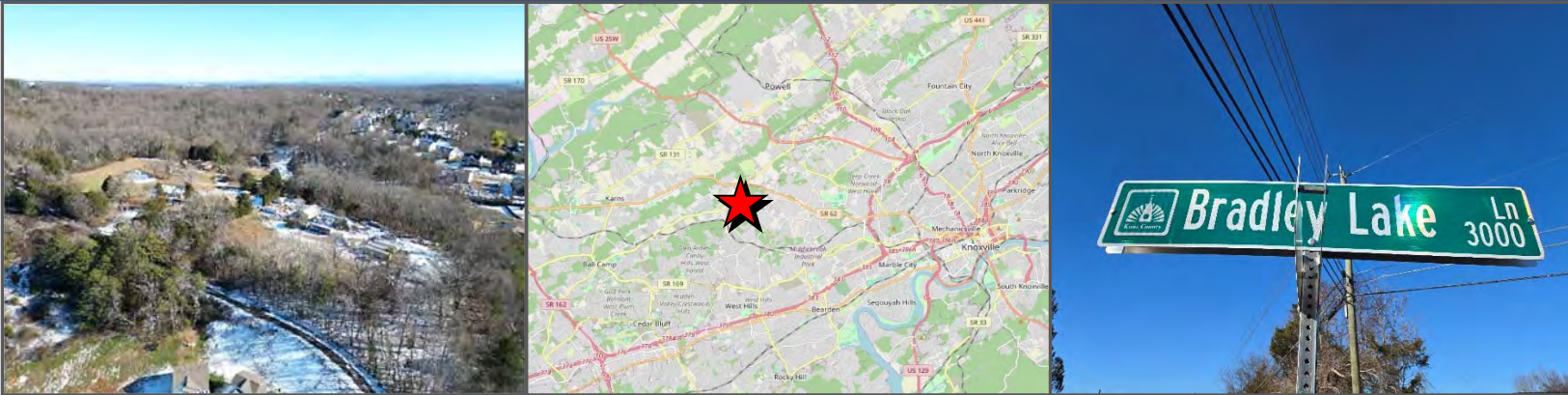


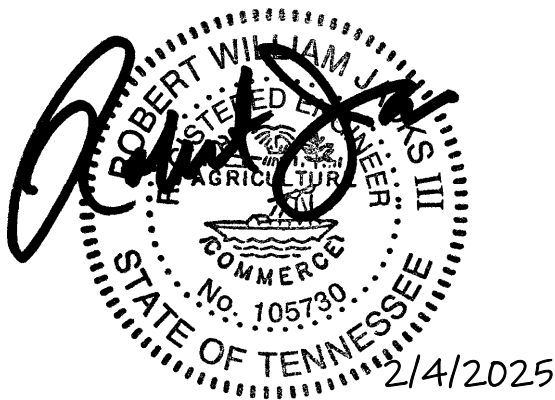


Transportation Impact Study 2921 Bradley Lake Lane Subdivision Knox County, Tennessee



Updated February 2025

Prepared for:
Mesana Investments, LLC
P.O. Box 11315
Knoxville, TN 37939



3-SI-25-C / 3-K-25-DP
TIS Version 2
2/4/2025

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EXECUTIVE SUMMARY

Preface:

Mesana Investments, LLC proposes a residential development adjacent to Bradley Lake Lane and off Amherst Road in Northwest Knox County, TN. The proposed development will include constructing 32 multi-family attached townhouses and 56 single-family detached houses on 19.41 +/- acres. The development is named and referenced in this study as “2921 Bradley Lake Lane Subdivision” since a formal name has not yet been chosen. The development proposes three entrances to Bradley Lake Lane, and the subdivision is anticipated to be fully built and occupied by 2028.

The primary purpose of this study is to determine and evaluate the potential impacts of the development on the adjacent transportation system. The study includes a review of the primary access roads, the entrance intersections, and the existing adjacent intersection of Amherst Road at Bradley Lake Lane. This report is a Level 1 study established by Knoxville/Knox County Planning. Recommendations and mitigation measures are offered if transportation operations are projected to be below recognized engineering standards.

Study Results:

The significant findings of this study include the following:

- The 2921 Bradley Lake Lane Subdivision, with 32 multi-family attached townhouses and 56 single-family detached houses, is estimated to generate 935 vehicle trips at full build-out and occupancy on an average weekday. Of these daily trips, 63 are estimated to occur during the AM peak hour and 89 in the PM peak hour in 2028.
- Two additional adjacent developments will be completed by 2028, including a second phase of the Spring Lake Farms Subdivision and a sports facility. With these other developments and the 2921 Bradley Lake Lane Subdivision fully completed and occupied by 2028, the exiting traffic lane of Bradley Lake Lane at Amherst Road is calculated to operate acceptably at Level of Service (LOS) B and C during the projected AM and PM peak hours. Southbound entering left turns on Amherst Road to Bradley Lake Lane are calculated to operate at LOS A during peak hours. Minimal vehicle queues are projected to occur at the intersection.
- The projected 2028 southbound left-turn entering volumes from Amherst Road onto Bradley Lake Lane are expected to meet warrants for a separate left-turn lane. However, the left-turn lane warrant is only met due to the additional thru trips at

the intersection generated and estimated for the adjacent proposed sports facility between Amherst Road and Bradley Lake Lane. Northbound right turns from Amherst Road onto Bradley Lake Lane are not projected to meet warrants for a separate right-turn lane.

- The existing pavement section of Bradley Lake Lane between Jumping Jack Lane in the Spring Lake Farms Subdivision and the proposed entrances for the 2921 Bradley Lake Lane Subdivision is narrow and will require widening per Knox County Engineering and Public Works.

Recommendations:

The following summary recommendations are offered based on the study analyses to minimize the impacts of the proposed development on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety. The recommendations marked with an asterisk indicate an existing transportation need and are not associated with the proposed development's projected impacts. More details regarding all the recommendations are discussed at the end of the report.

Amherst Road at Bradley Lake Lane:

- A separate southbound left-turn lane on Amherst Road at Bradley Lake Lane is not warranted based on the projected 2028 volumes strictly based on the trips generated by the future residences in the second phase of Spring Lake Farms Subdivision and 2921 Bradley Lake Lane Subdivision. However, due to the estimated thru trips generated by the Maddox Companies sports facility at the intersection, by 2028, the intersection is projected to experience volumes that warrant the need for a southbound left-turn lane on Amherst Road at Bradley Lake Lane. Since the results produced in the study are based on a land use with limited data in the ITE's Trip Generation Manual and may overestimate the number of trips that the sports facility could generate, it is recommended that the need for a southbound left-turn lane be re-examined in 2028 or when all three developments are entirely constructed and occupied. This re-examination would need to conduct new traffic counts at the intersection to determine if the trips generated by all three developments and the background traffic meet the threshold for a turn lane. The developer and the County should agree to a Memorandum of Understanding (MOU) that if the future volumes at the intersection during the re-examination meet the turn lane threshold, plans can be made to provide a southbound left-turn lane on Amherst Road at Bradley Lake Lane.

- Future landscaping or signage must not impact the intersection sight distance from Bradley Lake Lane at Amherst Road.
- Based on a posted speed limit of 30 mph on Amherst Road, the required intersection sight distance is 300 feet for exiting left and right-turning vehicles. The existing sight distances from Bradley Lake Lane at Amherst Road were estimated visually to be adequate in both directions. However, several items to the south of this intersection, including a horizontal curve on Amherst Road, vegetation, and existing fence posts along the eastern side of the road, hinder further viewing to the south. Due to these items reducing the potential amount of sight distance to the south and its benefits if it were extended, it is recommended that an existing tree and vegetation along the east side of Amherst Road be removed. Knox County should facilitate this recommendation since it affects motorists on the public roadway, and the tree and vegetation are on private property.

Bradley Lake Lane at Proposed Road “A”, “B”, and “C” Entrances:

- It is recommended that a Stop Sign (R1-1) be installed and a 24” white stop bar be applied to the Proposed Entrance approaches at Bradley Lake Lane. The stop bars should be applied a minimum of 4 feet away from the edge of Bradley Lake Lane and placed at the desired stopping point that maximizes the sight distance.
- Intersection sight distance from the Proposed Entrances at Bradley Lake Lane must not be impacted by future landscaping, signage, or vegetation.
- Based on an assumed maximum speed limit of 30 mph on Bradley Lake Lane, the required intersection sight distance is 300 feet for exiting vehicles at the proposed entrances. The existing sight distances were estimated visually to be inadequate in at least one direction at all of the proposed entrance locations based on an assumed maximum of 30 mph. Sight distance to the east and west from the proposed entrance locations is currently limited due to vegetation on both sides of Bradley Lake Lane and horizontal curves. This vegetation will need to be removed during construction, which will likely allow for more than 300 feet of sight distance at each entrance location. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans for all three proposed entrances.

2921 Bradley Lake Lane Subdivision Internal Roads:

- A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the Proposed Entrance roads off Bradley Lake Lane.
- A Stop Sign (R1-1) with a 24" white stop bar is recommended to be installed at the internal road intersection, as shown in the report.
- Dual end-of-roadway object markers (OM4-1) should be installed at the end of subdivision Road "C". A hammerhead turnaround for vehicles should also be provided at the end of Road "C".
- Five proposed lots in the subdivision are adjacent to and south of Bradley Lake Lane. All of these lots will have access to either Road "A", "B", or "C" and should not be allowed direct access to Bradley Lake Lane.
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a proposed speed limit of 25-mph in the development, the required internal intersection sight distance is 250 feet. The site designer should ensure that this internal sight distance length is met.
- If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision residents.
- All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.
- The internal roads in the proposed subdivision will have long, straight road segments. Straight road segments encourage higher vehicle speeds. It is recommended that the civil site designer consider including traffic calming measures on these internal roads, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper operation.

Other Transportation Issues:

- As part of approving the rezoning of the development property to Planned Residential (PR), Knox County included an amendment that Bradley Lake Lane "be expanded to 20 ft at the expense of developer". Based on this amendment, it is recommended that Bradley Lake Lane be widened to 20 feet from Jumping Jack Lane to just past the Proposed Road "B" Entrance, approximately 1,550 feet.

- * • A warning sign at the sharp horizontal curve on Bradley Lake Lane for travel towards Amherst Road has been damaged, fallen from its post, and is lying on the side of the road. However, the advisory 15 mph plaque on the post remains. This sign, a Turn Sign (W1-1R), should be replaced and the post straightened. To adequately warn motorists heading in the opposite direction towards the proposed subdivision, a Turn Sign (W1-1L) with an advisory 15 mph plaque (W13-1P) on a single post should also be installed on Bradley Lake Lane in advance of the sharp horizontal curve.
- * • Due to the steepness of the cut slope produced by the Spring Lake Farm Subdivision construction, consideration should be given to providing a guardrail on the north side of Bradley Lake Lane, just east and up to the sharp horizontal curve. Details regarding this road widening and the potential need for a guardrail should be discussed further with Knox County Engineering and Public Works.
- * • Due to several off-road crashes with objects on Amherst Road near Bradley Lake Lane, it is recommended that the County review the identified individual crash reports to determine if the narratives or other information could provide further insight as to the cause of these crashes and whether there are identifiable modifications that could reduce these types of crashes. At a minimum, due to the successive reverse curves on Amherst Road near Bradley Lake Lane, posting Reverse Turn (W1-3) signs in advance of these curves in both directions on Amherst Road may be beneficial.
- * • Knox County is recommended to install a 25-mph Speed Limit Sign (R2-1) on Bradley Lake Lane for vehicles turning off Amherst Road and traveling towards the 2921 Bradley Lake Lane Subdivision and the Spring Lake Farms Subdivision.

DESCRIPTION OF EXISTING CONDITIONS

▪ **STUDY AREA:**

The location of this proposed residential development is shown on a map in Figure 1. This development will be located on the southern side and near the end of Bradley Lake Lane, approximately 1,500 feet southeast of the unsignalized t-intersection of Amherst Road at Bradley Lake Lane in Northwest Knox County, TN. The three entrances for the subdivision will be located at and near the existing residential driveway for 2921 Bradley Lake Lane.

The development will be constructed from one existing parcel that currently contains a single-family detached residence and other structures. As requested, transportation impacts associated with the development were primarily analyzed at the intersection of Amherst Road at Bradley Lake Lane, where the development will have road access to and from external destinations.



The proposed development property is in a quasi-rural area, transitioning to a more suburban area of Northwest Knox County, TN. Many other residential subdivisions and standalone houses are in the surrounding area. In addition to residential areas, a few industrial and commercial businesses are located nearby. These businesses include a concrete mixing plant, a laboratory equipment supplier, a pipe supplier, and a medical supply store.

Adjacent to these industrial and commercial businesses, a CSX Railroad line traverses and parallels Amherst Road and Ball Camp Pike. This CSX Railroad line is named the KD Subdivision line and is part of the Appalachian Division. The KD Subdivision line runs from Corbin, KY, to Etowah, TN, for a total of 161.4 miles. Additionally, a large property between Amherst Road and

Bradley Lake Lane is currently being developed to house a proposed sports facility.

An existing subdivision, Spring Lake Farms Subdivision, has sole external access to Amherst Road via Bradley Lake Lane. Eighty single-family detached houses have been built and occupied in the first phase of this subdivision. A second phase of Spring Lake Farms Subdivision will construct 57 attached townhouses. The grading, roads, and utilities for this second phase have been completed, and the construction of these townhouses and full occupancy is expected by 2027. In



addition to the houses and future townhouses in the Spring Lake Farms Subdivision, three other existing standalone single-family detached houses will maintain access to Bradley Lake Lane.

The 2921 Bradley Lake Lane Subdivision property is partially cleared. The southern and southeastern corners of the property are forested, with the open areas mowed and maintained. A single-family detached house with several outbuildings, sheds, barns, and trailers is located on the property. These structures and items will be removed during the construction of the subdivision. This residence has roadway access via a concrete-paved driveway from the south to Bradley Like Lane. The topography for the proposed subdivision property is mainly defined by rolling terrain with a moderate swale cutting through the middle of the property from east to west. The southeastern corner of the property begins a considerable climb to a large hill with a peak further to the southeast of the development property.

Amherst Road provides major road access in this area of Knox County, traversing between Ball Camp Pike to the northwest and Middlebrook Pike (SR 169) to the southeast. Ball Camp Pike is 480 feet from the intersection of Amherst Road at Bradley Lake Lane and is controlled by a traffic signal. A bit further to the north of the signalized intersection, but without direct access from the signalized intersection, the Schaad Road Extension is creating an extensive northwest link between Interstate 75 at Callahan Road and Lovell Road at Kingston Pike. Knox County has pursued this multi-decade road project to provide a 13-mile roadway. It has included many phases that will provide a minimum of four lanes over its entire length, and several phases have been constructed, including the one near this proposed subdivision.

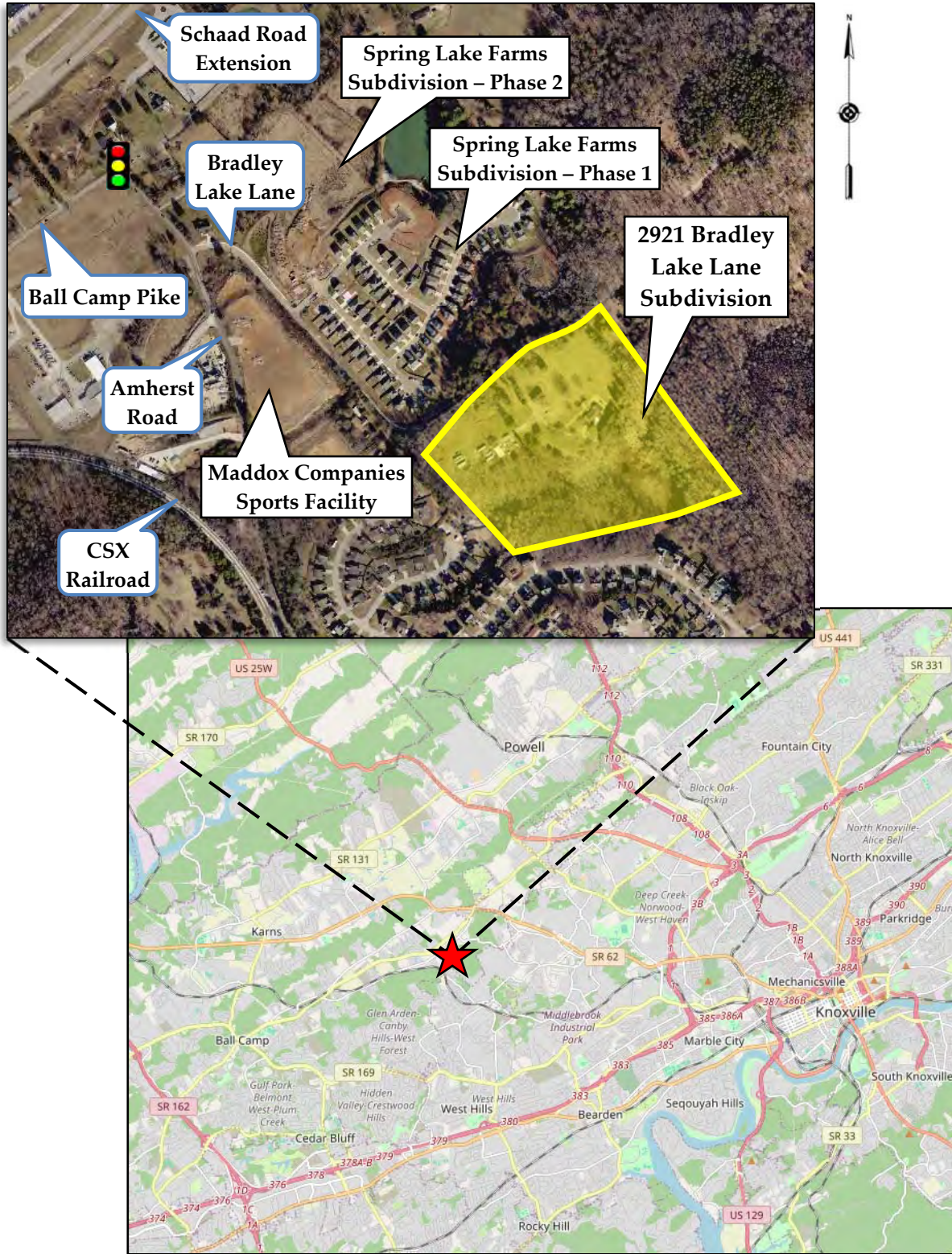


Figure 1
Location Map

▪ **EXISTING ROADWAYS:**

Table 1 lists the characteristics of the existing primary roadways near the development property and included in the study:

**TABLE 1
STUDY CORRIDOR CHARACTERISTICS**

NAME	CLASSIFICATION ¹	SPEED LIMIT	LANES	ROAD WIDTH ²	TRANSIT ³	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Amherst Road	Minor Arterial	30 mph	2 lanes undivided	22 - 23 feet	None	None	No bike lanes
Bradley Lake Lane	Local Street	Not Posted	2 lanes undivided	9.5 - 22 feet	None	5' Sidewalk between Amherst Road & Jumping Jack Lane	No bike lanes

¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² Edge of curb to edge of curb or edge of pavements near project site

³ According to Knoxville Area Transit System Map

Amherst Road is a 2-lane undivided roadway classified as a minor arterial between Ball Camp Pike and Piney Grove Church Road. It traverses in a generally northwest-southeast direction with a total length of 3.4 miles. Further south, Amherst Road is classified as a minor collector between Piney Grove Church Road and Middlebrook Pike (SR 169). The posted speed limit on Amherst Road is 30 mph at the intersection with Bradley Lake Lane. Amherst Road begins at a signalized t-intersection with Ball Camp Pike on its northwestern end and ends at a signalized t-intersection with Middlebrook Pike (SR 169) on its southeastern end.

Amherst Road has asphalt pavement approximately 22 - 23 feet wide adjacent to Bradley Lake Lane. The provided lanes are separated by a double yellow centerline and a few inches of additional pavement outside white edge lines. Unlined grass ditches and vegetation are on the side slopes immediately outside the pavement. Utility streetlights for roadway illumination are not provided on Amherst Road at Bradley Lake Lane. Bike lanes and sidewalks are also not provided on the roadway.



Amherst Road has a horizontal road alignment with reverse curves and a guardrail on its eastern side near the intersection with Bradley Lake Lane. Amherst Road has relatively good pavement conditions, but the pavement markings are faded. Amherst Road will be the primary road for future residents of the 2921 Bradley Lake Lane Subdivision to and from external destinations. Bradley Lake Lane is controlled by a Stop Sign (R1-1) at its intersection with Amherst Road.

Bradley Lake Lane is a 2-lane minor local street that traverses in an L-shaped pattern with a total length of 2,700 feet, ending abruptly on its southeastern end. Bradley Lake Lane has no posted speed limit. A 5-foot concrete sidewalk is provided on its eastern side between Amherst Road and Jumping Jack Lane in the Spring Lake Farms Subdivision. The sidewalk abruptly ends at Amherst Road and just before its intersection with Jumping Jack Lane. Sidewalks are not provided in the Spring Lake Farms Subdivision.

Bradley Lake Lane has a roughshod-applied asphalt pavement overlay at its approach to Amherst Road. Its pavement width between Amherst Road and Jumping Jack Lane is approximately 22 feet, and further to the south, its width substantially decreases. The section of Bradley Lake Lane between Amherst Road and Jumping Jack Lane was widened for the Spring Lake Farms Subdivision. To the south of Jumping Jack Lane, Bradley Lake Lane's road width was measured every 150 feet, indicating asphalt widths that fluctuated between 9.5 and 12 feet.

In addition to its narrow width, the asphalt pavement is in very poor condition to the south of Jumping Jack Lane. It has considerable alligator cracking, tree root intrusions, and depressions. Additionally, the adjacent sports facility development under construction between Amherst Road and Bradley Lake Lane appears to be using Bradley Lake Lane as a construction entrance.



Roughshod Pavement on Bradley Lake Lane near Amherst Road



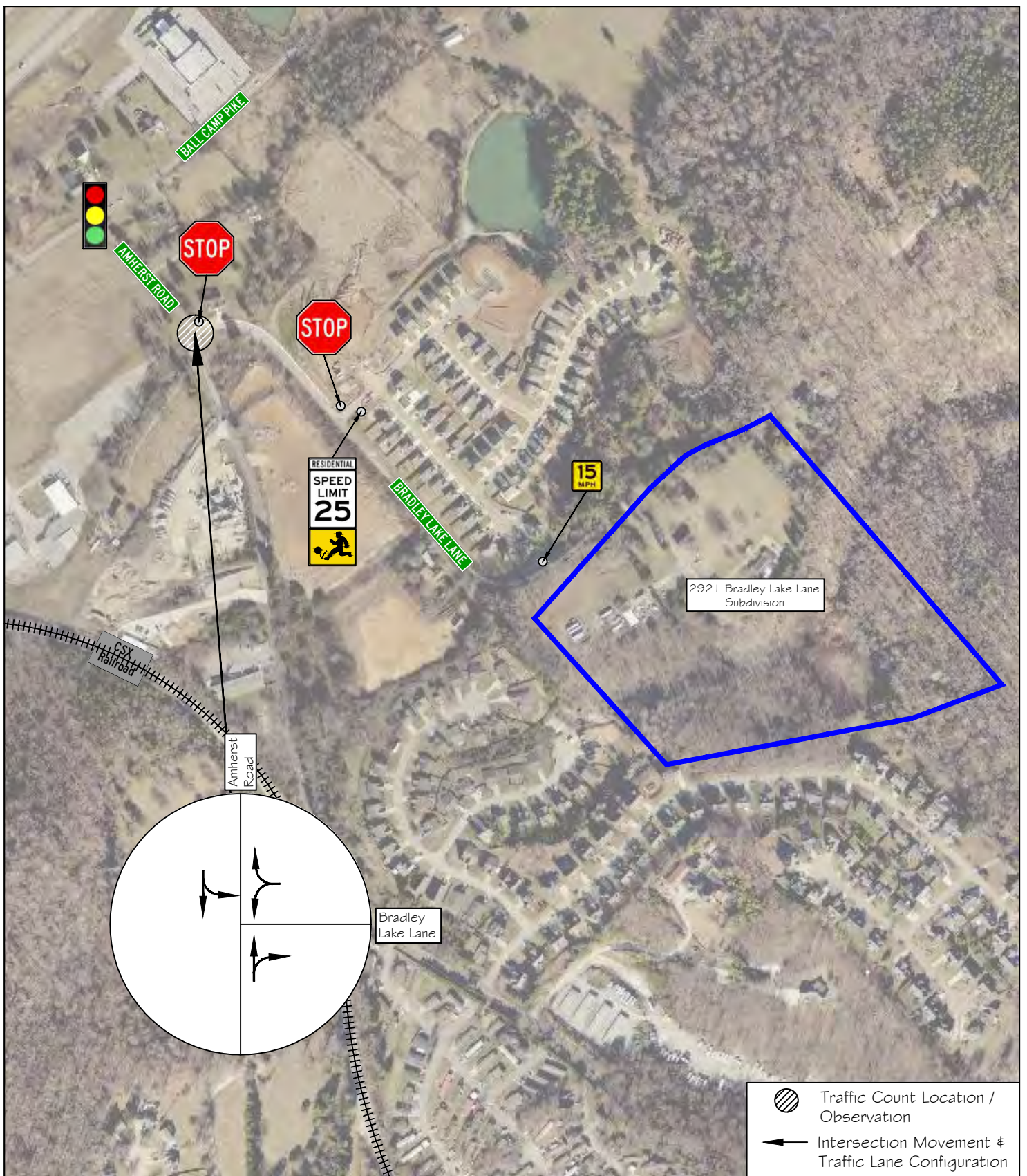
Bradley Lake Lane – South of Jumping Jack Lane (Looking North)

However, this entrance is not shown on the recently submitted site plan for the sports facility, and it is assumed that it will not maintain future access after construction.

Figure 2 shows the lane configurations of the existing intersection included in the study, the traffic count location, and the current traffic signage along Amherst Road and Bradley Lake Lane in the study area. The traffic signage shown in Figure 2 only includes warning and regulatory signage near the development site. It should be noted that a warning sign at the sharp horizontal curve on Bradley Lake Lane has been damaged, fallen from its post, and is lying on the side of the road. However, the advisory 15 mph plaque on the post remains. This sign is posted for vehicles heading towards Amherst Road. A similar sign in the opposite direction on Bradley Lake Lane is not provided. The pages following Figure 2 give a further overview of the site study area with photographs.



**Damaged & Fallen Warning Sign
on Bradley Lake Lane**



11812 Black Road
 Knoxville, TN 37932
 Phone: (865) 556-0042
 Email: ajaxengineering@gmail.com

NOT TO SCALE



FIGURE 2

2921 Bradley Lake Lane Subdivision

Traffic Count Location, Traffic Signage & Existing Lane Configurations

PHOTO EXHIBITS



Proposed Development Site

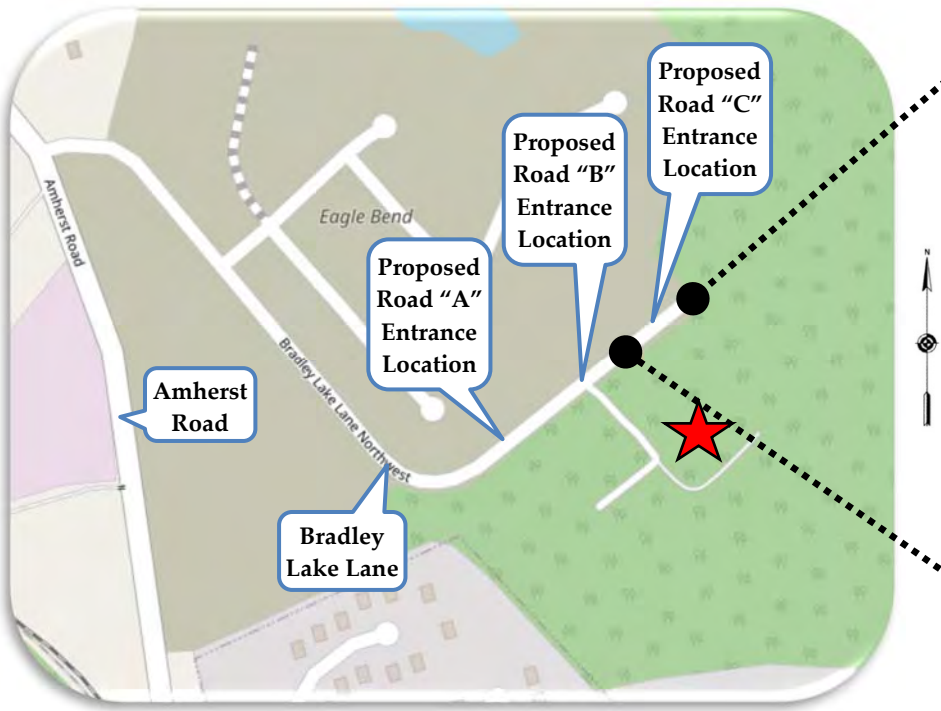


Aerial View of Proposed Development Site (Looking Southeast)

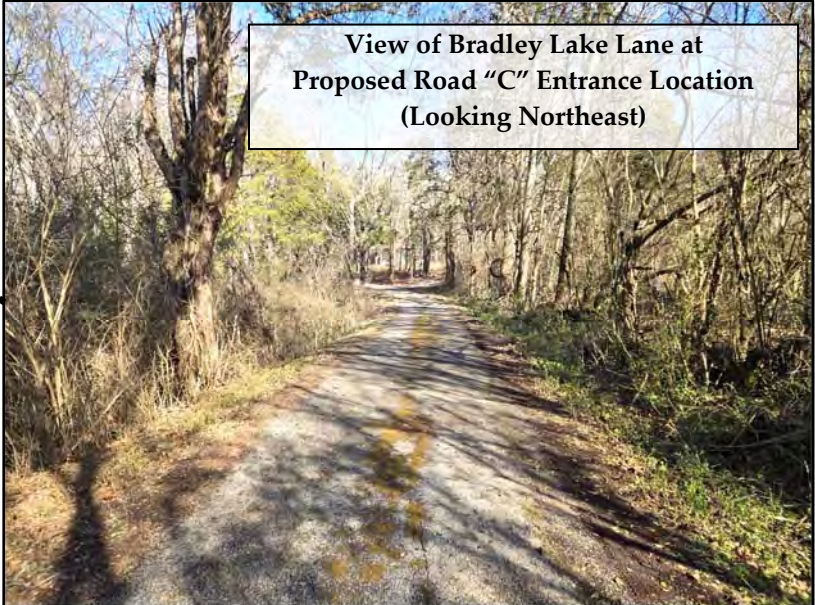


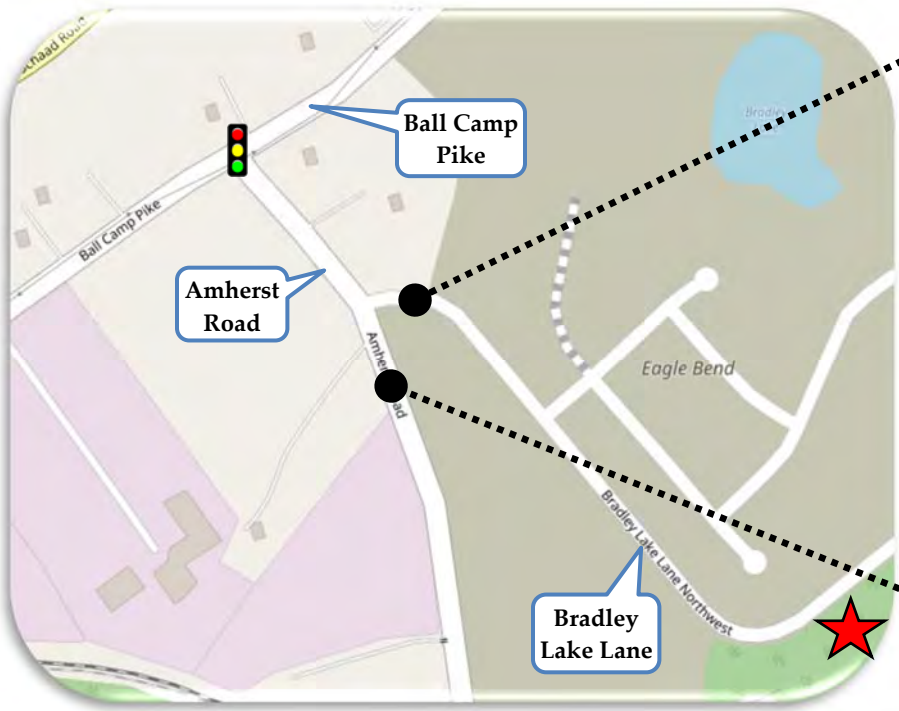
Aerial View of Proposed Development Site (Looking East)





Bradley Lake Lane

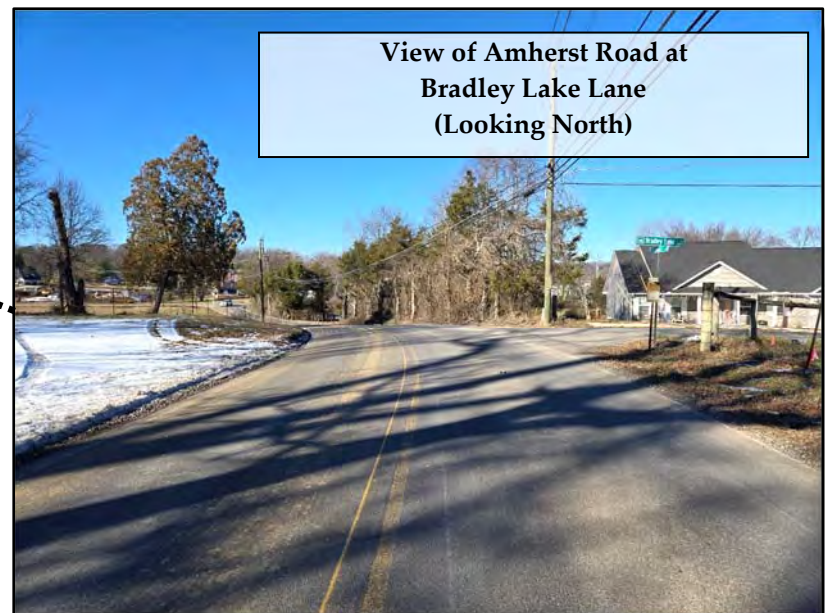




Amherst Road at Bradley Lake Lane



View of Bradley Lake Lane at Amherst Road (Looking West)



View of Amherst Road at Bradley Lake Lane (Looking North)

▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

One annual vehicular traffic count location is located near the study area, and the Knoxville Transportation Planning Organization (TPO) conducts this count on Amherst Road just south of Bradley Lake Lane. This count location has been conducted sporadically over the past 10 years. The count location data is the following and can be viewed with further details in Appendix A:

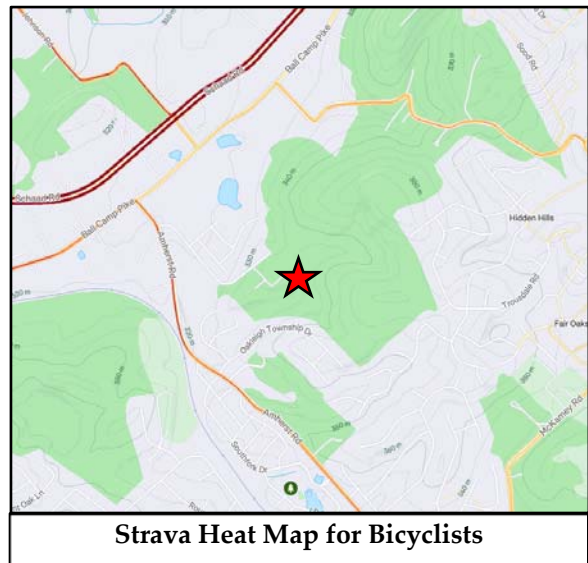
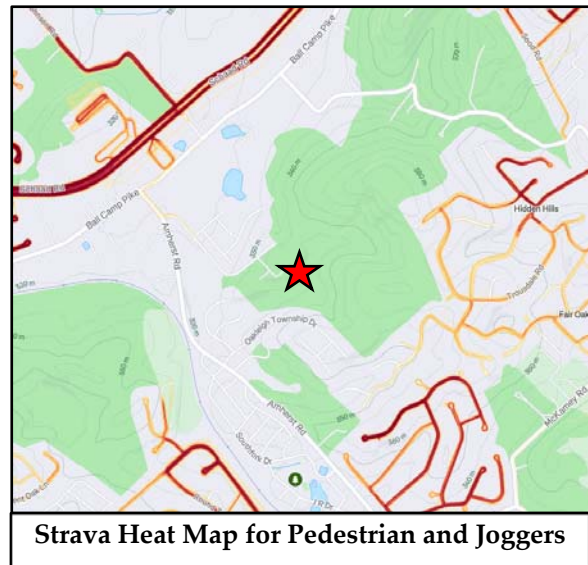
- Existing vehicular roadway traffic:

The TPO reported an Average Daily Traffic (ADT) on Amherst Road at 5,490 vehicles per day in 2023. From 2013 – 2023, this count station has indicated a +0.6% average annual growth rate.

- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic along Amherst Road and Bradley Lake Lane is unknown. However, with only a short section of sidewalk and no bike lanes, these roadways are assumed to have minimal pedestrian and bicyclist activity. During the traffic counts for this project, no bicyclists and a handful of pedestrians were observed. These pedestrians were school-age children to and from Knox County school buses stopping at the intersection of Amherst Road at Bradley Lake Lane.

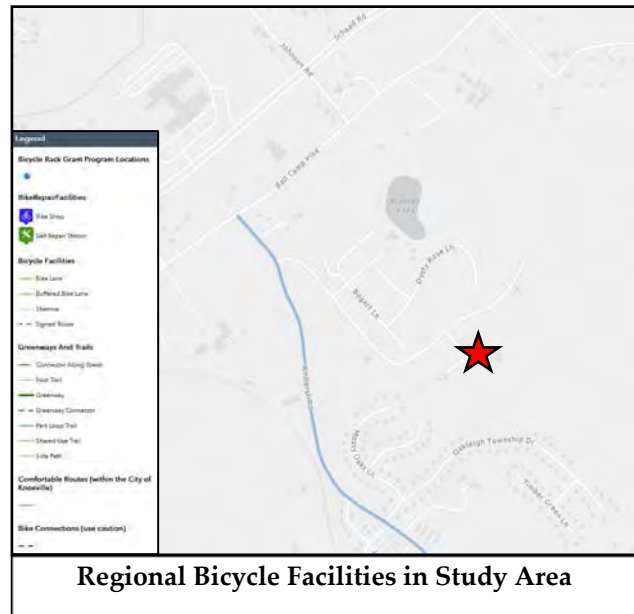
An online website, [strava.com](https://www.strava.com), provides “heat” maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the



roads with color intensities with darker colors signifying higher activity. For the most part, the Strava heat maps show little to no pedestrian activity near the development site, with some occurring in the existing residential subdivisions to the southeast. However, high activity is shown along the Schaad Road Extension further north. Some bicycle activity is shown on Amherst Road, with a higher amount along the Schaad Road Extension further north of the development site.

▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

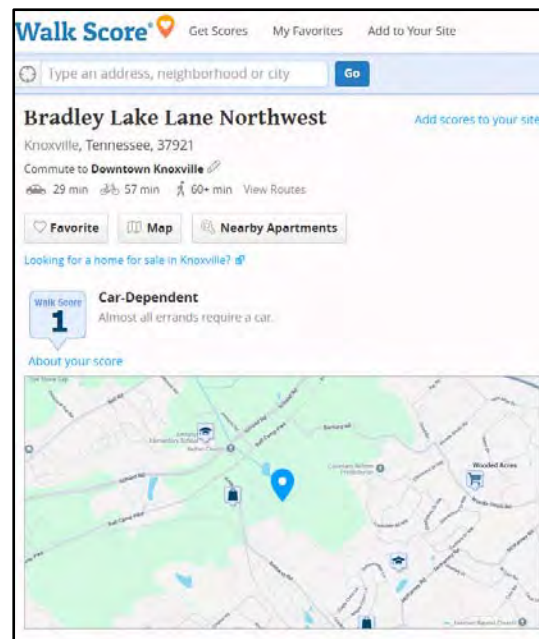
On Knoxville Transportation Planning Organization (TPO) mapping, Amherst Road is shown as a “Comfortable Route” for bicycle travel. This road does not have painted white bicycle pavement markings or signage warning motorists of potential bicycle activity. A “Comfortable Route” is defined as a route “based on low to medium traffic speeds and volumes along with other criteria.



▪ **WALK SCORE:**

A private company offers a website at walkscore.com that grades and gives scores to locations within the United States based on “walkability”, “bikeability”, and transit availability based on a patented system. According to the website, the numerical values assigned for the Walk Score and the Bike Score are based on the distance to the closest amenity in various relevant categories (businesses, schools, parks, etc.) and are graded from 0 to 100.

The project site location is graded with a Walk Score of 1 at the development property address. This Walk Score indicates that almost all errands currently

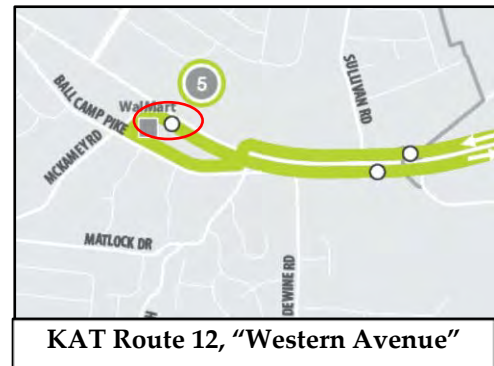


require a vehicle for travel at the development property. The Walk Score is graded very low due to the lack of sidewalks and nearby amenities. The site is not given a Bike Score. A Transit Score is also not given since no public transportation opportunities are near the development site. Overall, this study assumed no vehicle trip reductions due to pedestrian or bicyclist activity by the future 2921 Bradley Lake Lane Subdivision residents.

▪ **TRANSIT SERVICES:**

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). However, bus service is not available near the development site.

The closest public transit bus stop to the development site is 3.6 miles to the east on Route 12, “Western Avenue”, and is located on Western Avenue in front of the Walmart Neighborhood Market. This route has established bus service every 30 minutes at this bus stop. It operates on weekdays and weekends; the route map is also included in Appendix B. The schedule for this route is also included in Appendix B. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

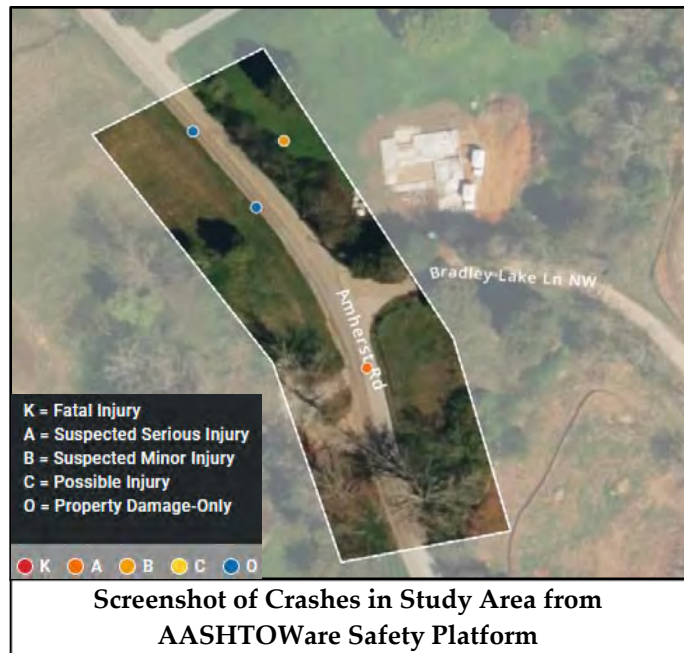


Since the distance to the nearest public bus service is several miles away, with no sidewalks or bike lanes available to access the bus stop without using a private vehicle, the proposed development is not expected to have any reduced vehicle trips due to public transit usage.

▪ **CRASH DATA:**

For this project, access to the AASHTOWare Safety online platform was provided. This AASHTO (American Association of State Highway and Transportation Officials) platform is a component of several offerings that include the compilation of crash data for local state DOTs to use in safety analyses. TDOT provides vehicle crash data to this system and is an extension of its existing E-TRIMS (Enhanced Tennessee Roadway Information Management System) database. The crash data in the E-TRIMS system is from the statewide TITAN (Tennessee Integrated Traffic Analysis Network) database. The TITAN database includes all reportable vehicle crash data from Tennessee law enforcement agencies.

In the vicinity of the intersection of Amherst Road at Bradley Lake Lane, four crashes occurred in the past 3 years between November 19th, 2021, and November 19th, 2024. All of these crashes were collisions with objects outside the roadway. Two were collisions with ditches, one with a pole and the other with a tree. Two crashes were property damage only (ditch and pole collisions), one had suspected minor injuries (ditch collision), and one involved a possible injury (collision with tree).



The crash data at the intersection does not readily indicate potential issues or impediments with additional vehicles generated to and from the proposed residential subdivision. The information in the system was insufficient to determine the crash causes, but further research provided by the individual crash reports may provide better insight. Overall, it does appear that vehicles near this intersection may have issues with maintaining control and staying on the roadway.

PROJECT DESCRIPTION

▪ LOCATION AND SITE PLAN:

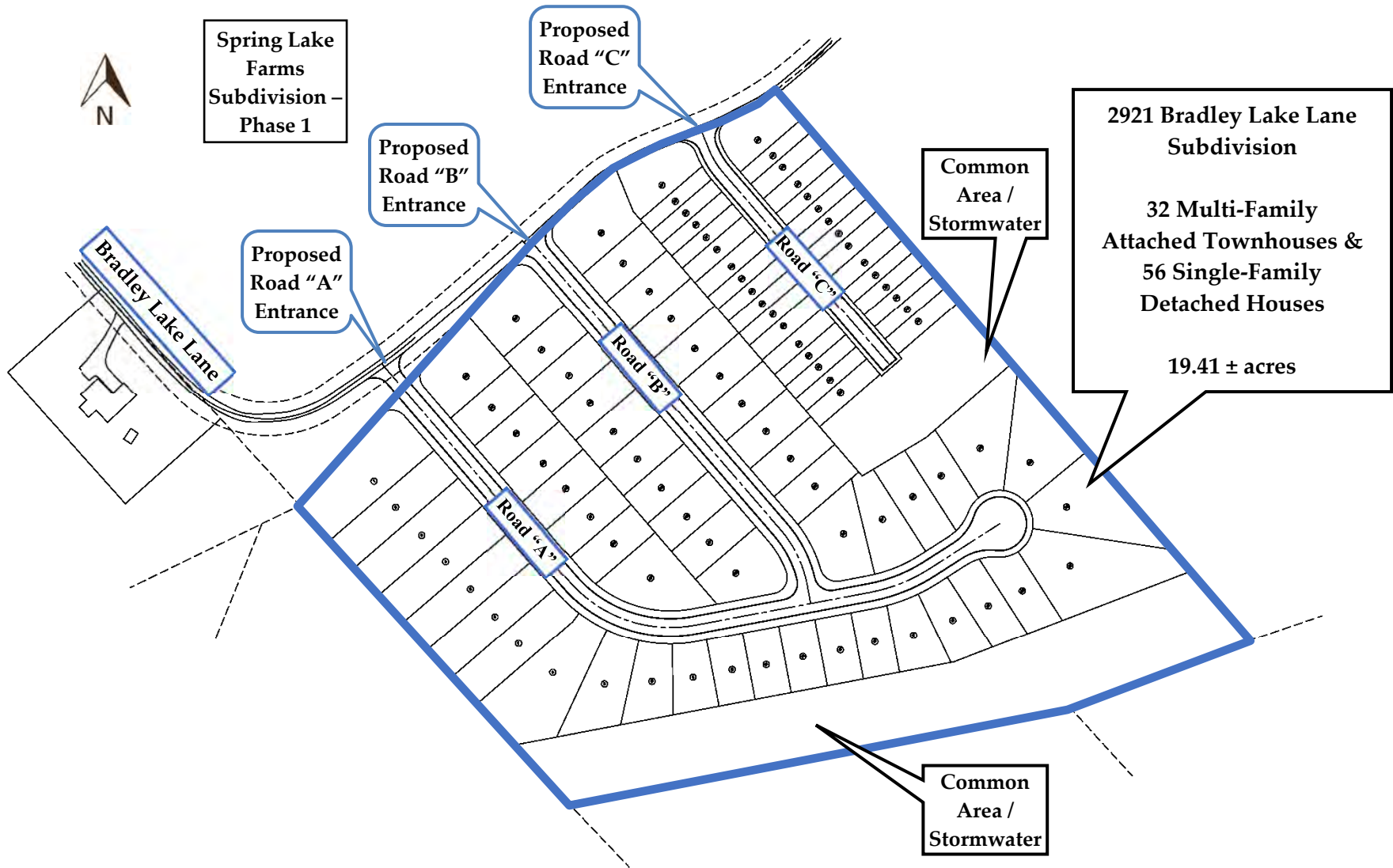
The proposed plan layout with 32 multi-family attached townhouses and 56 single-family detached houses on 19.41 +/- acres is designed by Urban Engineering and is shown in Figure 3. The design shows three new internal streets, Roads "A", "B", and "C". As shown in the figure, the entrances for the development will be constructed on the south side of Bradley Lake Lane. Roads "A" and "B" will be public roads, and Road "C" will be a private street.



The 2921 Bradley Lake Lane Subdivision will have some open space and common areas for the subdivision residents, including areas for detention ponds and stormwater control. The developer is not proposing on-site amenities for the future subdivision residents other than providing open common areas. Internal sidewalks are not proposed for this subdivision.

The townhouses will be located on the development site's eastern and western portions, and the single-family detached houses will be built on the remaining middle portion. The typical lot dimensions for the attached townhouses in the subdivision will be 120 feet deep and 24 feet wide, providing a typical townhouse lot area of 2,880 square feet. The typical lot dimensions for the single-family detached houses in the subdivision will be 120 feet deep and 55 feet wide, providing a typical single-family house lot area of 6,600 square feet. Each townhouse and single-family house will have a garage and driveway.

The schedule for the completion of this new residential development depends on economic factors and construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. Overall, the local real estate market for new housing remains quite competitive due to population growth and other factors. This study assumed that the total construction build-out of the development and full occupancy would occur by 2028.



22

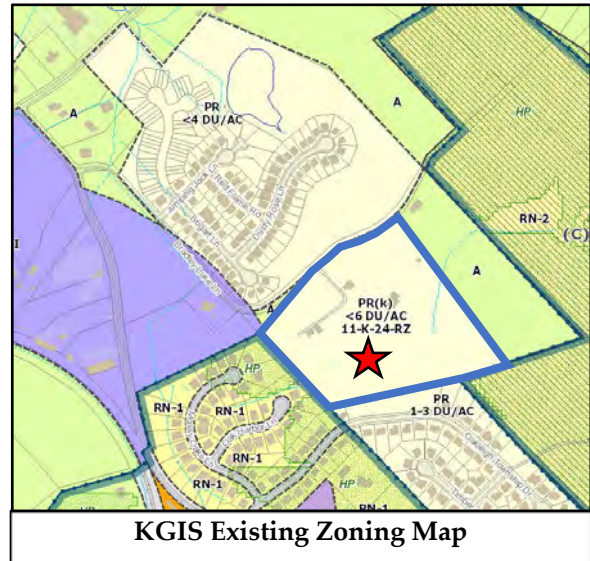
Figure 3
Proposed Plan Layout
2921 Bradley Lake Lane Subdivision

Not to Scale –
 Edited by Ajax
 Engineering for
 Display Purposes



▪ **PROPOSED USES AND ZONING REQUIREMENTS:**

The 2921 Bradley Lake Lane Subdivision development parcel is in Knox County but near the City of Knoxville Limits and was recently requested to be rezoned from Agricultural (A) to Planned Residential (PR). The Knoxville/Knox County Planning Commission approved this rezoning, and the Knox County Commission gave final approval on December 9th, 2024. The property rezoning was approved with a density of up to 6 units per acre. Uses permitted in the Planned Residential (PR) zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recently published online KGIS zoning map is provided in Appendix C. The existing adjacent surrounding zoning and land uses are the following:



- Bradley Lake Lane binds the development property to the north. Across Bradley Lake Lane, the properties adjacent to the road are zoned as Planned Residential (PR). These properties include single-family detached houses in the first phase of Spring Lake Farms Subdivision. None of these properties on the other side of Bradley Lake Lane have direct access to the road, and their only external access is provided by Jumping Jack Lane to Bradley Lake Lane. A large undeveloped area in the Spring Lake Farms Subdivision is also located on the other side of Bradley Lake Lane. It is assumed to be a common area for Spring Lake Farms Subdivision residents.
- The property to the east is zoned as Agricultural (A). A standalone single-family detached house occupies this property. The house to the east has road access to Bradley Lake Lane, further east of the proposed development, and is the last developed property on Bradley Lake Lane.
- One large property to the southeast is undeveloped, nearly wholly forested, and is located in the City of Knoxville. This property is zoned as Single-Family Residential Neighborhood (RN-2) and is delineated with Hillside Protection (HP). A field entrance to this property is provided on Oakleigh Township Drive in the Oakleigh Subdivision.
- To the south, the development property is bound by three parcels in the Oakleigh Subdivision, and they are zoned as Planned Residential (PR). Two single-family houses

and one common forested area occupy these three parcels. The houses have external road access to the southwest at Amherst Road via Oakleigh Township Drive.

- Several parcels in the Oakleigh Subdivision bind the development property to the southwest. These parcels are occupied by single-family detached houses in Knoxville and zoned as Single-Family Residential Neighborhood (RN-1). The houses on these parcels have external road access to Amherst Road via Oak Harbor Lane, Mossy Oaks Lane, and Oakleigh Township Drive.
- A small sliver of land northeast of the 2921 Bradley Lake Lane Subdivision property is zoned as Agricultural (A). It is located between Bradley Lake Lane and the development property. This property is unoccupied and is owned by Eagle Bend Development, the Spring Lake Farms Subdivision developer.
- Further to the northeast of the proposed development property, a parcel is zoned as Industrial (I) and comprises one of the parcels being developed as a sports facility. A 22,000-square-foot building is being constructed on this parcel, and a drive to the west on Amherst Road will provide future external road access once entirely constructed.

▪ **ON-SITE CIRCULATION:**

The total length of the three internal roads in the 2921 Bradley Lake Lane Subdivision will be 2,276 feet (0.4 miles), designed and constructed to Knox County specifications. The development will have asphalt-paved internal roadways with 8" extruded concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. No sidewalks are proposed on the internal roads in this development. The public right-of-way width within the development will be 50 feet.

Roads "A" and "B", totaling 1,824 feet, will be dedicated public roads, and Knox County will maintain these streets in the development after construction. Road "C" will be a private street maintained by the development in the future and will have a total length of 452 feet.

▪ **SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION:**

Besides residential passenger vehicles, the internal roadways will provide service, delivery, maintenance, and fire protection/rescue vehicle access. These vehicle types will not impact roadway operations except when they occasionally enter and exit the development. Curbside private garbage collection services are expected to be available for this residential subdivision if desired. The new public streets will be designed and constructed to Knox County specifications

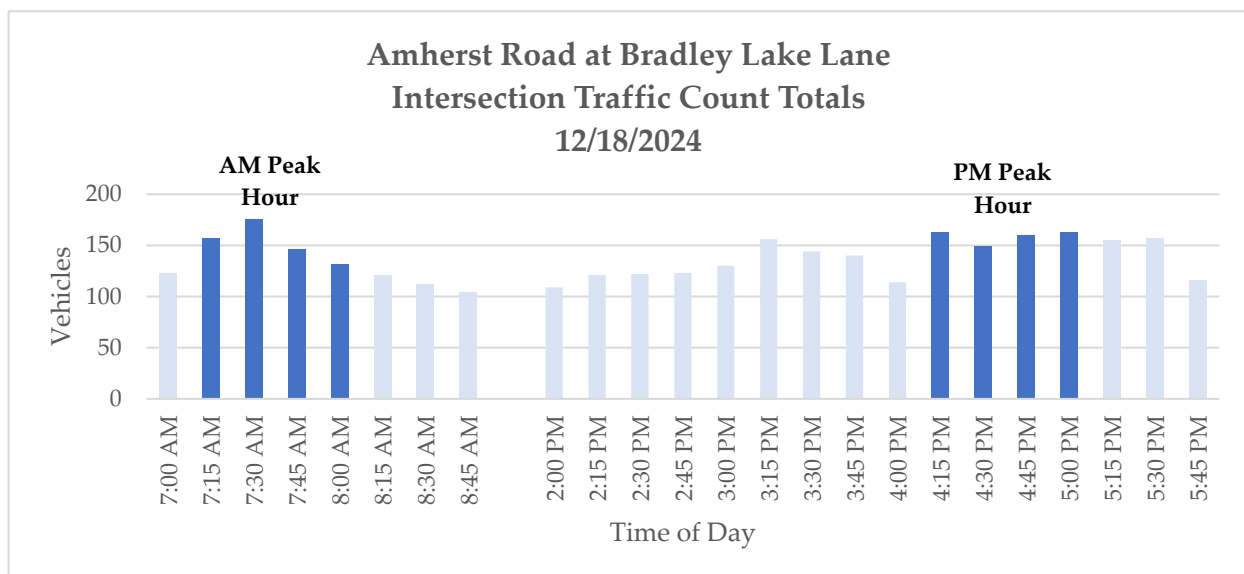
and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's internal drives will accommodate the larger vehicle types and residents' standard passenger vehicles and be sufficiently sized to allow vehicles to turn around.

ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

▪ **EXISTING TRAFFIC CONDITIONS:**

This study conducted a 6-hour traffic count at the intersection of Amherst Road at Bradley Lake Lane on Wednesday, December 18th, 2024. Local schools were in session. Manual traffic counts were conducted to identify and tabulate the morning and afternoon peak period volumes and the travel directions near the proposed development site. The intersection had an observed AM and PM peak hour at 7:15 – 8:15 AM and 4:15 – 5:15 PM. The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix D. Some observations at the intersection include the following:

- No bicyclists were observed during the morning or afternoon traffic counts. During the traffic count in the morning and in the afternoon, a few school-age children were observed walking. These children entered and exited school buses that stopped at the intersection of Amherst Road at Bradley Lake Lane. These bus stops temporarily caused traffic to back up on Amherst Road.
- Most vehicles were passenger vehicles during the traffic count. School buses, a few single-unit trucks, and dump trucks were also observed, especially in the morning.
- Fairly even northbound and southbound thru traffic on Amherst Road was observed during the AM peak hour. During the PM peak hour, a 60/40 split was observed, with most thru traffic heading northbound towards Ball Camp Pike.
- The entering and exiting vehicle splits to and from Bradley Lake Lane were roughly 70/30, with the majority to and from the north in the AM and PM peak hours.



Traffic Counts conducted on 12/18/2024
by Ajax Engineering, LLC



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FIGURE 4
2921 Bradley Lake Lane Subdivision
2024 Peak Hour Traffic Volumes -
EXISTING TRAFFIC CONDITIONS

Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2024 intersection traffic volumes shown at the intersection of Amherst Road at Bradley Lake Lane in Figure 4. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and utilizing Synchro Traffic Software (Version 12).

Methodology:

LOS is a qualitative measurement developed by the transportation profession to express how well an intersection or roadway performs based on a driver's perception. LOS designations include LOS A through LOS F. The designation of LOS A signifies a roadway or intersection operating at best, while LOS F signifies road operations at worst. This grading system provides a reliable, straightforward means to communicate road operations to the public. The HCM lists the level of service criteria for unsignalized intersections and signalized intersections.



LOS is defined by delay per vehicle (seconds), and roadway facilities are also characterized by the volume-to-capacity ratio (v/c). LOS designations, which are based on delay, are reported differently for unsignalized and signalized intersections. For example, a delay of 20 seconds at an unsignalized intersection would indicate LOS C, representing the additional delay a motorist would experience traveling through the intersection. Also, for example, a v/c ratio of 0.75 for an approach at an unsignalized intersection would indicate that it is operating at 75% of its available capacity. This difference is primarily due to motorists' different expectations between the two road facilities. Generally, for most instances, the LOS D / LOS E boundary is considered the upper limit of acceptable delay during peak periods in urban and suburban areas.

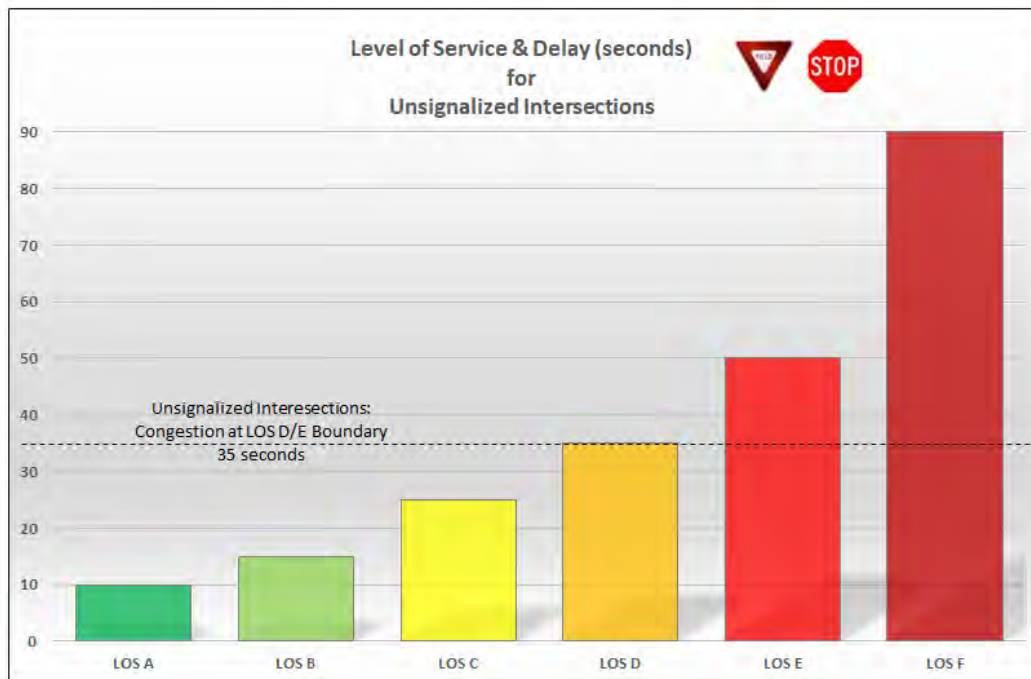
For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure attempts to quantify delay, including travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline thru and right-turn traffic does not stop and is not affected by the traffic on the minor side streets. Thus, the LOS for a two-way stop (or yield) controlled intersection is defined by

the delay for each minor approach and major street left-turn movements. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used. More often, in normal road conditions, drivers are more willing to accept smaller gaps in traffic than what is modeled using the HCM methodology. The unsignalized intersection methodology also does not account for more significant gaps sometimes produced by nearby upstream and downstream signalized intersections. For unsignalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 35 seconds.

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS 

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (seconds/vehicle)
A	Little or no delay	0 - 10
B	Short Traffic Delays	>10 -15
C	Average Traffic Delays	>15 - 25
D	Long Traffic Delays	>25 - 35
E	Very Long Traffic Delays	>35 - 50
F	Extreme Traffic Delays	>50


Source: Highway Capacity Manual, 7th Edition



Intersection capacity results from the existing 2024 peak hour traffic are shown in Table 3. The intersection in the table is shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix E includes the worksheets for the existing 2024 peak hour capacity analyses.

As shown in Table 3, the intersection of Amherst Road at Bradley Lake Lane is calculated to operate with excellent LOS and short vehicle delays in the existing peak hour 2024 conditions.

TABLE 3
2024 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Amherst Road (SB & NB) at Bradley Lake Lane (WB)	 Unsignalized	Westbound Left/Right	B	11.7	0.107	B	12.0	0.051
		Southbound Left	A	7.9	0.010	A	8.2	0.014

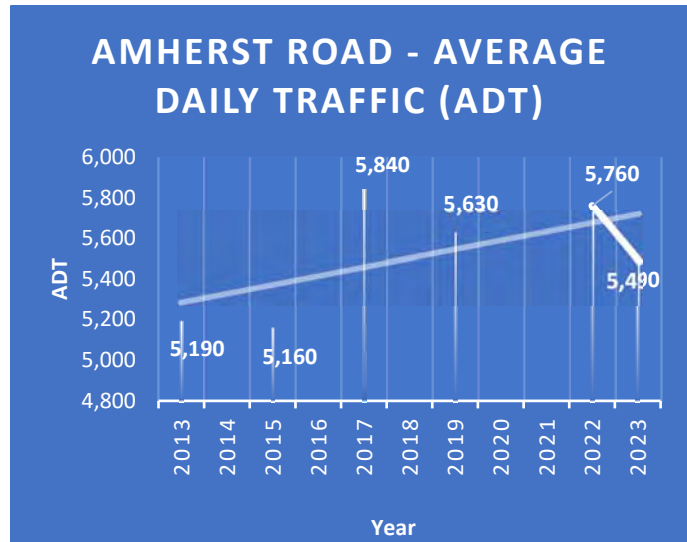
Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology

^a Level of Service, ^b Average Delay (sec/vehicle), ^c Volume-to-Capacity Ratio

▪ **PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT:**

Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). This proposed development's build-out and full occupancy are assumed to occur by 2028.

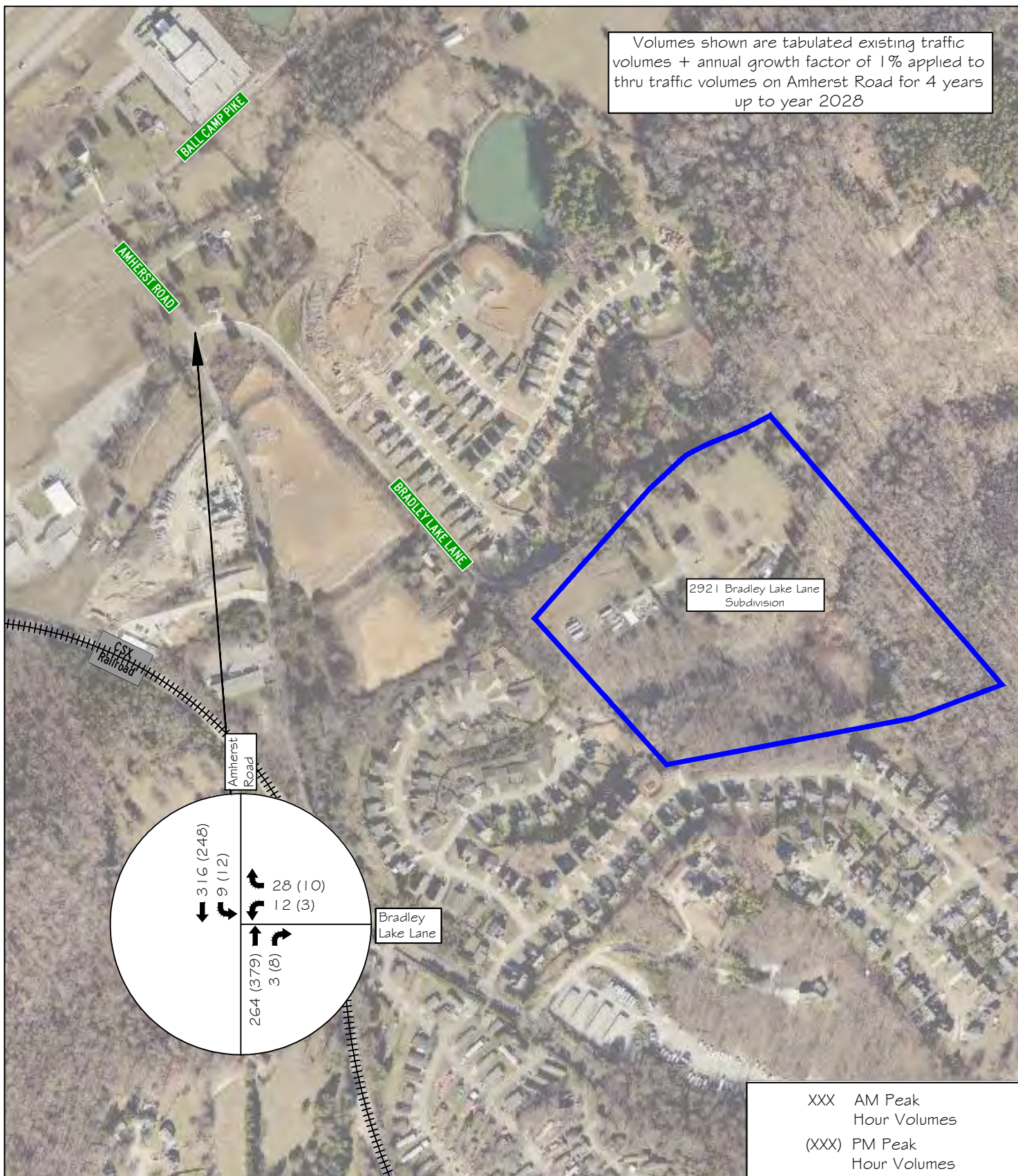
According to the nearby TPO count station, Amherst Road's vehicular traffic has been relatively flat over the past few years. Specifically, while sporadically collected, the TPO data shown in Appendix A indicates that Amherst Road has experienced annual growth of +0.6% over the past ten years. The traffic count station showed a crest in vehicular volumes in 2017 but has slowly decreased since 2017.



Nonetheless, this study used an annual growth rate of +1% to calculate future growth on Amherst Road up to 2028. The annual growth rate of 1% was applied to the existing 2024 thru volumes tabulated on Amherst Road to estimate the future volumes in the horizon year of 2028 without the proposed development traffic.

Figure 5 shows the projected horizon year traffic volumes without the project at the intersection of Amherst Road at Bradley Lake Lane during the 2028 AM and PM peak hours.

Volumes shown are tabulated existing traffic volumes + annual growth factor of 1% applied to thru traffic volumes on Amherst Road for 4 years up to year 2028



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FIGURE 5


2921 Bradley Lake Lane Subdivision

2028 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITHOUT THE PROJECT

Capacity analyses were undertaken to determine the projected LOS in 2028 without the development trips at the studied intersection. The results are shown in Table 4, and Appendix E includes the capacity analysis worksheets from the software.

The results in Table 4 show just slightly worse vehicle delays at the intersection in the 2028 projected conditions versus the existing 2024 conditions. This result is due to the small increase in Amherst Road traffic volumes due to the assumed general growth of 1%.

TABLE 4
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Amherst Road (SB & NB) at Bradley Lake Lane (WB)		Westbound Left/Right	B	11.9	0.109	B	12.2	0.053
		Southbound Left	A	8.0	0.010	A	8.2	0.014

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology

^a Level of Service , ^b Average Delay (sec/vehicle) , ^c Volume-to-Capacity Ratio

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated traffic the 2921 Bradley Lake Lane Subdivision will generate was based on the equations provided by two sources. The trips generated by the 52 single-family detached houses were calculated using rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The trips generated by the 32 townhouses were based on equations provided by Knoxville/Knox County Planning. These equations from Knoxville/Knox County Planning were developed from an extensive local study to estimate townhouse (and apartment) trip generation in the surrounding area. For Knox County, this is the preferred rate to use for townhouses and apartments. This local rate calculates slightly higher trip rates than the similar land use in the ITE Trip Generation Manual.

The data and calculations from the ITE and local trip generation study for the proposed land uses are shown in Appendix F. A summary of this information is presented in Table 5a:

TABLE 5a
TRIP GENERATION FOR 2921 BRADLEY LAKE LANE SUBDIVISION
32 Attached Townhouses and 56 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Multi-Family Attached Townhouses	32	343	22%	78%		55%	45%	
				4	15	19	17	14	31
#210	Single-Family Detached Housing	56	592	26%	74%		63%	37%	
				11	33	44	37	21	58
Total New Volume Site Trips			935	15	48	63	54	35	89

ITE Trip Generation Manual, 11th Edition and Local Trip Rates
Trips calculated by using Fitted Curve Equations

For the proposed 2921 Bradley Lake Lane Subdivision, it is estimated that 15 vehicles will enter and 48 will exit, for a total of 63 generated trips during the AM peak hour in the year 2028. Similarly, it is estimated that 54 vehicles will enter and 35 will exit, for a total of 89 generated trips during the PM peak hour in the year 2028. The calculated trips generated for an average weekday are estimated to be 935 vehicles for the proposed development. No vehicle trip reductions were

included in the calculations or analysis. All these estimated vehicle trips will enter and exit the intersection of Amherst Road at Bradley Lake Lane since this intersection will be the sole road access point to and from external destinations.

Furthermore, two other unrelated and adjacent developments must be included to account for future additional traffic growth at the intersection. These two developments include the second phase of the Spring Lake Farms Subdivision and the proposed sports facility located between Amherst Road and Bradley Lake Lane.

The second phase of the Spring Lake Farms Subdivision will include 57 attached townhouses and is assumed to be constructed and fully occupied by 2028. Trips generated by this second phase were calculated using the local rates provided by Knoxville/Knox County Planning and are shown in Table 5b.

TABLE 5b
TRIP GENERATION FOR SPRING LAKE FARMS SUBDIVISION - PHASE 2
57 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Townhouses	57	576	22%	78%		55%	45%	
				7	25	32	27	22	49
Total New Volume Site Trips			576	7	25	32	27	22	49

Data from Local Trip Rates and calculated by using Fitted Curve Equations

The proposed sports facility, by the Maddox Companies, proposes three buildings on the property between Amherst Road and Bradley Lake Lane. One of these buildings is 22,000 square feet and is under construction. Two other buildings of 6,000 square feet and 42,500 square feet are also proposed, resulting in 70,500 square feet of sports facilities. Knoxville/Knox County Planning is currently reviewing this development to determine if a sports facility is allowed on this property since the property is zoned as Industrial (I). Appendix G of this study provides the Maddox Companies' submittal detailing their proposed development. In their submittal, the developer claims that the sports facility operations will occur between 10 AM and 10 PM, thus not affecting the AM peak traffic hours on the adjacent roadways. The site plan for this sports facility shows a single entrance to Amherst Road, south of Bradley Lake Lane.

The trips generated by the proposed sports facility were estimated using ITE’s Trip Generation Manual data. The most applicable land use in the Trip Generation Manual is #493, Athletic Club. For this ITE Land Use, with a total square footage of 70,500 square feet in three buildings, the AM peak hour of adjacent traffic would be calculated to be a total of 223 vehicles. The PM peak hour of adjacent traffic would be calculated to be 443 vehicles. These calculated AM and PM trip trips seem excessive, especially since the Maddox Companies site plan only shows parking for 117 vehicles.

ITE Land Use 435, Multipurpose Recreational Facility, is more geared towards facilities that provide mini golf, go-carts, etc. However, this ITE Land Use would give more reasonable results in line with the development's proposed parking spaces. AM peak hour data is unavailable for this ITE Land Use, but this would be acceptable since the Maddox Companies submittal claims that the sports facility's operations hours would be from 10 AM to 10 PM. Overall, limited data has been produced for this land use and the actual, realized trips by the sports facility may be overestimated by the ITE data. Nonetheless, to provide the best estimate, trips generated by this development in the PM peak hour were calculated using the average rate provided by ITE Land Use #435, Multipurpose Recreational Facility, and shown in Table 5c.

The Maddox Companies sports facility buildings with 70,500 square feet are assumed to be constructed and fully occupied by 2028.

TABLE 5c
TRIP GENERATION FOR MADDOX COMPANIES - SPORTS FACILITY
 70,500 square feet of Multipurpose Recreational Facility

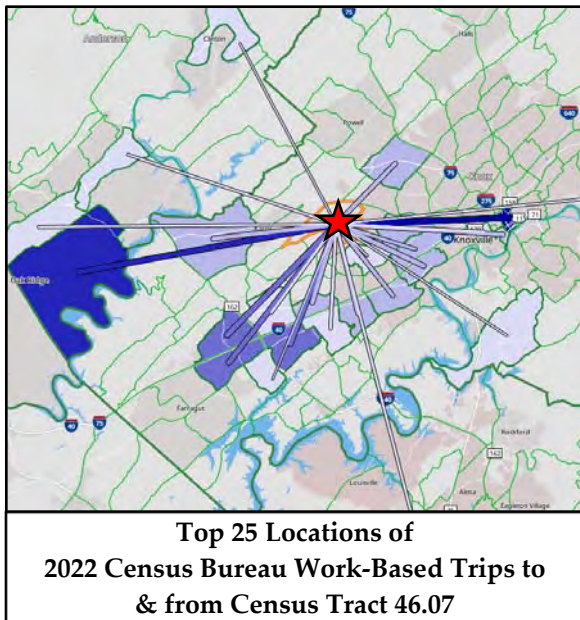
ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#435	Multipurpose Recreational Facility	70.5	-	-	-	-	55%	45%	-
				-	-	-	139	113	252
Total New Volume Site Trips			-	-	-	-	139	113	252

ITE Trip Generation Manual, 11th Edition calculated by using Average Trip Rates

▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for the 2921 Bradley Lake Lane Subdivision are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the existing intersection of Amherst Road at Bradley Lake Lane.

During the traffic counts, motorists to and from Bradley Lake Lane at Amherst Road showed a distinct inclination for travel to and from the north in the AM and PM peak hours. This inclination is likely due to the proximity of the Schaad Road Extension and the access it provides to Western Avenue and Oak Ridge Highway to the east and north and Lovell Road (SR 131) to the west. The existing traffic turning movements at the intersection of Amherst Road at Bradley Lake Lane are a good analog for the projected distribution of generated traffic for the 2921 Bradley Lake Lane Subdivision since the existing turning movements are composed entirely of the residents in the first phase of the Spring Lake Farms Subdivision.



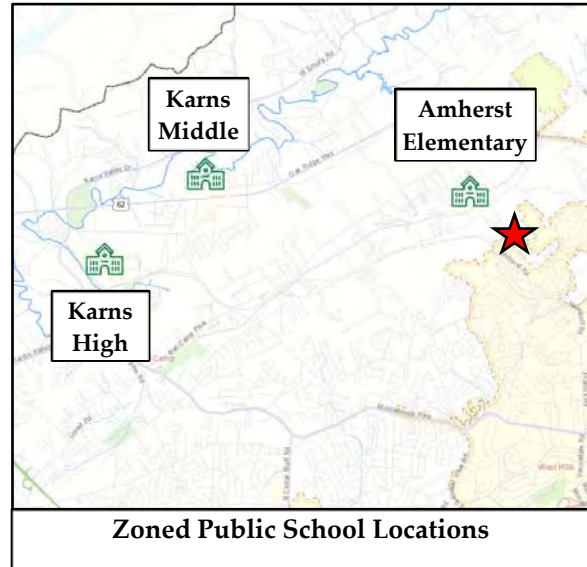
The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for trips generated by the development, and these trips are more likely to travel to and from the west, east, southwest, and southeast. This assertion is based on data from the United States Bureau website for Census Tract 46.07, where the development property is located. Based on 2022 (latest available) census data and as presented in Appendix H, most work-based trips in the surrounding area correspond to Oak Ridge, TN, downtown Knoxville, the University of

Tennessee, and areas of West Knoxville. Some of these work-based trips also correspond to Alcoa and Maryville, TN areas. Less work-based trips are shown towards the north of the development site. Most of these work-based locations will likely generate traffic on Bradley Lake Lane to and from the north on Amherst Road.

In addition to employment centers, some generated traffic will travel to and from public and private schools. Schools will be another impetus for external trip-making. The development

property is currently zoned for Amherst Elementary, Karns Middle, and Karns High School. The zoned public schools for this development property are located north and southwest of the development site. The zoned schools are between 1.1 and 5.4 miles from the proposed subdivision by roadway. The shortest and quickest routes from the proposed subdivision to and from these schools will be made by primarily traveling north and south on Amherst Road on the section north of Bradley Lake Lane. The furthest school, Karns High School, is located 5.4 miles to the west, and the closest school, Amherst Elementary, is 1.1 miles directly to the northwest. Karns Middle School is 4.7 miles to the northwest.

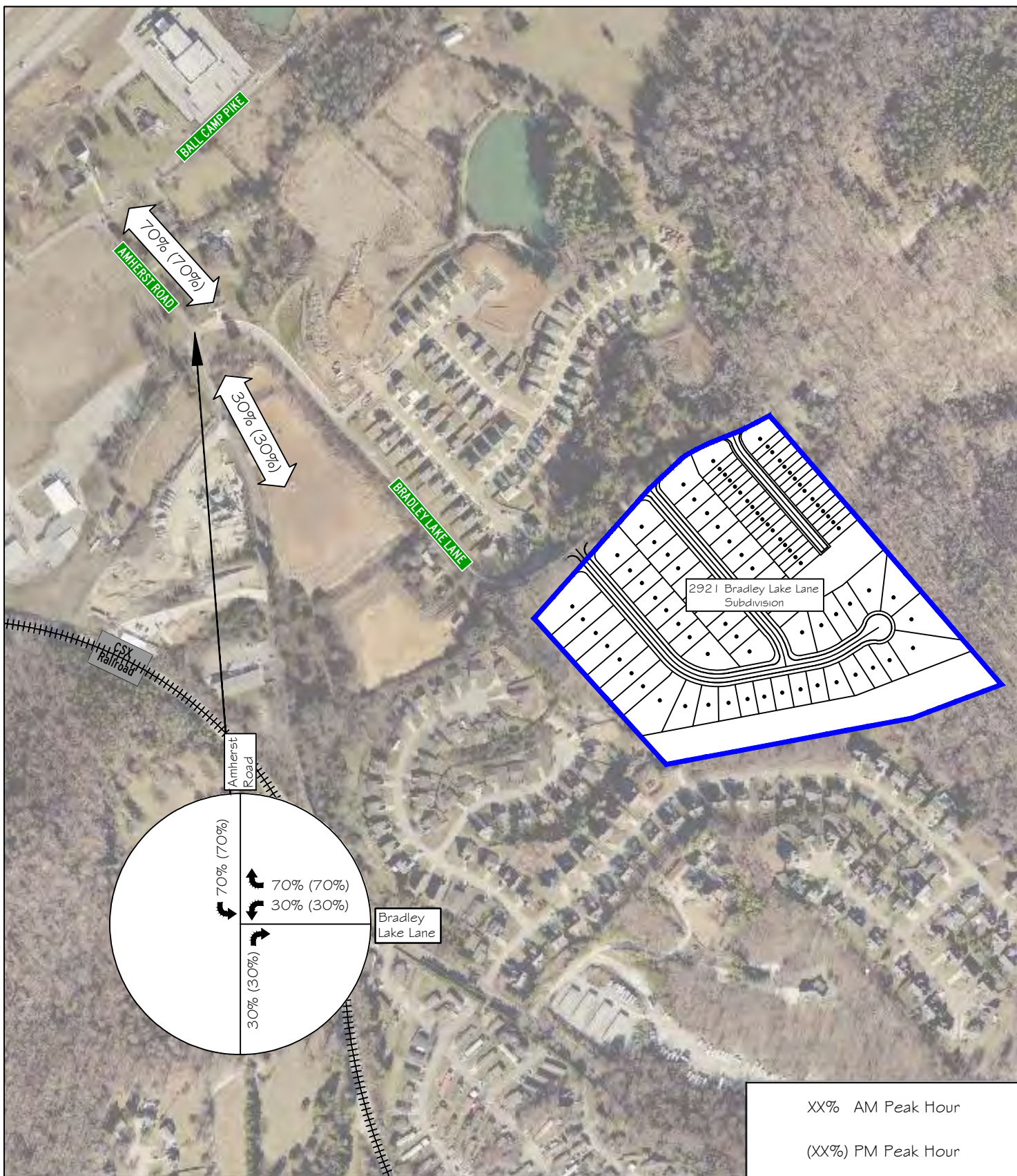
The Knox County Schools Transportation Department has developed Parental Responsibility Zones (PRZ) to determine whether students are offered transportation services to and from school. The PRZ is defined as being 1.5 miles for grades 6 – 12 and 1.0 miles for grades K – 5 from where the students’ parcel is accessed to the point where the buses unload at the school. This development will be outside the PRZ for all the zoned schools, and all school-age children attending public schools in the development will be able to utilize this service if desired.



Based on all these factors, Figure 6 shows the projected distribution of traffic entering and exiting the proposed residential subdivision at the intersection of Amherst Road at Bradley Lake Lane. Overall, the traffic generated by future residents in the subdivision was heavily assumed based on the observations during the traffic count at the intersection.

Figure 7a shows the traffic assignment of the computed trips generated by the 2921 Bradley Lake Lane Subdivision and is based on the assumed distribution of trips shown in Figure 6.

Figures 7b and 7c show the traffic assignment of the computed trips generated by the second phase of the Spring Lake Farms Subdivision and the Maddox Companies sports facility. These assignments were also based on the assumed distribution of trips shown in Figure 6. For the sports facility, no trips are assumed to enter or exit Bradley Lake Lane, and no trips are assigned for the AM peak hour since the operation of this sports facility will be outside this period. All entering and exiting trips for the sports facility to and from the south will not travel through the intersection of Amherst Road at Bradley Lake Lane since its entrance will be further to the south.



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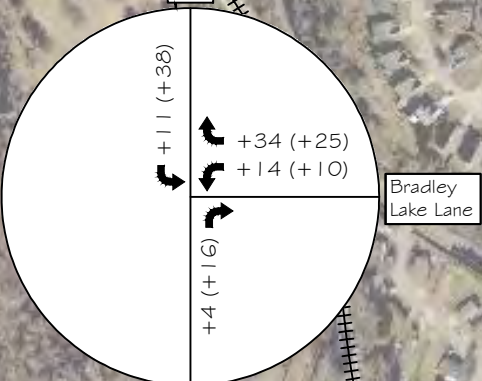
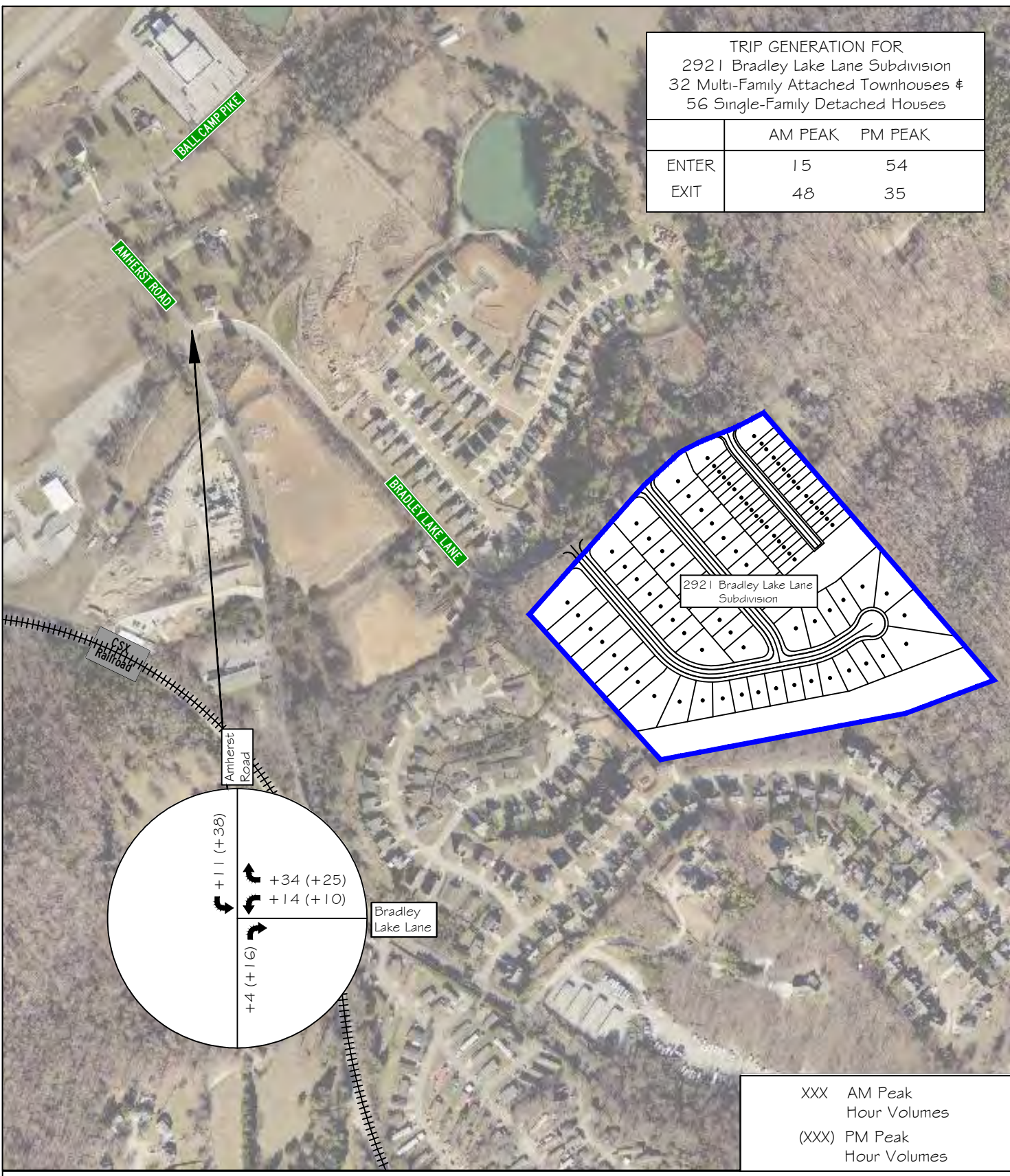


FIGURE 6

2921 Bradley Lake Lane Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour

TRIP GENERATION FOR 2921 Bradley Lake Lane Subdivision 32 Multi-Family Attached Townhouses & 56 Single-Family Detached Houses		
	AM PEAK	PM PEAK
ENTER	15	54
EXIT	48	35



XXX AM Peak
Hour Volumes
(XXX) PM Peak
Hour Volumes



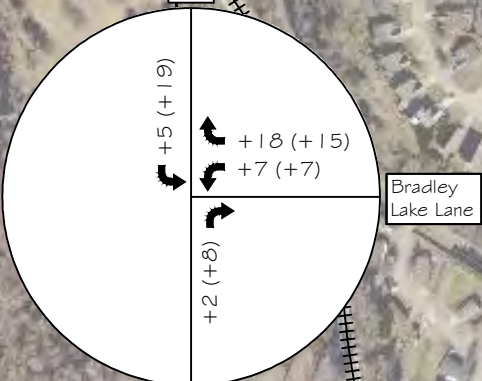
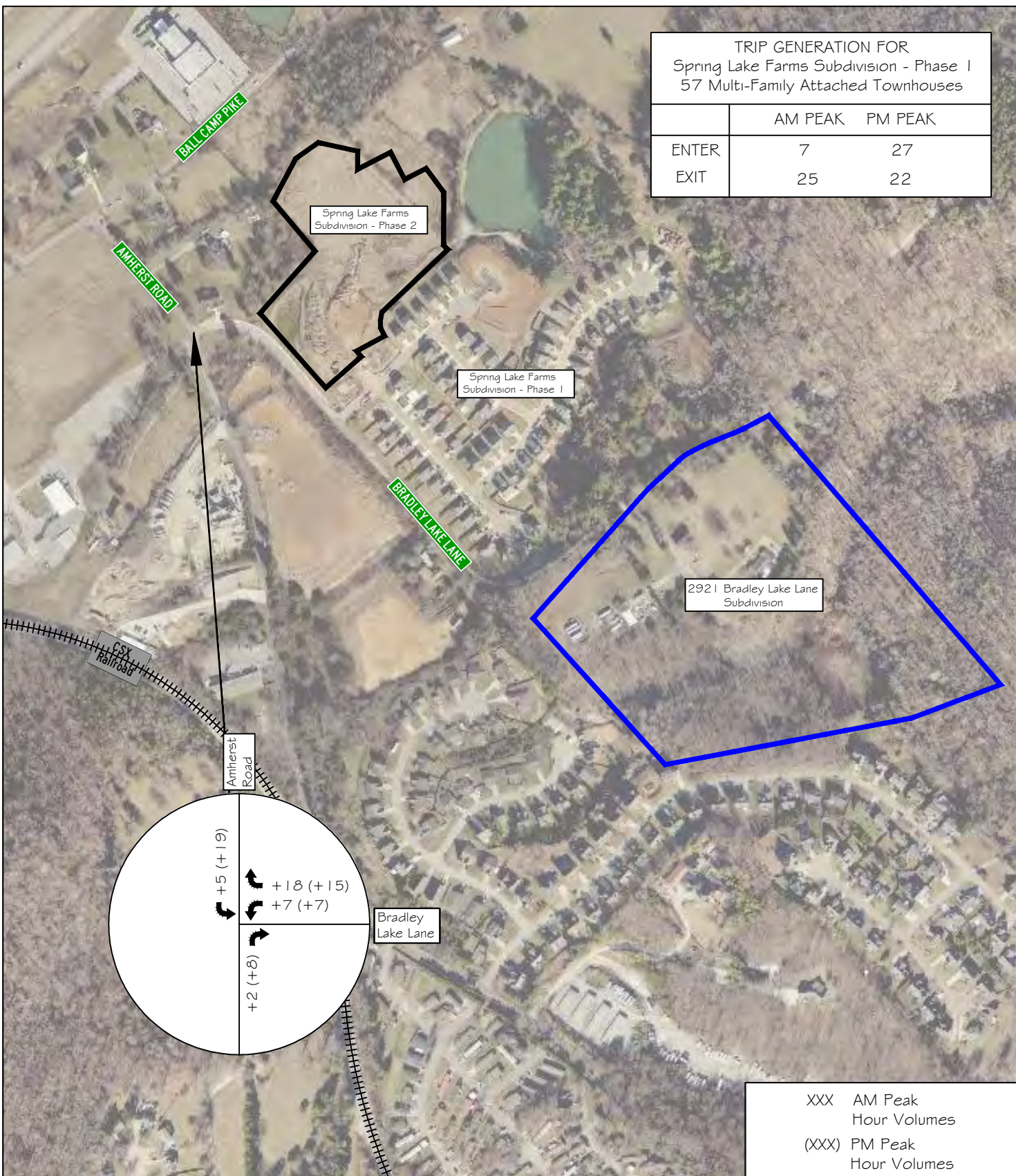
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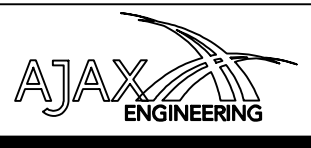


FIGURE 7a
2921 Bradley Lake Lane Subdivision
Traffic Assignment of Generated Traffic
during AM and PM Peak Hour -
2921 Bradley Lake Lane Subdivision

TRIP GENERATION FOR Spring Lake Farms Subdivision - Phase I 57 Multi-Family Attached Townhouses		
	AM PEAK	PM PEAK
ENTER	7	27
EXIT	25	22



XXX AM Peak Hour Volumes
(XXX) PM Peak Hour Volumes



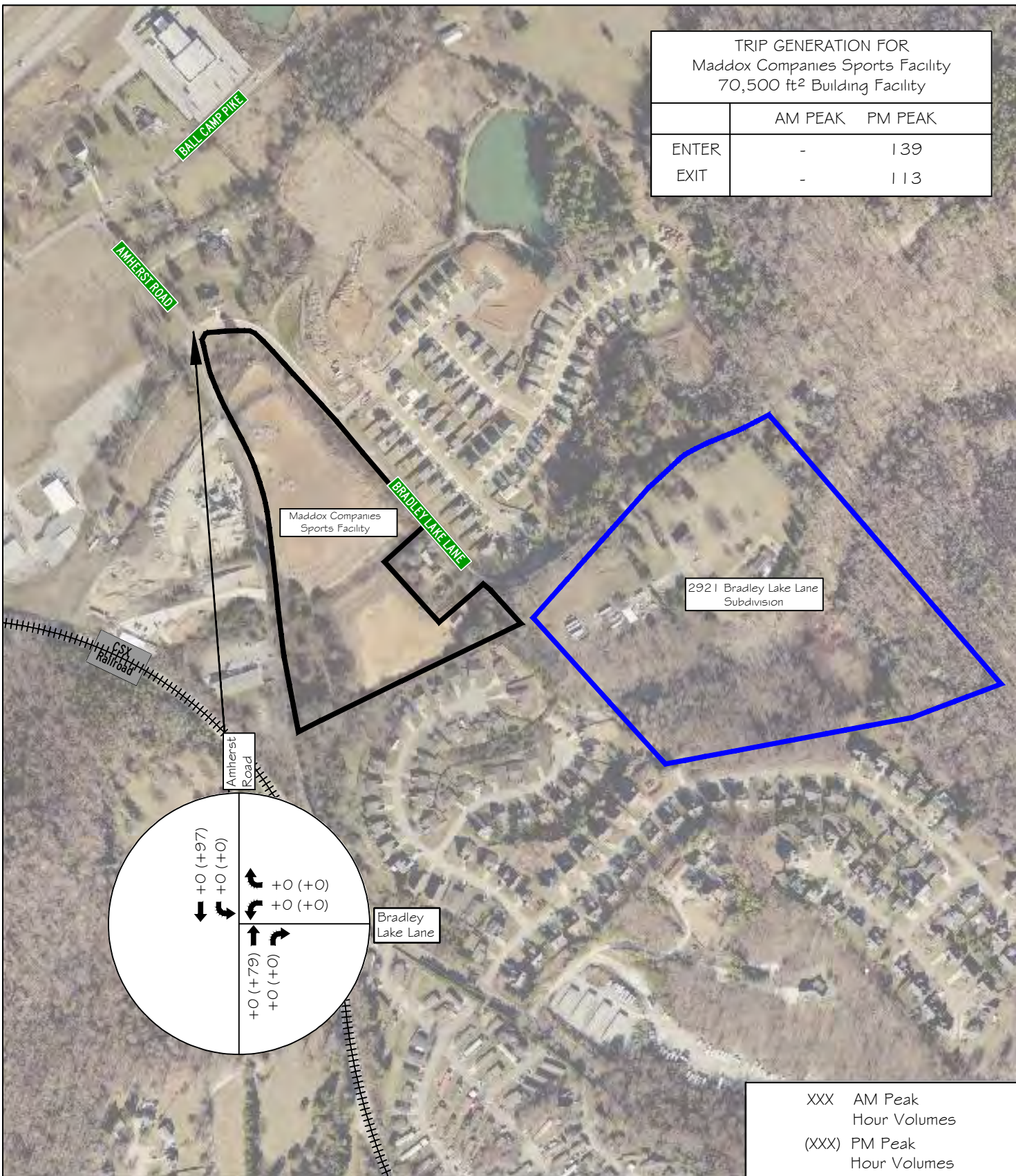
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NOT TO SCALE



FIGURE 7b
2921 Bradley Lake Lane Subdivision
Traffic Assignment of Generated Traffic during AM and PM Peak Hour - Spring Lake Farms Subdivision - Phase 2

TRIP GENERATION FOR Maddox Companies Sports Facility 70,500 ft ² Building Facility		
	AM PEAK	PM PEAK
ENTER	-	139
EXIT	-	113



XXX AM Peak
Hour Volumes
(XXX) PM Peak
Hour Volumes



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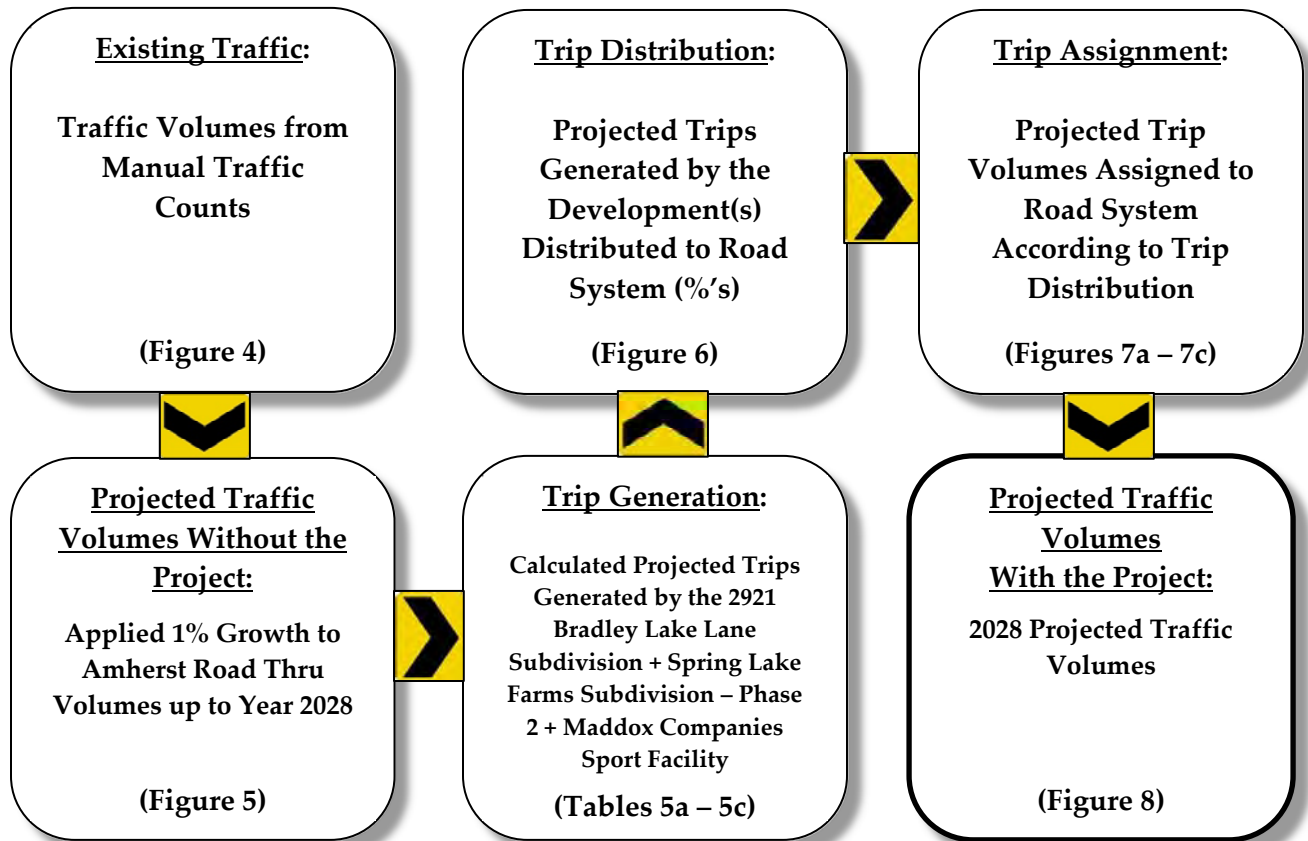
NOT TO SCALE



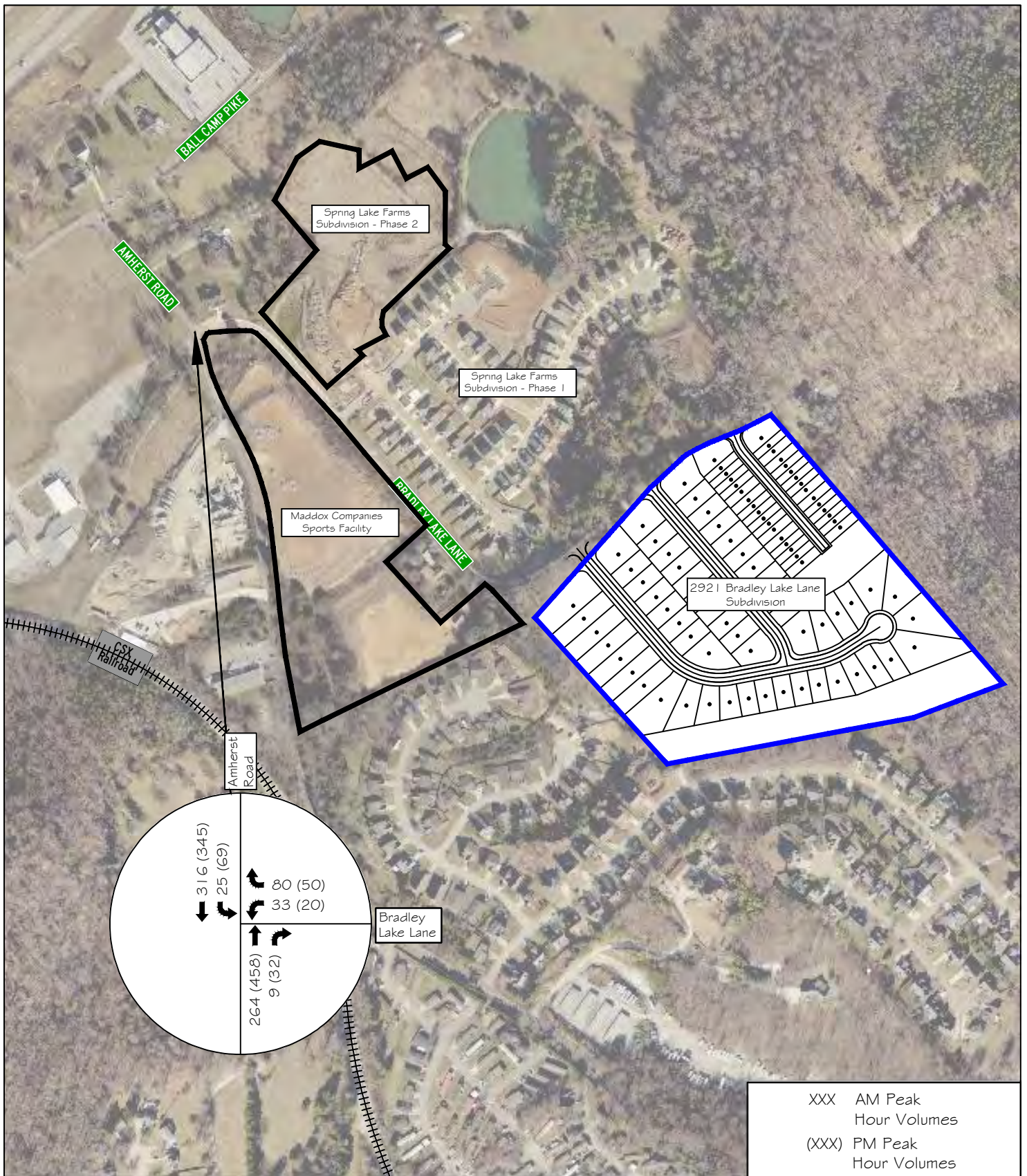
FIGURE 7c
2921 Bradley Lake Lane Subdivision
Traffic Assignment of Generated Traffic
during AM and PM Peak Hour -
Maddox Companies Sports Facility

▪ **PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT:**

Several additive steps were taken to estimate the total projected traffic volumes at the intersection of Amherst Road at Bradley Lake Lane when the 2921 Bradley Lake Lane Subdivision is constructed and fully occupied in 2028. The procedure also included accounting for the trips generated by the second phase of Springs Lake Farms Subdivision and the Maddox Companies sports facility. The steps are illustrated below for clarity and review:



The calculated peak hour traffic generated by the 2921 Bradley Lake Lane Subdivision was added to the 2028 horizon year traffic by following the predicted trip distributions and assignments. This procedure was completed to obtain the total projected traffic volumes at the intersection of Amherst Road at Bradley Lake Lane when the 2921 Bradley Lake Lane Subdivision is fully built and occupied in 2028. The procedure also took into account the adjacent proposed residential and sports facility developments.



11812 Black Road
Knoxville, TN 37932
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NOT TO SCALE



FIGURE 8


2921 Bradley Lake Lane Subdivision

2028 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITH THE PROJECT

Capacity analyses were conducted to determine the projected LOS at the intersection of Amherst Road at Bradley Lake Lane with the development traffic in 2028, as shown in Figure 8. Intersection capacity results from the projected 2028 peak hour traffic are shown in Table 6. Appendix E includes the worksheets for the projected 2028 peak hour capacity analyses.

As shown in Table 6, the intersection is projected to operate with good to average LOS in the AM and PM peak hours. The worst-performing traffic movement is westbound left and right turns from Bradley Lake Lane to Amherst Road, projected to operate at LOS C in the PM peak hour but LOS B in the AM peak hour.

TABLE 6
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Amherst Road (SB & NB) at Bradley Lake Lane (WB)		Westbound Left/Right	B	14.2	0.319	C	23.6	0.444
		Southbound Left	A	8.0	0.027	A	8.9	0.092

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology
^a Level of Service, ^b Average Delay (sec/vehicle), ^c Volume-to-Capacity Ratio

▪ **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

The study area was investigated for potential existing and future safety issues when the development is constructed. These transportation features are discussed in the following pages.

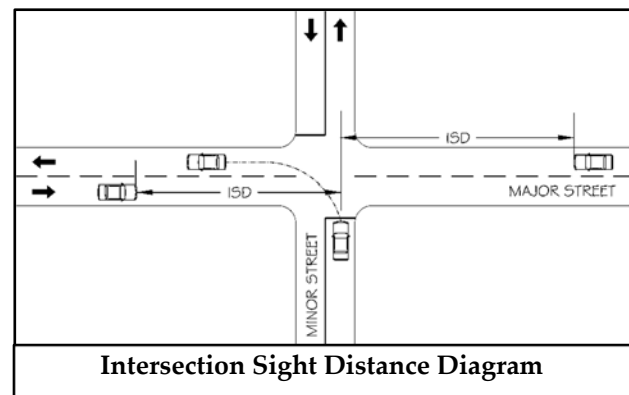
○ **EVALUATION OF SIGHT DISTANCE**

For intersections, sight distance evaluations have two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD).

Methodology:

SSD is the distance required for a motorist on a major street to perceive, react, and the vehicle to come to a complete stop before colliding with an object on the road. For evaluating intersections, this object would be another vehicle entering the intersection from a minor street. SSD can be considered the minimum visibility distance standard for evaluating the safety of an intersection.

ISD is the required visibility distance standard for evaluating the safety of an intersection per section 3.04.J.5 in the Knoxville-Knox County Subdivision Regulations. ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver.



Intersection Sight Distance Diagram

Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being overtaken by an approaching vehicle. The most critical ISD is for left turns from the minor street. The ISD for this maneuver includes the time to turn left and clear half of the intersection without conflicting with the oncoming traffic from the left and accelerating to the road's operating speed without causing the approaching vehicles from the right to reduce their speed substantially.

Amherst Road has a posted speed limit of 30 mph. Based on Knox County's policy of requiring 10 feet of sight distance per 1 mph of speed, the required intersection sight distance is 300 feet. This distance is required for a motorist to exit safely to the left and right from Bradley Lake Lane onto Amherst Road.

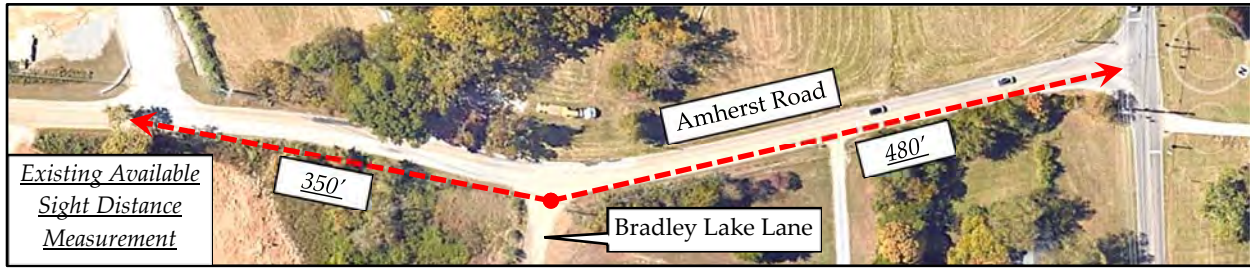
Bradley Lake Lane does not have a posted speed limit. According to Knox County Code, Section 62-152, "unless otherwise posted, maximum lawful speeds on the roadways of the county shall be 30 miles per hour". Assuming a worst-case scenario speed limit of 30 mph on Bradley Lake Lane, the required distance for a motorist to exit safely to the left and right at the proposed entrances would be 300 feet.

Visual observations of the sight distances on Bradley Lake Lane at Amherst Road were undertaken. Using a Nikon Laser Rangefinder from Bradley Lake Lane at Amherst Road, the available sight distance was visually estimated to be 350 feet to the south and 480 feet to the north (up to the signalized intersection of Amherst Road at Ball Camp Pike). A horizontal curve, vegetation, and existing fence posts along the eastern side of Amherst Road hinder further distance viewing to the south.

Visual observations of the sight distances from the proposed entrance locations at Bradley Lake Lane were also undertaken. The available sight distance was visually estimated to be 200 feet to the west and 475 feet to the west at the Proposed Road "A" Entrance location. The sharp horizontal curve and a vertical curve on Bradley Lake Lane combined with vegetation on the northern side of Bradley Lake Lane currently hinder further distance viewing to the west at the Proposed Road "A" Entrance location.

The available sight distance was visually estimated to be 450 feet to the west and 235 feet to the east at the Proposed Road "B" Entrance location. A horizontal curve and vegetation on the southern side of Bradley Lake Lane currently hinder further distance viewing to the east at the Proposed Road "B" Entrance location. The available sight distance was visually estimated to be 175 feet to the west and 225 feet to the east at the Proposed Road "C" Entrance location. Horizontal curves and vegetation on both sides of Bradley Lake Lane currently hinder further distance viewing to the west and east at the Proposed Road "C" Entrance location.

Images of the existing sight distances at Bradley Lake Lane at Amherst Road and the proposed entrance locations on Bradley Lake Lane are labeled in the following images with the required ISD and rangefinder-measured sight distances.



View of Sight Distance on Amherst Road at Bradley Lake Lane (Looking South)



View of Sight Distance on Amherst Road at Bradley Lake Lane (Looking North)



View of Sight Distance on Bradley Lake Lane at the Proposed Road "A" Entrance Location (Looking West)



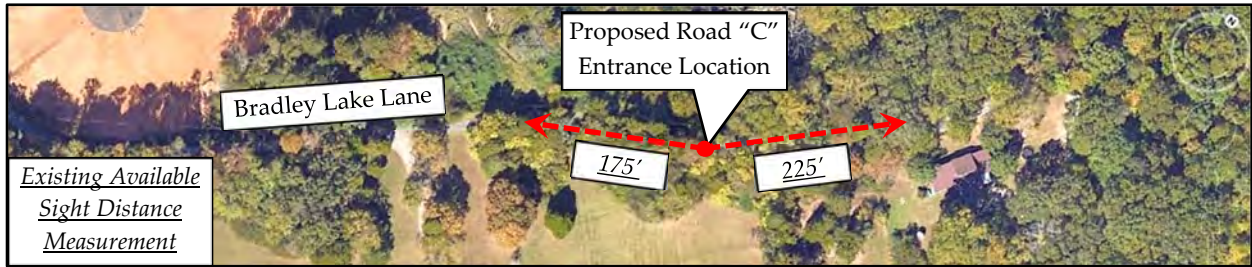
View of Sight Distance on Bradley Lake Lane at the Proposed Road "A" Entrance Location (Looking East)



View of Sight Distance on Bradley Lake Lane at the Proposed Road "B" Entrance Location (Looking West)



View of Sight Distance on Bradley Lake Lane at the Proposed Road "B" Entrance Location (Looking East)



View of Sight Distance on Bradley Lake Lane at the Proposed Road "C" Entrance Location (Looking West)



View of Sight Distance on Bradley Lake Lane at the Proposed Road "C" Entrance Location (Looking East)

○ **EVALUATION OF TURN LANE THRESHOLDS**

The need for separate entering turn lanes was evaluated in the projected 2028 conditions for the intersection of Amherst Road at Bradley Lake Lane.

The criteria used for these turn lane evaluations were based on Knox County's "Access Control and Driveway Design Policy". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The location of this intersection of Amherst Road at Bradley Lake Lane is within a 30 mph speed zone, and thus, this intersection was evaluated based on these posted speeds. The worksheets for these evaluations are provided in Appendix I.

Based on the projected 2028 traffic volumes at the intersection, a separate northbound right-turn lane on Amherst Road is not warranted, but a separate left-turn lane on Amherst Road will be in the 2028 PM peak hour. However, the left-turn lane warrant is only met due to the additional thru trips at the intersection generated and estimated for the adjacent proposed sports facility. The worksheet showing the effect of the sports facility trips is also included in Appendix I.

○ **PROJECTED VEHICLE QUEUES**

An additional software program calculated the 2028 AM and PM peak hour projected vehicle queues at the intersection of Amherst Road at Bradley Lake Lane. The previously mentioned Synchro traffic software includes SimTraffic. The Synchro portion of the software performs the macroscopic calculations for intersections, and SimTraffic performs micro-simulation and animation of vehicular traffic. SimTraffic software was utilized to estimate the projected vehicle queues at the intersections.

The 95th percentile vehicle queue is the recognized measurement in the transportation engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results were based on averaging the outcome obtained during ten traffic simulations in the software. The 95th percentile vehicle queue lengths at the studied intersection are shown in Table 7 for the projected 2028 conditions. The vehicle queue worksheet results from the SimTraffic software are in Appendix J. Importantly, due to the warranted southbound left-turn lane, a separate left-turn lane on Amherst Road was included in the simulations to determine the necessary length of the lane.

TABLE 7
VEHICLE QUEUE SUMMARY -
2028 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT

INTERSECTION	APPROACH/ MOVEMENT	SIMTRAFFIC 95 th PERCENTILE QUEUE LENGTH (ft)	
		AM PEAK HOUR	PM PEAK HOUR
Amherst Road (SB & NB) at Bradley Lake Lane (WB)	Westbound Left/Right	59	50
	Southbound Left	27	50

Note: 95th percentile queues were calculated in SimTraffic 12 software
 Results obtained are with separate left-turn lane on Amherst Road at Bradley Lake Lane

Table 7 shows minimal vehicle queue lengths on the intersection approaches in the 2028 AM and PM peak hours. The longest queue is calculated to be 59 feet for the Bradley Lake Lane approach in the AM peak hour. The longest queue in the warranted southbound left-turn lane on Amherst Road is 50 feet in the AM and PM peak hours. Based on this result, the longest queue in the warranted Amherst Road southbound left-turn lane will be just two passenger vehicles, assuming a length of 25 feet per vehicle.

CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of the 2921 Bradley Lake Lane Subdivision on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.



Amherst Road at Bradley Lake Lane: This intersection is projected to operate with average to reasonable vehicle delays and minimal vehicle queues for all movements.

- 1a) A separate southbound left-turn lane on Amherst Road at Bradley Lake Lane is not warranted based on the projected 2028 volumes strictly based on the trips generated by the future residences in the second phase of Spring Lake Farms Subdivision and 2921 Bradley Lake Lane Subdivision. However, due to the estimated thru trips generated by the Maddox Companies sports facility at the intersection, by 2028, the intersection is projected to experience volumes that warrant the need for a southbound left-turn lane on Amherst Road at Bradley Lake Lane.

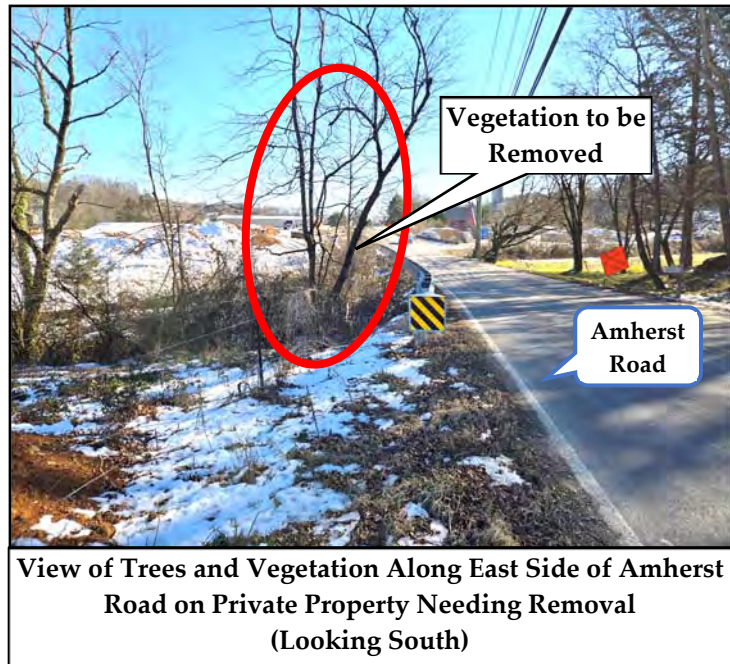
Since the results produced in the study are based on a land use with limited data in the ITE's Trip Generation Manual and may overestimate the number of trips that the sports facility could generate, it is recommended that the need for a southbound left-turn lane be re-examined in 2028 or when all three developments are entirely constructed and occupied. This re-examination would need to conduct new traffic counts at the intersection to determine if the trips generated by all three developments and the background traffic meet the threshold for a turn lane. The developer and the County should agree to a Memorandum of Understanding (MOU) that if the future volumes at the intersection during the re-examination meet the turn lane threshold, plans can be made to provide a southbound left-turn lane on Amherst Road at Bradley Lake Lane.

- 1b) Future landscaping or signage must not impact the intersection sight distance from Bradley Lake Lane at Amherst Road.
- 1c) Based on a posted speed limit of 30 mph on Amherst Road, the required intersection sight distance is 300 feet for exiting left and right-turning vehicles. The existing sight distances from Bradley Lake Lane at Amherst Road were estimated visually to be adequate in both directions. However, several items to the south of this intersection,

including a horizontal curve on Amherst Road, vegetation, and existing fence posts along the eastern side of the road, hinder further distance viewing to the south.

Due to these items reducing the potential amount of sight distance to the south and its benefits if it were extended, it is recommended that an existing tree and vegetation

along the east side of Amherst Road be removed. This tree and vegetation are on private property and along an existing creek. The Maddox Companies own this property, and the site plan for their proposed sports facility does not show any activity in this area. Nonetheless, this property owner should be approached to determine if these items can be removed and maintained in future conditions. Knox County should facilitate this recommendation since it affects motorists on the public roadway, and the tree and vegetation are on private property.





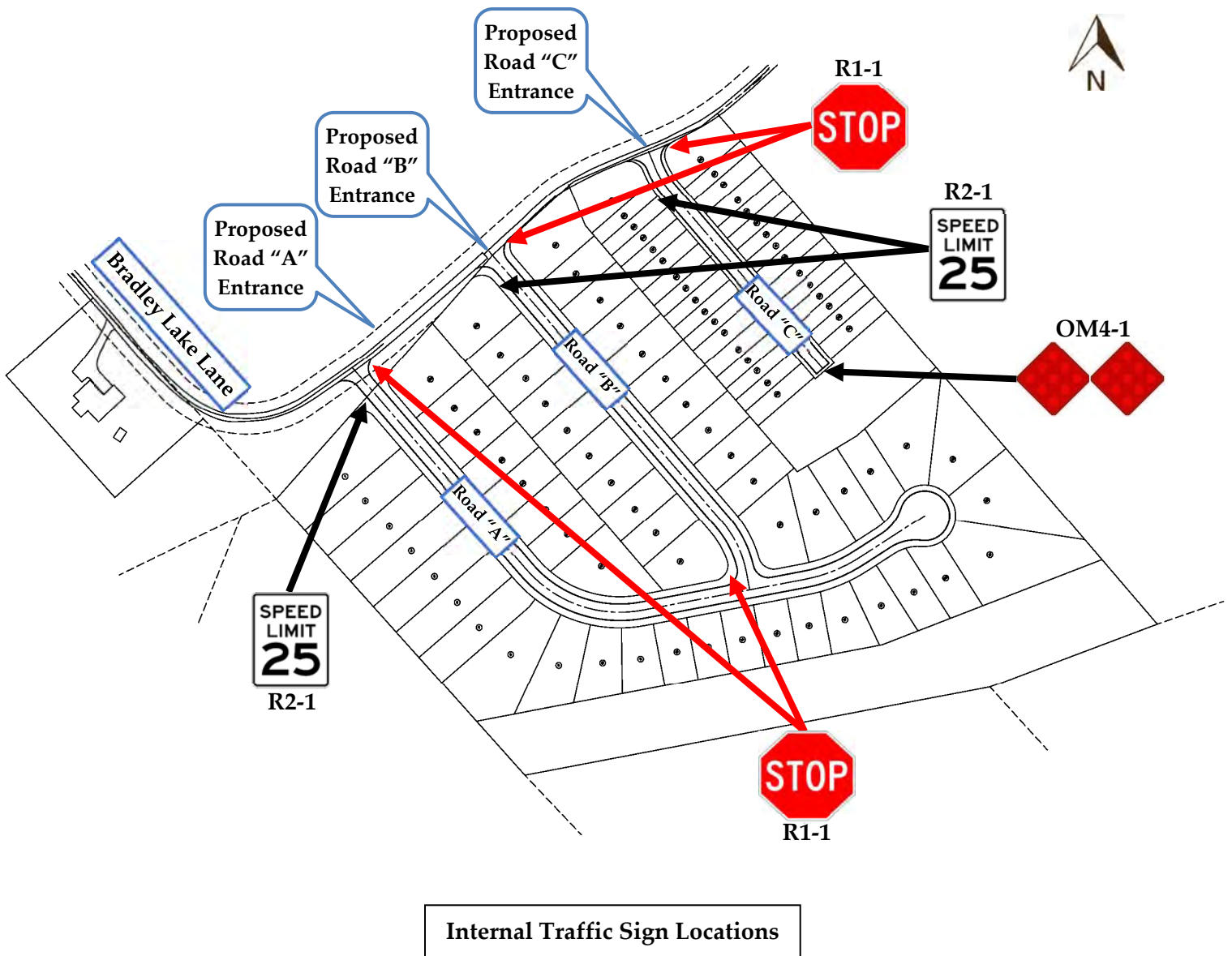
Bradley Lake Lane at Proposed Road “A”, “B”, and “C” Entrances: While not specifically calculated, these intersections are expected to operate with little to no vehicle delays and queues due to the near-zero conflicting volumes on Bradley Lake Lane.

- 2a) It is recommended that a Stop Sign (R1-1) be installed and a 24” white stop bar be applied to the Proposed Entrance approaches at Bradley Lake Lane. The stop bars should be applied a minimum of 4 feet away from the edge of Bradley Lake Lane and placed at the desired stopping point that maximizes the sight distance.
- 2b) Intersection sight distance from the Proposed Entrances at Bradley Lake Lane must not be impacted by future landscaping, signage, or vegetation.
- 2c) Based on an assumed maximum speed limit of 30 mph on Bradley Lake Lane, the required intersection sight distance is 300 feet for exiting vehicles at the proposed entrances. The existing sight distances were estimated visually to be inadequate in at least one direction at all of the proposed entrance locations based on an assumed maximum of 30 mph. Sight distance to the east and west from the proposed entrance locations is currently limited due to vegetation on both sides of Bradley Lake Lane and horizontal curves. This vegetation will need to be removed during construction, which will likely allow for more than 300 feet of sight distance at each entrance location. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans for all three proposed entrances.



2921 Bradley Lake Lane Subdivision Internal Roads: The layout plan shows three new streets, as shown in Figure 3.

- 3a) A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the Proposed Entrance roads off Bradley Lake Lane.
- 3b) A Stop Sign (R1-1) with a 24" white stop bar is recommended to be installed at the internal road intersection, as shown in the image below. Dual end-of-roadway object markers (OM4-1) should be installed at the end of subdivision Road "C". A hammerhead turnaround for vehicles should also be provided at the end of Road "C".



- 3c) Five proposed lots in the subdivision are adjacent to and south of Bradley Lake Lane. All of these lots will have access to either Road "A", "B", or "C" and should not be allowed direct access to Bradley Lake Lane.

- 3d) Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a proposed speed limit of 25-mph in the development, the required internal intersection sight distance is 250 feet. The site designer should ensure that this internal sight distance length is met.

- 3e) If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision residents.

- 3f) All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.

- 3g) The internal roads in the proposed subdivision will have long, straight road segments. Straight road segments encourage higher vehicle speeds. It is recommended that the civil site designer consider including traffic calming measures on these internal roads, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.

- 3h) All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper operation.



Other Transportation Issues: Several other transportation items must be addressed to develop the 2921 Bradley Lake Lane Subdivision. A few of these are unrelated and not contributable to development and are included in the following:

4a) As part of approving the rezoning of the development property to Planned Residential (PR), Knox County included an amendment that Bradley Lake Lane “be expanded to 20 ft at the expense of developer”. Based on this amendment, it is recommended that Bradley Lake Lane be widened to 20 feet from Jumping Jack Lane to just past the Proposed Road “B” Entrance, approximately 1,550 feet. The pavement width of this section of Bradley Lake Lane was measured every 150 feet and indicated current asphalt widths that fluctuated between 9.5 and 12 feet.

4b) As discussed, a warning sign at the sharp horizontal curve on Bradley Lake Lane for travel towards Amherst Road has been damaged, fallen from its post, and is lying on the side of the road. However, the advisory 15 mph plaque on the post remains. This sign, a Turn Sign (W1-1R), should be reinstated and the post straightened. To adequately warn motorists heading in the opposite direction towards the proposed subdivision, a Turn Sign (W1-1L) with an advisory 15 mph plaque (W13-1P) on a single post should also be installed on Bradley Lake Lane in advance of the sharp horizontal curve.



4c) Furthermore, due to the steepness of the cut slope produced by the Spring Lake Farm Subdivision construction, consideration should be given to providing a guardrail on the north side of Bradley Lake Lane, just east and up to the sharp horizontal curve. This cut slope is 2:1 and has an elevation change of approximately 25 feet from the top to the base at its maximum. The toe of the cut slope ends in the backyard of three single-family detached



houses in the first phase of Spring Lake Farms Subdivision. Details regarding this road widening and the potential need for a guardrail should be discussed further with Knox County Engineering and Public Works.

- 4d) Due to several off-road crashes with objects on Amherst Road near Bradley Lake Lane, it is recommended that the County review the identified individual crash reports to determine if the narratives or other information could provide further insight as to the cause of these crashes and whether if there are identifiable modifications that could reduce these types of crashes. The crash data on Amherst Road near Bradley Lake Lane indicated a couple of crashes due to collisions with ditches. This section of Amherst Road currently has evidence of vehicles off-tracking the pavement. The crash data review may indicate that the edges of Amherst Road could be supplemented with additional pavement to reduce vehicles leaving the roadway.



Vehicle Off-Tracking on Amherst Road near Bradley Lake Lane (Looking South)

At a minimum, due to the successive reverse curves on Amherst Road near Bradley Lake Lane, posting Reverse Turn (W1-3) signs in advance of these curves in both directions on Amherst Road may be beneficial. Reverse Turn (W1-3) signs would be appropriate in this situation since there are two changes in the roadway alignment in opposite directions and are separated by a tangent distance of less than 600 feet, as described in the Manual on Uniform Traffic Control Devices (MUTCD).

- 4e) Knox County is recommended to install a 25-mph Speed Limit Sign (R2-1) on Bradley Lake Lane for vehicles turning off Amherst Road and traveling towards the 2921 Bradley Lake Lane Subdivision and the Spring Lake Farms Subdivision. This speed would be appropriate due to Bradley Lake Lane's sharp horizontal curve (with an already posted advisory speed of 15 mph) and residential nature.

APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

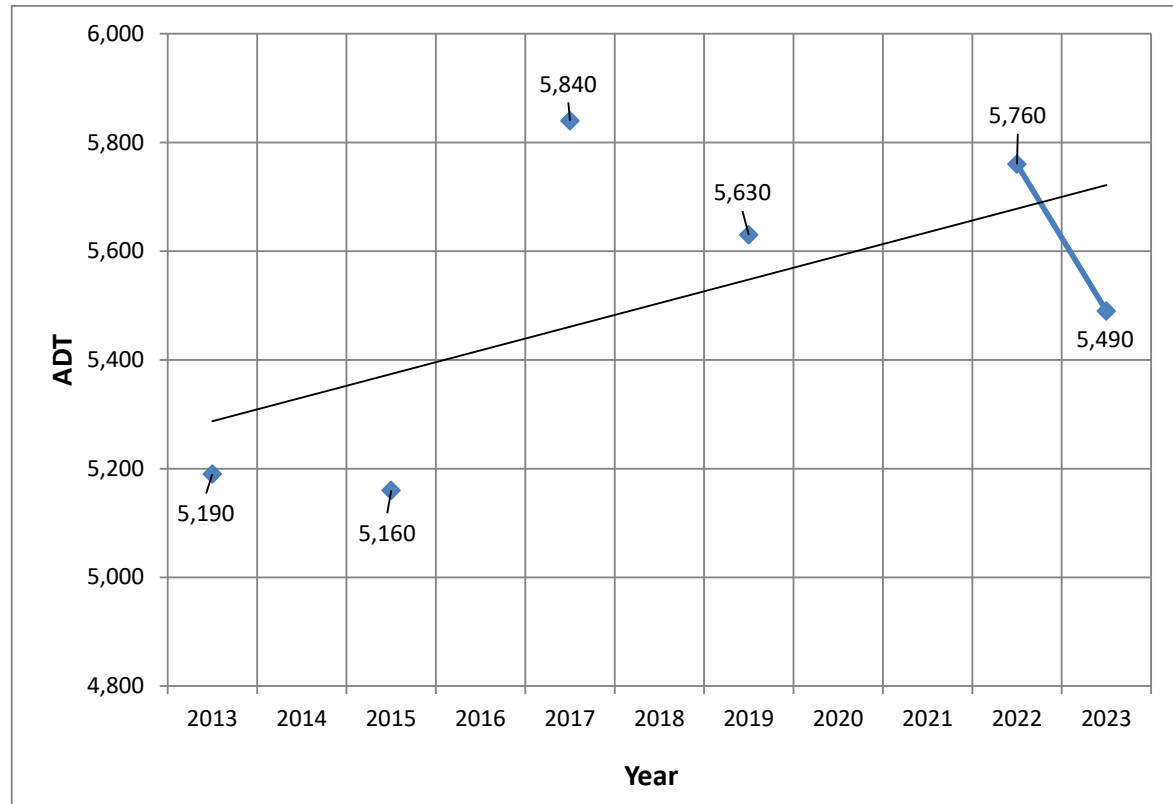
Historical Traffic Counts

Organization: Knoxville Regional TPO

Station ID #: 093M367

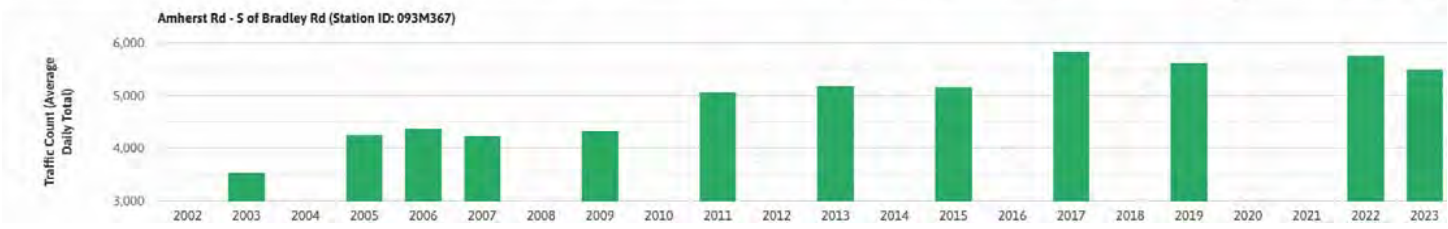
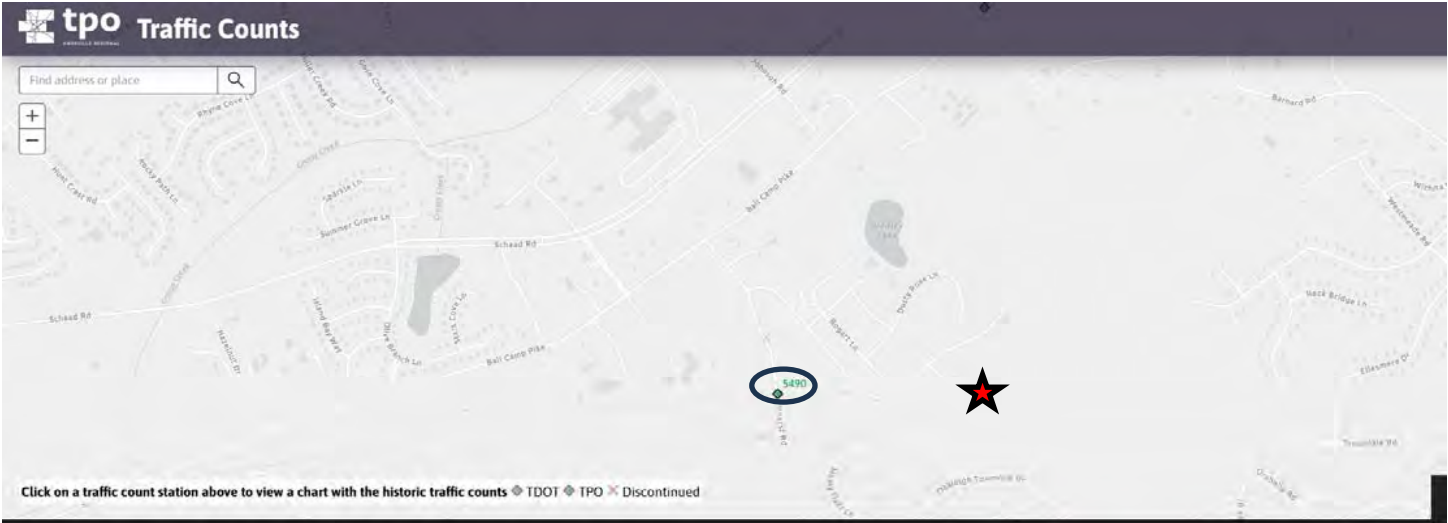
Location: Amherst Road, south of Bradley Lake Lane

YEAR	AADT	
2013	5,190	Trendline ↓
2014		
2015	5,160	
2016		
2017	5,840	
2018		
2019	5,630	
2020		
2021		
2022	5,760	
2023	5,490	



2013 - 2023 Growth Rate = 5.8%

Average Annual Growth Rate = 0.6%



APPENDIX B

KNOXVILLE AREA TRANSIT MAP AND INFORMATION



Route 12 - Western Avenue WEEKDAYS

Going away from downtown					Going toward downtown				
Knoxville Station Bay E	Cumberland and James Agee	Food City Western Ave.	Sherman NB and Texas	Western after McKamey	Western after McKamey	Sherman NB and Texas	Western EB (Cherokee Health)	Cumberland and Phillip Fulmer Way	Knoxville Station Bay E
		<i>Transfer to Rt. 15</i>					<i>Transfer to Rt. 15</i>		
1	2	3	4	5	5	6	7	8	9
						5:58 AM	6:08 AM	6:15 AM	6:25 AM
					6:18 AM	6:28 AM	6:38 AM	6:45 AM	6:55 AM
6:00 AM	6:07 AM	6:20 AM	6:30 AM	6:38 AM	6:48 AM	6:58 AM	7:08 AM	7:15 AM	7:25 AM
6:30 AM	6:37 AM	6:50 AM	7:00 AM	7:08 AM	7:18 AM	7:28 AM	7:38 AM	7:45 AM	7:55 AM
7:00 AM	7:07 AM	7:20 AM	7:30 AM	7:38 AM	7:48 AM	7:58 AM	8:08 AM	8:15 AM	8:25 AM
7:30 AM	7:37 AM	7:50 AM	8:00 AM	8:08 AM	8:18 AM	8:28 AM	8:38 AM	8:45 AM	8:55 AM
8:00 AM	8:07 AM	8:20 AM	8:30 AM	8:38 AM	8:48 AM	8:58 AM	9:08 AM	9:15 AM	9:25 AM
8:30 AM	8:37 AM	8:50 AM	9:00 AM	9:08 AM	9:18 AM	9:28 AM	9:38 AM	9:45 AM	9:55 AM
9:00 AM	9:07 AM	9:20 AM	9:30 AM	9:38 AM	9:48 AM	9:58 AM	10:08 AM	10:15 AM	10:25 AM
9:30 AM	9:37 AM	9:50 AM	10:00 AM	10:08 AM	10:18 AM	10:28 AM	10:38 AM	10:45 AM	10:55 AM
10:00 AM	10:07 AM	10:20 AM	10:30 AM	10:38 AM	10:48 AM	10:58 AM	11:08 AM	11:15 AM	11:25 AM
10:30 AM	10:37 AM	10:50 AM	11:00 AM	11:08 AM	11:18 AM	11:28 AM	11:38 AM	11:45 AM	11:55 AM
11:00 AM	11:07 AM	11:20 AM	11:30 AM	11:38 AM	11:48 AM	11:58 AM	12:08 PM	12:15 PM	12:25 PM
11:30 AM	11:37 AM	11:50 AM	12:00 PM	12:08 PM	12:18 PM	12:28 PM	12:38 PM	12:45 PM	12:55 PM
12:00 PM	12:07 PM	12:20 PM	12:30 PM	12:38 PM	12:48 PM	12:58 PM	1:08 PM	1:15 PM	1:25 PM
12:30 PM	12:37 PM	12:50 PM	1:00 PM	1:08 PM	1:18 PM	1:28 PM	1:38 PM	1:45 PM	1:55 PM
1:00 PM	1:07 PM	1:20 PM	1:30 PM	1:38 PM	1:48 PM	1:58 PM	2:08 PM	2:15 PM	2:25 PM
1:30 PM	1:37 PM	1:50 PM	2:00 PM	2:08 PM	2:18 PM	2:28 PM	2:38 PM	2:45 PM	2:55 PM
2:00 PM	2:07 PM	2:20 PM	2:30 PM	2:38 PM	2:48 PM	2:58 PM	3:08 PM	3:15 PM	3:25 PM
2:30 PM	2:37 PM	2:50 PM	3:00 PM	3:08 PM	3:18 PM	3:28 PM	3:38 PM	3:45 PM	3:55 PM
3:00 PM	3:07 PM	3:20 PM	3:30 PM	3:38 PM	3:48 PM	3:58 PM	4:08 PM	4:15 PM	4:25 PM
3:30 PM	3:37 PM	3:50 PM	4:00 PM	4:08 PM	4:18 PM	4:28 PM	4:38 PM	4:45 PM	4:55 PM
4:00 PM	4:07 PM	4:20 PM	4:30 PM	4:38 PM	4:48 PM	4:58 PM	5:08 PM	5:15 PM	5:25 PM
4:30 PM	4:37 PM	4:50 PM	5:00 PM	5:08 PM	5:18 PM	5:28 PM	5:38 PM	5:45 PM	5:55 PM
5:00 PM	5:07 PM	5:20 PM	5:30 PM	5:38 PM	5:48 PM	5:58 PM	6:08 PM	6:15 PM	6:25 PM
5:30 PM	5:37 PM	5:50 PM	6:00 PM	6:08 PM	6:18 PM	6:28 PM	6:38 PM	6:45 PM	6:55 PM
6:00 PM	6:07 PM	6:20 PM	6:30 PM	6:38 PM	6:48 PM	6:58 PM	7:08 PM	7:15 PM	7:25 PM
6:30 PM	6:37 PM	6:50 PM	7:00 PM	7:08 PM	7:18 PM	7:28 PM	7:38 PM	7:45 PM	7:55 PM
7:00 PM	7:07 PM	7:20 PM	7:30 PM	7:38 PM	7:48 PM	7:58 PM	8:08 PM	8:15 PM	8:25 PM
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9:00 PM	9:07 PM	9:20 PM	9:30 PM	9:38 PM	9:48 PM	9:58 PM	10:08 PM	10:15 PM	10:25 PM
9:30 PM	9:37 PM	9:50 PM	10:00 PM	10:08 PM	10:18 PM	10:28 PM	10:38 PM	10:45 PM	10:55 PM
10:00 PM	10:07 PM	10:20 PM	10:30 PM	10:38 PM	10:48 PM	10:58 PM	11:08 PM	11:15 PM	
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11:00 PM	11:07 PM	11:20 PM	11:30 PM						



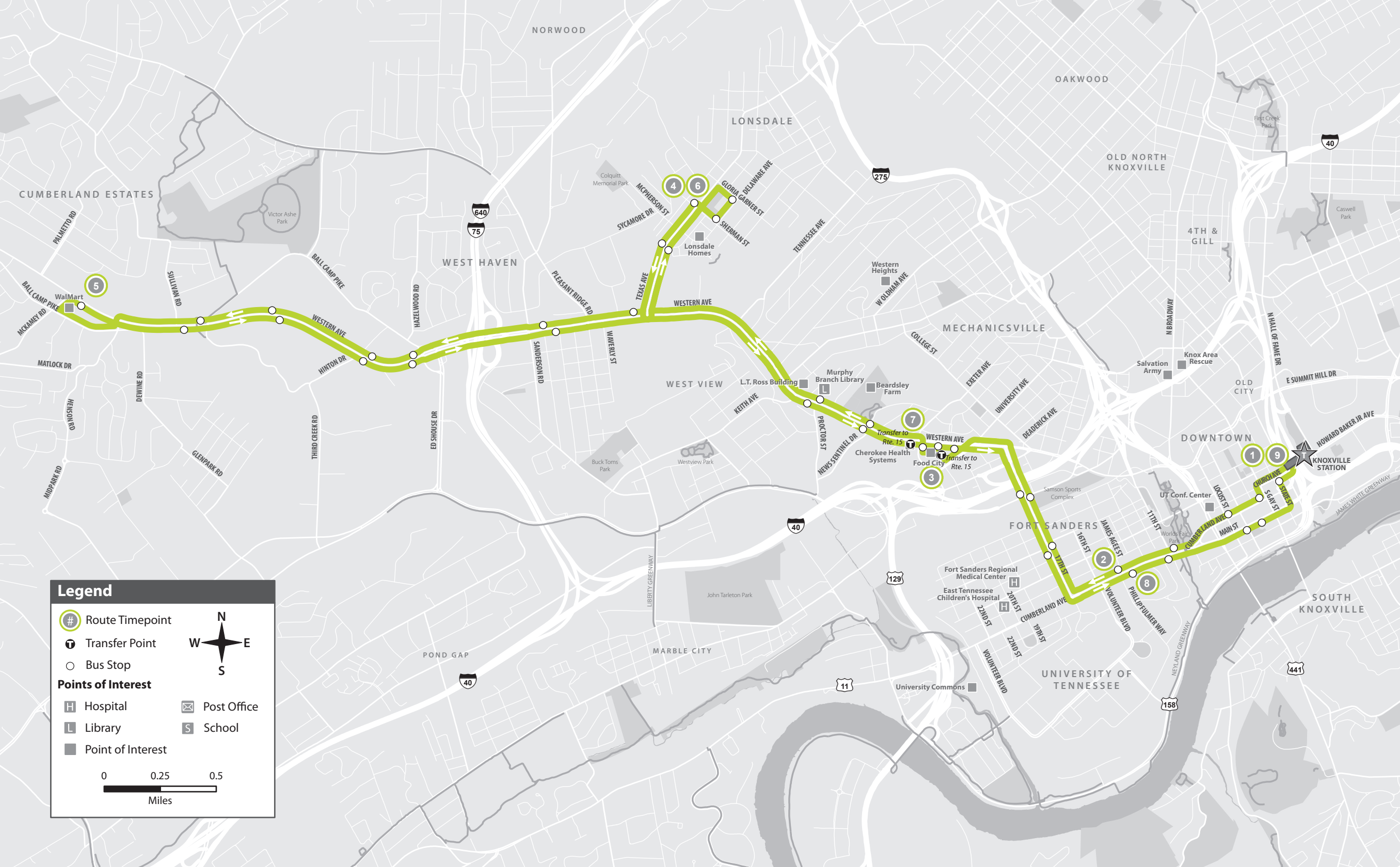
Route 12 - Western Avenue SATURDAY

Going away from downtown					Going toward downtown				
Knoxville Station Bay E	Cumberland and James Agee	Food City Western Ave.	Sherman NB and Texas	Western after McKamey	Western after McKamey	Sherman NB and Texas	Western EB (Cherokee Health)	Cumberland and Phillip Fulmer Way	Knoxville Station Bay E
		<i>Transfer to Rt. 15</i>					<i>Transfer to Rt. 15</i>		
1	2	3	4	5	5	6	7	8	9
						6:58 AM	7:08 AM	7:15 AM	7:25 AM
					7:18 AM	7:28 AM	7:38 AM	7:45 AM	7:55 AM
7:00 AM	7:07 AM	7:20 AM	7:30 AM	7:38 AM	7:48 AM	7:58 AM	8:08 AM	8:15 AM	8:25 AM
7:30 AM	7:37 AM	7:50 AM	8:00 AM	8:08 AM	8:18 AM	8:28 AM	8:38 AM	8:45 AM	8:55 AM
8:00 AM	8:07 AM	8:20 AM	8:30 AM	8:38 AM	8:48 AM	8:58 AM	9:08 AM	9:15 AM	9:25 AM
8:30 AM	8:37 AM	8:50 AM	9:00 AM	9:08 AM	9:18 AM	9:28 AM	9:38 AM	9:45 AM	9:55 AM
9:00 AM	9:07 AM	9:20 AM	9:30 AM	9:38 AM	9:48 AM	9:58 AM	10:08 AM	10:15 AM	10:25 AM
9:30 AM	9:37 AM	9:50 AM	10:00 AM	10:08 AM	10:18 AM	10:28 AM	10:38 AM	10:45 AM	10:55 AM
10:00 AM	10:07 AM	10:20 AM	10:30 AM	10:38 AM	10:48 AM	10:58 AM	11:08 AM	11:15 AM	11:25 AM
10:30 AM	10:37 AM	10:50 AM	11:00 AM	11:08 AM	11:18 AM	11:28 AM	11:38 AM	11:45 AM	11:55 AM
11:00 AM	11:07 AM	11:20 AM	11:30 AM	11:38 AM	11:48 AM	11:58 AM	12:08 PM	12:15 PM	12:25 PM
11:30 AM	11:37 AM	11:50 AM	12:00 PM	12:08 PM	12:18 PM	12:28 PM	12:38 PM	12:45 PM	12:55 PM
12:00 PM	12:07 PM	12:20 PM	12:30 PM	12:38 PM	12:48 PM	12:58 PM	1:08 PM	1:15 PM	1:25 PM
12:30 PM	12:37 PM	12:50 PM	1:00 PM	1:08 PM	1:18 PM	1:28 PM	1:38 PM	1:45 PM	1:55 PM
1:00 PM	1:07 PM	1:20 PM	1:30 PM	1:38 PM	1:48 PM	1:58 PM	2:08 PM	2:15 PM	2:25 PM
1:30 PM	1:37 PM	1:50 PM	2:00 PM	2:08 PM	2:18 PM	2:28 PM	2:38 PM	2:45 PM	2:55 PM
2:00 PM	2:07 PM	2:20 PM	2:30 PM	2:38 PM	2:48 PM	2:58 PM	3:08 PM	3:15 PM	3:25 PM
2:30 PM	2:37 PM	2:50 PM	3:00 PM	3:08 PM	3:18 PM	3:28 PM	3:38 PM	3:45 PM	3:55 PM
3:00 PM	3:07 PM	3:20 PM	3:30 PM	3:38 PM	3:48 PM	3:58 PM	4:08 PM	4:15 PM	4:25 PM
3:30 PM	3:37 PM	3:50 PM	4:00 PM	4:08 PM	4:18 PM	4:28 PM	4:38 PM	4:45 PM	4:55 PM
4:00 PM	4:07 PM	4:20 PM	4:30 PM	4:38 PM	4:48 PM	4:58 PM	5:08 PM	5:15 PM	5:25 PM
4:30 PM	4:37 PM	4:50 PM	5:00 PM	5:08 PM	5:18 PM	5:28 PM	5:38 PM	5:45 PM	5:55 PM
5:00 PM	5:07 PM	5:20 PM	5:30 PM	5:38 PM	5:48 PM	5:58 PM	6:08 PM	6:15 PM	6:25 PM
5:30 PM	5:37 PM	5:50 PM	6:00 PM	6:08 PM	6:18 PM	6:28 PM	6:38 PM	6:45 PM	6:55 PM
6:00 PM	6:07 PM	6:20 PM	6:30 PM	6:38 PM	6:48 PM	6:58 PM	7:08 PM	7:15 PM	7:25 PM
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7:00 PM	7:07 PM	7:20 PM	7:30 PM	7:38 PM	7:48 PM	7:58 PM	8:08 PM	8:15 PM	8:25 PM
7:30 PM	7:37 PM	7:50 PM	8:00 PM	8:08 PM	8:18 PM	8:28 PM	8:38 PM	8:45 PM	8:55 PM
8:00 PM	8:07 PM	8:20 PM	8:30 PM	8:38 PM	8:48 PM	8:58 PM	9:08 PM	9:15 PM	9:25 PM
8:30 PM	8:37 PM	8:50 PM	9:00 PM	9:08 PM	9:18 PM	9:28 PM	9:38 PM	9:45 PM	9:55 PM
9:00 PM	9:07 PM	9:20 PM	9:30 PM	9:38 PM	9:48 PM	9:58 PM	10:08 PM	10:15 PM	10:25 PM
9:30 PM	9:37 PM	9:50 PM	10:00 PM	10:08 PM	10:18 PM	10:28 PM	10:38 PM	10:45 PM	10:55 PM
10:00 PM	10:07 PM	10:20 PM	10:30 PM	10:38 PM	10:48 PM	10:58 PM	11:08 PM	11:15 PM	
10:30 PM	10:37 PM	10:50 PM	11:00 PM	11:08 PM					
11:00 PM	11:07 PM	11:20 PM	11:30 PM						



Route 12 - Western Avenue SUNDAY

Going away from downtown					Going toward downtown				
Knoxville Station Bay E	Cumberland and James Agee	Food City Western Ave.	Sherman NB and Texas	Western after McKamey	Western after McKamey	Sherman NB and Texas	Western EB (Cherokee Health)	Cumberland and Phillip Fulmer Way	Knoxville Station Bay E
		<i>Transfer to Rt. 15</i>					<i>Transfer to Rt. 15</i>		
1	2	3	4	5	5	6	7	8	9
					7:48 AM	7:58 AM	8:08 AM	8:15 AM	8:25 AM
					8:18 AM	8:28 AM	8:38 AM	8:45 AM	8:55 AM
8:00 AM	8:07 AM	8:20 AM	8:30 AM	8:38 AM	8:48 AM	8:58 AM	9:08 AM	9:15 AM	9:25 AM
8:30 AM	8:37 AM	8:50 AM	9:00 AM	9:08 AM	9:18 AM	9:28 AM	9:38 AM	9:45 AM	9:55 AM
9:00 AM	9:07 AM	9:20 AM	9:30 AM	9:38 AM	9:48 AM	9:58 AM	10:08 AM	10:15 AM	10:25 AM
9:30 AM	9:37 AM	9:50 AM	10:00 AM	10:08 AM	10:18 AM	10:28 AM	10:38 AM	10:45 AM	10:55 AM
10:00 AM	10:07 AM	10:20 AM	10:30 AM	10:38 AM	10:48 AM	10:58 AM	11:08 AM	11:15 AM	11:25 AM
10:30 AM	10:37 AM	10:50 AM	11:00 AM	11:08 AM	11:18 AM	11:28 AM	11:38 AM	11:45 AM	11:55 AM
11:00 AM	11:07 AM	11:20 AM	11:30 AM	11:38 AM	11:48 AM	11:58 AM	12:08 PM	12:15 PM	12:25 PM
11:30 AM	11:37 AM	11:50 AM	12:00 PM	12:08 PM	12:18 PM	12:28 PM	12:38 PM	12:45 PM	12:55 PM
12:00 PM	12:07 PM	12:20 PM	12:30 PM	12:38 PM	12:48 PM	12:58 PM	1:08 PM	1:15 PM	1:25 PM
12:30 PM	12:37 PM	12:50 PM	1:00 PM	1:08 PM	1:18 PM	1:28 PM	1:38 PM	1:45 PM	1:55 PM
1:00 PM	1:07 PM	1:20 PM	1:30 PM	1:38 PM	1:48 PM	1:58 PM	2:08 PM	2:15 PM	2:25 PM
1:30 PM	1:37 PM	1:50 PM	2:00 PM	2:08 PM	2:18 PM	2:28 PM	2:38 PM	2:45 PM	2:55 PM
2:00 PM	2:07 PM	2:20 PM	2:30 PM	2:38 PM	2:48 PM	2:58 PM	3:08 PM	3:15 PM	3:25 PM
2:30 PM	2:37 PM	2:50 PM	3:00 PM	3:08 PM	3:18 PM	3:28 PM	3:38 PM	3:45 PM	3:55 PM
3:00 PM	3:07 PM	3:20 PM	3:30 PM	3:38 PM	3:48 PM	3:58 PM	4:08 PM	4:15 PM	4:25 PM
3:30 PM	3:37 PM	3:50 PM	4:00 PM	4:08 PM	4:18 PM	4:28 PM	4:38 PM	4:45 PM	4:55 PM
4:00 PM	4:07 PM	4:20 PM	4:30 PM	4:38 PM	4:48 PM	4:58 PM	5:08 PM	5:15 PM	5:25 PM
4:30 PM	4:37 PM	4:50 PM	5:00 PM	5:08 PM	5:18 PM	5:28 PM	5:38 PM	5:45 PM	5:55 PM
5:00 PM	5:07 PM	5:20 PM	5:30 PM	5:38 PM	5:48 PM	5:58 PM	6:08 PM	6:15 PM	6:25 PM
5:30 PM	5:37 PM	5:50 PM	6:00 PM	6:08 PM	6:18 PM	6:28 PM	6:38 PM	6:45 PM	6:55 PM
6:00 PM	6:07 PM	6:20 PM	6:30 PM	6:38 PM	6:48 PM	6:58 PM	7:08 PM	7:15 PM	7:25 PM
6:30 PM	6:37 PM	6:50 PM	7:00 PM	7:08 PM	7:18 PM	7:28 PM	7:38 PM	7:45 PM	7:55 PM
7:00 PM	7:07 PM	7:20 PM	7:30 PM	7:38 PM	7:48 PM	7:58 PM	8:08 PM	8:15 PM	
7:30 PM	7:37 PM	7:50 PM	8:00 PM	8:08 PM					
8:00 PM	8:07 PM	8:20 PM	8:30 PM						



Legend

- Route Timepoint
- Transfer Point
- Bus Stop

Points of Interest

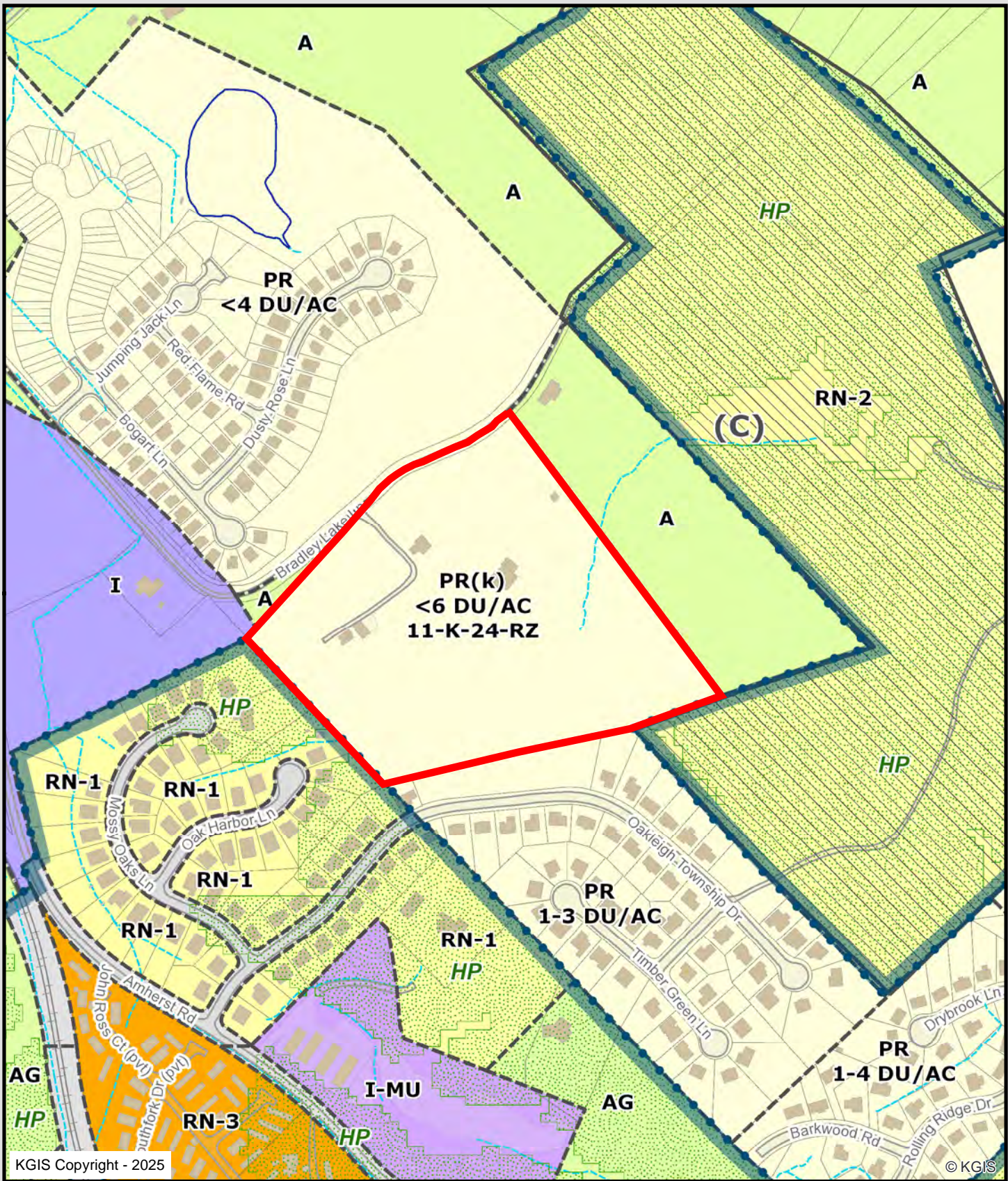
- Hospital
- Library
- Point of Interest
- Post Office
- School

0 0.25 0.5
Miles



APPENDIX C

ZONING MAP



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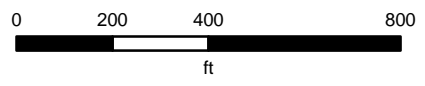
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Zoning Map

1.13.25



Printed: 1/13/2025 at 5:28:55 PM



Knoxville - Knox County - KUB Geographic Information System

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APPENDIX D

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Amherst Road (SB and NB)
 Minor Street: Bradley Lake Lane (WB)
 Traffic Control: Stop Sign on Minor Street

12/18/2024 (Wednesday)
 Overcast and Rain Showers
 Conducted by: Ajax Engineering

TIME BEGIN	Amherst Road SOUTHBOUND		Bradley Lake Lane WESTBOUND		Amherst Road NORTHBOUND		VEHICLE TOTAL	PEAK HOUR
	LT	THRU	LT	RT	THRU	RT		
7:00 AM	0	56	5	5	56	1	123	
7:15 AM	3	60	4	9	80	1	157	7:15 AM - 8:15 AM
7:30 AM	2	89	4	12	68	1	176	
7:45 AM	1	79	3	3	59	1	146	
8:00 AM	3	76	1	4	47	0	131	
8:15 AM	2	68	2	3	44	2	121	
8:30 AM	1	60	0	5	44	2	112	
8:45 AM	1	50	4	7	42	0	104	
TOTAL	13	538	23	48	440	8	1070	
2:00 PM	5	47	0	1	56	0	109	
2:15 PM	3	46	1	2	69	0	121	
2:30 PM	3	45	1	6	67	0	122	
2:45 PM	7	56	0	4	55	1	123	
3:00 PM	2	62	1	3	61	1	130	
3:15 PM	1	64	1	2	86	2	156	
3:30 PM	5	63	1	3	71	1	144	
3:45 PM	4	66	1	2	65	2	140	
4:00 PM	2	54	1	3	54	0	114	
4:15 PM	3	68	0	0	91	1	163	4:15 PM - 5:15 PM
4:30 PM	3	55	1	5	84	1	149	
4:45 PM	2	65	0	4	87	2	160	
5:00 PM	4	50	2	1	102	4	163	
5:15 PM	3	49	2	4	94	3	155	
5:30 PM	5	62	0	2	84	4	157	
5:45 PM	6	44	1	7	56	2	116	
TOTAL	58	896	13	49	1182	24	2222	

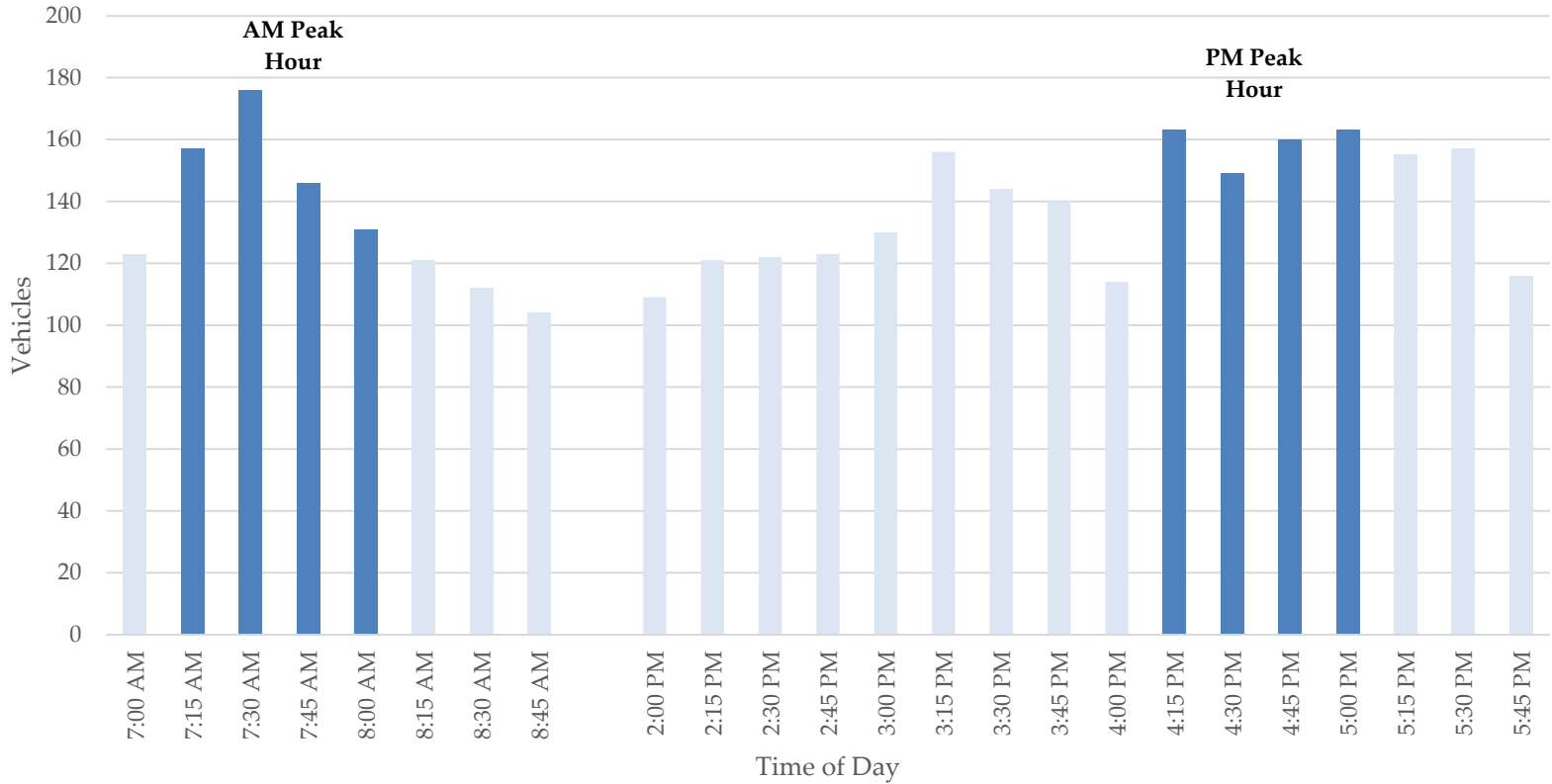
2024 AM Peak Hour **7:15 AM - 8:15 AM**

TIME BEGIN	Amherst Road SOUTHBOUND		Bradley Lake Lane WESTBOUND		Amherst Road NORTHBOUND	
	LT	THRU	LT	RT	THRU	RT
7:15 AM	3	60	4	9	80	1
7:30 AM	2	89	4	12	68	1
7:45 AM	1	79	3	3	59	1
8:00 AM	3	76	1	4	47	0
TOTAL	9	304	12	28	254	3
PHF	0.75	0.85	0.75	0.58	0.79	0.75
TRUCK %	0.0%	2.6%	0.0%	0.0%	5.5%	0.0%

2024 PM Peak Hour **4:15 PM - 5:15 PM**

TIME BEGIN	Amherst Road SOUTHBOUND		Bradley Lake Lane WESTBOUND		Amherst Road NORTHBOUND	
	LT	THRU	LT	RT	THRU	RT
4:15 PM	3	68	0	0	91	1
4:30 PM	3	55	1	5	84	1
4:45 PM	2	65	0	4	87	2
5:00 PM	4	50	2	1	102	4
TOTAL	12	238	3	10	364	8
PHF	0.75	0.88	0.38	0.50	0.89	0.50
TRUCK %	0.0%	1.3%	0.0%	0.0%	0.8%	0.0%

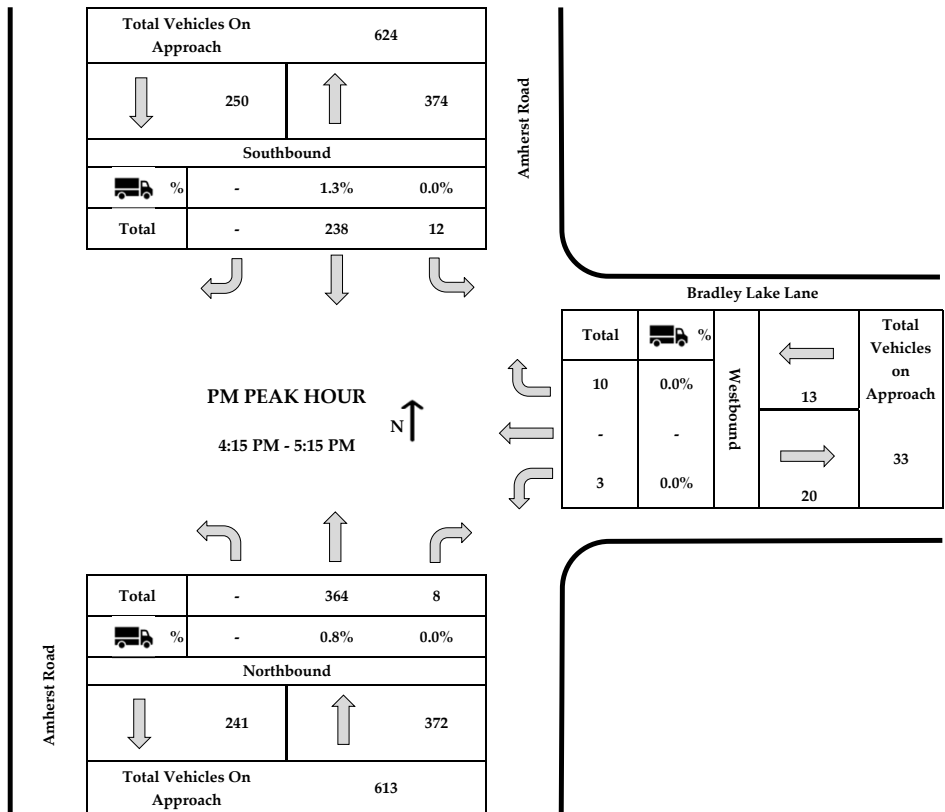
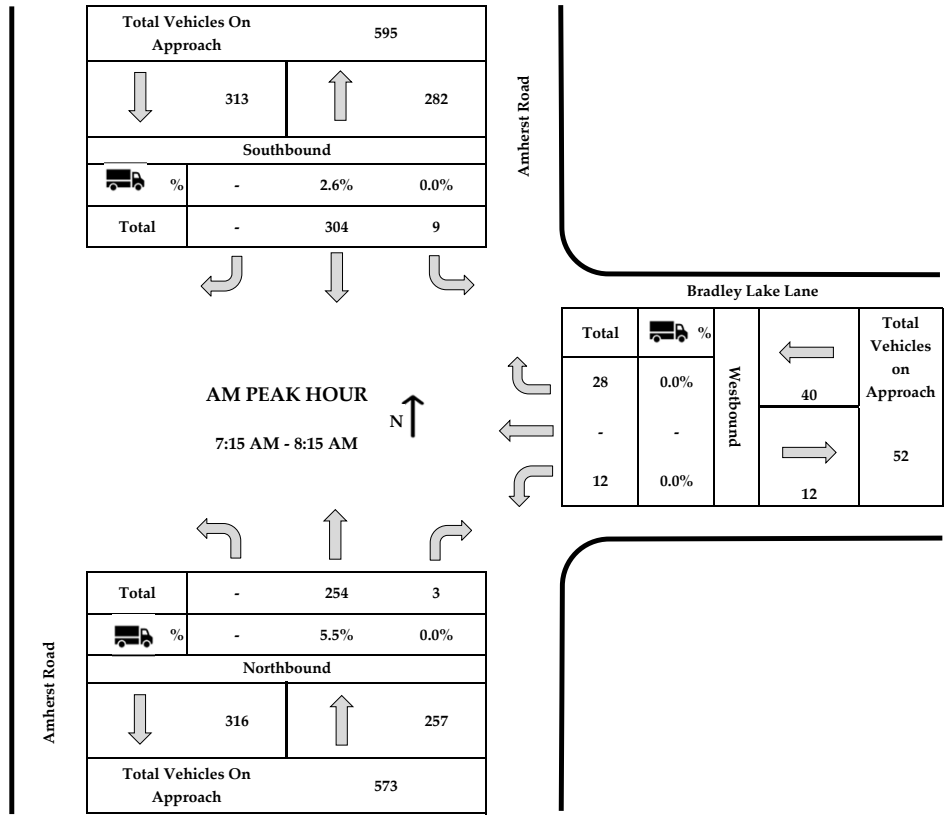
**Amherst Road at Bradley Lake Lane
Intersection Traffic Count Totals
12/18/2024**



PEAK HOUR DATA

Major Street: Amherst Road (SB and NB)
 Minor Street: Bradley Lake Lane (WB)
 Traffic Control: Stop Sign on Minor Street

12/18/2024 (Wednesday)
 Overcast and Rain Showers
 Conducted by: Ajax Engineering



APPENDIX E

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 12)

EXISTING CONDITIONS

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		T			T
Traffic Vol, veh/h	12	28	254	3	9	304
Future Vol, veh/h	12	28	254	3	9	304
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	58	79	75	75	85
Heavy Vehicles, %	0	0	6	0	0	3
Mvmt Flow	16	48	322	4	12	358

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	705	324	0	0	326	0
Stage 1	324	-	-	-	-	-
Stage 2	382	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	406	722	-	-	1246	-
Stage 1	738	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	401	722	-	-	1246	-
Mov Cap-2 Maneuver	401	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	686	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	11.69	0	0.26
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	602	58
HCM Lane V/C Ratio	-	-	0.107	0.01
HCM Ctrl Dly (s/v)	-	-	11.7	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		T			T
Traffic Vol, veh/h	3	10	364	8	12	238
Future Vol, veh/h	3	10	364	8	12	238
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	50	89	50	75	88
Heavy Vehicles, %	0	0	1	0	0	3
Mvmt Flow	8	20	409	16	16	270

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	719	417	0	0	425
Stage 1	417	-	-	-	-
Stage 2	302	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	398	640	-	-	1145
Stage 1	669	-	-	-	-
Stage 2	754	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	391	640	-	-	1145
Mov Cap-2 Maneuver	391	-	-	-	-
Stage 1	669	-	-	-	-
Stage 2	742	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	11.99	0	0.46
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	543	101
HCM Lane V/C Ratio	-	-	0.051	0.014
HCM Ctrl Dly (s/v)	-	-	12	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

PROJECTED CONDITIONS WITHOUT THE PROJECT

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		T			T
Traffic Vol, veh/h	12	28	264	3	9	316
Future Vol, veh/h	12	28	264	3	9	316
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	58	79	75	75	85
Heavy Vehicles, %	0	0	6	0	0	3
Mvmt Flow	16	48	334	4	12	372

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	732	336	0	0	338	0
Stage 1	336	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	391	710	-	-	1232	-
Stage 1	728	-	-	-	-	-
Stage 2	684	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	387	710	-	-	1232	-
Mov Cap-2 Maneuver	387	-	-	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	676	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	11.87	0	0.25
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	588	56
HCM Lane V/C Ratio	-	-	0.109	0.01
HCM Ctrl Dly (s/v)	-	-	11.9	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		T			T
Traffic Vol, veh/h	3	10	379	8	12	248
Future Vol, veh/h	3	10	379	8	12	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	50	89	50	75	88
Heavy Vehicles, %	0	0	1	0	0	3
Mvmt Flow	8	20	426	16	16	282

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	748	434	0	0	442	0
Stage 1	434	-	-	-	-	-
Stage 2	314	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	383	626	-	-	1129	-
Stage 1	658	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	377	626	-	-	1129	-
Mov Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	658	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	12.21	0	0.44
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	527	97
HCM Lane V/C Ratio	-	-	0.053	0.014
HCM Ctrl Dly (s/v)	-	-	12.2	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

PROJECTED CONDITIONS WITH THE PROJECT

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	3.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	80	264	9	25	316
Future Vol, veh/h	33	80	264	9	25	316
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	58	79	75	75	85
Heavy Vehicles, %	0	0	6	0	0	3
Mvmt Flow	44	138	334	12	33	372

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	779	340	0	0	346	0
Stage 1	340	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	367	707	-	-	1224	-
Stage 1	725	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	355	707	-	-	1224	-
Mov Cap-2 Maneuver	355	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	14.25	0	0.66
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	570	148
HCM Lane V/C Ratio	-	-	0.319	0.027
HCM Ctrl Dly (s/v)	-	-	14.2	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.4	0.1

HCM 7th TWSC
 3: Amherst Road & Bradley Lake Lane

Intersection						
Int Delay, s/veh	3.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	50	458	32	69	345
Future Vol, veh/h	20	50	458	32	69	345
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	50	89	50	75	88
Heavy Vehicles, %	0	0	1	0	0	3
Mvmt Flow	53	100	515	64	92	392

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1123	547	0	0	579	0
Stage 1	547	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	230	541	-	-	1005	-
Stage 1	584	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	203	541	-	-	1005	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	23.6	0	1.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	343	342
HCM Lane V/C Ratio	-	-	0.444	0.092
HCM Ctrl Dly (s/v)	-	-	23.6	8.9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	2.2	0.3

APPENDIX F

TRIP GENERATION DATA

Local Apartment Trip Generation Study

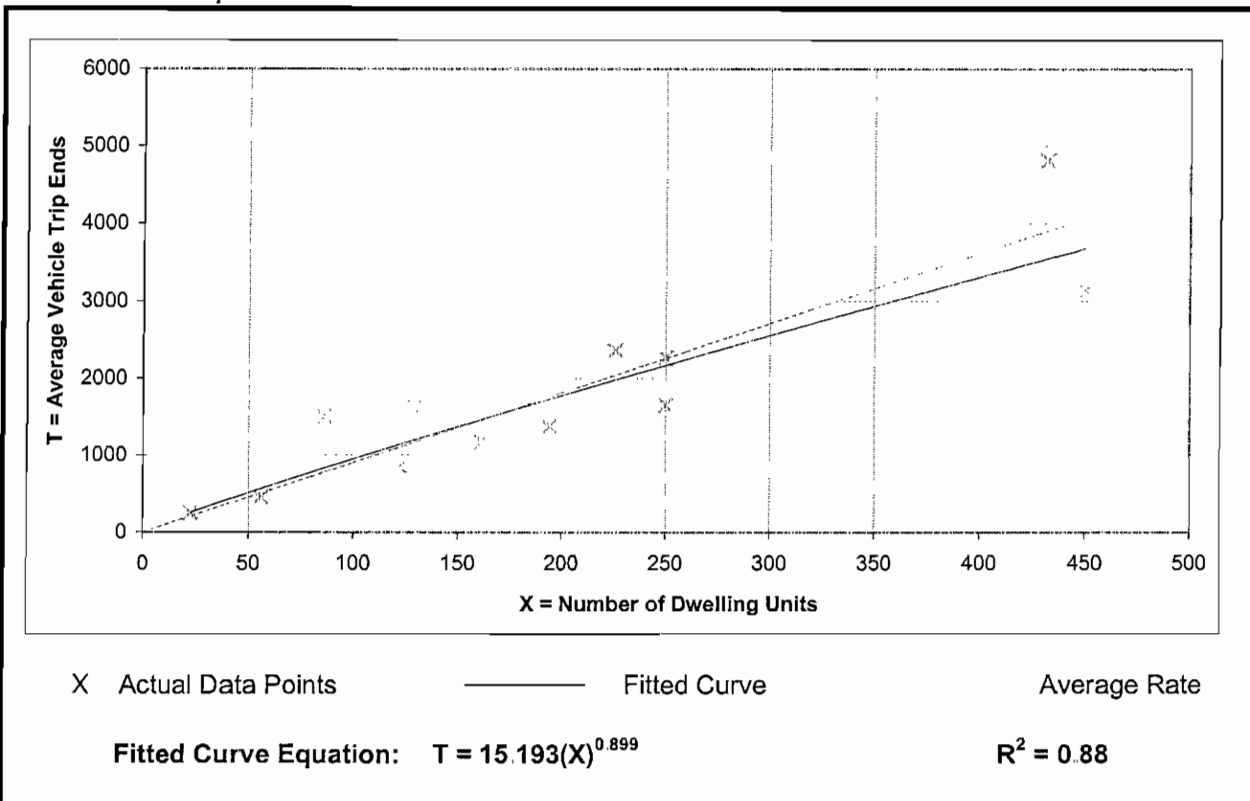
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 50% entering, 50% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
9.03	6.59 - 17.41	2.47

Data Plot and Equation



Local Apartment Trip Generation Study

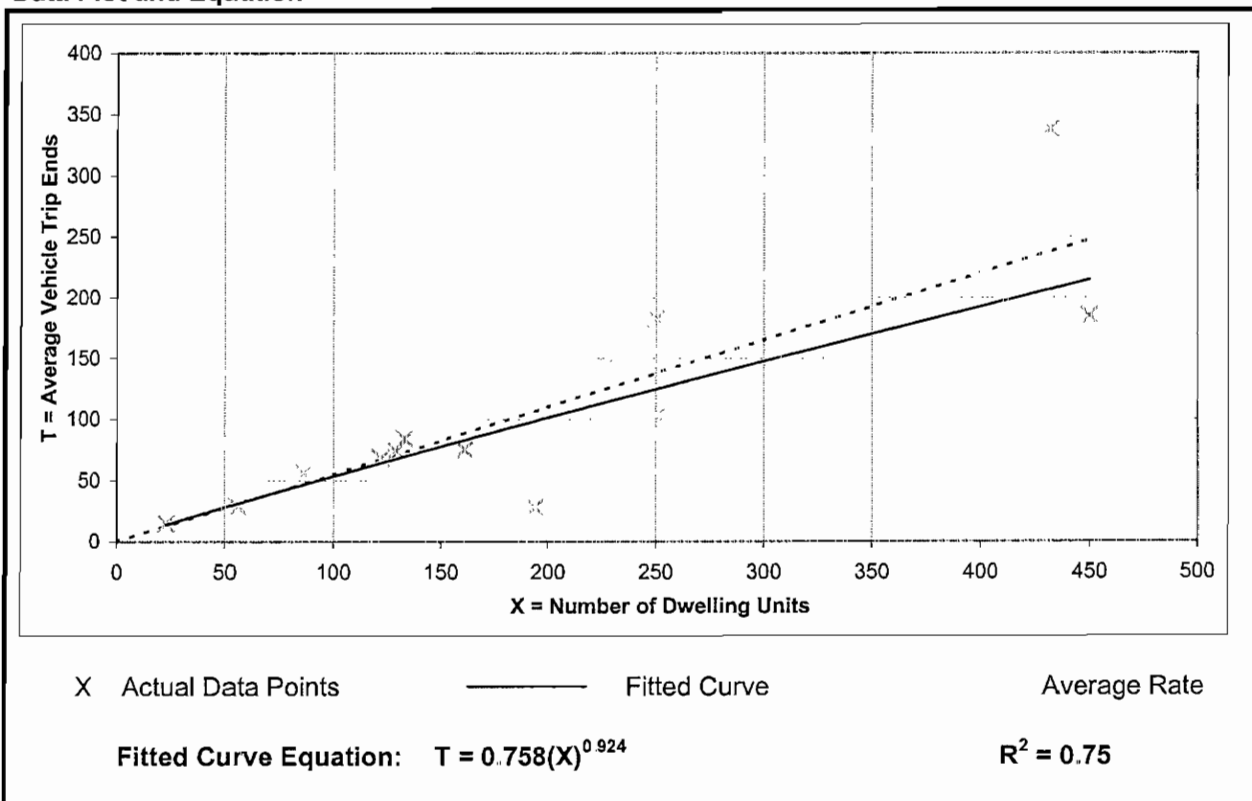
Average Vehicle Trip Ends vs: Dwelling Units
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.

Number of Studies: 13
 Average Number of Dwelling Units: 193
 Directional Distribution: 22% entering, 78% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.55	0.14 - 0.78	0.18

Data Plot and Equation



Local Apartment Trip Generation Study

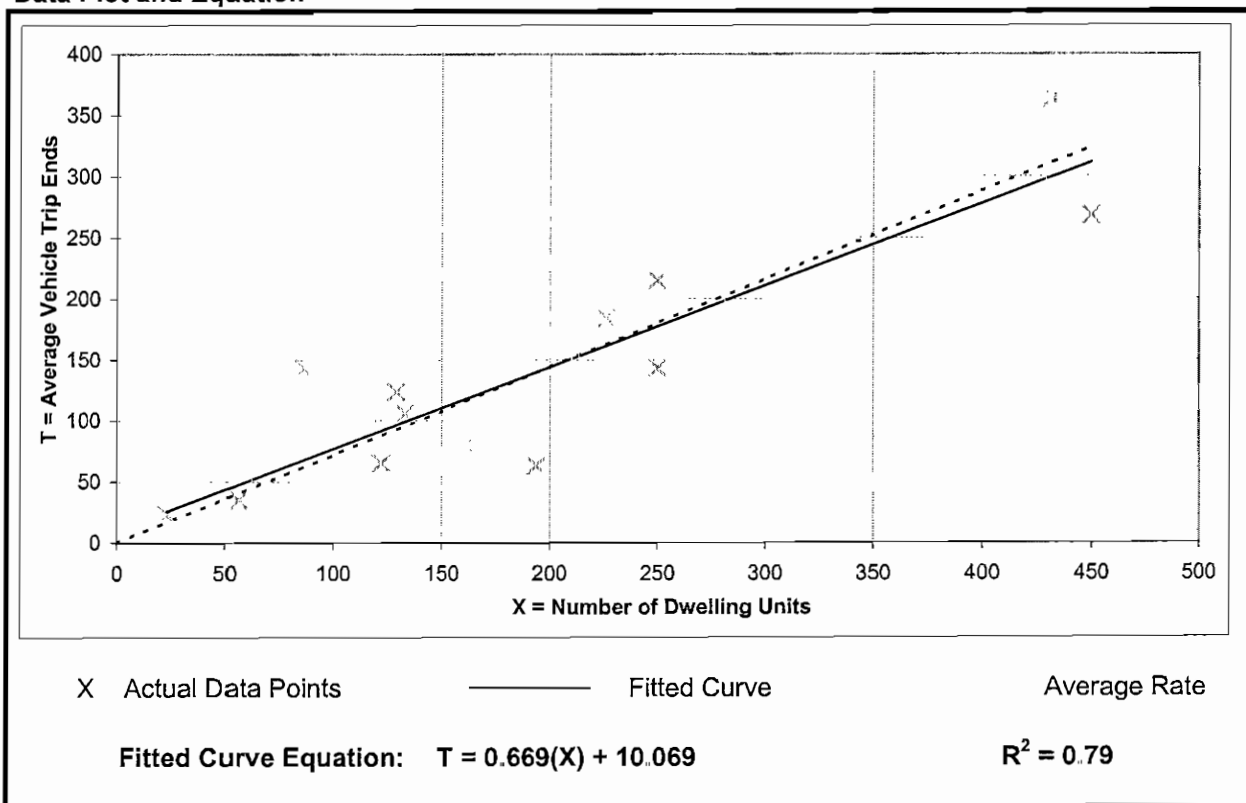
Average Vehicle Trip Ends vs: Dwelling Units
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.

Number of Studies: 13
 Average Number of Dwelling Units: 193
 Directional Distribution: 55% entering, 45% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.72	0.32 - 1.66	0.25

Data Plot and Equation



Land Use: 210

Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

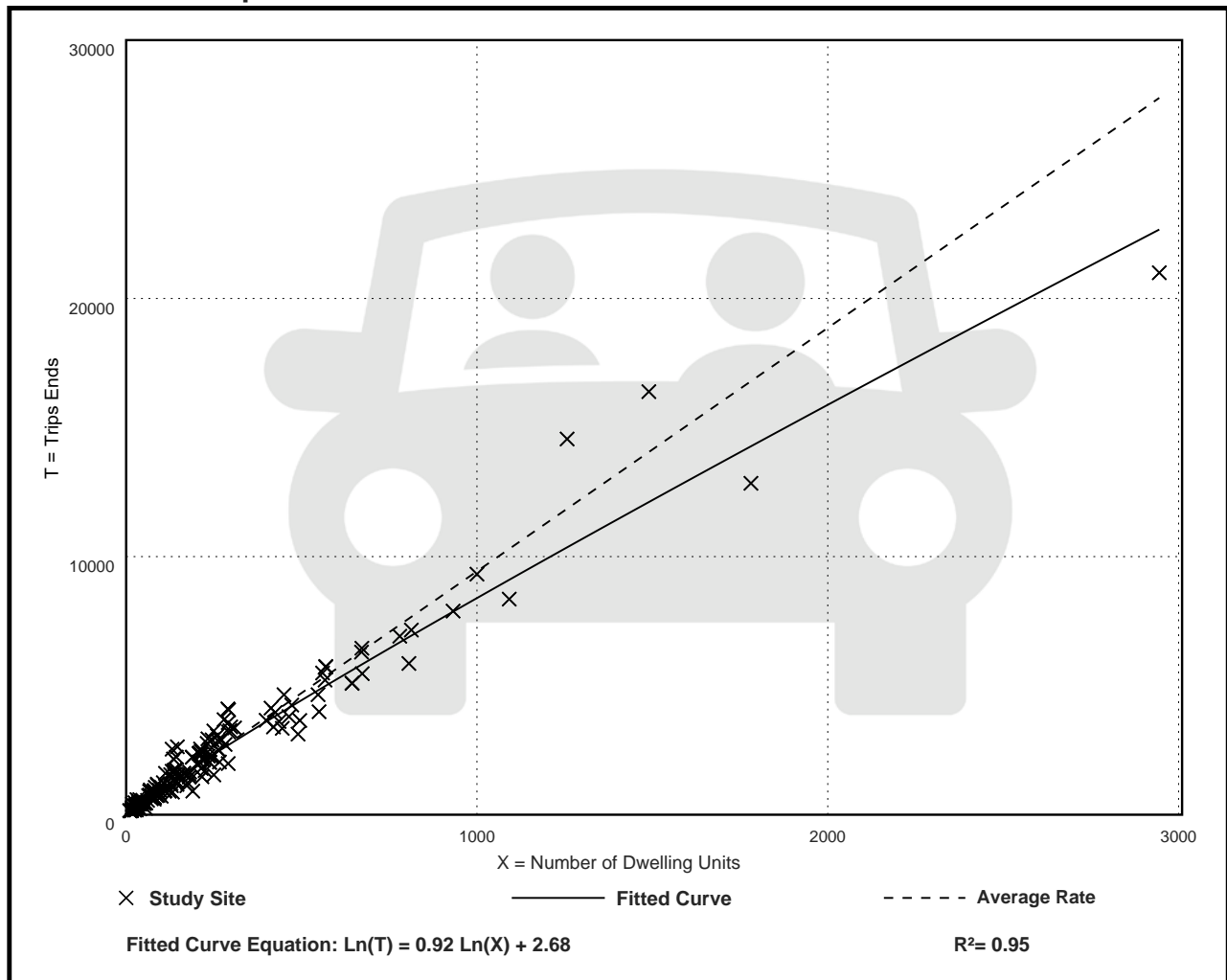
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

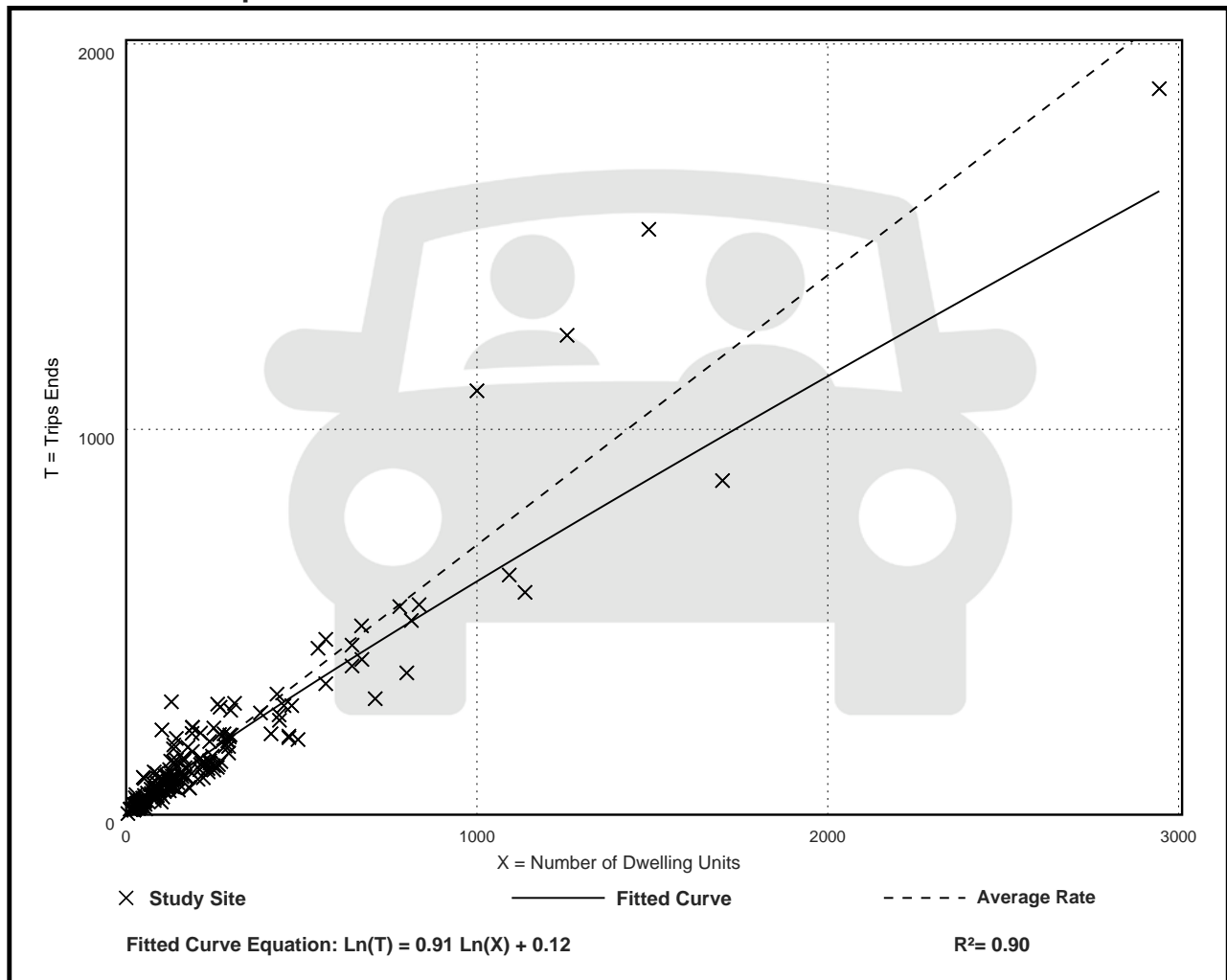
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

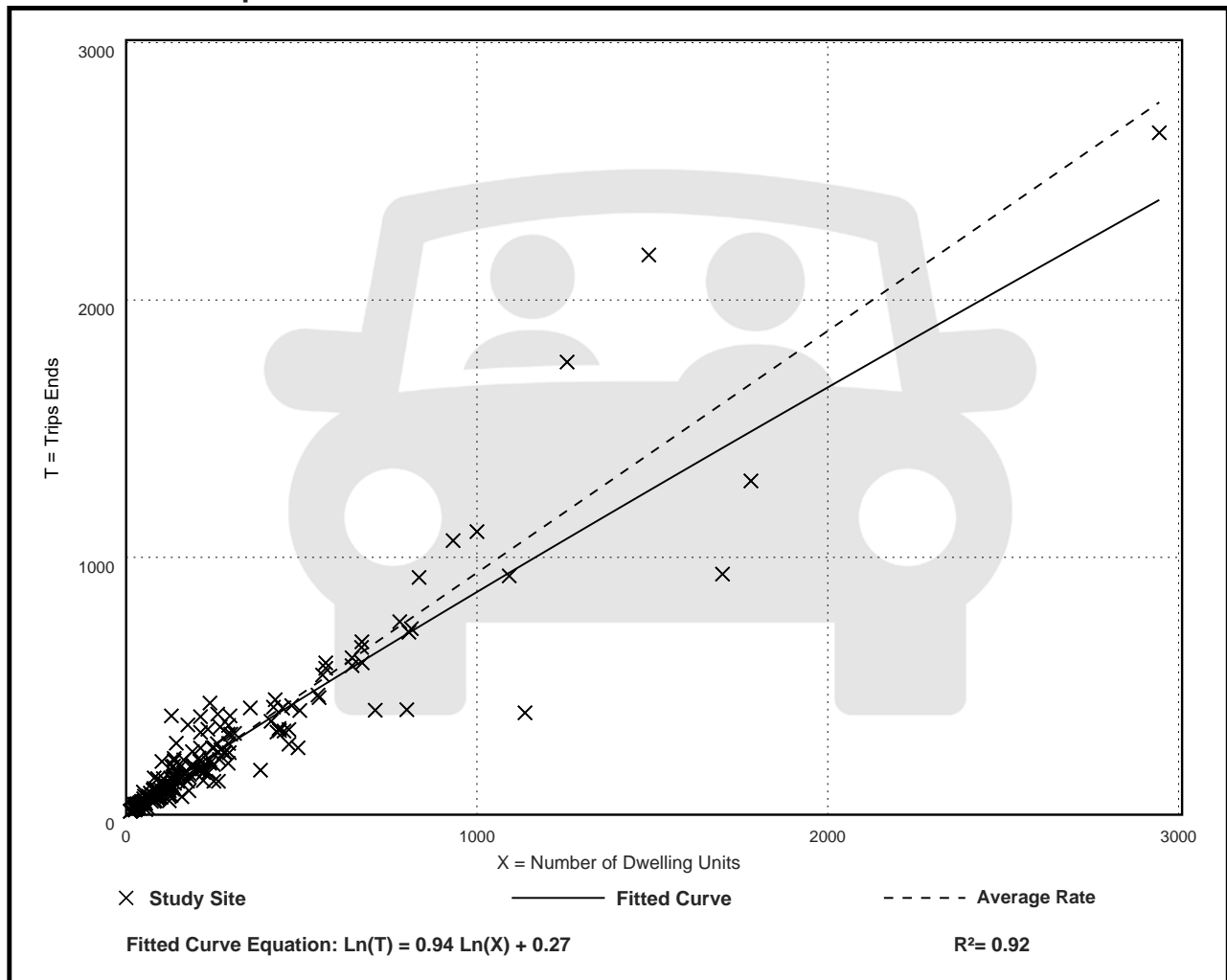
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Land Use: 435

Multipurpose Recreational Facility

Description

A multipurpose recreational facility contains two or more of the following land uses combined at one site: miniature golf, batting cages, video arcade, bumper boats, go-carts, and golf driving range. A refreshment area may also be provided. Golf course (Land Use 430), miniature golf course (Land Use 431), golf driving range (Land Use 432), batting cages (Land Use 433), rock climbing gym (Land Use 434), and trampoline park (Land Use 436) are related uses.

Additional Data

The sites were surveyed in the 1990s and the 2000s in Oregon.

Source Numbers

583, 611, 618

Multipurpose Recreational Facility (435)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 3

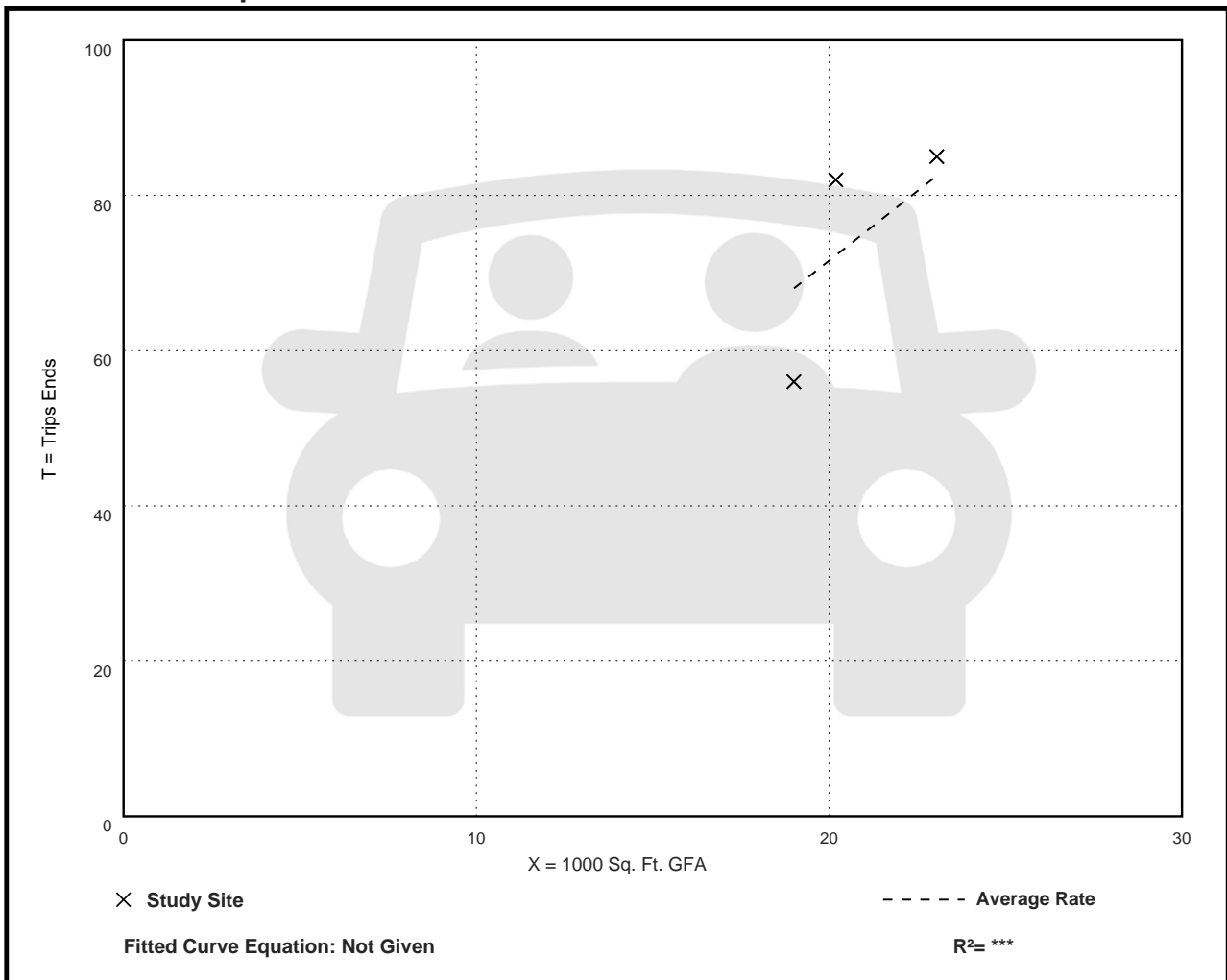
Avg. 1000 Sq. Ft. GFA: 21

Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.58	2.95 - 4.06	0.55

Data Plot and Equation



TRIP GENERATION FOR 2921 BRADLEY LAKE LANE SUBDIVISION

32 Attached Townhouses and 56 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Multi-Family Attached Townhouses	32	343	22%	78%		55%	45%	
				4	15	19	17	14	31
#210	Single-Family Detached Housing	56	592	26%	74%		63%	37%	
				11	33	44	37	21	58
Total New Volume Site Trips			935	15	48	63	54	35	89

ITE Trip Generation Manual, 11th Edition and Local Trip Rates

Trips calculated by using Fitted Curve Equations

TRIP GENERATION FOR 2921 BRADLEY LAKE LANE SUBDIVISION
32 Attached Townhouses

$$32 \text{ Units} = X$$

Weekday:

Fitted Curve Equation: $T = 15.193(X)^{0.899}$

$$T = 15 * 22.55$$

$$T = \underline{\underline{343 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $T = 0.758(X)^{0.924}$

$$T = 0.758 * 25$$

$$T = \underline{\underline{19 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $T = 0.669(X)+10.069$

$$T = 0.669 * 32 + 10.07$$

$$T = \underline{\underline{31 \text{ trips}}}$$

TRIP GENERATION FOR 2921 BRADLEY LAKE LANE SUBDIVISION

56 Single-Family Detached Houses

56 Residential Houses = X

Weekday:

Fitted Curve Equation: $\ln(T) = 0.92 \ln(X) + 2.68$

$$\ln(T) = 0.92 * 4.03 + 2.68$$

$$\ln(T) = 6.38$$

$$\underline{\underline{T = 592 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $\ln(T) = 0.91 \ln(X) + 0.12$

$$T = 0.91 * 4 + 0.12$$

$$\ln(T) = 3.78$$

$$\underline{\underline{T = 44 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $\ln(T) = 0.94 \ln(X) + 0.27$

$$\ln(T) = 0.94 * 4.03 + 0.27$$

$$\ln(T) = 4.05$$

$$\underline{\underline{T = 58 \text{ trips}}}$$

APPENDIX G

ADJACENT PROPERTY DEVELOPMENT SUBMITTAL



MEMORANDUM

TO: Knoxville-Knox County Planning Commission
FROM: Mike Reynolds, AICP, Principal Planner
DATE: Thursday, January 2, 2025
SUBJECT: Agenda Item # 39 / File # 1-C-25-OB
Similar use determination for indoor sports and recreation facility in the I (Industrial) zone.

STAFF RECOMMENDATION:

Approve indoor sports and recreational facility (NAICS 713940) as a permitted use in the I (Industrial) zone.

BACKGROUND:

The property at 3030 & 3060 Amherst Road is zoned I (Industrial), which allows the Planning Commission to approve “other uses of the same general character as those listed in this section (5.61.02. Uses permitted) as permitted uses and deemed appropriate”. The applicant requests that the Planning Commission approve “indoor sports and recreation facility” as a similar use to “indoor paintball ranges”, which is listed as a permitted use in the I zone. See Exhibit A for a detailed description of the proposed use and its comparison to the indoor paintball ranges use. If approved as requested, the indoor sports and recreation facility use will be permitted in all I-zoned properties.

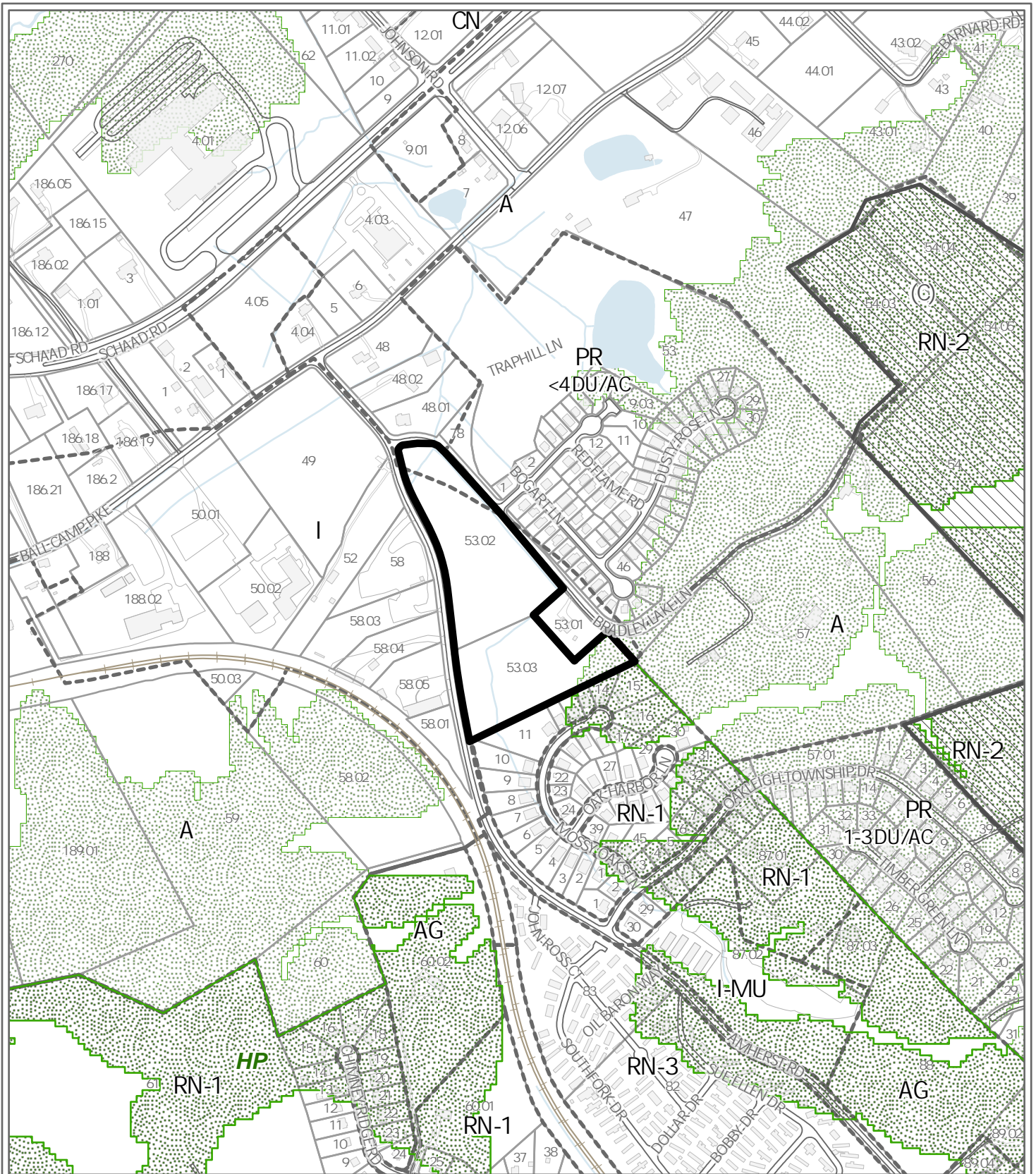
The general description of the I zone is it “provides areas in which the principal use of land is for manufacturing, assembling, fabrication and for warehousing and other uses which have heavy impacts and adverse effects on surrounding property. These uses do not depend primarily on frequent personal visits of customers or clients, but usually require good accessibility to major rail, air, or street transportation routes. Such uses are not properly associated with, nor compatible with residential, institutional and retail commercial uses.” While the proposed use is reliant on frequent personal visits from customers and clients, the location of properties with the I zone, typically being on major roads, is appropriate for the use.

Indoor paintball ranges, by definition, include airsoft ranges. This use is subject to the supplemental

regulations in Article 4.97.01.C., Standards for the approval of indoor and outdoor paintball/airsoft ranges. The only standards that apply in the I zone for indoor paintball/airsoft ranges are a minimum floor area of 25,000 sqft and a plan of operations being provided to the director of codes enforcement and administration, which must be submitted for review and approval by the county sheriff's department, the county health department, and the state department of transportation. These requirements were developed specifically for paintball/airsoft ranges and will not apply to the requested indoor sports and recreational facility use.

The I zone provides a NAICS (North American Industry Classification System, 1997 edition) code for most permitted uses (Section 5.61.2. Uses permitted). Any business listed under the NAICS classification for is considered permitted, provided all other zoning code requirements are fulfilled. The most similar NAICS code to the proposed use is "fitness and recreational sports centers" (NAICS 713940). The code description and uses under this code are in Exhibit B.

Staff recommends approval of the "indoor sports and recreation facility" similar use request, adding the NAICS code 713940.



OTHER BUSINESS

1-C-25-OB

Petitioner: Maddox, Steven K

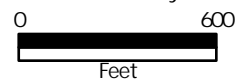


Purpose of Request: Similar use determination (County only)

Original Print Date: 12/11/2024

Knoxville - Knox County Planning Commission * City / County Building * Knoxville, TN 37902

Map No: 92
Jurisdiction: County



As the property owner and developer we have been approached by multiple indoor sports use tenants about wanting to lease space within our flex industrial buildings. The following write up serves both to describe the potential uses of these businesses, along with how this aligns with the existing zoning.

The proposed indoor sports facility aligns closely with already permitted uses in Knox County's industrial zoning, such as indoor paintball ranges, which establish a precedent for recreational and high-energy activities within industrial spaces. This comparison underscores the compatibility of the proposed facility with current zoning by showing how its operations, design, and community benefits are consistent with other approved recreational uses within the industrial classification.

Indoor paintball ranges are comparable to indoor sports facilities in terms of the physical demands placed on the building. Both uses:

- Require large, open spaces with high ceilings and ample floor space for movement and game play.
- Benefit from soundproofing and durable materials to contain noise and withstand the wear associated with active play.
- Use industrial zoning because the structure, design, and durability of these buildings are well-suited for high-intensity activities.

The proposed facility's sports offerings (such as indoor soccer, basketball, and volleyball) share similar spatial and structural requirements, making it a natural extension of permitted recreational activities within an industrial-zoned building.

1. Proposed Business Overview

The proposed use is an **indoor sports and recreational facility** designed to offer structured and flexible sports activities, including, but not limited to, indoor soccer, basketball, volleyball, pickleball, and fitness classes. Additional offerings may include youth sports programs, adult leagues, personal training sessions, and specialized fitness events. The facility aims to serve local residents, including families, youth organizations, and corporate clients, fostering community engagement and supporting health and wellness initiatives.

2. Rationale for Choosing a Flex Industrial Building

Flex industrial buildings are highly adaptable, providing ample space, high ceilings, and an open layout ideal for sports activities. The robust structure can support the installation of sports

EXHIBIT A

equipment, floor markings, and spectator areas. Moreover, **existing features** such as concrete floors, tall ceilings, and wide-span layouts minimize the need for extensive structural alterations, reducing construction time and costs, and allowing for quicker community access to recreational activities.

Key Flex Building Advantages:

- **High Ceilings:** Suitable for sports requiring height clearance, such as volleyball and basketball.
- **Large Open Floor Plans:** Support multiple sports areas or courts without major modifications.

3. Facility Design and Operational Overview

The proposed layout may include:

- **Sports Courts:** Multiple, clearly designated spaces for sports activities, divided using temporary or permanent barriers as required.
- **Fitness and Training Areas:** Dedicated zones for physical fitness classes, personal training, and functional workouts.
- **Spectator and Waiting Areas:** Designated spaces for visitors, parents, or spectators to view games or activities comfortably.
- **Administrative and Support Spaces:** Offices for staff, restrooms, locker rooms, etc.

Hours of Operation:

- Typical hours of operation are from **10 a.m. to 10 p.m.**, with flexible scheduling for various age groups, leagues, and events. This schedule aligns with community demand, accommodating both daytime and evening users without causing disturbance during late-night hours.

4. Impact on Community and Adjacent Properties

The indoor sports facility is expected to have a positive impact on the surrounding area by:

- **Job Creation:** Providing employment opportunities, from managerial to entry-level positions, which can be particularly valuable in industrial areas seeking economic stimulation.
- **Community Health and Wellness:** Facilitating access to physical fitness activities promotes health, especially for families and youth, in line with community health objectives.
- **Increased Traffic Flow During Non-Peak Hours:** As most facility use occurs outside typical industrial hours (evenings and weekends), it lessens the impact on daily industrial operations and traffic patterns.

5. Traffic, Parking, and Noise Considerations

Traffic:

Given that the facility's busiest hours are outside typical work hours, the increased traffic will not significantly affect existing traffic flows or disrupt adjacent businesses.

Parking:

The facility will provide **adequate parking for peak usage times**, with plans to utilize existing spaces and expand if needed. Analysis has shown that nearby industrial tenants typically vacate the area after business hours, freeing up additional parking spaces.

Noise Control:

The use of sports facilities fits well within an industrial zoning that already is prepared for the potential of higher noise. With that said, indoor sports largely serve to lower the amount of noise surrounding these activities and can often be quieter than other flex industrial uses.

6. Compliance with Zoning Requirements

The proposed use aligns with flex-industrial zoning classifications and broader community and municipal goals. Flex-industrial zones often encourage a **diverse array of business uses** to enhance property values and support community development. By demonstrating a minimal impact on adjacent industrial activities and outlining the benefits to community health, well-being, and local economy, the zoning board can see that the indoor sports business is a compatible and beneficial use.

Floor Plan Description:

The layout of Amherst Business Park offers an ideal setting for an indoor sports facility, as its design and infrastructure are already well-suited to support a high-activity recreational use within flex buildings. These flex buildings are built with open spaces, high ceilings, and durable materials that can readily accommodate sports courts, fitness areas, and spectator zones without extensive modifications. This allows for a seamless transition to a sports facility, minimizing construction costs and preserving the natural flow of the park.

Furthermore, the park's entrance is situated on a classified street rather than a local street, a significant advantage for an indoor sports use. This strategic placement on a classified street ensures smooth access for visitors, allowing for efficient traffic flow in and out of the park without

EXHIBIT A

impacting residential streets or local traffic patterns. This layout benefits both the community and facility users, as the classified street can handle the increased traffic during peak usage times, such as evenings and weekends, when sports leagues, fitness classes, and recreational events are likely to draw more visitors.

In summary, Amherst Business Park's existing flex buildings and entrance on a classified street make it a perfect match for an indoor sports facility. The park's thoughtful design aligns with the operational needs of a sports business, creating a venue that is accessible, functional, and seamlessly integrated into the surrounding area.



Menu



NAICS Code Description

NAICS Code/Keyword Search



713940 - Fitness and Recreational Sports Centers

Top Businesses by Annual Sales for 713940 – Click for Complete Profiles:

Life Time Group Holdings Inc	Town Sports Intl Holdings Inc
St John Health System Inc	Equinox Holdings Inc
Planet Fitness Inc	St Charles Parish Pub Schools
Trustmark Mutual Holding Co	24 Hour Fitness Worldwide Inc
Affinity Group Holding LLC	Xponential Fitness Inc

This industry comprises establishments primarily engaged in operating fitness and recreational sports facilities featuring exercise and other active physical fitness conditioning or recreational sports activities, such as swimming, skating, or racquet sports.

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Illustrative Examples:

EXHIBIT B

Aerobic dance or exercise centers
 Ice or roller skating rinks
 Gymnasiums
 Physical fitness centers
 Handball, racquetball, or tennis club facilities
 Swimming or wave pools

Cross-References.

- Establishments primarily engaged in providing non-medical services to assist clients in attaining or maintaining a desired weight are classified in U.S. Industry 812191, Diet and Weight Reducing Centers;
- Establishments primarily engaged in providing personal fitness training services are classified in Industry 812990, All Other Personal Services;
- Establishments primarily engaged in operating health resorts and spas where recreational facilities are combined with accommodations are classified in Industry 721110, Hotels (except Casino Hotels) and Motels; and
- Recreational sports clubs (i.e., sports teams) not operating sports facilities are classified in Industry 713990, All Other Amusement and Recreation Industries.

<u>2007 NAICS</u>	<u>2012 NAICS</u>	<u>2017 NAICS</u>	<u>Index Entries for 713940</u>
713940	713940	713940	Aerobic dance and exercise centers
713940	713940	713940	Athletic club facilities, physical fitness
713940	713940	713940	Body building studios, physical fitness
713940	713940	713940	Dance centers, aerobic
713940	713940	713940	Exercise centers
713940	713940	713940	Fitness centers
713940	713940	713940	Fitness salons
713940	713940	713940	Fitness spas without accom

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713940	713940	713940	Gymnasiums	EXHIBIT B
713940	713940	713940	Gyms, physical fitness	
713940	713940	713940	Handball club facilities	
713940	713940	713940	Health club facilities, physical fitness	
713940	713940	713940	Health spas without accommodations, physical fitness	
713940	713940	713940	Health studios, physical fitness	
713940	713940	713940	Ice skating rinks	
713940	713940	713940	Physical fitness centers	
713940	713940	713940	Physical fitness facilities	
713940	713940	713940	Physical fitness studios	
713940	713940	713940	Racquetball club facilities	
713940	713940	713940	Recreational sports club facilities	
713940	713940	713940	Rinks, ice or roller skating	
713940	713940	713940	Roller skating rinks	
713940	713940	713940	Spas without accommodations, fitness	
713940	713940	713940	Sports club facilities, physical fitness	
713940	713940	713940	Squash club facilities	
713940	713940	713940	Strength development centers	
713940	713940	713940	Swimming pools	
713940	713940	713940	Tennis club facilities	
713940	713940	713940	Tennis courts	
713940	713940	713940	Wave pools	
713940	713940	713940	Weight training centers	



Similar Use Determination

Knox County Only

Name of Applicant: Steven K. Maddox

Date Filed: ~~10/24/2024~~ ^{11/05/2024} Application Accepted by: M/. Reynolds

Fee Amount: \$250.00 Meeting Date: January 9, 2025 File Number: 1-C-25-OB
Pd. 11/21/2024, SG

<p>PROPERTY INFORMATION</p> <p>Address: <u>3030 and 3060 Amherst Rd. Knoxville, TN</u></p> <p>General Location: <u>At the corner of Amherst and Bradley Lake Lane</u></p> <p>Tract Size: <u>11.43 Acres</u> No. of Units: _____</p> <p>Zoning District: <u>W6</u></p> <p>Existing Land Use: <u>Zoned Industrial</u> <u>Currently Flex Industrial building being constructed</u></p> <p>Planning Sector: _____</p> <p>Sector Plan Proposed Land Use Classification: _____</p> <p>Growth Policy Plan Designation: <u>UGB</u></p> <p>Census Tract: <u>46.07</u></p> <p>Traffic Zone: _____</p> <p>Parcel ID Number(s): <u>092 05303 and 092 05302</u></p> <p>Jurisdiction: <input checked="" type="checkbox"/> County Commission <u>3</u> District</p>	<p>PROPERTY OWNER/OPTION HOLDER</p> <p>PLEASE PRINT Name: <u>Steven K. Maddox</u></p> <p>Company: <u>Maddox Construction Co. Inc.</u></p> <p>Address: <u>100 Dalton Place Way Suite 105</u></p> <p>City: <u>Knoxville</u> State: <u>TN</u> Zip: <u>37912</u></p> <p>Telephone: <u>865-805-5501</u></p> <p>Fax: _____</p> <p>E-mail: <u>smaddox@maddoxcompany.com</u></p>
<p>USE REQUESTED</p> <p><u>Indoor Sports Usage</u></p> <p>ATTACH AS A SEPARATE DOCUMENT:</p> <p><input checked="" type="checkbox"/> A detailed description of the proposed specific use. Including: number of employees, hours of operation, products made or sold, services performed, special equipment used.</p> <p><input checked="" type="checkbox"/> A statement indicating how the various permitted uses listed in the zoning regulations are similar in nature, operations, and character to the proposed use in this application and how they would be compatible.</p> <p><input checked="" type="checkbox"/> Floor/site plan factors. Details regarding limitations (such as maximum floor area or site area) on building and site development for the following: office areas, warehousing areas, manufacturing areas, showroom/retail areas.</p>	<p>APPLICATION CORRESPONDENCE</p> <p>All correspondence relating to this application should be sent to:</p> <p>PLEASE PRINT Name: <u>Dalton Maddox</u></p> <p>Company: <u>Maddox Construction Co. Inc.</u></p> <p>Address: <u>100 Dalton Place Way Suite 105</u></p> <p>City: <u>Knoxville</u> State: <u>TN</u> Zip: <u>37912</u></p> <p>Telephone: <u>865-318-5178</u></p> <p>Fax: _____</p> <p>E-mail: <u>dmaddox@maddoxcompany.com</u></p>
	<p>APPLICATION AUTHORIZATION</p> <p>I hereby certify that I am the authorized applicant, representing ALL property owners involved in this request or holders of option on same, whose signatures are included on the back of this form.</p> <p>Signature: <u>[Signature]</u></p> <p>PLEASE PRINT Name: <u>Steven K. Maddox</u></p> <p>Company: <u>Maddox Construction Co. Inc.</u></p> <p>Address: <u>100 Dalton Place Way Ste 105</u></p> <p>City: <u>Knoxville</u> State: <u>TN</u> Zip: <u>37912</u></p> <p>Telephone: <u>865-805-5501</u></p> <p>E-mail: <u>smaddox@maddoxcompany.com</u></p>

APPENDIX H

2022 CENSUS BUREAU DATA

Destination Analysis

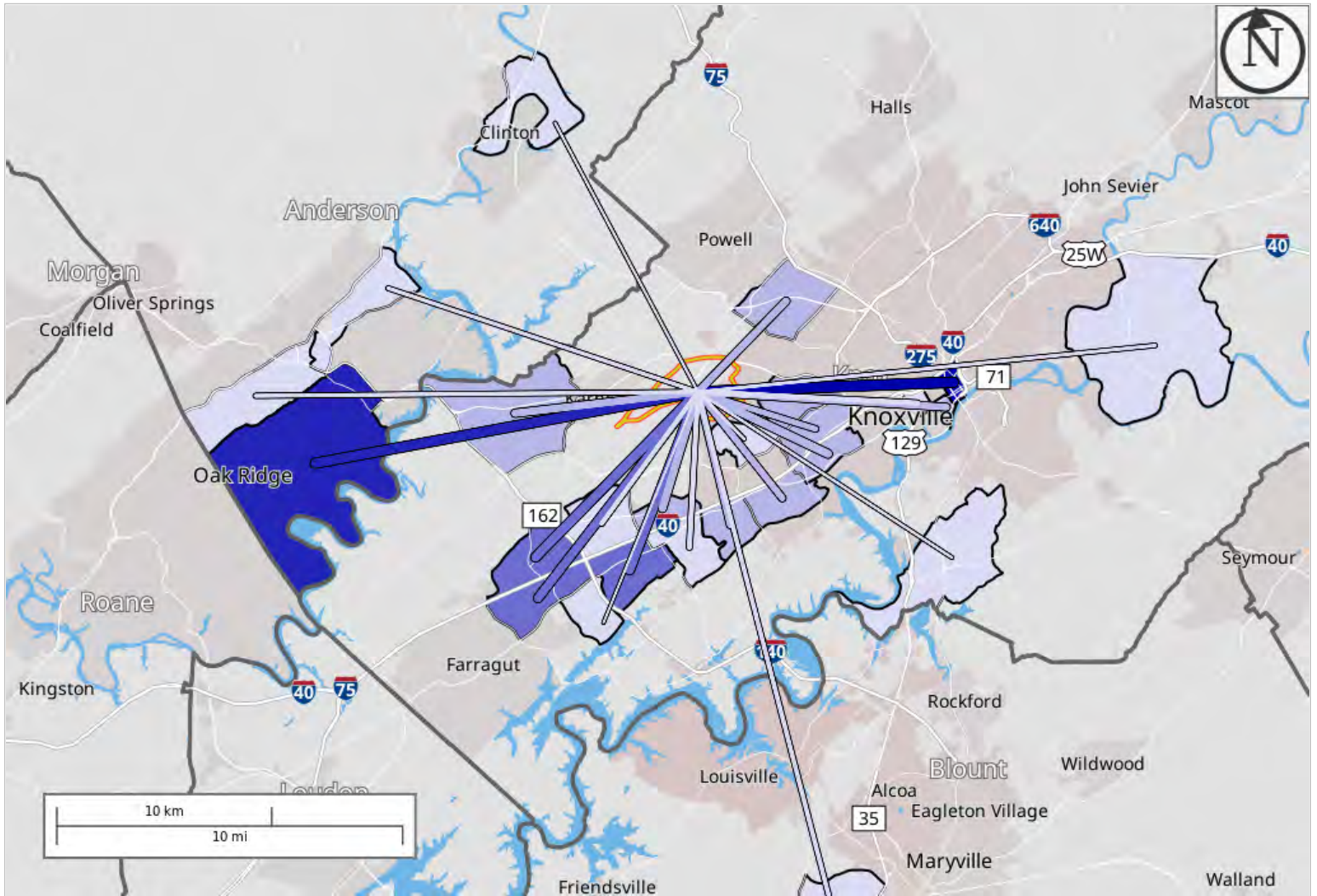
Workers: Living in 46.07 (Knox, TN)

Showing: Employment locations grouped by Census Tracts

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 01/21/2025

Counts of All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers



Map Legend

Job Count

- 157 - 178
- 136 - 156
- 115 - 135
- 94 - 114
- 73 - 93
- 52 - 72
- 30 - 51

Selection Areas

- ▭ Home Area

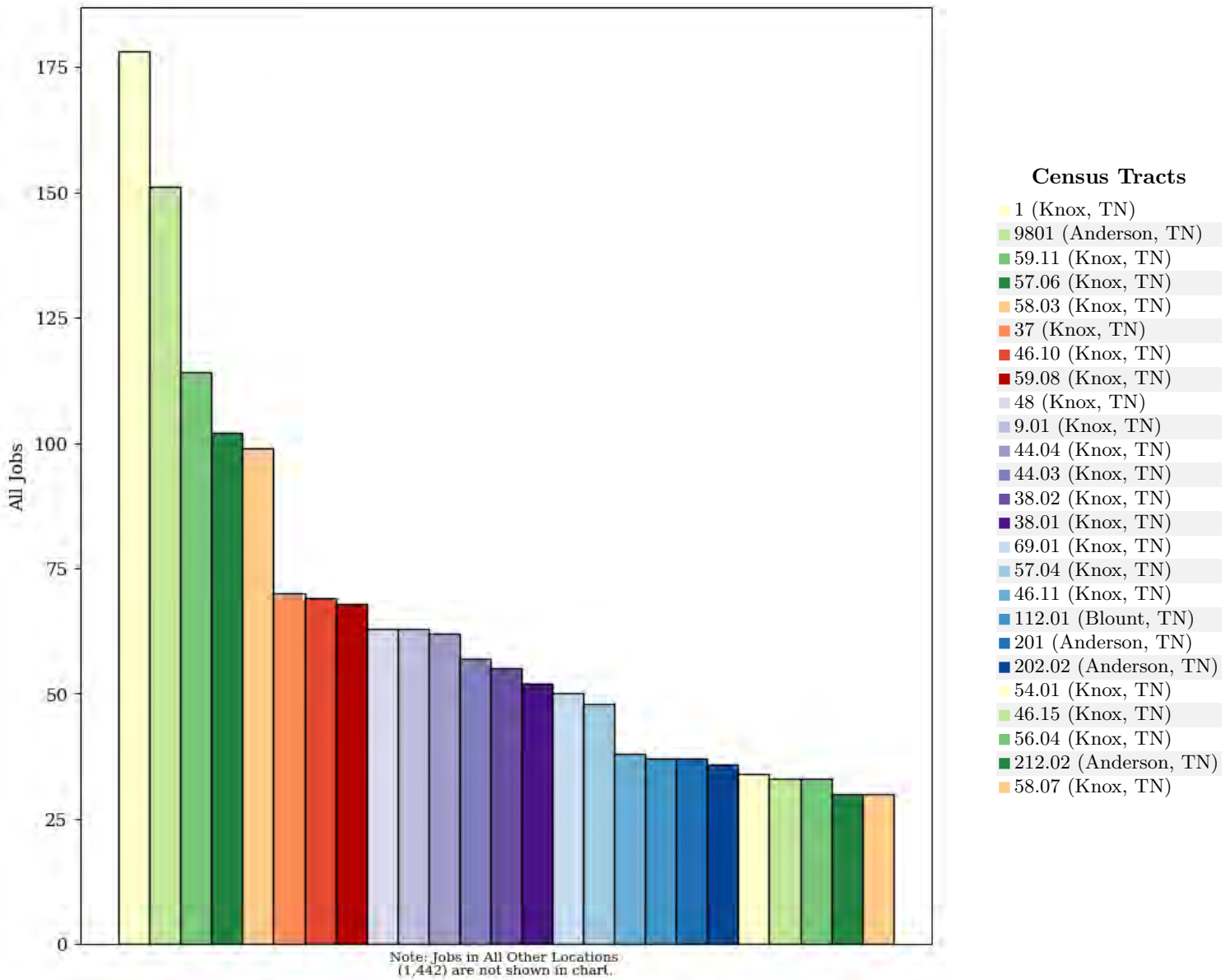
Job Count

- ▭ 157 - 178
- ▭ 136 - 156
- ▭ 115 - 135
- ▭ 94 - 114
- ▭ 73 - 93
- ▭ 52 - 72
- ▭ 30 - 51



All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers



All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers

Census Tracts as Work Destination Area	2022	
	Count	Share
All Census Tracts	3,051	100.0%
1 (Knox, TN)	178	5.8%
9801 (Anderson, TN)	151	4.9%
59.11 (Knox, TN)	114	3.7%
57.06 (Knox, TN)	102	3.3%
58.03 (Knox, TN)	99	3.2%
37 (Knox, TN)	70	2.3%
46.10 (Knox, TN)	69	2.3%
59.08 (Knox, TN)	68	2.2%
48 (Knox, TN)	63	2.1%
9.01 (Knox, TN)	63	2.1%

Census Tracts as Work Destination Area	2022	
	Count	Share
44.04 (Knox, TN)	62	2.0%
44.03 (Knox, TN)	57	1.9%
38.02 (Knox, TN)	55	1.8%
38.01 (Knox, TN)	52	1.7%
69.01 (Knox, TN)	50	1.6%
57.04 (Knox, TN)	48	1.6%
46.11 (Knox, TN)	38	1.2%
112.01 (Blount, TN)	37	1.2%
201 (Anderson, TN)	37	1.2%
202.02 (Anderson, TN)	36	1.2%
54.01 (Knox, TN)	34	1.1%
46.15 (Knox, TN)	33	1.1%
56.04 (Knox, TN)	33	1.1%
212.02 (Anderson, TN)	30	1.0%
58.07 (Knox, TN)	30	1.0%
All Other Locations	1,442	47.3%

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2022
Job Type	All Jobs
Selection Area	46.07 (Knox, TN) from Census Tracts
Selected Census Blocks	62
Analysis Generation Date	01/21/2025 16:02 - OnTheMap 6.24.2
Code Revision	11cd69dd857837bcac2424d75eb8f52ad166c052
LODES Data Vintage	20241022_1605

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2022).

Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
2. Educational Attainment is only produced for workers aged 30 and over.
3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011.

APPENDIX I

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105			65	55
450 - 499	105	90			60	50
500 - 549	95	80			55	50
550 - 599	85	70			50	45
600 - 649	75	65			45	40
650 - 699	70	60			40	35
700 - 749	65	55			35	30
750 or More	60	50	45	40	35	30

264 + 9
= 273

316

Amherst Road at
Bradley Lake Lane

2028 Projected AM
SB Left Turns = 25

Left Turn Lane NOT
Warranted

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	50	45	45	40	35
450 - 499	50	45	45	40	35	35
500 - 549	50	45	40	40	35	35
550 - 599	45	40	40	35	35	35
600 - 649	40	35	35	35	35	30
650 - 699	35	35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or More	30	30	30	30	30	30

* Or through volume only if a right-turn lane exists.

TABLE 4B
RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
9 Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes	Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Amherst Road at
Bradley Lake Lane

2028 Projected AM
NB Right Turns = 9

Right Turn Lane NOT
Warranted

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists.

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	Amherst Road at Bradley Lake Lane 2028 Projected PM SB Left Turns = 69 Left Turn Lane Warranted		185 160	145 130	120 110	100 90
200 - 249 250 - 299			140 125	115 105	100 90	80 70
300 - 349 350 - 399			110 100	95 85	80 70	65 60
400 - 449 450 - 499			90 80	75 70	65 60	55 50
500 - 549 550 - 599	95 85	80 70	70 65	65 60	55 50	50 45
600 - 649 650 - 699	75 70	65 60	60 55	55 50	45 40	40 35
700 - 749 750 or More	65 60	55 50	50 45	45 40	35 35	30 30

458 + 32
= 490

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	80 75	70 65	60 55	55 50	50 45
200 - 249 250 - 299	80 70	72 65	460 55	55 50	50 45	45 40
300 - 349 350 - 399	65 60	60 55	50 50	50 45	45 40	40 40
400 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	45 40	40 40	40 35	35 35	35 35
600 - 649 650 - 699	40 35	35 35	35 35	35 30	35 30	30 30
700 - 749 750 or More	30 30	30 30	30 30	30 30	30 30	30 30

* Or through volume only if a right-turn lane exists.

TABLE 4B
RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes	2028 Projected PM NB Right Turns = 32	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Right Turn Lane NOT Warranted	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes		Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists.

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105	90	75	65	55
450 - 499	105	90	80	70	60	50
500 - 549	95	80	70	65	60	50
550 - 599	85	75	65	60	55	45
600 - 649	75	65	55	50	45	35
650 - 699	70	60	50	45	40	30
700 - 749	65	55	50	45	40	30
750 or More	60	50	45	40	35	30

379 + 32 = 411

248

Left Turn Warrant Analysis Without Sports Facility Generated Trips

Amherst Road at Bradley Lake Lane
2028 Projected PM SB Left Turns = 69
Left Turn Lane NOT Warranted

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	50	45	45	40	35
450 - 499	50	45	45	40	35	35
500 - 549	50	45	40	40	35	35
550 - 599	45	40	40	35	35	35
600 - 649	40	35	35	35	35	30
650 - 699	35	35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or More	30	30	30	30	30	30

* Or through volume only if a right-turn lane exists.

APPENDIX J

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Queuing and Blocking Report

With Separate SB Left Turn Lane

Intersection: 3: Amherst Road & Bradley Lake Lane

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	69	31
Average Queue (ft)	35	6
95th Queue (ft)	59	27
Link Distance (ft)	416	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		75
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report

With Separate SB Left Turn Lane

Intersection: 3: Amherst Road & Bradley Lake Lane

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	59	9	51
Average Queue (ft)	28	0	22
95th Queue (ft)	50	4	50
Link Distance (ft)	416	308	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			75
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Network Summary

Network wide Queuing Penalty: 0

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CIVIL ENGINEERING / TRAFFIC ENGINEERING