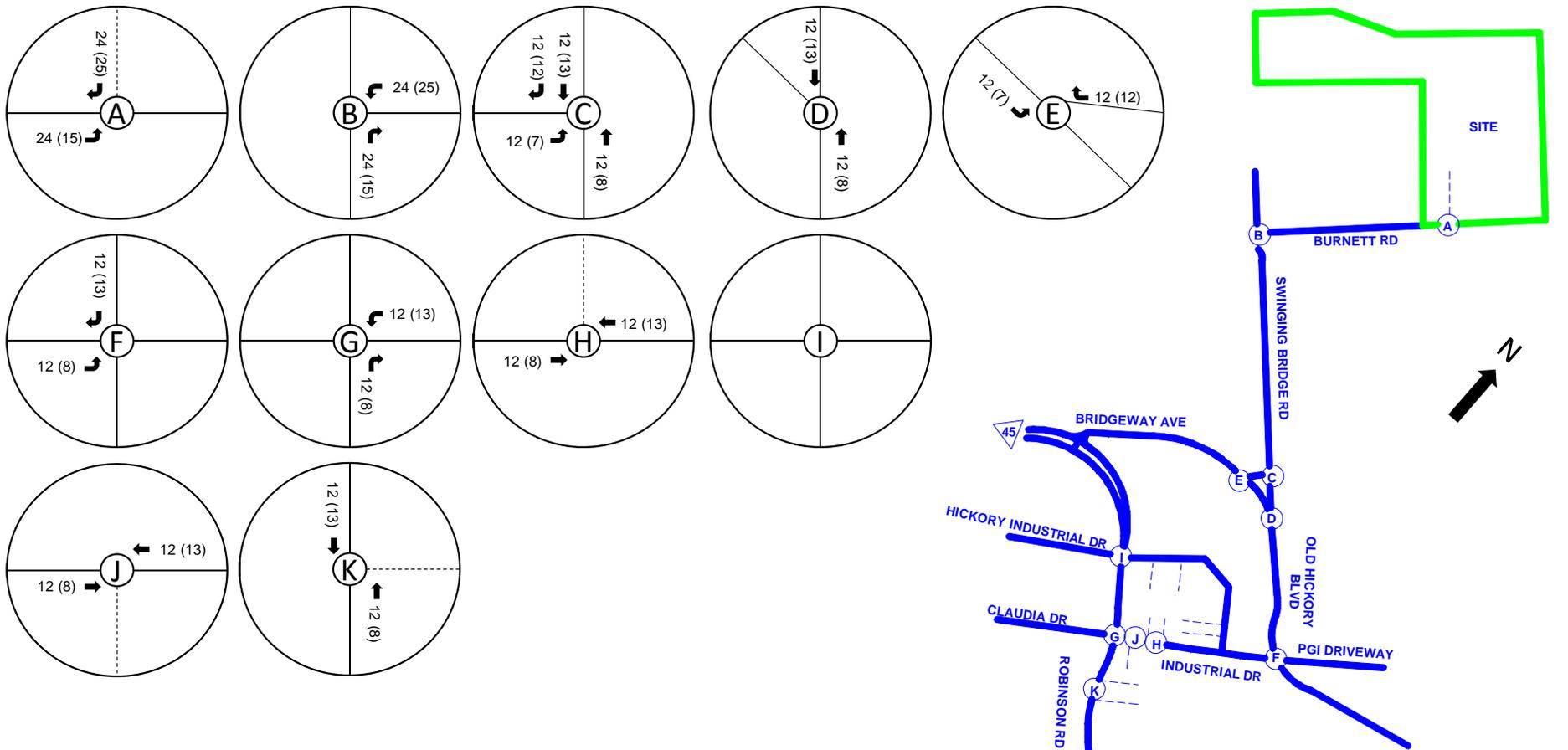


Figure 15A: Burnett Road Site Generated Peak Hour Traffic Volume 2017

NOTE: Includes Quarry Site, Asphalt Plant, Concrete Plant, and Block Plant

LEGEND: No Scale

AM (PM) Peak Hours

↑↑↑ Turning Movements

----- Future Driveways



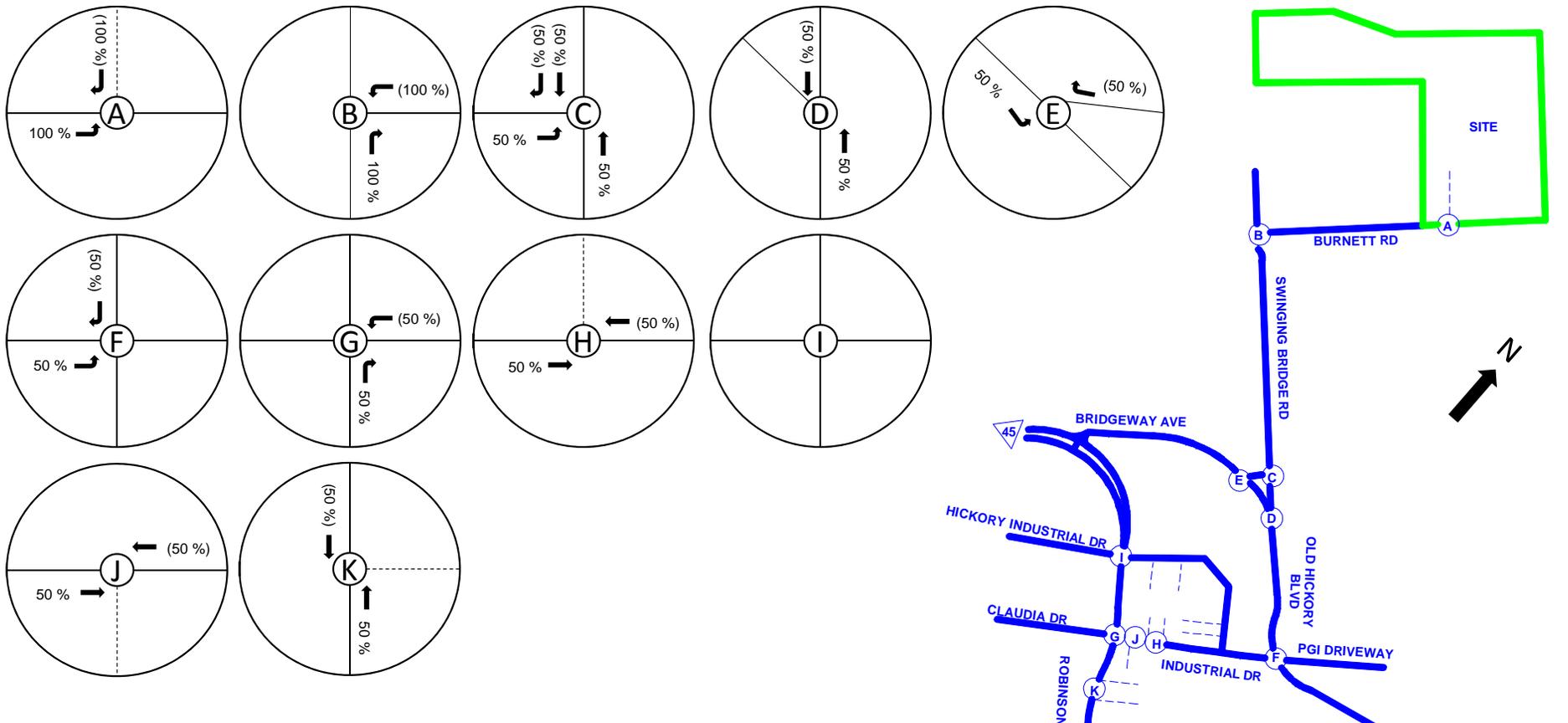


Figure 15B: Distribution Peak Hour Traffic Volume Generated by Burnett Road Site

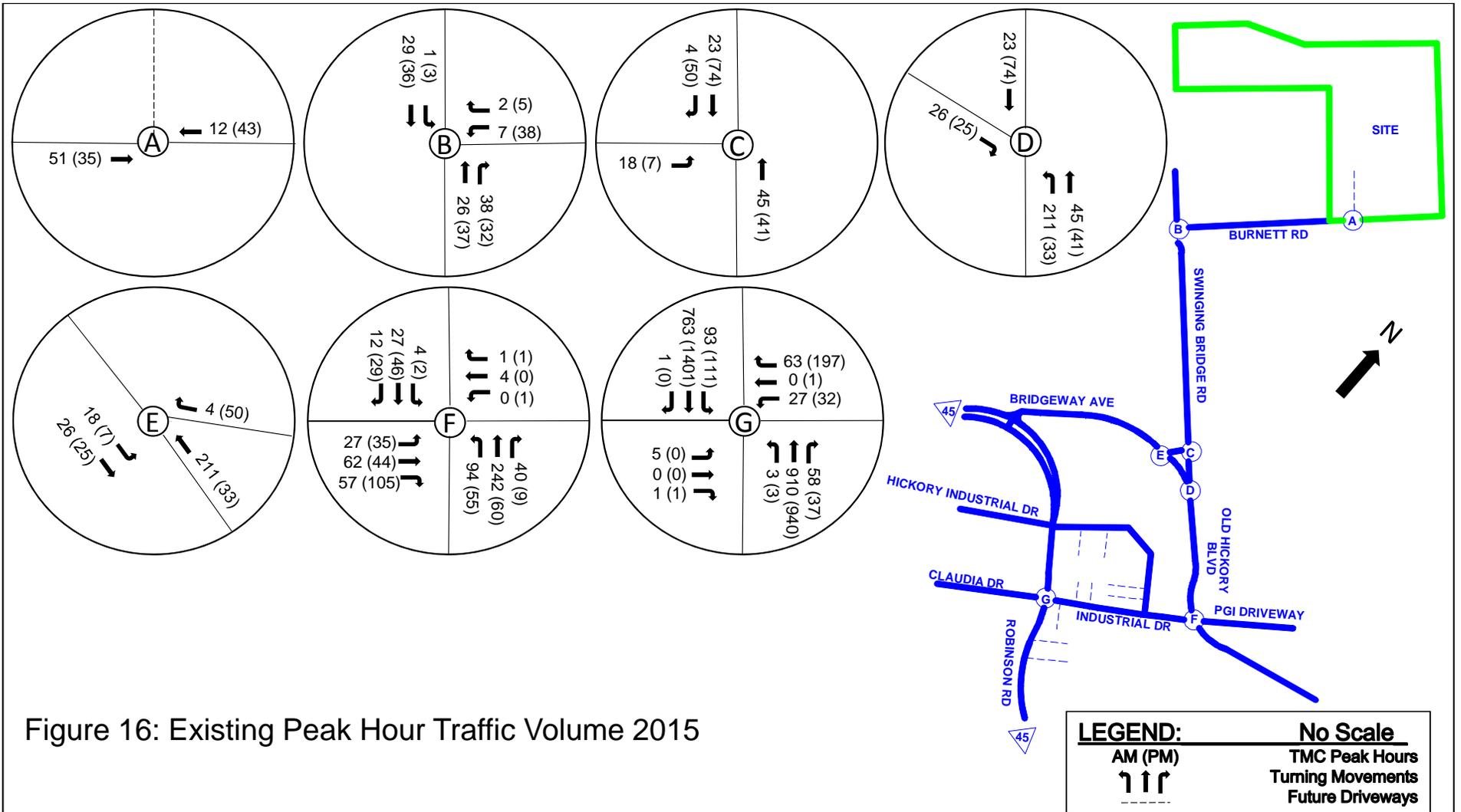


Figure 16: Existing Peak Hour Traffic Volume 2015

Source: Wisser Consultants – Turning Movement Count (TMC) Weekday
September 2015

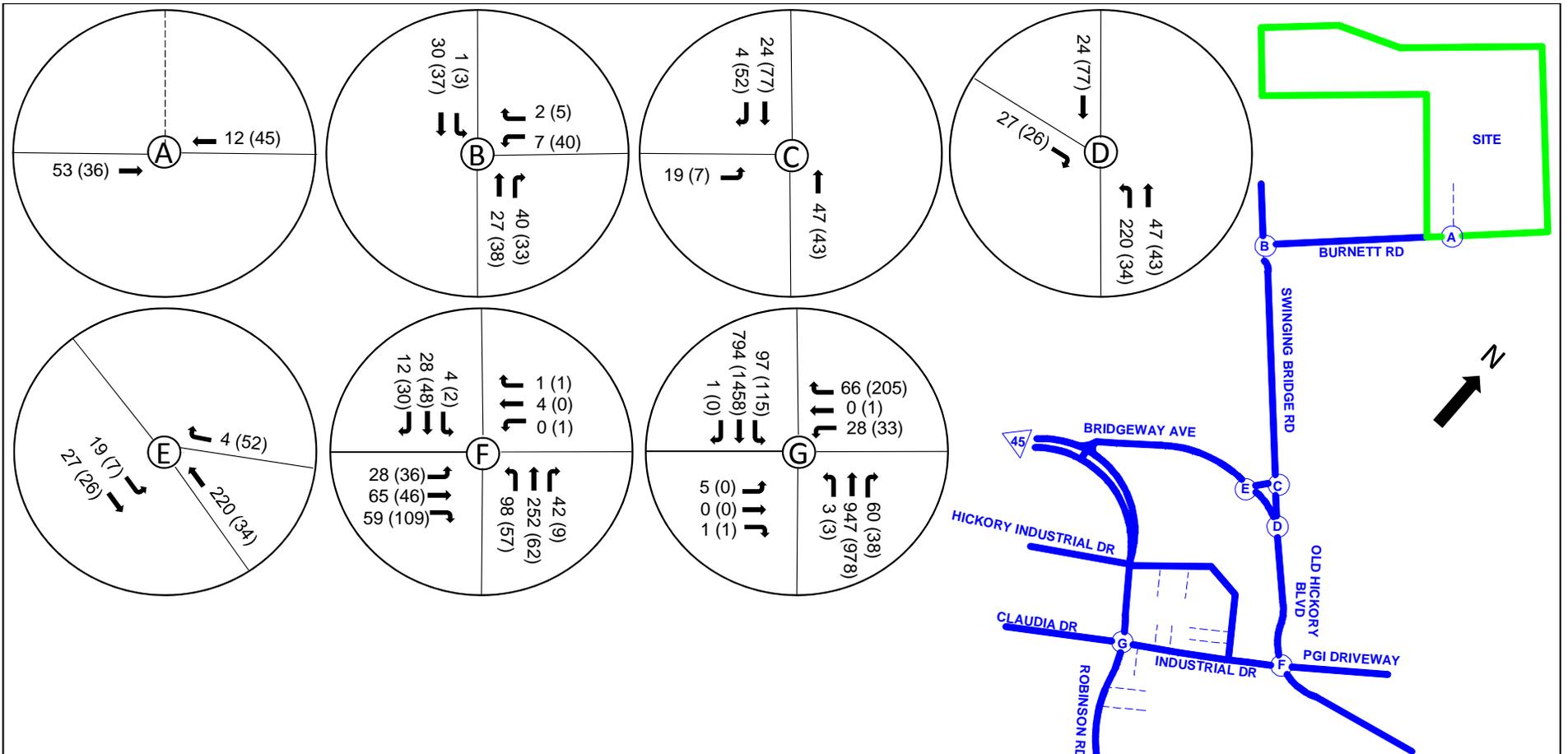


Figure 17: Horizon Peak Hour Traffic Volume 2017 for Background Traffic Analysis

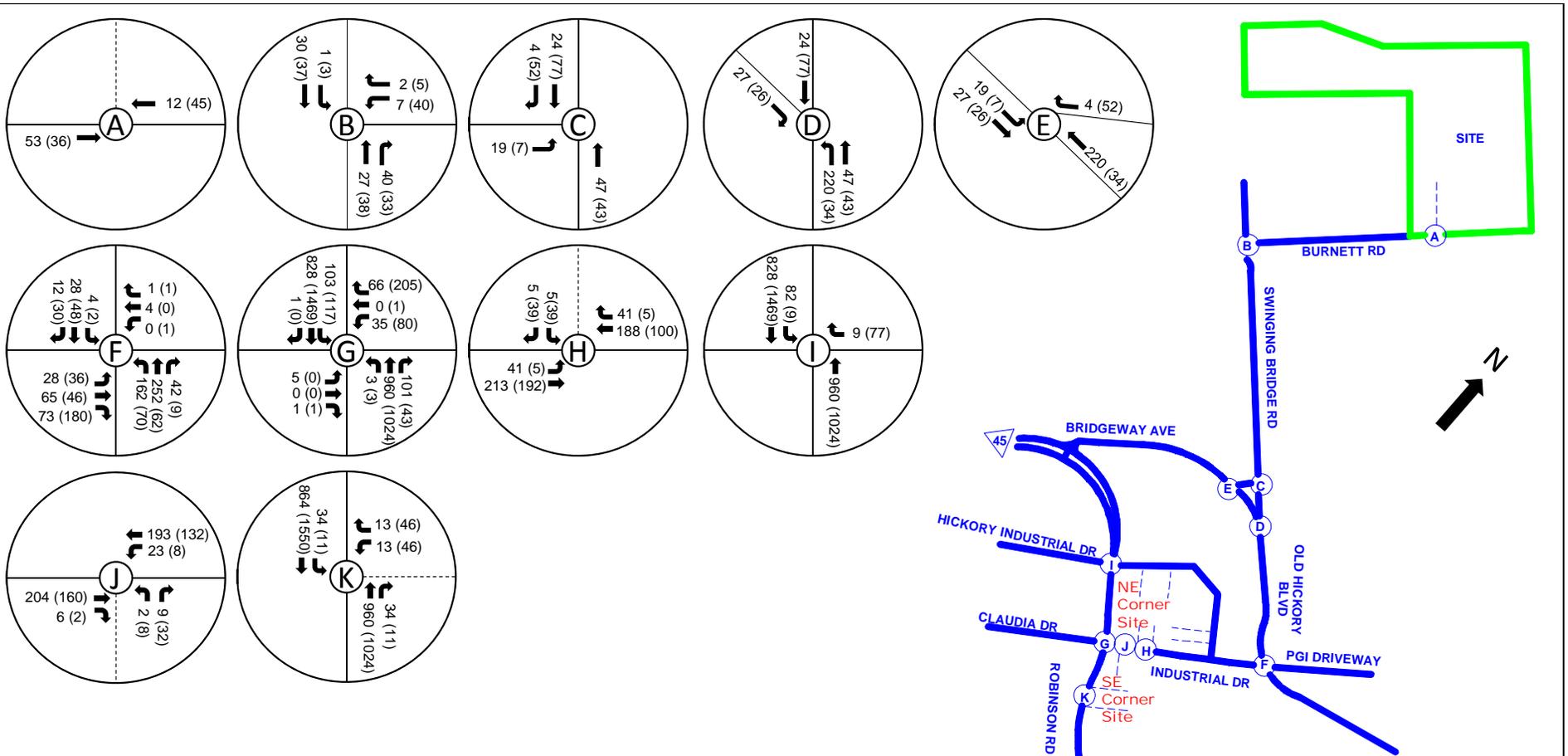


Figure 18: Background Peak Hour Traffic Volume 2017
 - Includes Horizon, Northeast and Southeast Corner Sites

LEGEND:

AM (PM)	No Scale
↑↑↑	Peak Hours
---	Turning Movements
---	Future Driveways



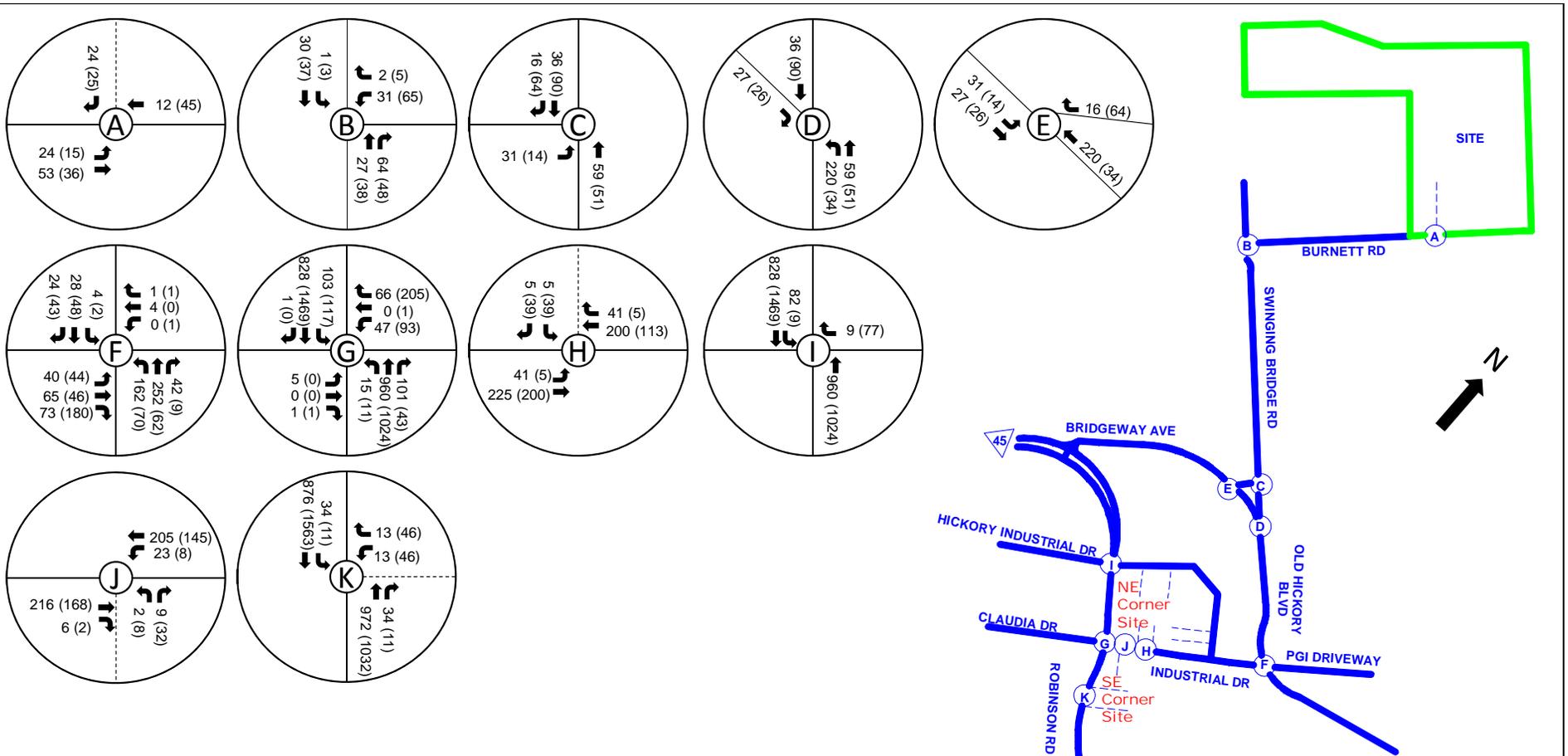


Figure 19: Future Peak Hour Traffic Volume 2017

LEGEND:

AM (PM)

No Scale
 Peak Hours
 Turning Movements
 Future Driveways

NOTE: Future Peak Hour Traffic Volume 2017 = Background Peak Hour Traffic Volume 2017 (i.e. Horizon Year + NE Corner + SE Corner) + Burnett Road Site Generated Traffic 2017

