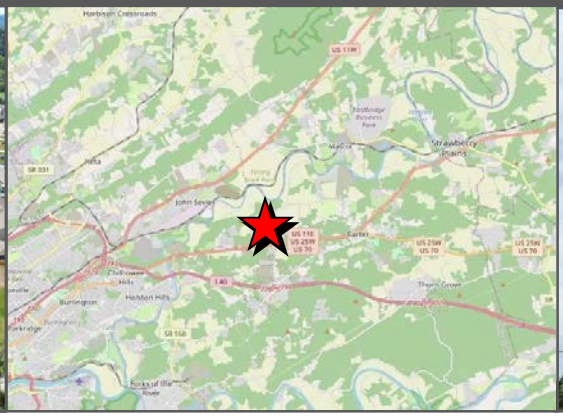
AJAX ENGINEERING

CIVIL ENGINEERING / TRAFFIC ENGINEERING

Transportation Impact Study

The Ridge at Neals Landing – Unit 3 Subdivision

Knox County, Tennessee



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EXECUTIVE SUMMARY

Preface:

Mesana Investments, LLC proposes an additional phase of residential development near Asheville Highway in East Knox County, TN. The proposed phase will include constructing 111 multi-family attached townhouses on 13.6 +/- acres. The development is named and referenced in this study as "The Ridge at Neals Landing – Unit 3 Subdivision". Units 1 and 2 of The Ridge at Neals Landing Subdivision are in various stages of development, and all external road access for the existing and proposed units will be provided via a traffic signal at the intersection of Neals Landing Road at Asheville Highway and Brakebill Road. All three units (phases) of The Ridge at Neals Landing Subdivision are anticipated to be fully built and occupied by 2028. A third phase of Neal's Landing Subdivision adjacent to The Ridge at Neals Landing Subdivision is also expected to be occupied by 2028.

The primary purpose of this study is to determine and evaluate the potential impacts of the Unit 3 development on the adjacent transportation system. The study includes a review of the primary access roads and the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road, and it is a Level 1 study established by Knoxville/Knox County Planning. This study also includes the impact and increase in traffic due to the planned and unfinished phases of the adjacent residential units and other nearby planned residential subdivisions along Asheville Highway. 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 Ridge at Neals Landing – Unit 3 Subdivision, with 111 multi-family attached townhouses, is estimated to generate 1,049 vehicle trips at full build-out and occupancy on an average weekday. Of these daily trips, 59 are estimated to occur during the AM peak hour and 85 in the PM peak hour in 2028.
- With the development of The Ridge at Neals Landing – Unit 3 Subdivision and the other adjacent residential phases being completed and occupied by 2028, the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road without improvements is projected to operate with acceptable vehicle delays during the projected AM and PM peak hours except for the southbound approach of Neals Landing Road.

Recommendations:

The following recommendations are offered based on the study analyses to minimize the impacts of the proposed subdivision on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety. These recommendations also take into account the contribution of additional traffic from the other known planned residential subdivisions. More details regarding all the recommendations are discussed at the end of the report.

Asheville Highway at Brakebill Road and Neals Landing Road:

- At this time, based on the known planned subdivision phases in the Ridge at Neals Landing and Neal's Landing Subdivisions, a southbound right-turn lane is recommended to be constructed on Neals Landing Road at the traffic signal before completion of the subdivisions. The turn lane should have a minimum of 75 feet of storage with a taper length of 25 feet.
- If future development occurs beyond the known phases of the adjacent residential subdivisions in The Ridge at Neals Landing and Neals Landing Subdivisions included in this study, it is recommended that the box culvert for Shining Creek East on Neals Landing Road be widened sufficiently enough to allow for a southbound right-turn lane to be extended past the box culvert to the north and provide additional storage beyond the recommended storage of 75 feet. Once additional width is provided at the box culvert, the storage length for a southbound right-turn lane could be more than doubled its recommended length of 75 feet without encroaching upon the first house lot on the west side of Neals Landing Road. A future subsequent study can determine how much this lane should be extended to accommodate potential additional residential phases.
- If future development occurs beyond the known phases included in this report, it is recommended that a secondary entrance be provided for these subdivisions north of Asheville Highway. Since all the existing and proposed subdivisions north of Asheville Highway at the signalized intersection will have only one means of ingress and egress, a secondary entrance access point will be required if future development goes beyond the 294 total housing units in Neal's Landing (Units 1 – 3) and The Ridge at Neals Landing (Units 1 – 3) Subdivisions.
- The existing cycle length for the traffic signal at Asheville Highway at Brakebill Road and Neals Landing Road during the AM and PM peak periods is set at 120 seconds. The cycle length is recommended to be 90 seconds during the afternoon peak periods in the 2028 peak period projected conditions. This change will

decrease vehicle delays for Brakebill Road, and particularly for Neals Landing Road's southbound approach at the traffic signal.

The Ridge at Neals Landing – Unit 3 Subdivision Internal Road:

- A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the Unit 3 entrance, on Road "A", off Limelight Lane, to reinforce the reduced speed limits within the subdivisions to the north of Asheville Highway at Neals Landing Road.
- A Stop Sign (R1-1) with a 24" white stop bar is recommended to be installed at the southern end of proposed Road "A" at Limelight Lane, as shown in the study.
- Dual end-of-roadway object markers (OM4-1) should be installed at the end of Limelight Lane's extension and the proposed turnaround. Furthermore, an additional sign should be posted at the western end of the extended stub-out for Limelight Lane to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, "NOTICE – This road may be extended and connected to the west – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800".
- Sight distance at the new internal intersection of Road "A" at Limelight Lane must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the required internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.
- 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.
- Road "A" in the proposed subdivision will have two 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 Road "A", 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.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The proposed location of this new residential development phase is shown on a map in Figure 1a. This development phase will be located about 1,000 feet to the northwest of the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road in East Knox County, TN. The development property will be constructed from a portion of a single existing parent parcel and will have access to Neals Landing Road via an extension of Limelight Lane. As requested, transportation impacts associated with the development were analyzed at the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road, where the proposed development will have road access to and from external destinations.

Figure 1b clarifies the existing and proposed phases of the two adjacent subdivisions to the north of Asheville Highway at Neals Landing Road. The information below Figure 1b also includes a breakdown of the housing units. The two subdivisions, Neal's Landing and The Ridge at Neals Landing, are at various stages of development, each currently proposed with three units (phases). The Neal's Landing Subdivision has undergone the construction of Units 1 and 2 with 44 single-family detached houses along Neals Landing Road, Vista View Lane, Stone Bluff Court, and Ivy Mill Court. This phase was completed about 20 years ago. Unit 3 of Neal's Landing Subdivision was recently designed and will encompass the land north of Units 1 and 2. This phase will have 41 single-family detached houses. Rough grading of this phase has been completed, but the utilities and road construction have not yet begun. Unit 3 of Neal's Landing Subdivision will have two access points to Neals Landing Road and will also include extending Vista View Lane to the north.

The Ridge at Neals Landing Units 1 and 2 are also at various stages of development—the land for these phases is along Neals Landing Road, Illumination Lane, and Eclipse Lane. The lots in these phases have been set, and road construction was recently completed with utilities installed. As of September 2024, 39 single-family houses have been constructed and are occupied along Eclipse Lane in Unit 1.

The Ridge at Neals Landing - Unit 3 Subdivision will be west of Units 1 and 2 and on the other side of Shining Creek East. Road access to this phase will be provided via an extension of Limelight Lane and an already constructed box culvert across the creek.

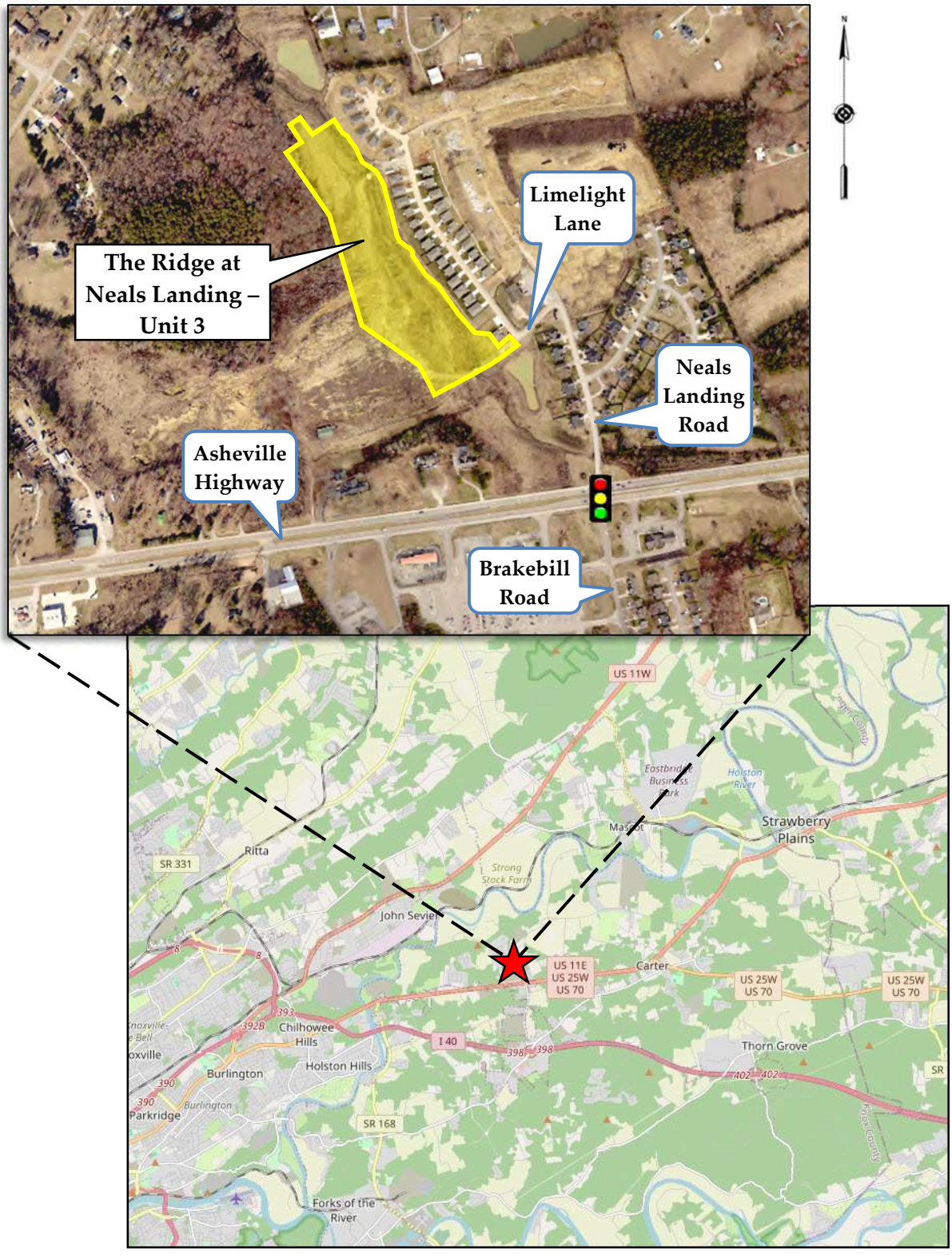


Figure 1a
Location Map

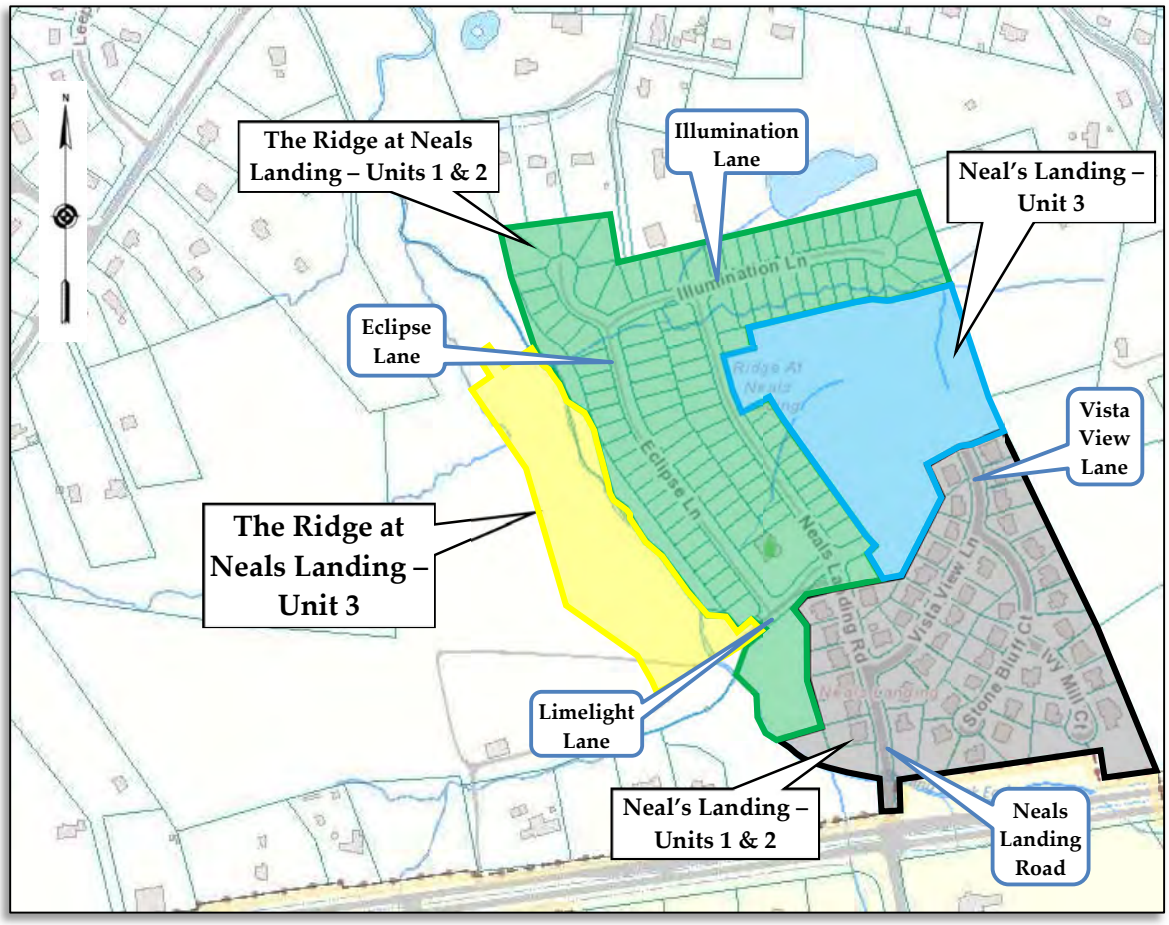


Figure 1b
Subdivision and Phases Map

Overall, the known, planned residential developments include the following housing units:

Neal's Landing Subdivision – Units 1 & 2: 44 single-family detached houses (completed)
Neals' Landing Subdivision – Unit 3: 41 single-family detached houses (proposed/not completed)
The Ridge at Neals Landing Subdivision – Units 1 & 2: 98 single-family detached houses (39 completed)
The Ridge at Neals Landing Subdivision – Unit 3: 111 multi-family attached townhouses (proposed/not completed)

Already built and occupied = 83 houses
Remaining to be built & occupied = 100 houses
The Ridge at Neals Landing – Unit 3 Subdivision = 111 townhouses
Total in both subdivisions = 294 houses

The proposed development property is in a formerly rural area, slowly transitioning to a more suburban area of East Knox County, TN. There are many residential subdivisions, standalone houses in the surrounding area, and commercial development along Asheville Highway. These adjacent commercial properties near Neals Landing Road include a bank and a shopping center with a Food City grocery store. There are also many unoccupied and agricultural properties nearby as well. The property for The Ridge at Neals Landing – Unit 3 Subdivision has already been cleared and partially graded. To the west and adjacent to Shining Creek East, a double row of silt fence has been installed to control sediment from leaving the site and entering the creek.

Main road access to this area of Knox County is provided by Asheville Highway, which traverses east towards Jefferson City and Dandridge and Knoxville to the west. Brakebill Road provides minor access to the area, traversing between Asheville Highway to the north and Strawberry Plains Pike to the south, where it intersects near Interstate 40.

View of Existing Development Site from South Side of Property (Looking Northwest)

- **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
Asheville Highway (US 25E/US 11E/US 70/SR 9)	Principal Arterial	55 mph	4 lanes with divided median	100 feet	None	No sidewalks along roadway	No bike lanes
Neals Landing Road	Local Street	25 mph	2 lanes undivided	26 feet	None	No sidewalks along roadway	No bike lanes
Brakebill Road	Major Collector	30 mph	2 lanes undivided	20 feet	None	No sidewalks along roadway	No bike lanes

[1] 2018 Major Road Plan by Knoxville/Knox County Planning & TDOT Functional Classification Map (9.14.18)
[2] From edges of pavement near project site
[3] According to Knoxville Area Transit System Map

Asheville Highway (US 25E/US 11E/US 70/SR 9) is a 4-lane Principal Arterial that traverses in a generally east-west direction. Closer to the study area, Asheville Highway provides convenient access to Knoxville to the west, Jefferson City to the northeast (via Andrew Johnson Highway), and Dandridge to the east. The posted speed limit on Asheville Highway is 55 mph at the intersection of Brakebill Road and Neals Landing Road.

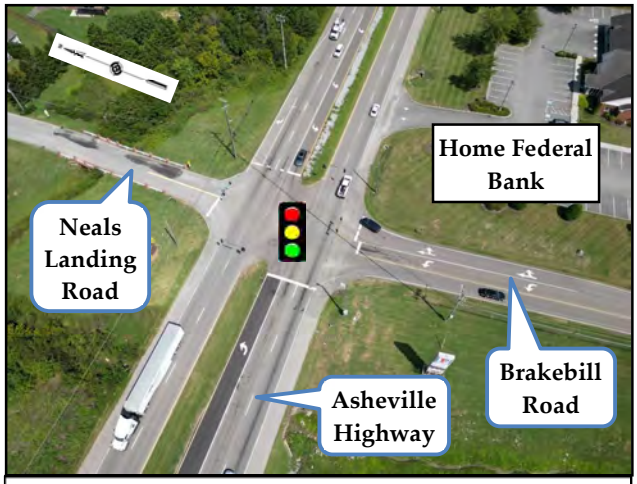
At the intersection of Brakebill Road and Neals Landing Road, Asheville Highway is a divided highway at the development property with a grassed median and an average 30-foot width. A separate left-turn lane is provided for eastbound traffic on Asheville Highway for turns onto Neals Landing Road. This turn lane has recently been extended and now provides 250 feet of vehicle storage. A separate left-turn and right-turn lane is provided for westbound traffic on Asheville Highway for turns onto Brakebill Road and Neals Landing Road, respectively. The westbound left-turn lane has 235 feet of storage, and the right-turn lane has 90 feet.

In both directions, grooved pavement rumble strips are located just outside the white edge lines along the shoulder of Asheville Highway. Traffic movements at the 4-way intersection of Asheville Highway at Neals Landing Road and Brakebill Road are controlled by a traffic signal with signal heads supported on span wires. Along this stretch of Asheville Highway, the road

has a very straight alignment with a few minor vertical curves. Roadway features, including sidewalks, bike lanes, and greenway paths, are not provided along Asheville Highway.

Asheville Highway has relatively good pavement conditions and will be the primary road for future residents of The Ridge at Neals Landing – Unit 3 Subdivision to and from external destinations. All lanes on Asheville Highway are 12 feet in width, and the paved shoulders are 10 feet in width.

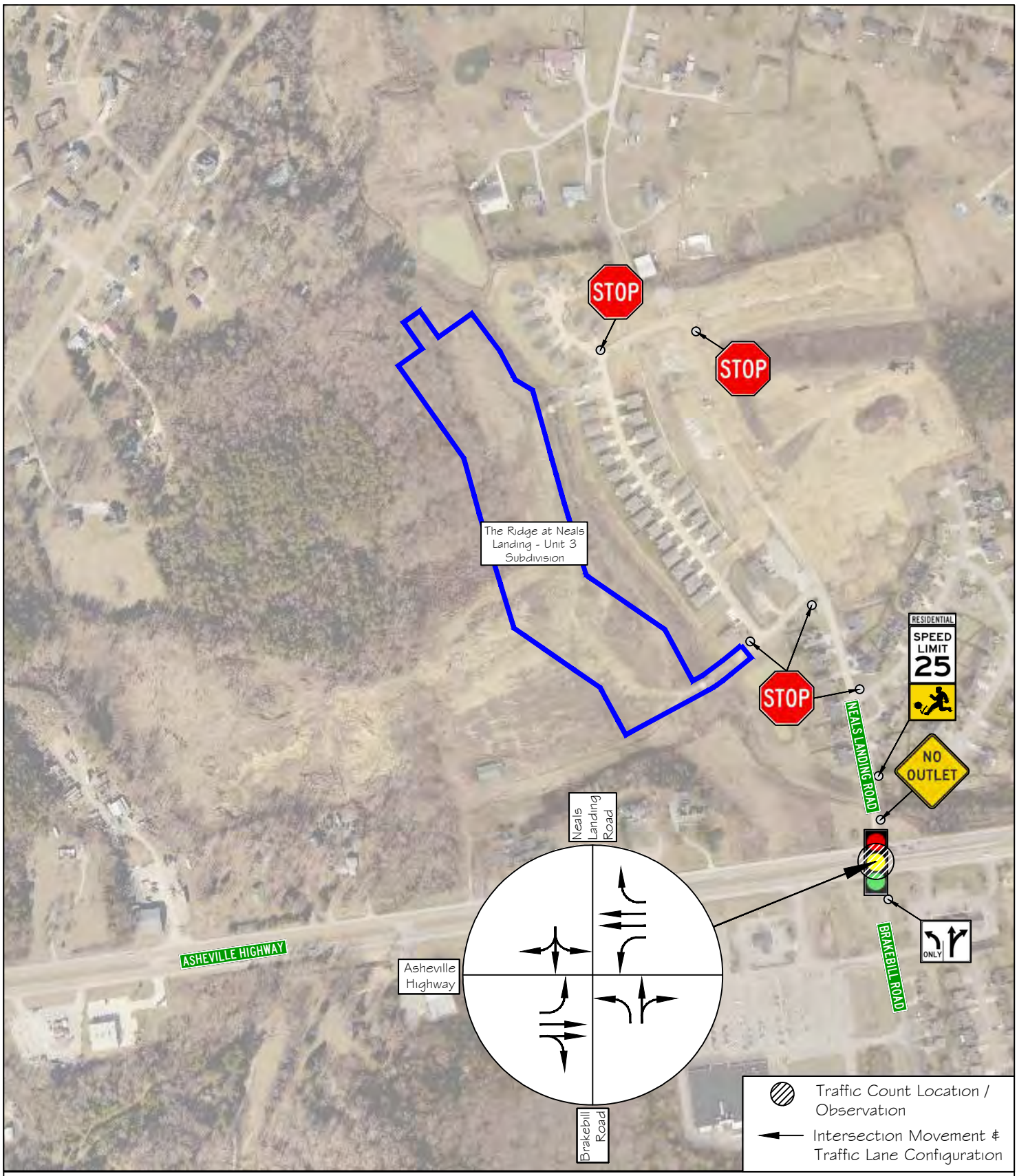
Neals Landing Road is classified as a Local Street and generally traverses north to south. It was recently extended 1,800 feet to the north for additional residential phases. Immediately to the north of the intersection with Asheville Highway, Neals Landing Road traverses over Shining Creek East via a box culvert. A "No Outlet" Sign (W14-2a) is posted on Neals Landing Road. In addition, a residential speed limit sign of 25 mph is posted for entering residential traffic. The southbound approach of Neals Landing Road at Asheville Highway has a single lane for left, thru, and right turn vehicle movements. The white stop bar and double yellow centerline pavement markings were recently re-applied to this approach.



Asheville Highway at Brakebill Road and Neals Landing Road

Brakebill Road provides access to Strawberry Plains Pike and Interstate 40 south of the Neals Landing residential development. Brakebill Road is a Major Collector and traverses in a north-south direction. Brakebill Road is 1.3 miles in length between Asheville Highway to the north and Strawberry Plains Pike to the south. Commercial development is located on each end of Brakebill Road, with residential properties, farm properties, a temple, and undeveloped land in between. The Brakebill Road northbound approach at the intersection with Asheville Highway has two lanes: an exclusive left-turn lane and a shared thru/right-turn lane.

Figure 2 shows the existing lane configurations of the intersection examined in the study, the traffic count location, and the current traffic signage in the study area. The traffic signage shown in Figure 2 only includes warning and regulatory signage near the development site. The pages following Figure 2 give a further overview of the site study area with photographs.



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NOT TO SCALE

NORTH

FIGURE 2

The Ridge at Neals Landing - Unit 3

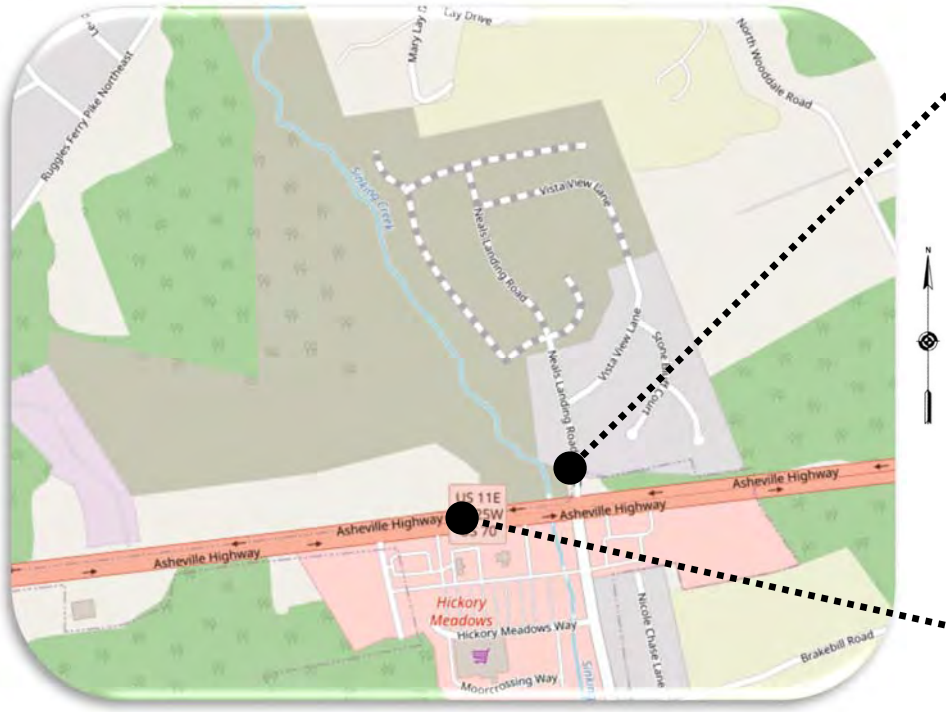
Traffic Count Location, Traffic Signage & Existing Lane Configurations

PHOTO EXHIBITS

Proposed Development Site

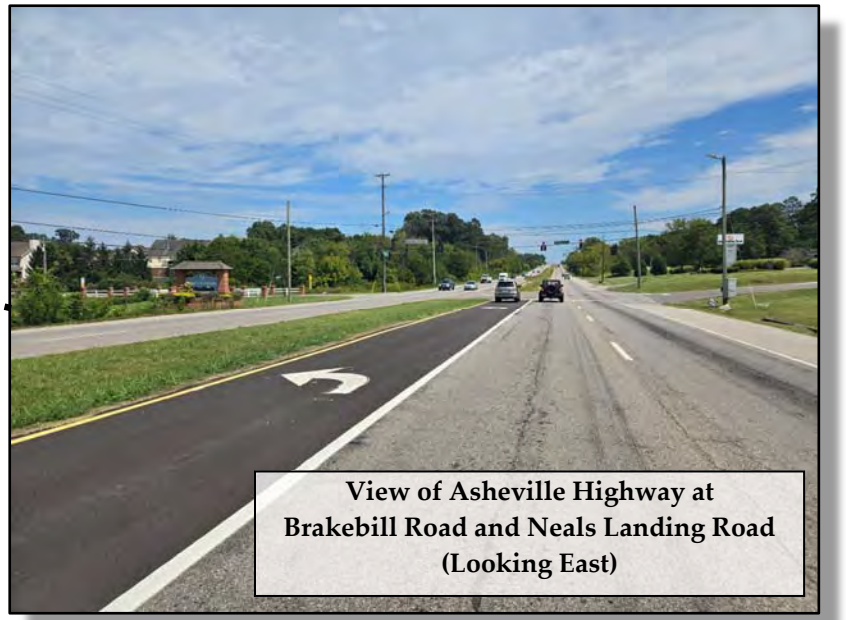
Aerial View of Proposed Development Site (Looking Northwest)

Aerial View of Proposed Development Site (Looking Southwest)

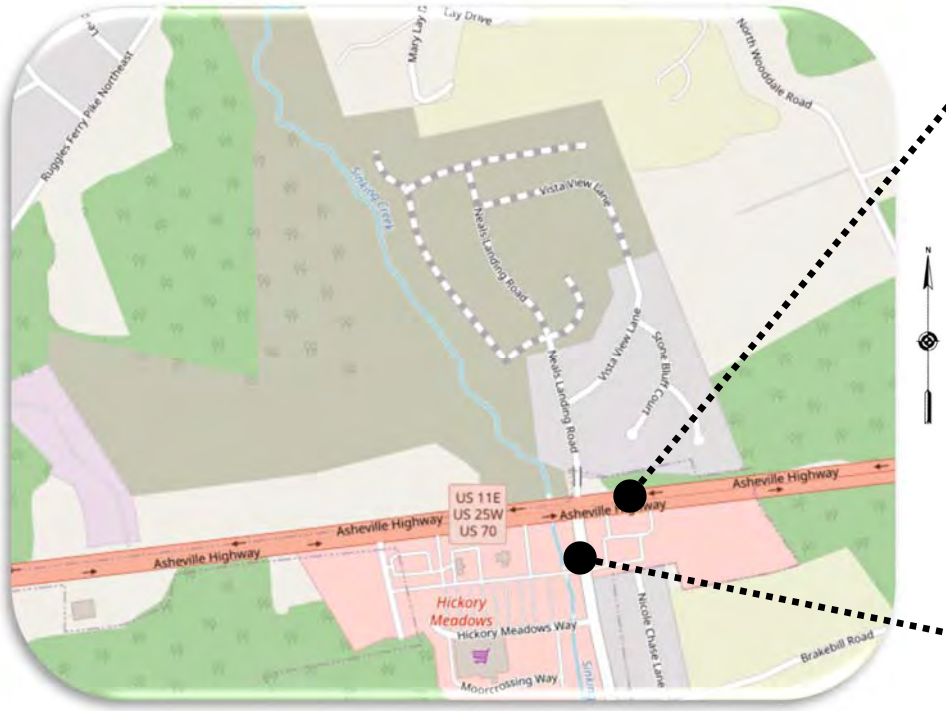


Proposed Development Site

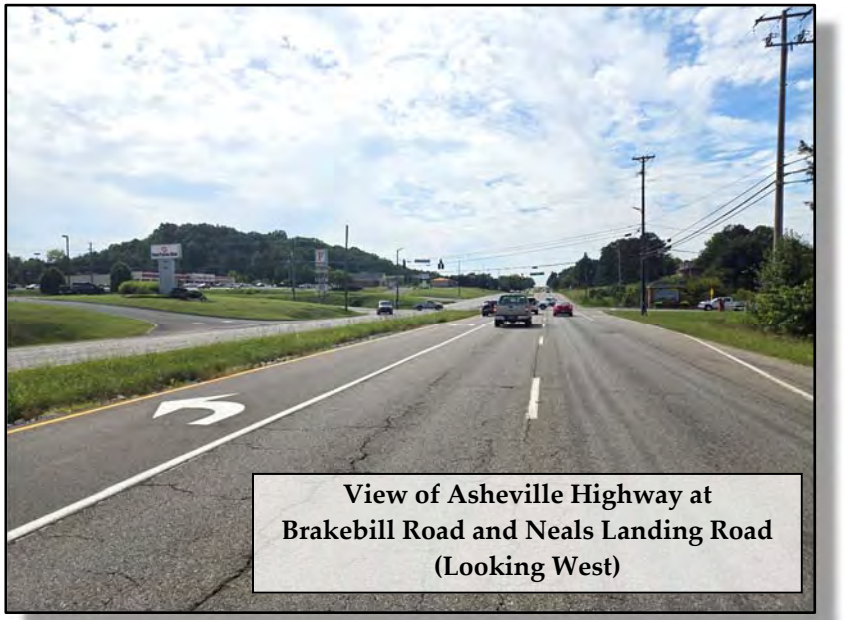
View of Neals Landing Road at Asheville Highway and Brakebill Road (Looking South)



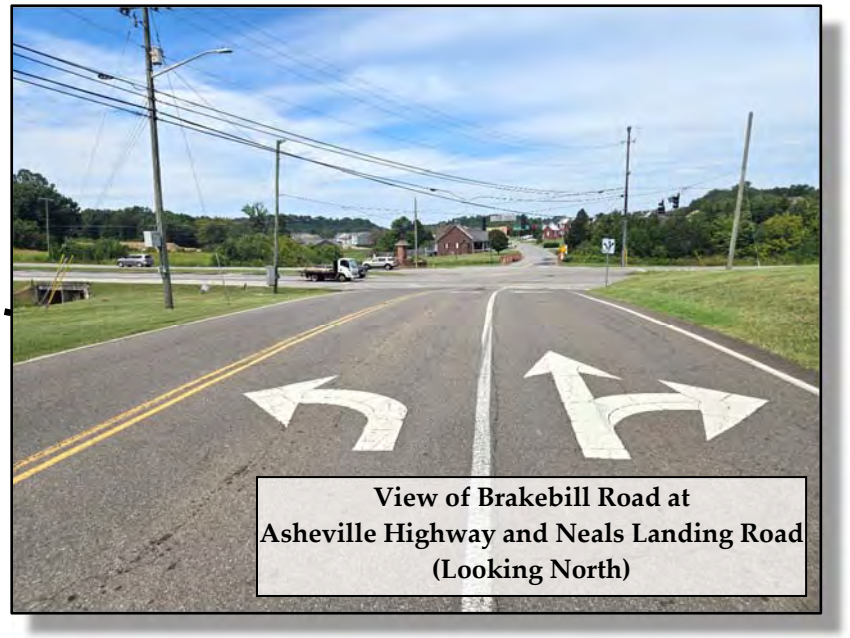
View of Asheville Highway at Brakebill Road and Neals Landing Road (Looking East)



Proposed Development Site



View of Asheville Highway at Brakebill Road and Neals Landing Road (Looking West)



View of Brakebill Road at Asheville Highway and Neals Landing Road (Looking North)

Proposed Development Site

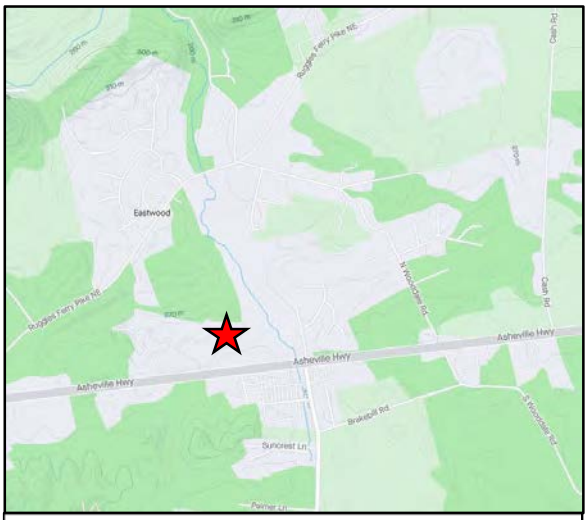
- **EXISTING TRANSPORTATION VOLUMES PER MODE**:

One annual vehicular traffic count location is located near the study area, and the Tennessee Department of Transportation (TDOT) conducts this count on Asheville Highway. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:
  - The Tennessee Department of Transportation (TDOT) reported an Average Daily Traffic (ADT) on Asheville Highway east of the project site at 20,381 vehicles per day in 2023. From 2013 – 2023, this count station has indicated a -0.9% average annual growth rate.

- Existing bicycle and pedestrian volumes: The average daily pedestrian and bicycle traffic along Asheville Highway, Brakebill Road, and Neals Landing Road is unknown. However, with the lack of sidewalks and bike lanes, as well as high vehicular volumes, 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 at the signalized intersection near the development site. The observed "pedestrians" were members of a litter crew cleaning the shoulders and median along Asheville Highway.

  An online website, 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



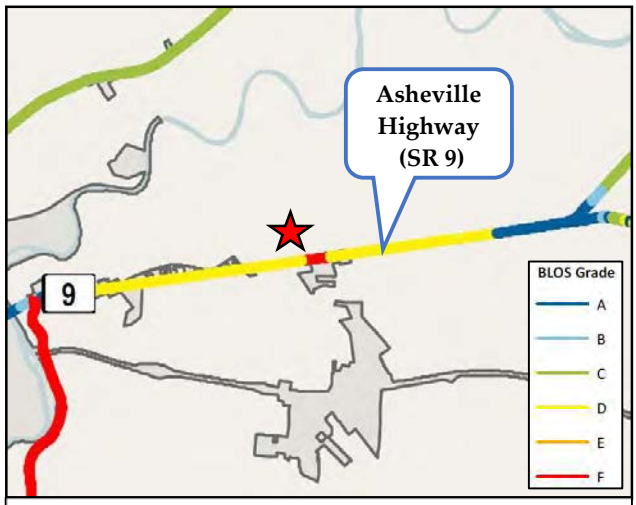
Strava Heat Map for Pedestrian and Joggers

Strava Heat Map for Bicyclists

their routes (millions of users). The activities in the maps are shown on the roads with color intensities with darker colors signifying higher activity. The Strava heat maps show no pedestrian, jogger, or bicycle activity along Asheville Highway, Brakebill Road, and Neals Landing Road. The only activity shown in the surrounding area is bicyclists using North Ruggles Ferry Road further to the north.

- **PEDESTRIAN AND BICYCLE FACILITIES**:

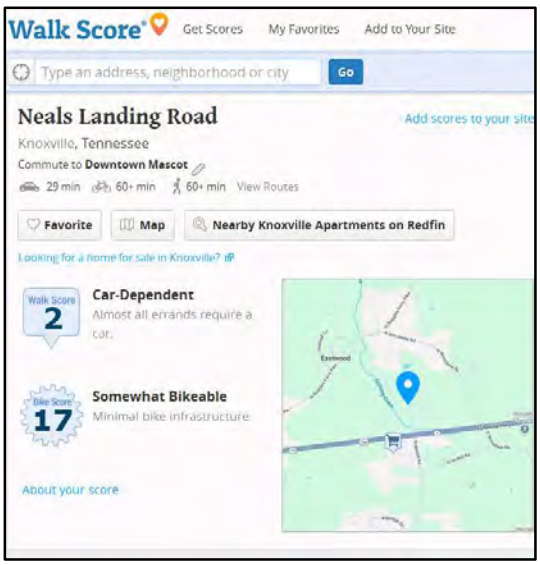
TDOT has published mapping illustrating the Bicycle Level of Service (BLOS) for State Routes. BLOS is a nationally used measure of bicyclist comfort based on a roadway's geometry and traffic conditions. BLOS A designates the route as most suitable for bicyclists and BLOS F as the least suitable. At the development site, the BLOS for Asheville Highway, State Route 9, has a grade of D and F, suggesting that the highway is unsuitable for bicycle traffic near the proposed development site.



Mapping of Bicycle Level of Service (BLOS) - TDOT

- **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 2 at Neals Landing Road. 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 the high vehicular volumes on the highway adjacent to the site. The site is given a Bike Score of 17, meaning there is minimal bike infrastructure. The site is not given a Transit Score since no public transportation opportunities are near the development site. Overall, for this study, no vehicle trip reductions for pedestrian or bicyclist activity were used or assumed.

- **TRANSIT SERVICES:**

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

KAT Route 34, "Burlington Shopper"

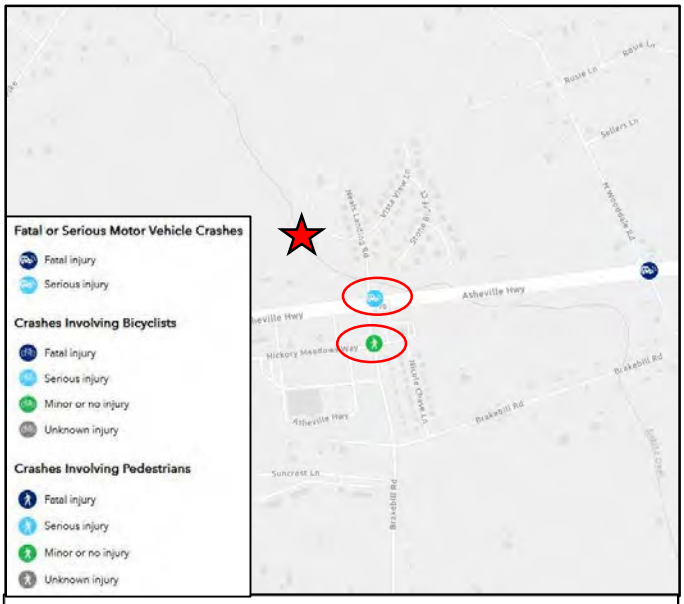
The closest public transit to the development site is 4.7 miles to the southwest by roadway. The closest bus stop to the proposed development is on Route 34, "Burlington Shopper", at the intersection of North Chilhowee Drive and Asheville Highway. KAT made several changes and improvements to their routes that began on August 26th, 2024. This recent change 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. 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:**

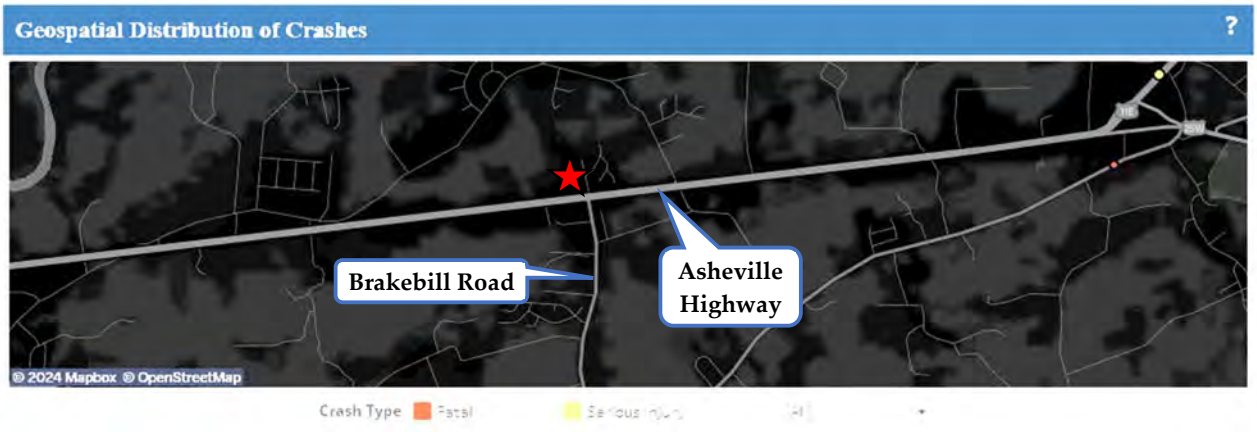
The Knoxville Transportation Planning Organization (TPO) provides a website that lists bicycle, pedestrian, and vehicle severe or fatal crashes from October 2016 to September 2021. The data shows that two crashes occurred at and near the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road during that time period. Also, unfortunately, a fatal crash occurred further to the east at the intersection of Asheville Highway at South and North Wooddale Road. The crashes at the signalized intersection near the development site occurred on 12/23/19 and 4/21/21. No crash factors were listed as the cause of these crashes. The incident

that occurred on December 23rd, 2019, involved a minor injury to a pedestrian, and this crash involved a teen driver. It occurred just south of the signalized intersection near one of the Food City shopping center entrances. The other crash occurred on the westbound approach of Asheville Highway at the signalized intersection and resulted in a serious injury.



Bicycle, Pedestrian, and Vehicle Crash Data in Study Area (TPO)

TDOT publishes and lists State crash data on its website that has involved a serious injury or a fatality over the past three calendar years. Between 2022 and 2024, the data shows no serious or fatal crashes near the proposed development site.



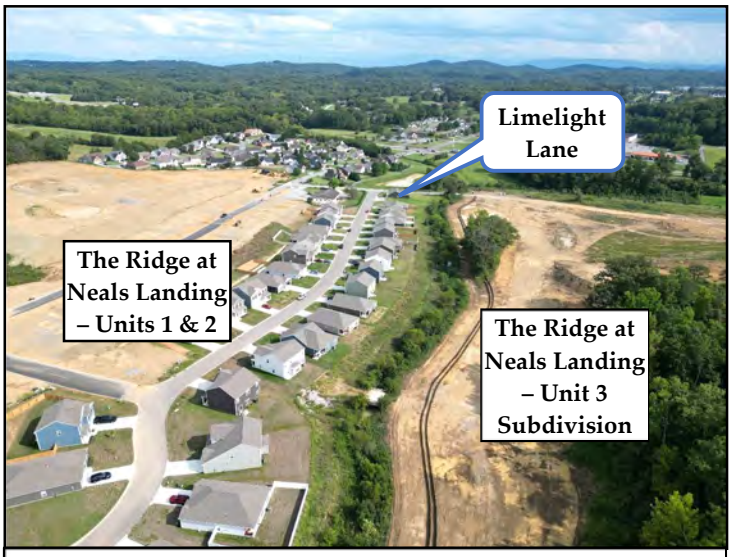
TDOT - Serious or Fatal Injury Traffic Crashes in Study Area (2022 – 2024)

Ultimately, the crash data from the Knoxville TPO and TDOT is not specific enough to ascertain crash patterns or types to incorporate into the recommendations for this proposed development. However, TDOT continually monitors for high crash locations and conducts further investigations if a spot location or intersection experiences above-average crash rates.

PROJECT DESCRIPTION

- **LOCATION AND SITE PLAN:**

The proposed plan layout with 111 multi-family attached townhouses on 13.6 +/- acres is designed by Urban Engineering and is shown in Figure 3. The design shows one new internal street, Road "A", and an extension of an existing street already constructed for the adjacent residential phases. As shown in the figure, Limelight Lane will be extended approximately 412 feet further to the west. Limelight Lane currently provides access to Neals Landing Road. A box culvert has already been installed across Shining Creek East, allowing access to the Unit 3 property. Road "A" will be a private street, and it will be constructed with a turnaround near its end on the subdivision's north side.



View of Development Site (Looking South)

The Ridge at Neals Landing – Unit 3 Subdivision will have some open space and common areas for the subdivision residents, including areas for detention ponds and stormwater control. Shining Creek East on the east side of Unit 3 will remain undisturbed and provided buffers. A 25-foot inside buffer will be set for no disturbance, and an additional 25 feet will be a no-build area.

Fairly large portions of the existing parent parcel will remain undeveloped and may be used for future development. The remaining land to the west of Unit 3 will be around 26 acres in size and will also remain zoned as Planned Residential (PR) with a density of 12 units per acre. The remaining property to the north will only have road access to the north to North Ruggles Ferry Road due to the creek and an existing detention pond blocking access back to the south.

The typical lot dimensions in Unit 3 will be 105 feet deep and 22 feet wide, providing a typical townhouse lot area of 2,310 square feet. Each townhouse will have a garage and driveway. 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 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. It will also likely depend on the progress of the other adjacent phases that are already further in the development process. Overall, the local real estate market for new housing remains quite competitive. This study assumed that the total construction build-out of the development and full occupancy would occur within the next four years (2028) to provide a conservative outlook.

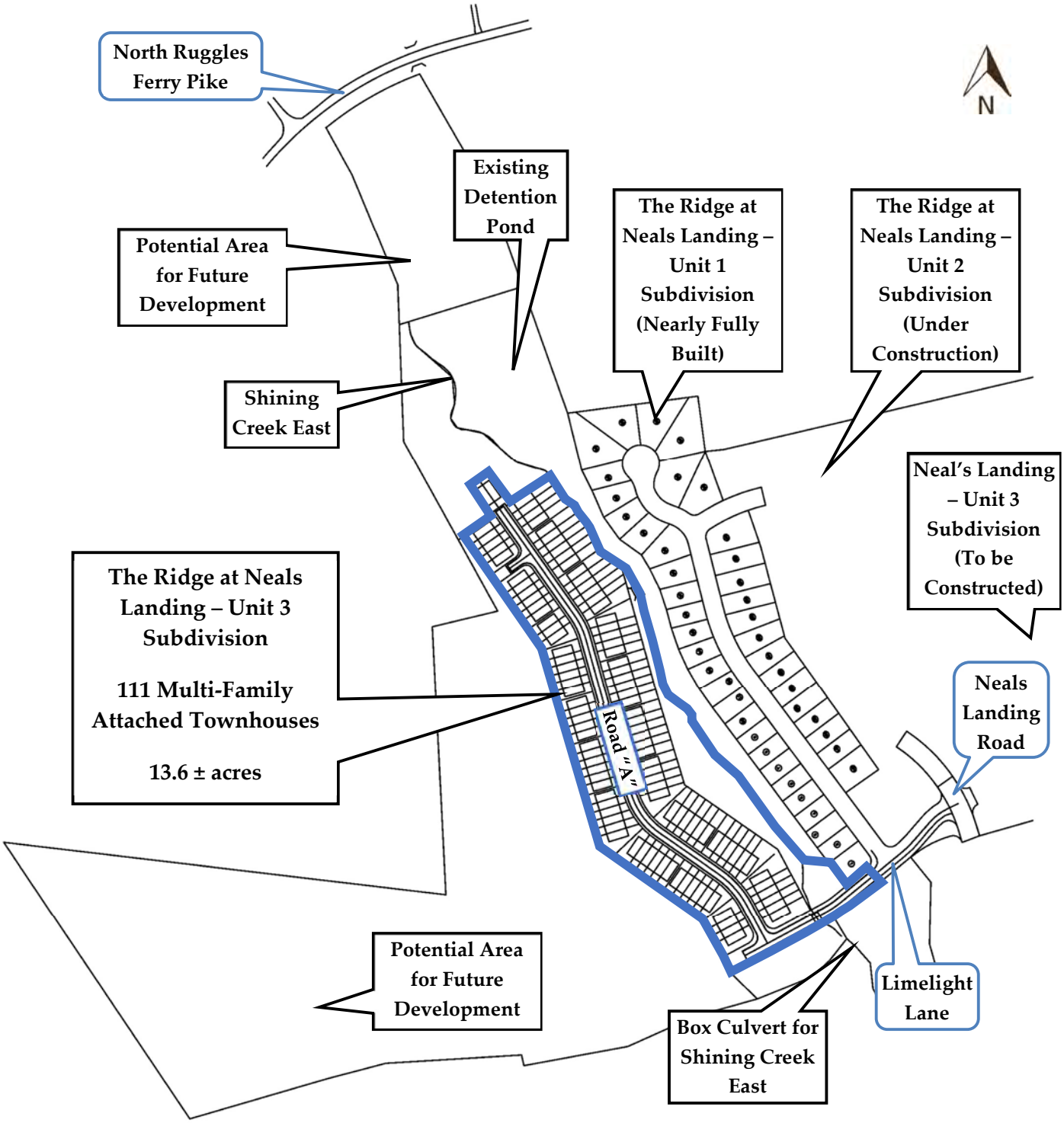


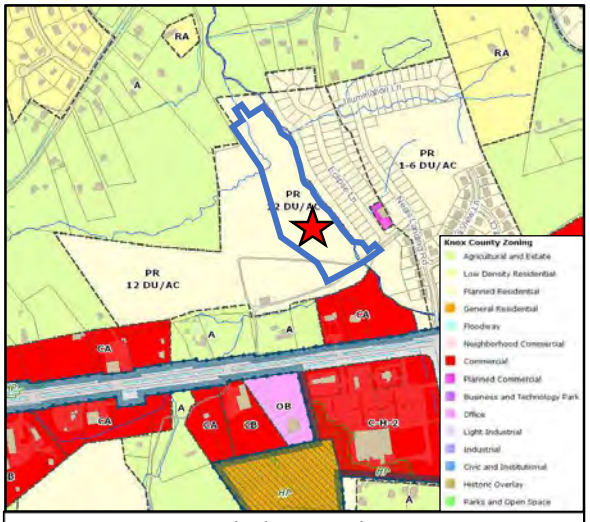
Figure 3
Proposed Plan Layout
The Ridge at Neals Landing – Unit 3 Subdivision

Not to Scale

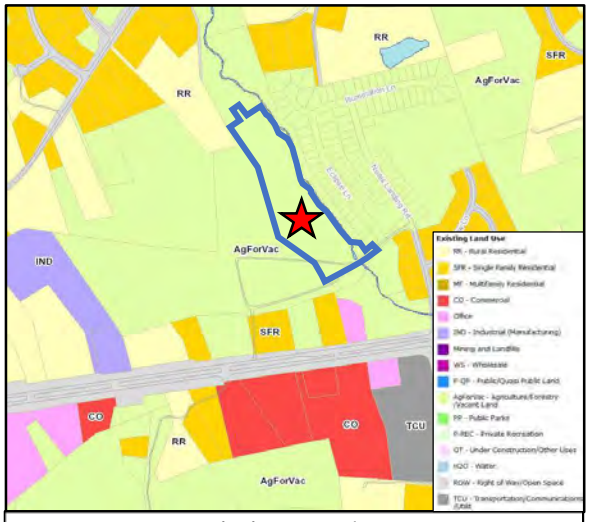
- **PROPOSED USES AND ZONING REQUIREMENTS:**

The existing parent parcel comprising The Ridge at Neals Landing – Unit 3 Subdivision development property is in Knox County. It is zoned as Planned Residential (PR) with a density of up to 12 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:

- The Ridge at Neals Landing – Unit 3 Subdivision property will be adjacent to the remaining land owned by the developer that may be used for future development. This remaining land will be around 26 acres and remain as Planned Residential (PR) with a density of 12 units per acre. This land is currently undeveloped, partially cleared, and rough-graded. Access to this remaining land would require a further extension of Limelight Lane or an alternative path that does not currently exist.
- Outside the remaining land and further to the northwest, a few non-related parcels are zoned as Agricultural (A). They are primarily forested with single-family detached houses with road access to the northwest at North Ruggles Ferry Pike.
- To the north, the properties are zoned as Agricultural (A). One of these properties is a parcel owned by the homeowner's association of The Ridge at Neals Landing and occupied by a stormwater detention pond. The other area to the north is part of the parent property subdivided for The Ridge at Neals Landing – Unit 3 Subdivision and has access to North Ruggles Ferry Road to the north.
- To the east and southeast, the parcels are zoned as Planned Residential (PR) with a density of 12 units per acre. These parcels are in Unit 1 of The Ridge at Neals Landing Subdivision. Single-family detached houses occupy the parcels and have road access to Eclipse Lane and Limelight Lane to the east and south.
- To the south of The Ridge at Neals Landing – Unit 3 Subdivision property, two parcels are zoned as Agricultural (A), and three are zoned as Commercial (CA). These parcels are adjacent and have road access to the south at Asheville Highway. Two parcels are undeveloped and unoccupied, while the others have single-family detached houses. Based on appearance, one house is believed to be used for commercial or business purposes.



KGIS Existing Zoning Map



KGIS Existing Land Use Map

- **ON-SITE CIRCULATION:**

The total length of The Ridge at Neals Landing – Unit 3 Subdivision internal road will be 1,416 feet (0.27 miles), designed and constructed to Knox County specifications. The extension of Limelight Lane will be 412 feet long. Limelight Lane will remain a public road and will be maintained in the future by Knox County. Road "A" and the extension of Limelight Lane 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. The right-of-way width within the development will be 50 feet for Limelight Lane and 40 feet for Road "A". No sidewalks are proposed on the internal road in this development. The developer will maintain Road "A" in the development after construction, and the road will remain private.

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

Besides residential passenger vehicles, the internal roadways will provide access for service, delivery, maintenance, and fire protection/rescue vehicles. 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 private street and road extension will be designed and constructed to Knox County specifications and is expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's turnaround near the end of Road "A" 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 signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road on Wednesday, September 4th, 2024. 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 was observed having an AM and PM peak hour at 7:00 – 8:00 a.m. and 3:45 – 4:45 p.m. The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix D. Some observations at the intersection include the following:

- No pedestrians or bicyclists were observed in the morning or afternoon traffic counts except for a litter crew cleaning up Asheville Highway.
- Most vehicles at the intersections were passenger vehicles, but school buses, semi-tractor trailer trucks, single-unit trucks, and construction vehicles with trailers were observed.
- Much higher westbound volumes on Asheville Highway and turning volumes to the west were observed in the morning versus eastbound volumes. In the afternoon, the opposite occurred, with more vehicles overall heading east versus west. This pattern indicated most motorists in the area heading towards Knoxville in the morning and returning in the afternoon. A few U-turns were observed on Asheville Highway.

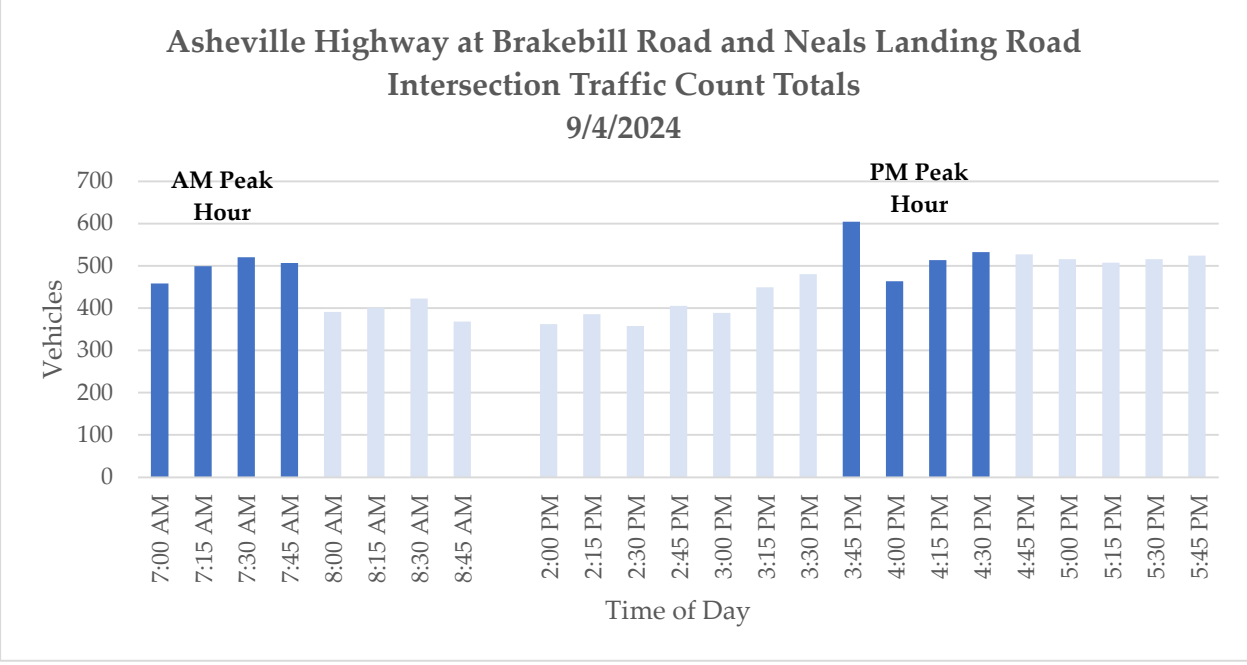


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FIGURE 4

The Ridge at Neals Landing - Unit 3

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 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 in the method. 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.

For signalized intersections, LOS is based on delay (in seconds) for various movements within the intersection and the overall operation of all the traffic entering the intersection. This delay measures driver discomfort, frustration, fuel consumption, and lost travel time and depends on traffic signal cycle lengths, lengths of green phases, and the quality of traffic progression. This control delay includes deceleration/acceleration delay, queue move-up time, and stopped delay time. For signalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 55 seconds. Table 3 lists the level of service criteria for signalized intersections.

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

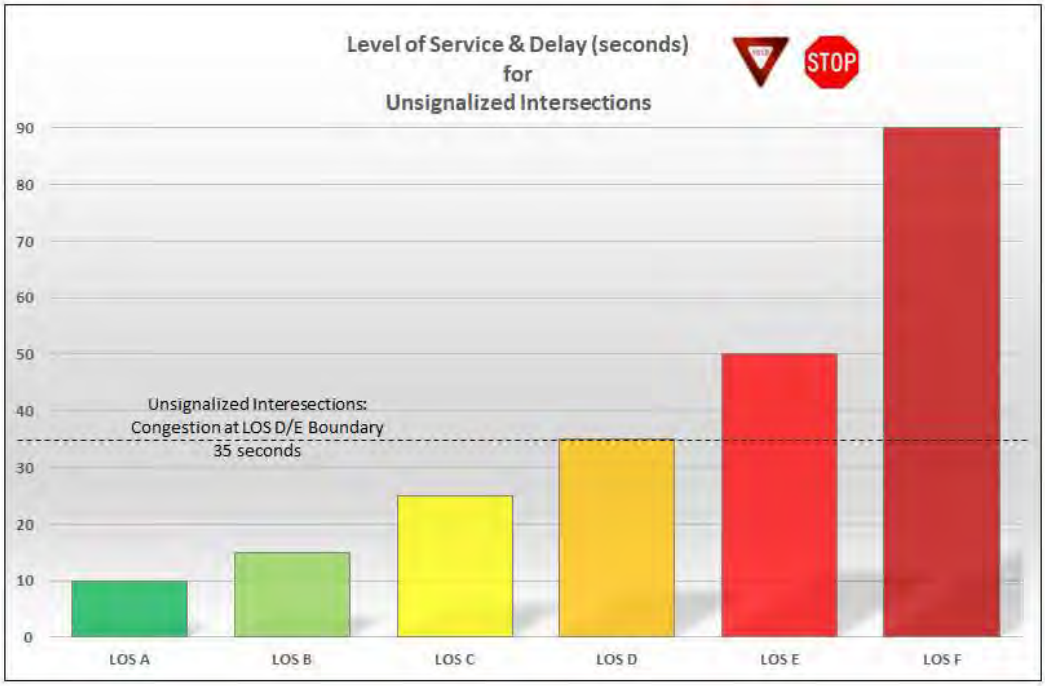
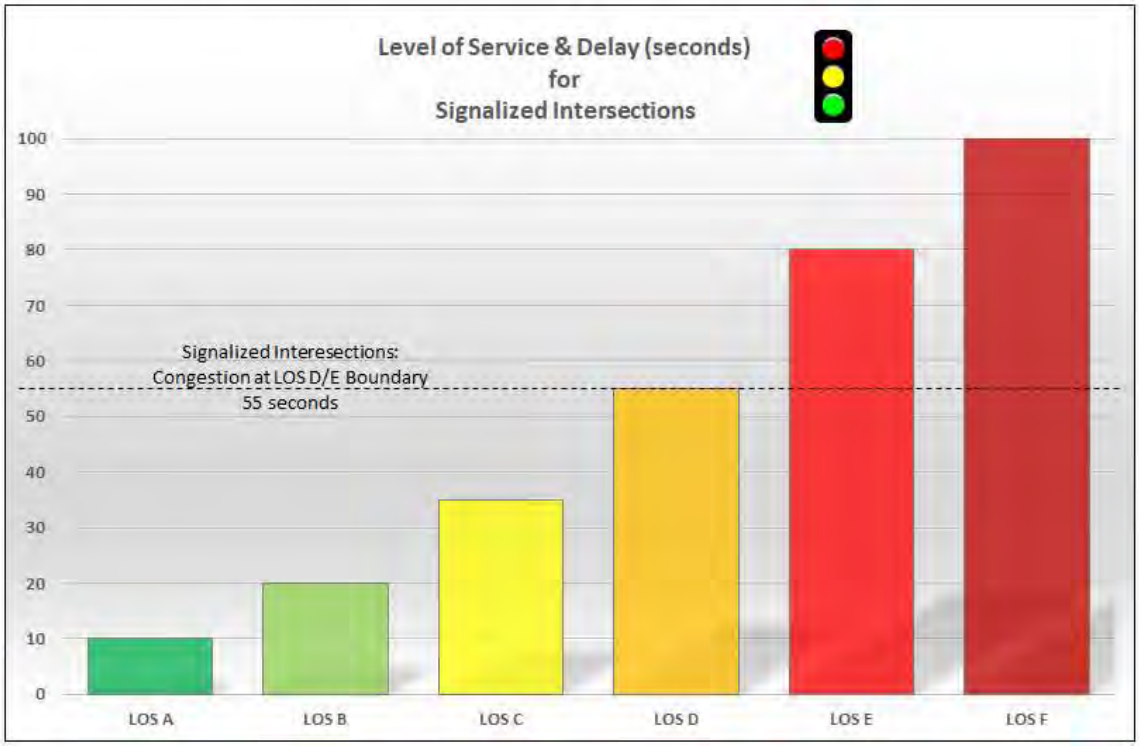


TABLE 3
LEVEL OF SERVICE AND DELAY FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (seconds/vehicle)
A	Operation with very low control delay. Progression is extremely favorable and most vehicles do not stop at all.	≤10.0
B	Generally good level of progression. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 - 20
C	Higher delays with individual cycle failures may begin at this level. Many vehicles may still pass through without stopping.	> 20 - 35
D	Approaching unstable flow. The influence of congestion becomes more noticeable. Many vehicles stop.	> 35 - 55
E	Considered the limit of acceptable delay. High delays indicated by poor progression, long cycle lengths, and high v/c ratios.	> 55 - 80
F	Unacceptable delay occurs. Progression is extremely poor with long cycle lengths and high v/c ratios.	>80

Source: Highway Capacity Manual, 7th Edition



Intersection capacity results from the existing 2024 peak hour traffic are shown in Table 4a. 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.

The signal timing used to analyze the Asheville Highway at Brakebill Road and Neals Landing Road intersection was obtained from the City of Knoxville and is included in Appendix E. The traffic signal operates in an actuated-uncoordinated system. The signal timings were not changed for the existing analysis and were used as given with the peak hour periods operating with a 120-second cycle length.

As shown in Table 4a, the intersection is calculated to operate with good to average LOS and short to average vehicle delays in the existing peak hour 2024 conditions. The worst-performing approach is the Brakebill Road approach, which operates at LOS D during the AM peak hour.

TABLE 4a
2024 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	Max v/c [c]	LOS [a]	DELAY [b] (seconds)	Max v/c [c]
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound	A	8.5		B	11.7	
		Westbound	A	7.6		A	6.8	
		Northbound	D	46.6		C	28.5	
		Southbound	C	23.3		C	30.5	
		Summary	B	11.2	0.61	B	11.6	0.55

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

A companion software program calculated the existing AM and PM peak hour vehicle queues at the traffic signal. The previously mentioned Synchro 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. Queue length worksheets calculated from the SimTraffic software are provided in Appendix F.

The 95th percentile vehicle queue is a recognized measurement in the transportation engineering profession as a common design standard when considering vehicle queue lengths. A 95th percentile vehicle queue length is a 95% certainty that a vehicle queue will not extend beyond that distance. The calculated vehicle queue results in SimTraffic were based on averaging the outcome obtained during ten traffic simulations in the software. The calculated 95th percentile

vehicle queue lengths at the traffic signal are shown in Table 4b for the existing conditions. The results show that the vehicle queues in the existing conditions are calculated to be fully contained in the provided turn lane storage lengths without spilling or blocking other traffic lanes or movements.

TABLE 4b
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2024 EXISTING PEAK HOUR TRAFFIC

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SIMTRAFFIC 95th PERCENTILE QUEUE LENGTH (ft)		ADEQUATE LENGTH?
				AM PEAK HOUR	PM PEAK HOUR	
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound Left	250	20	31	✓
		Eastbound Thru	n/a	110	207	n/a
		Eastbound Thru/Right	n/a	62	173	n/a
		Westbound Left	235	68	92	✓
		Westbound Thru [1]	n/a	160	110	n/a
		Westbound Right	90	0	0	✓
		Northbound Left	150	114	104	✓
		Northbound Thru/Right	n/a	63	92	n/a
		Southbound Left/Thru/Right	n/a	62	48	n/a

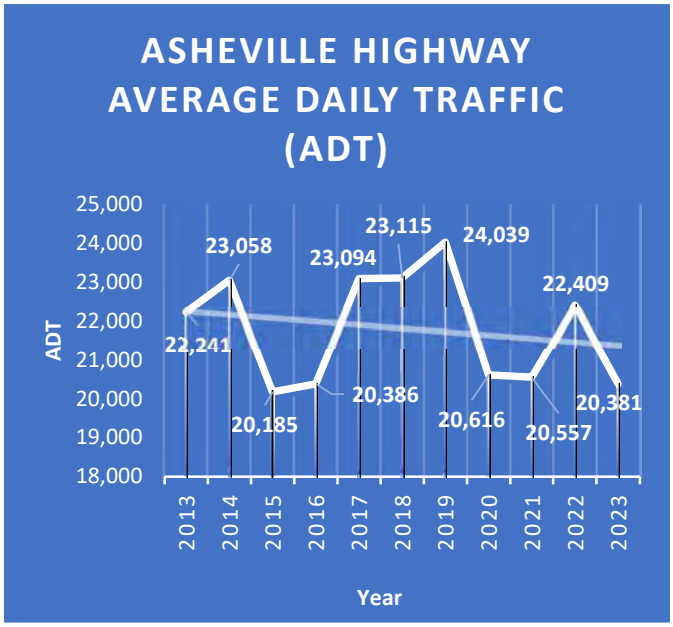
Note: 95th percentile queues were calculated in SimTraffic 12 software
[1] Longest reported length in through dual lanes

The turn lane closest to being exceeded in length in the existing conditions is the northbound approach, Brakebill Road. With a provided vehicle storage length of 150 feet for the northbound left-turn lane, the AM peak hour was calculated to have a 95th percentile vehicle queue of 114 feet and 104 feet in the PM peak hour.

- **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 TDOT count station, vehicular traffic on Asheville Highway has shown negative growth over the past few years. Specifically, the TDOT data in Appendix A shows that Asheville Highway has experienced annual growth of -0.9% over the past ten years. The traffic count station showed a drop in vehicular volumes in 2020 due to the pandemic, remained lower in 2021, rebounded in 2022, but dropped again in 2023.



Nonetheless, this study used an annual growth rate of +2% to calculate future growth on Asheville Highway and Brakebill Road (volumes associated with Neals Landing Road were not included) up to 2028. The annual growth rate was applied to the existing 2024 volumes tabulated at the intersection to estimate the future volumes in the horizon year of 2028 without the potential additional development traffic. Figure 5 shows the projected 2028 horizon year traffic volumes at the studied intersection without the project during the AM and PM peak hours.

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FIGURE 5

The Ridge at Neals Landing - Unit 3

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

Capacity analyses were undertaken to determine the projected LOS in 2028 without the project at the signalized intersection. The existing signal timings were unchanged for the capacity analyses in the projected conditions without the project. The results are shown in Table 5a, and Appendix E includes the capacity analysis worksheets from the software.

As expected, the results in Table 5a show slightly worse vehicle delays for all the intersection approaches in the 2028 projected conditions versus the existing 2024 conditions. This result is due to the slight increase in traffic volumes due to the assumed general growth.

TABLE 5a
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	Max v/c [c]	LOS [a]	DELAY [b] (seconds)	Max v/c [c]
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound	A	8.6		B	12.7	
		Westbound	A	8.4		A	7.3	
		Northbound	D	47.2		C	29.1	
		Southbound	C	22.8		C	30.9	
		Summary	B	11.7	0.64	B	12.3	0.58

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

The calculated 95th percentile vehicle queue lengths at the traffic signal are shown in Table 5b for the projected 2028 conditions without the project. The worksheets from the software are provided in Appendix F. The calculated results show slightly longer vehicle queues for the approaches, but all turning movements are still contained within the designated provided storage lengths.

TABLE 5b
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2028 PROJECTED PEAK HOUR TRAFFIC WITHOUT THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SIMTRAFFIC 95th PERCENTILE QUEUE LENGTH (ft)		ADEQUATE LENGTH?
				AM PEAK HOUR	PM PEAK HOUR	
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound Left	250	21	30	✓
		Eastbound Thru	n/a	115	224	n/a
		Eastbound Thru/Right	n/a	66	187	n/a
		Westbound Left	235	74	108	✓
		Westbound Thru [1]	n/a	168	112	n/a
		Westbound Right	90	0	10	✓
		Northbound Left	150	150	112	✓
		Northbound Thru/Right	n/a	66	105	n/a
		Southbound Left/Thru/Right	n/a	62	49	n/a

Note: 95th percentile queues were calculated in SimTraffic 12 software
[1] Longest reported length in through dual lanes

- **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated traffic The Ridge at Neals Landing – Unit 3 Subdivision will generate was based on the equations provided by Knoxville/Knox County Planning. These equations were developed from an extensive local study to estimate townhouse (and apartment) trip generation in the surrounding area and were published in December 1999. 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 often-referenced Institute of Transportation (ITE) Trip Generation Manual.

The data and calculations from the local trip generation study for the proposed land use are shown in Appendix G. A summary of this information is presented in Table 6a:

TABLE 6a
TRIP GENERATION FOR THE RIDGE AT NEALS LANDING - UNIT 3 SUBDIVISION
111 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Townhouses	111	1,049	22%	78%		55%	45%	
				13	46	59	47	38	85
Total New Volume Site Trips			**1,049**	**13**	**46**	**59**	**47**	**38**	**85**

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

For the proposed residential development, it is estimated that 13 vehicles will enter and 46 will exit, for a total of 59 generated trips during the AM peak hour in the year 2028. Similarly, it is estimated that 47 vehicles will enter and 38 will exit, for a total of 85 generated trips during the PM peak hour in the year 2028. The calculated trips generated for an average weekday are estimated to be 1,049 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis.

Additional trip generation calculations were also made for the adjacent phases of The Ridge at Neals Landing and the Neals Landing Subdivision, which are planned but have not yet been constructed and occupied. These phases include 100 single-family detached houses that have not begun contributing trips to and from Neals Landing Road at the signalized intersection. These

phases include Neal's Landing Subdivision – Unit 3 and a portion of The Ridge at Neals Landing Subdivision – Units 1 and 2. The trips generated for the single-family detached houses in these adjacent, un-built phases were calculated using rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The data and calculations from ITE for these other phases are shown in Appendix G. A summary of this information is presented in the following table:

TABLE 6b
TRIP GENERATION FOR REMAINING LOTS IN NEAL'S LANDING (UNIT 3) SUBDIVISION & THE RIDGE AT NEALS LANDING SUBDIVISION (UNITS 1 AND 2)
100 Single-Family Detached Houses Remaining to be Built and Occupied

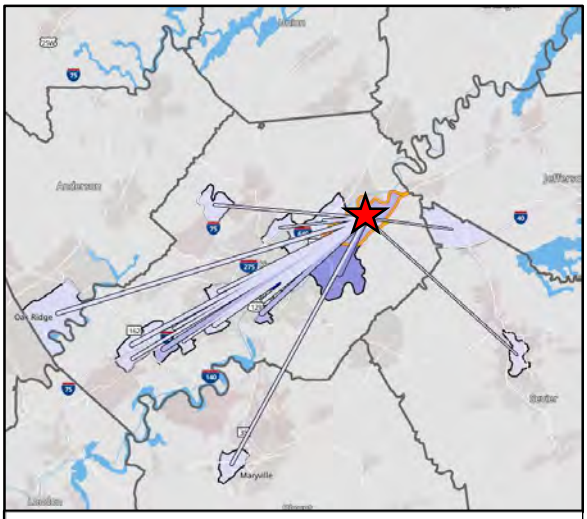
ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	100 Houses Remaining to be Occupied	1,009	25%	75%		63%	37%	
				18	56	74	62	37	99
Total New Volume Site Trips			**1,009**	**18**	**56**	**74**	**62**	**37**	**99**

ITE Trip Generation Manual, 11th Edition
Trips calculated by using Fitted Curve Equation

- **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for The Ridge at Neals Landing – Unit 3 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 signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road near the proposed development site.

During the traffic count, residents and others entering and exiting the existing phases of Neal's Landing Subdivision and The Ridge at Neals Landing Subdivision showed a distinct inclination towards Knoxville (westbound) during the morning peak hour and the reverse during the afternoon peak hour. This split was also observed by the thru traffic movements on Asheville Highway. Fewer amounts of the existing subdivision's entering and exiting traffic were observed to and from Brakebill Road and to and from the east on Asheville Highway.

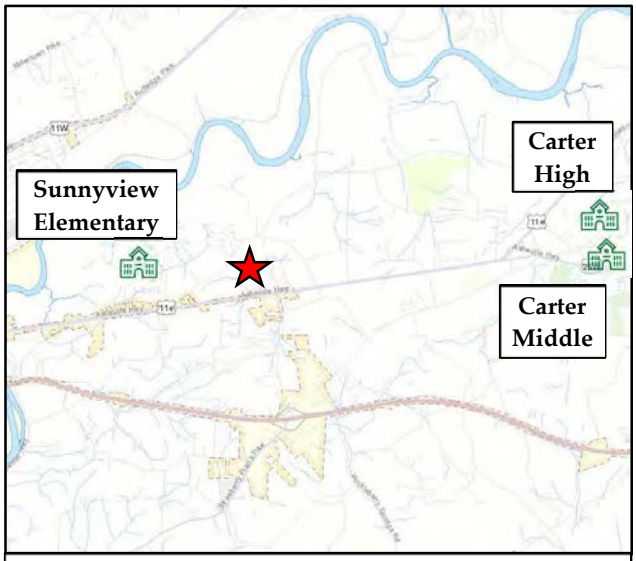


Top 25 Locations of 2021 Census Bureau Work-Based Trips to & from Census Tract 53.01

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 and southwest. This assertion is based on data from the United States Bureau website for Census Tract 53.01, where the development property is located. Based on 2021 (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. Very few of these work-based trips are shown east of the proposed subdivision.

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 Sunnyview Elementary and Carter Middle and High School. The zoned public schools for this development property are located west and east of the development

site. The zoned schools are between 2.3 and 4 miles from the proposed subdivision by roadway. The shortest and quickest routes from the proposed subdivision to and from these schools will be via Neals Landing Road and traveling either east or west on Asheville Highway.



Zoned Public School Locations

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 these factors, Figure 6 shows the projected distribution of traffic entering and exiting the proposed residential subdivision at the signalized intersection. Overall, the majority of traffic generated by future residents in the Unit 3 subdivision is expected to occur to and from the west on Asheville Highway.

Figure 7a shows the traffic assignment of the computed trips generated by The Ridge at Neals Landing – Unit 3 Subdivision and the remaining unbuilt 100 single-family detached houses in the adjacent phases in Neal's Landing Subdivision and The Ridge at Neals Landing Subdivision. This assignment is based on the assumed distribution of trips shown in Figure 6.

Furthermore, several other nearby proposed residential subdivisions are in the planning stages. They are also expected to impact the signalized intersection due to the trips they generate in the near future. These other residential subdivisions include the 0 Asheville Highway Subdivision, the 8014 Asheville Highway Subdivision, and the Habitat for Humanity Subdivision. These known proposed residential subdivisions are all a bit further to the east off Asheville Highway. The 0 Asheville Highway Subdivision will be between North Wooddale Road and Cash Road, approximately 0.6 miles away. The 8014 Asheville Highway Subdivision and the Habitat for Humanity Subdivision will be adjacent to each other and slightly east of Cash Road,

approximately 1 mile away.

Figure 7b shows the traffic assignment of the computed trips generated by the 0 Asheville Highway Subdivision. Figure 7c shows the proposed 8014 Asheville Highway Subdivision assignment. Figure 7d shows the proposed Habitat for Humanity Subdivision assignment. These additional future residential developments are also assumed to be fully occupied by 2028, and the trips shown in Figures 7b, 7c, and 7d are also based on the projected distribution patterns shown in Figure 6. These projected traffic volumes for the other subdivisions were obtained from the other transportation impact studies Ajax Engineering, LLC produced.

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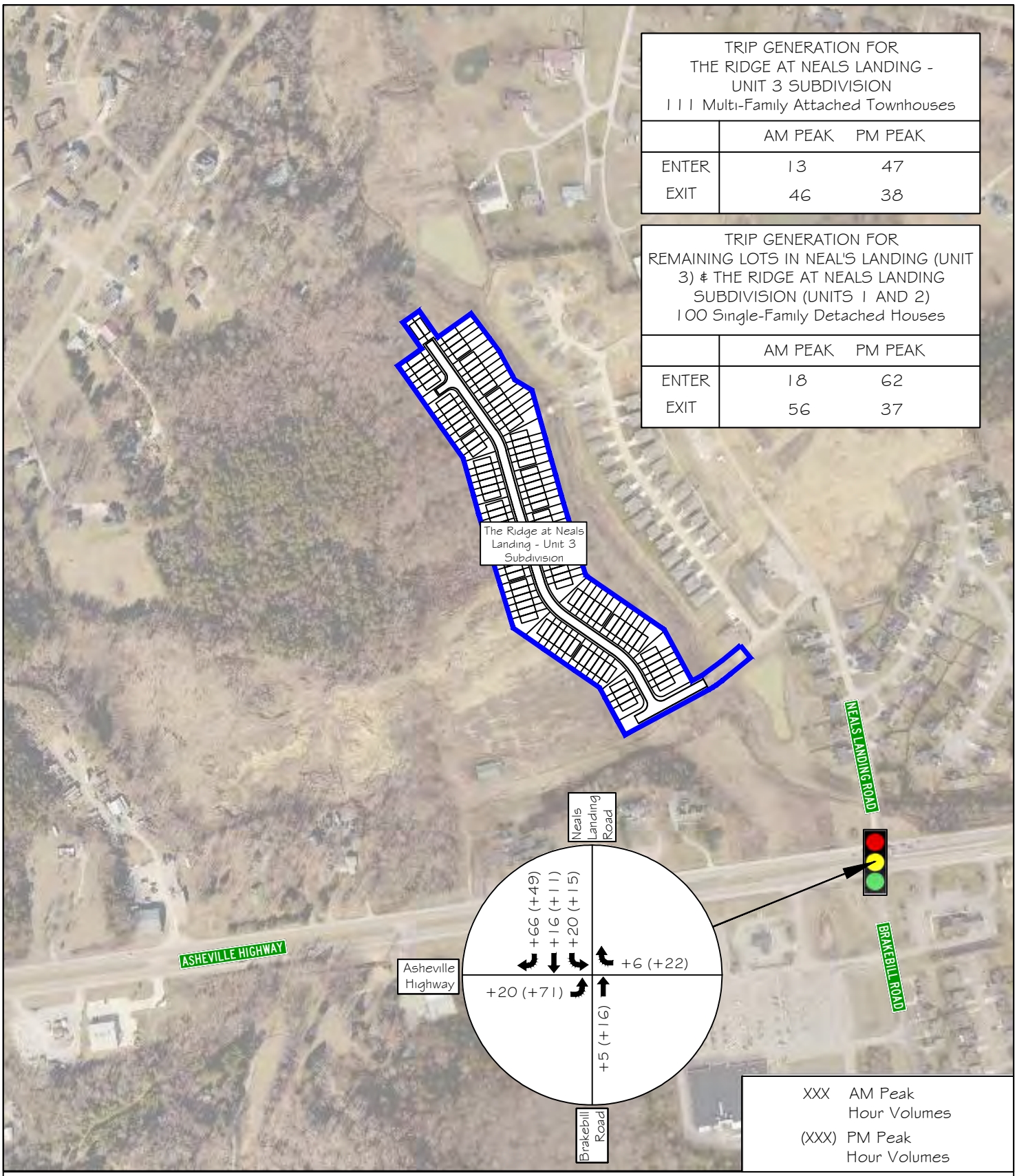
FIGURE 6

The Ridge at Neals Landing - Unit 3

Directional Distribution of Generated Traffic during AM and PM Peak Hour



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

NOT TO SCALE

NORTH

FIGURE 7a

The Ridge at Neals Landing - Unit 3

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for Neals Landing Subdivisions

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FIGURE 7b

The Ridge at Neals Landing - Unit 3

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for 0 Asheville Highway Subdivision

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Email: ajaxengineering@gmail.com

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FIGURE 7c

The Ridge at Neals Landing - Unit 3

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for 8014 Asheville Highway Subdivision

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Email: ajaxengineering@gmail.com

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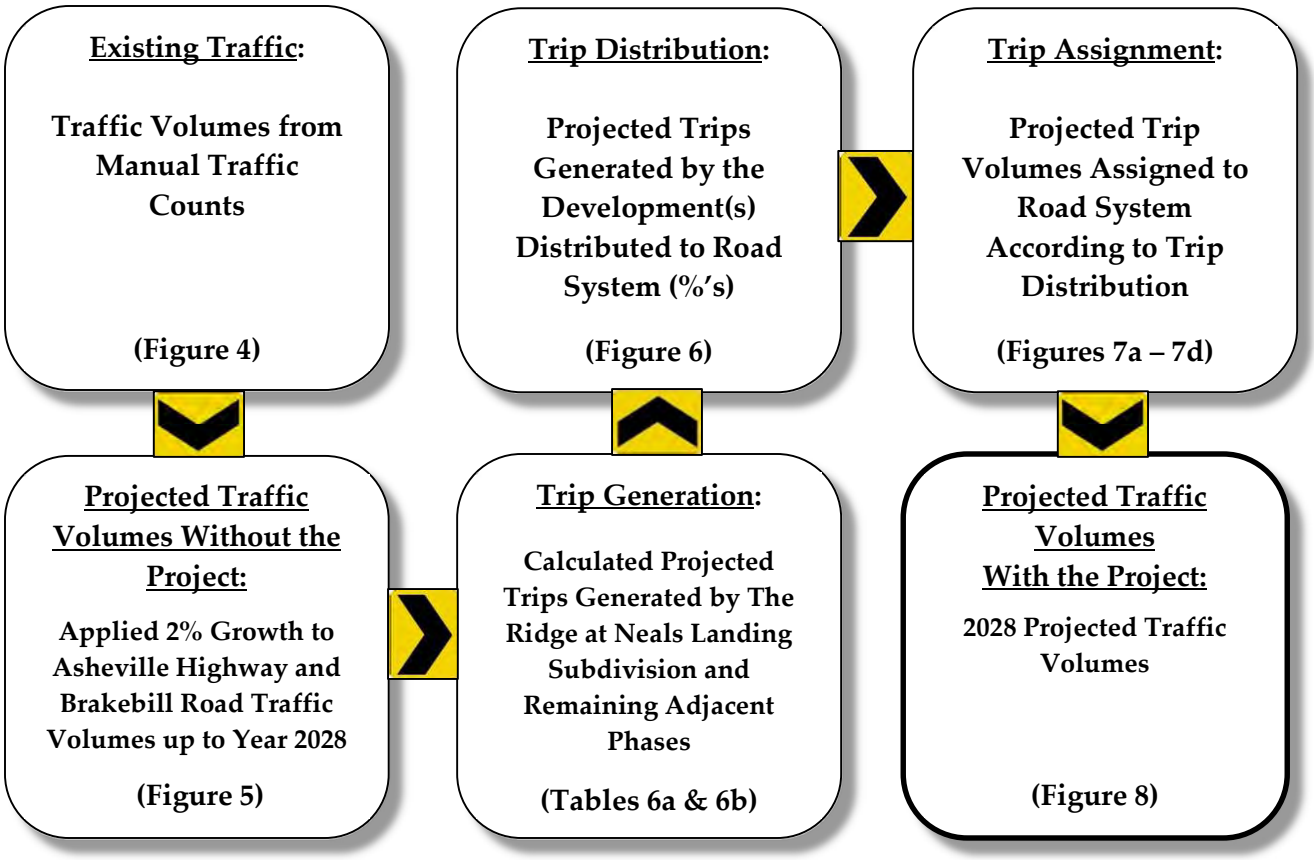
FIGURE 7d

The Ridge at Neals Landing - Unit 3

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for Habitat for Humanity Subdivision

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

Several additive steps were taken to estimate the total projected traffic volumes at the signalized intersection when the proposed development and other nearby subdivisions are constructed and fully occupied in 2028. The steps are illustrated below for clarity and review:



The calculated peak hour traffic generated by The Ridge at Neals Landing – Unit 3 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 signalized intersection when The Ridge at Neals Landing – Unit 3 Subdivision is fully built and occupied in 2028. In addition to The Ridge at Neals Landing – Unit 3 Subdivision trips, projected 2028 volumes also included the additional trips by the adjacent Neals Landing Subdivisions phases and the other known proposed residential developments, including the 0 Asheville Highway, 8014 Asheville Highway, and Habitat for Humanity Subdivisions. Figure 8 shows the projected 2028 AM and PM peak hour volumes for The Ridge at Neals Landing – Unit 3 Subdivision trips at the signalized intersection and includes the trips from the other proposed non-related residential developments that are expected to be fully built and occupied by 2028.

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Email: ajaxengineering@gmail.com

NOT TO SCALE

NORTH

FIGURE 8

The Ridge at Neals Landing - Unit 3

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

Capacity analyses were conducted to determine the projected LOS at the signalized intersection with all the development traffic in 2028, shown in Figure 8. Intersection capacity results from the projected 2028 peak hour traffic are shown in Table 7a. Appendix E includes the worksheets for the projected 2028 peak hour capacity analyses.

As shown in Table 7a, the signalized intersection is projected to operate with reasonable LOS and vehicle delays. The exceptions are the Brakebill Road approach in the AM peak hour with a LOS E and the Neals Landing Road approach with a LOS F in the PM peak hour.

TABLE 7a
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	Max v/c [c]	LOS [a]	DELAY [b] (seconds)	Max v/c [c]
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound	B	12.7		B	17.2	
		Westbound	B	15.9		B	11.7	
		Northbound	E	71.6		C	31.9	
		Southbound	D	49.5		F	105.8	
		Summary	C	22.0	0.93	C	20.0	0.99

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

The 95th percentile vehicle queue lengths are shown in Table 7b for the projected 2028 conditions with the project. The worksheets are provided in Appendix F. The results show that the projected vehicle queues for all the turning movements will be within the designated storage lengths. However, the southbound approach of Neals Landing Road shows fairly significant vehicle queues within a single lane during peak AM and PM hours. These queues are approximately six vehicles in the AM peak hour and five in the PM peak hour, assuming 25 feet per vehicle.

TABLE 7b
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2028 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SIMTRAFFIC 95th PERCENTILE QUEUE LENGTH (ft)		ADEQUATE LENGTH?
				AM PEAK HOUR	PM PEAK HOUR	
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound Left	250	47	86	✓
		Eastbound Thru	n/a	147	272	n/a
		Eastbound Thru/Right	n/a	94	253	n/a
		Westbound Left	235	103	124	✓
		Westbound Thru [1]	n/a	239	175	n/a
		Westbound Right	90	10	37	✓
		Northbound Left	150	119	114	✓
		Northbound Thru/Right	n/a	73	141	n/a
		Southbound Left/Thru/Right	n/a	138	111	n/a

Note: 95th percentile queues were calculated in SimTraffic 12 software
[1] Longest reported length in through dual lanes

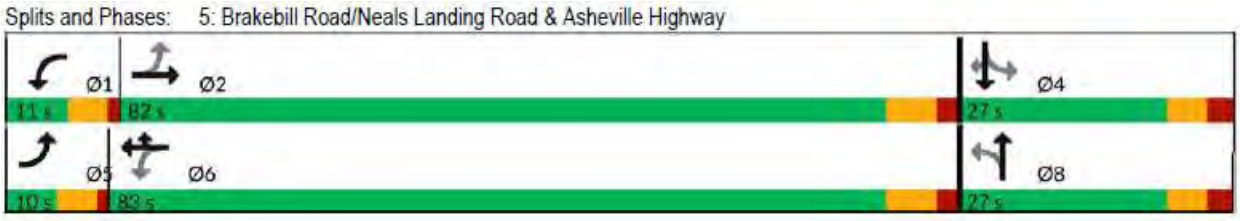
CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of The Ridge at Neals Landing – Unit 3 Subdivision on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level. The recommendations also take into account the nearby non-related proposed residential subdivisions along Asheville Highway.

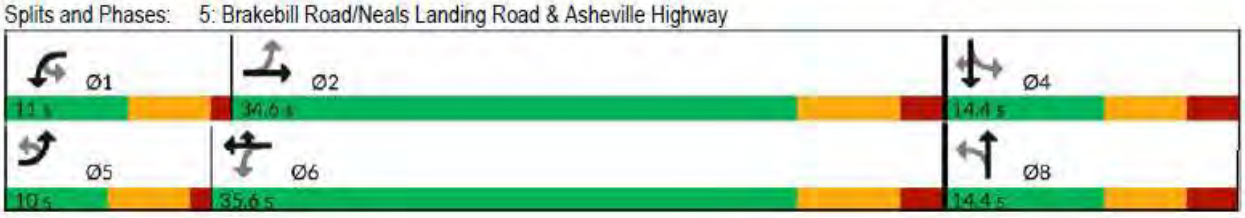
1 **Asheville Highway at Brakebill Road and Neals Landing Road**: Due to the poor results for the southbound approach of Neals Landing Road in the projected 2028 conditions, some improvements were tested using the Synchro software. These improvements included the following:

- The addition of a southbound right-turn lane on Neals Landing Road at the traffic signal before the completion of the subdivisions: Due to the existing constraints, a relatively short right-turn lane with a storage of 75 feet and a taper of 25 feet was modeled in the software. The constraints include the limited distance on Neals Landing Road between Asheville Highway and a box culvert over Shining Creek East. The width of the box culvert is not sufficiently wide enough to support a third lane, and there is only 100 feet between the white stop bar and the beginning edge of the box culvert.
- The Synchro software was used to optimize the traffic signal splits and cycle length for the AM and PM peak hours with the projected 2028 traffic volumes. The optimized timings resulted in a cycle length of 60 seconds during the PM peak hour and are provided in the Synchro worksheets in Appendix E and also shown below:

AM Peak Hour:



PM Peak Hour:



The existing cycle length during the AM and PM peak periods is 120 seconds. Though the optimized cycle length was calculated to be 60 seconds, there is concern that this short cycle length may generate complaints from motorists about vehicle queueing on Asheville Highway. Thus, the cycle length is recommended to be 90 seconds during the afternoon peak periods in the 2028 peak period projected conditions. This change will decrease vehicle delays for Brakebill Road, and particularly for Neals Landing Road's southbound approach at the traffic signal.

As shown in Table 8, the signalized intersection approach is projected to operate with reasonable LOS and vehicle delays with the addition of the southbound right-turn lane and optimized signal timing. The worksheets are provided in Appendix E.

TABLE 8
2028 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT AND IMPROVEMENTS *

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	Max v/c [c]	LOS [a]	DELAY [b] (seconds)	Max v/c [c]
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound	A	8.7		B	17.3	
		Westbound	B	11.4		B	12.4	
		Northbound	D	46.7		C	30.8	
		Southbound	D	38.1		C	28.1	
		Summary	B	15.6	0.66	B	17.1	0.73

Note: All analyses were calculated in Synchro 12 software and reported with HCM 7th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio
* Optimized Traffic Signal Timing and New SB Right Turn Lane

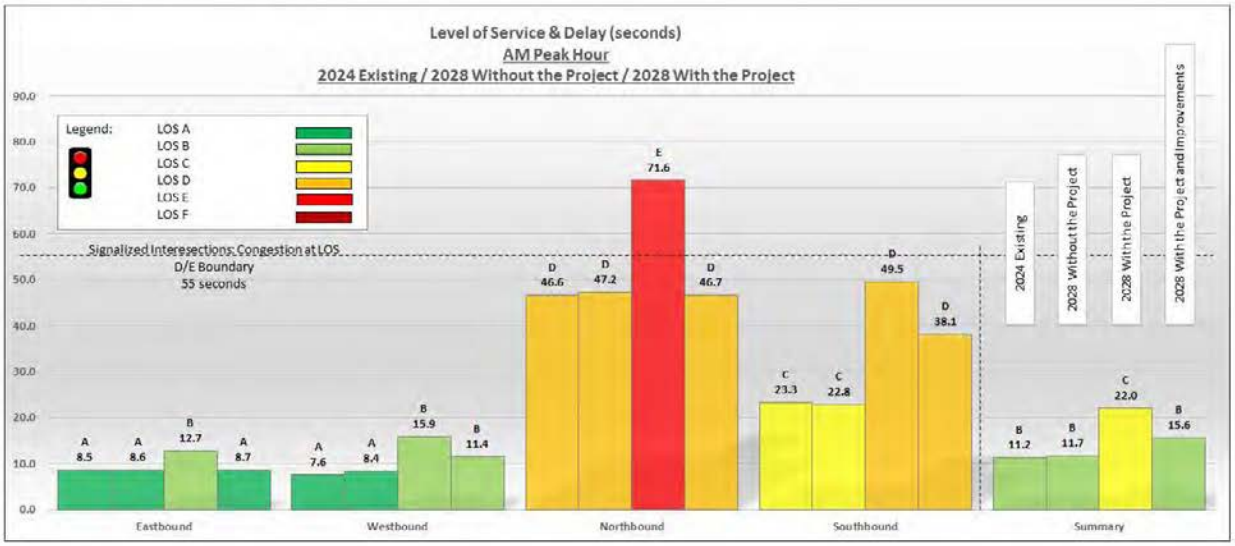
A summary of the capacity analyses for this intersection is presented in Table 9. This table provides a side-by-side summary and comparison of the signalized intersection for the existing 2024 conditions, projected conditions in 2028 without the project, the projected conditions in 2028 with the project, and the projected conditions in 2028 with the project and the improvements.

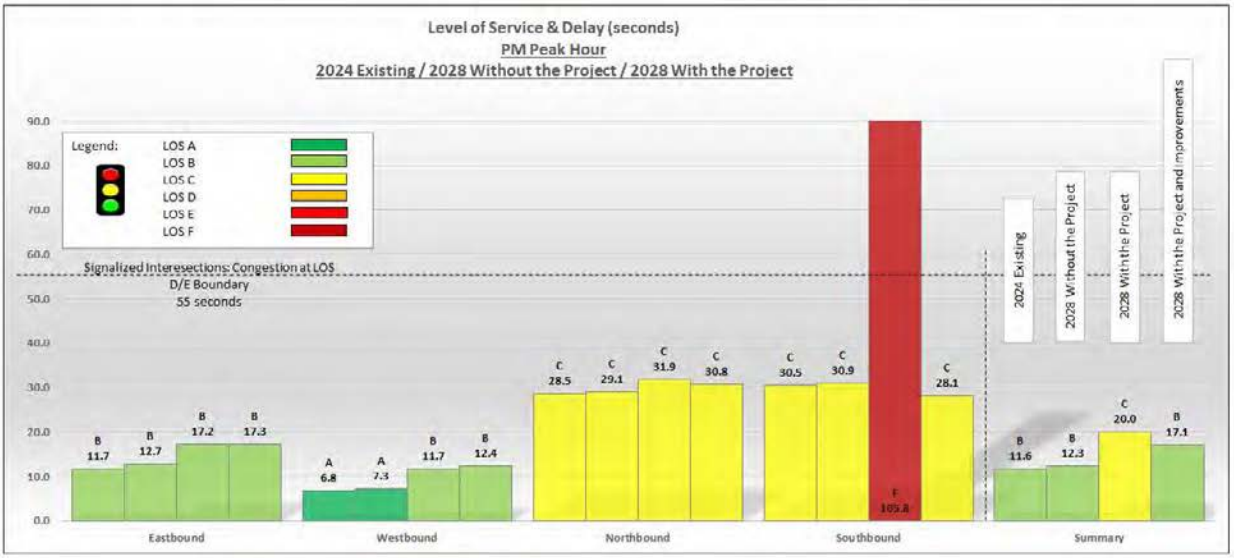
Overall, the signalized intersection of Asheville Highway at Brakebill Road and Neals Landing Road is projected to operate with reasonable vehicle delays and queues when coupled with the recommended signal timing during the peak afternoon periods and providing a southbound right-turn lane for Neals Landing Road.

TABLE 9
INTERSECTION CAPACITY ANALYSIS SUMMARY
ASHEVILLE HIGHWAY AT BRAKEBILL ROAD & NEALS LANDING ROAD

APPROACH / PEAK HOUR MOVEMENT	2024 EXISTING			2028 WITHOUT THE PROJECT			2028 WITH THE PROJECT			2028 WITH THE PROJECT * AND IMPROVEMENTS		
	LOS[a]	Delay[b]	Max v/c [c]	LOS[a]	Delay[b]	Max v/c [c]	LOS[a]	Delay[b]	Max v/c [c]	LOS[a]	Delay[b]	Max v/c [c]
AM Peak												
Eastbound	A	8.5		A	8.6		B	12.7		A	8.7	
Westbound	A	7.6		A	8.4		B	15.9		B	11.4	
Northbound	D	46.6		D	47.2		E	71.6		D	46.7	
Southbound	C	23.3		C	22.8		D	49.5		D	38.1	
Summary	B	11.2	0.61	B	11.7	0.64	C	22.0	0.93	B	15.6	0.66
PM Peak												
Eastbound	B	11.7		B	12.7		B	17.2		B	17.3	
Westbound	A	6.8		A	7.3		B	11.7		B	12.4	
Northbound	C	28.5		C	29.1		C	31.9		C	30.8	
Southbound	C	30.5		C	30.9		F	105.8		C	28.1	
Summary	B	11.6	0.55	B	12.3	0.58	C	20.0	0.99	B	17.1	0.73

Note: All analyses were calculated in Synchro 12 software and reported with HCM 7th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio
* Optimized Traffic Signal Timing and New SB Right Turn Lane





The 95th percentile vehicle queue lengths are shown in Table 10 for the projected 2028 conditions with the project and the recommended improvements. The worksheets are provided in Appendix F. The results show that the projected vehicle queues for all the turning movements will be within the designated storage lengths. However, the southbound approach of Neals Landing Road shows a vehicle queue of 87 feet in the AM peak hour, which exceeds the recommended proposed storage length of 75 feet by 12 feet.

TABLE 10
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT AND IMPROVEMENTS *

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SIMTRAFFIC 95th PERCENTILE QUEUE LENGTH (ft)		ADEQUATE LENGTH?
				AM PEAK HOUR	PM PEAK HOUR	
Asheville Highway (WB & EB) at Brakebill Road (NB) and Neals Landing Road (SB)	Signalized	Eastbound Left	250	43	80	✓
		Eastbound Thru	n/a	124	242	n/a
		Eastbound Thru/Right	n/a	79	219	n/a
		Westbound Left	235	88	110	✓
		Westbound Thru [1]	n/a	219	153	n/a
		Westbound Right	90	9	34	✓
		Northbound Left	150	129	99	✓
		Northbound Thru/Right	n/a	84	130	n/a
		Southbound Left/Thru	n/a	83	63	n/a
		Southbound Right	75	87	48	NO

Note: 95th percentile queues were calculated in SimTraffic 12 software
[1] Longest reported length in through dual lanes
* Optimized Traffic Signal Timing and New SB Right Turn Lane

Even though the proposed 75-foot southbound right-turn lane storage length is slightly exceeded during the AM peak hour, it is presumed sufficient and not worth the effort or expense to widen the box culvert over Shining Creek East based on the known phases included in this study.

It is recommended that the box culvert be widened if there is any other future development beyond the known, adjacent, and studied 111 townhouses in The Ridge at Neals Landing – Unit 3 Subdivision and the remaining 100 single-family detached houses in Neal's Landing – Unit 3 Subdivision and The Ridge at Neals Landing Subdivision Units 1 and 2. If future development occurs beyond these phases included in this study, it is recommended that the box culvert be widened sufficiently enough to allow for a southbound right-turn lane to be extended past the box culvert to the north and provide additional storage beyond the recommended storage of 75 feet without encroaching upon the first house lot on the west side of Neals Landing Road. Once additional width is provided at the box culvert, the storage length for a southbound right-turn lane could be more than doubled its recommended length of 75 feet. A future subsequent study can

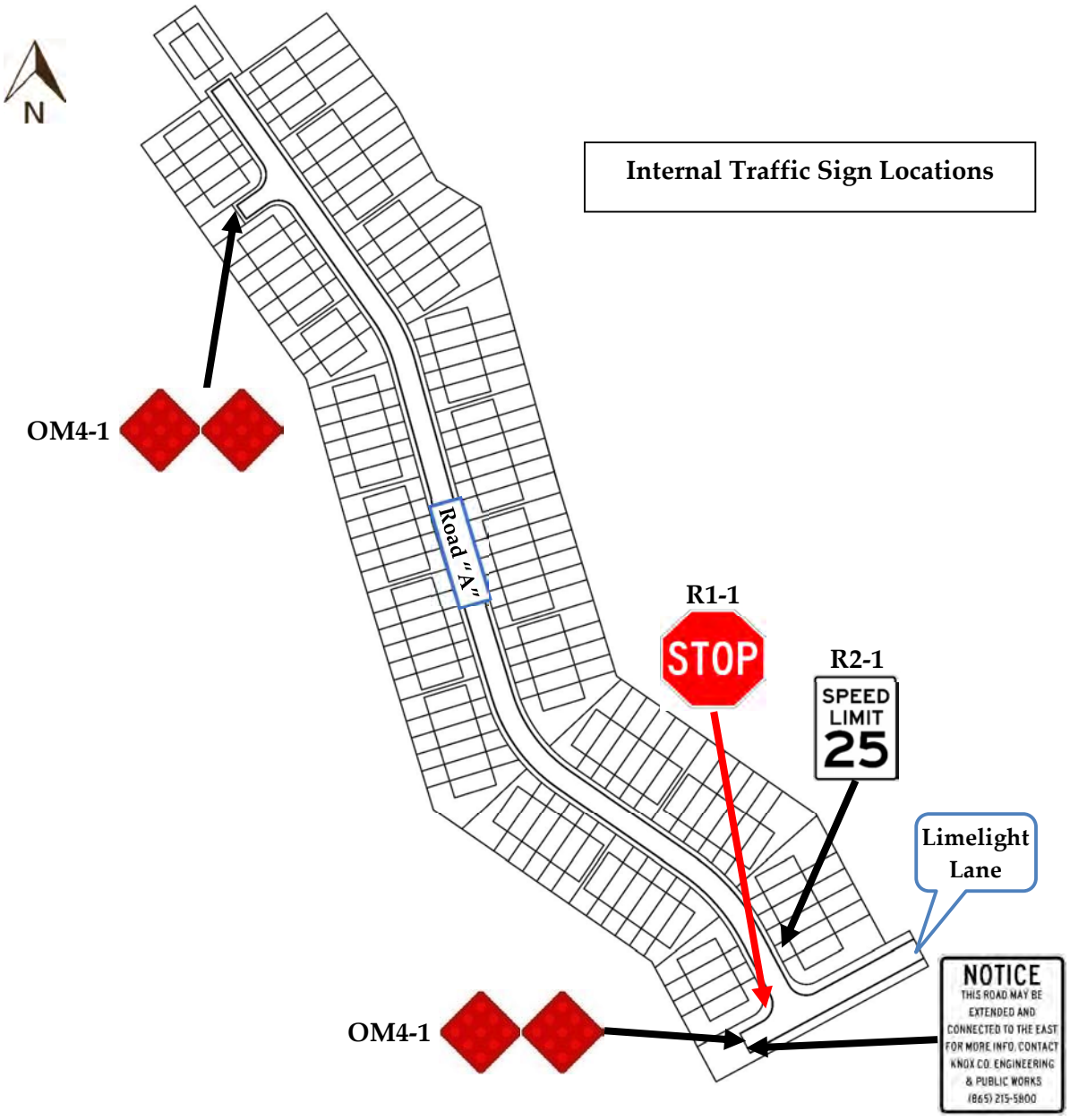
determine how much this lane should be extended to accommodate potential additional residential phases.

Also, if future development occurs beyond the known phases included in this report, it is recommended that a secondary entrance be provided for these subdivisions north of Asheville Highway. For residential subdivisions with more than 150 housing units, Knox County has a long-standing unwritten design policy requiring a secondary access point for ensuring access to subdivisions during potential emergencies. Since all the existing and proposed subdivisions north of Asheville Highway at the signalized intersection will have only one means of ingress and egress, a secondary entrance access point will be required if future development goes beyond the 294 total housing units in Neal's Landing (Units 1 – 3) and The Ridge at Neals Landing (Units 1 – 3) Subdivisions.

2 **<u>The Ridge at Neals Landing – Unit 3 Subdivision Internal Road:</u>** The layout plan shows one new street and an extension of an existing street for the additional subdivision phase, as shown in Figure 3.

2a) A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the Unit 3 entrance, on Road "A", off Limelight Lane, to reinforce the reduced speed limits within the subdivisions to the north of Asheville Highway at Neals Landing Road.

2b) A Stop Sign (R1-1) with a 24" white stop bar is recommended to be installed at the southern end of proposed Road "A" at Limelight Lane, as shown in the image below.



Dual end-of-roadway object markers (OM4-1) should be installed at the end of Limelight Lane's extension and the proposed turnaround, as shown in the image. Furthermore, an additional sign should be posted at the western end of the extended stub-out for Limelight Lane to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, "NOTICE – This road may be extended and connected to the west – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800".

2c) Sight distance at the new internal intersection of Road "A" at Limelight Lane must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the required internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.

2d) 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.

2e) All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.

2f) Road "A" in the proposed subdivision will have two 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 Road "A", such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.

2g) All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper transportation operations.

APPENDIX A

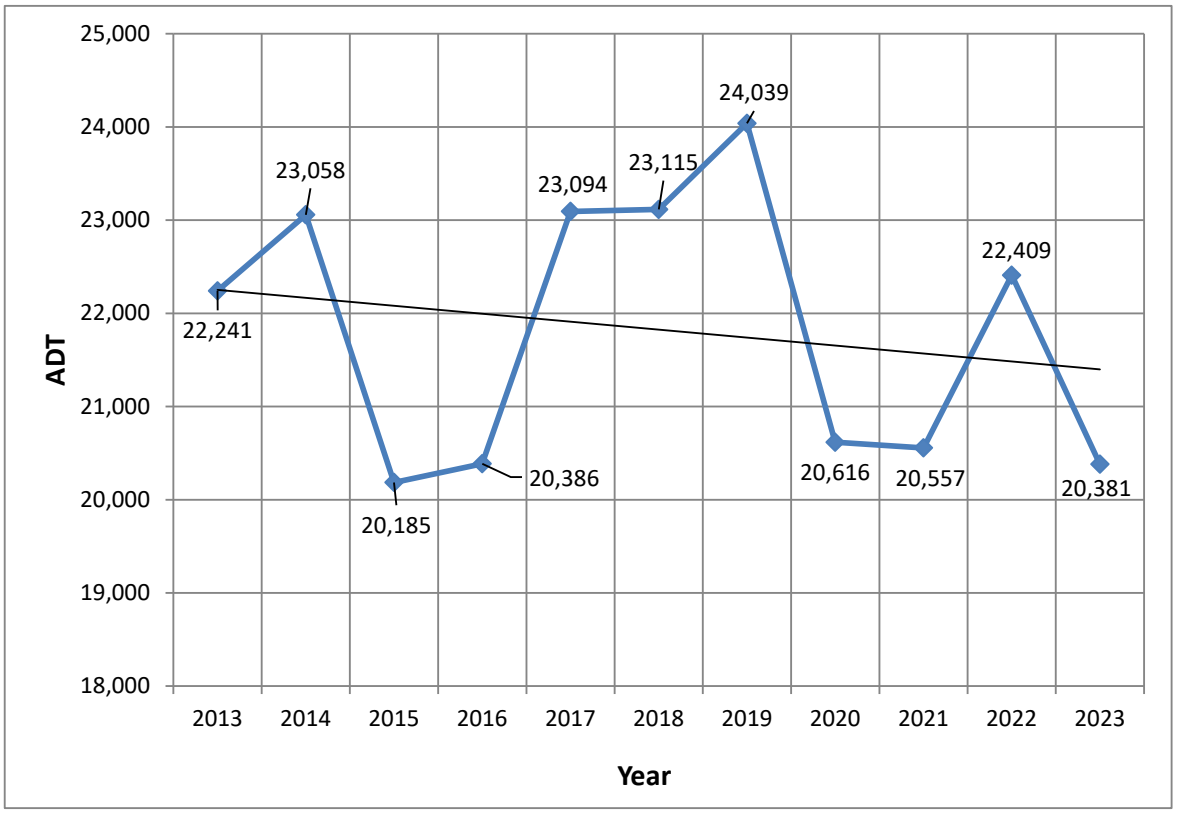
HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

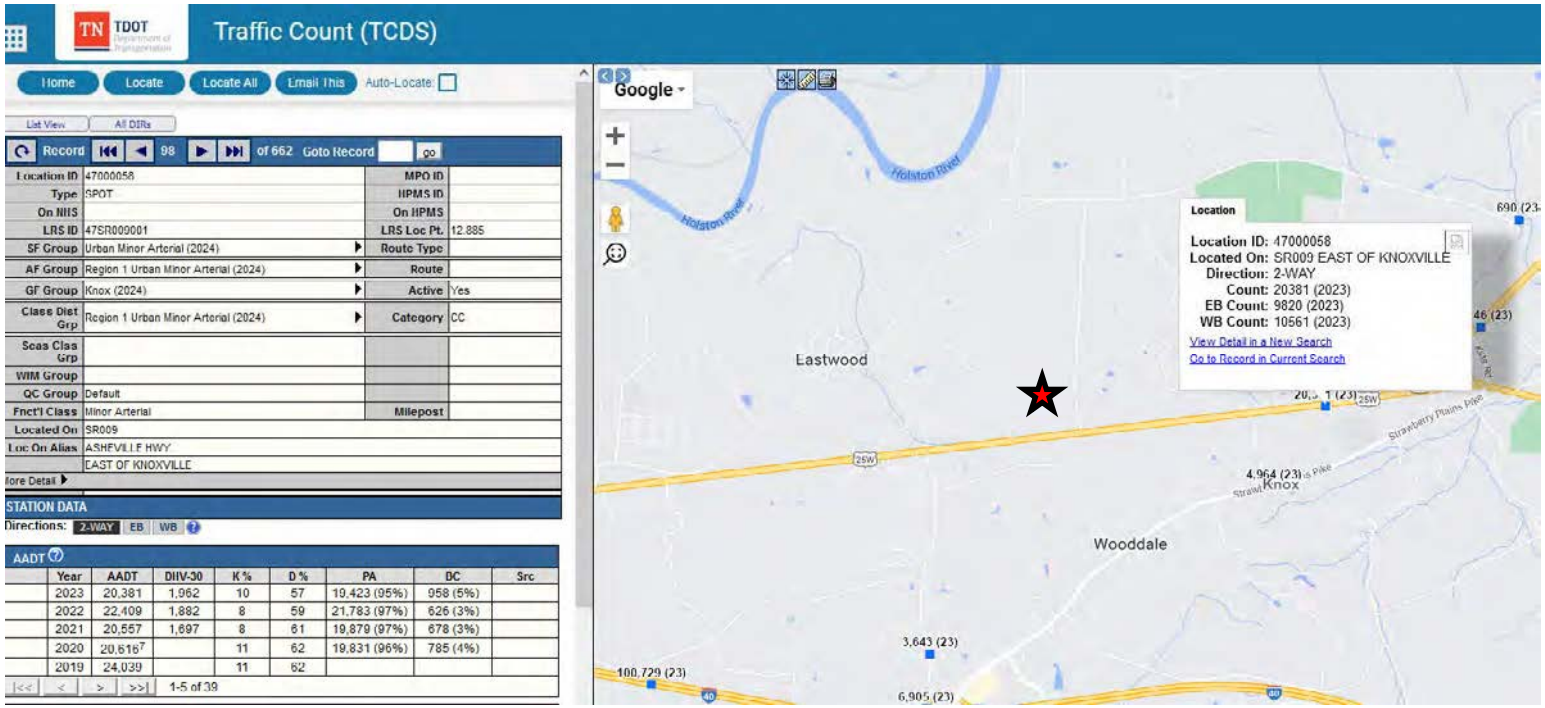
Organization: TDOT
Station ID #: 47000058
Location: Asheville Highway, east of Molly Bright Road

YEAR	AADT
2013	22,241
2014	23,058
2015	20,185
2016	20,386
2017	23,094
2018	23,115
2019	24,039
2020	20,616
2021	20,557
2022	22,409
2023	20,381

Trendline



2013 - 2023 Growth Rate = -8.4%
Average Annual Growth Rate = -0.9%


TN TDOT
Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate:
List View
All DIRs
Record 98 of 662 Goto Record
Location ID 47000058
Type SPOT
On NHS
LRS ID 47SR000001
SF Group Urban Minor Arterial (2024)
AF Group Region 1 Urban Minor Arterial (2024)
GF Group Knox (2024)
Class Dist Grp Region 1 Urban Minor Arterial (2024)
Seas Class Grp
WIM Group
QC Group Default
Fnct'l Class Minor Arterial
Located On SR009
Loc On Alias ASHEVILLE HWY
EAST OF KNOXVILLE
More Detail
MPO ID
HPMS ID
On HPMS
LRS Loc Pt. 12.885
Route Type
Route
Active Yes
Category CC
Milepost
STATION DATA
Directions: 2-WAY EB WB
AADT
Year AADT DHV-30 K % D % PA DC Src
2023 20,381 1,962 10 57 19,423 (95%) 958 (5%)
2022 22,409 1,882 8 59 21,783 (97%) 626 (3%)
2021 20,557 1,697 8 61 19,879 (97%) 678 (3%)
2020 20,616[7] 11 62 19,831 (96%) 785 (4%)
2019 24,039 11 62
1-5 of 39
Google
Holston River
Eastwood
Wooddale
Knox
Strawberry Plains Pike
25W
3,643 (23)
100,729 (23)
6,905 (23)
Location
Location ID: 47000058
Located On: SR009 EAST OF KNOXVILLE
Direction: 2-WAY
Count: 20381 (2023)
EB Count: 9820 (2023)
WB Count: 10561 (2023)
View Detail in a New Search
Go to Record in Current Search

APPENDIX B

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

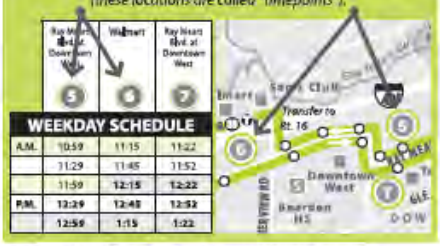
Route 34: Burlington Shopper

How to Read this Schedule

SATURDAY						
Going away from downtown			Going toward downtown			
Knoxville Station Bay H	Austin East High	Kirkwood St Superstop WB	Walmart	Kirkwood St Superstop EB	MLK at Beal Bourne Street (Austin-East High School)	Knoxville Station Bay H
		Transfer to Rts. 31 & 32	Transfer to Rt. 23	Transfer to Rts. 31 & 32		
1	2	3	4	5	6	7
			6:55 AM	7:15 AM	7:20 AM	7:35 AM
			7:25 AM	7:45 AM	7:50 AM	8:05 AM
7:15 AM	7:35 AM	7:38 AM	7:55 AM	8:15 AM	8:20 AM	8:35 AM
7:45 AM	8:05 AM	8:08 AM	8:25 AM	8:45 AM	8:50 AM	9:05 AM
8:15 AM	8:35 AM	8:38 AM	8:55 AM	9:15 AM	9:20 AM	9:35 AM
8:45 AM	9:05 AM	9:08 AM	9:25 AM	9:45 AM	9:50 AM	10:05 AM
9:15 AM	9:35 AM	9:38 AM	9:55 AM	10:15 AM	10:20 AM	10:35 AM
9:45 AM	10:05 AM	10:08 AM	10:25 AM	10:45 AM	10:50 AM	11:05 AM
10:15 AM	10:35 AM	10:38 AM	10:55 AM	11:15 AM	11:20 AM	11:35 AM
10:45 AM	11:05 AM	11:08 AM	11:25 AM	11:45 AM	11:50 AM	12:05 PM
11:15 AM	11:35 AM	11:38 AM	11:55 AM	12:15 PM	12:20 PM	12:35 PM
11:45 AM	12:05 PM	12:08 PM	12:25 PM	12:45 PM	12:50 PM	1:05 PM
12:15 PM	12:35 PM	12:38 PM	12:55 PM	1:15 PM	1:20 PM	1:35 PM
12:45 PM	1:05 PM	1:08 PM	1:25 PM	1:45 PM	1:50 PM	2:05 PM
1:15 PM	1:35 PM	1:38 PM	1:55 PM	2:15 PM	2:20 PM	2:35 PM
1:45 PM	2:05 PM	2:08 PM	2:25 PM	2:45 PM	2:50 PM	3:05 PM
2:15 PM	2:35 PM	2:38 PM	2:55 PM	3:15 PM	3:20 PM	3:35 PM
2:45 PM	3:05 PM	3:08 PM	3:25 PM	3:45 PM	3:50 PM	4:05 PM
3:15 PM	3:35 PM	3:38 PM	3:55 PM	4:15 PM	4:20 PM	4:35 PM
3:45 PM	4:05 PM	4:08 PM	4:25 PM	4:45 PM	4:50 PM	5:05 PM
4:15 PM	4:35 PM	4:38 PM	4:55 PM	5:15 PM	5:20 PM	5:35 PM
4:45 PM	5:05 PM	5:08 PM	5:25 PM	5:45 PM	5:50 PM	6:05 PM
5:15 PM	5:35 PM	5:38 PM	5:55 PM	6:15 PM	6:20 PM	6:35 PM
5:45 PM	6:05 PM	6:08 PM	6:25 PM	6:45 PM	6:50 PM	7:05 PM
6:15 PM	6:35 PM	6:38 PM	6:55 PM	7:15 PM	7:20 PM	7:35 PM
6:45 PM	7:05 PM	7:08 PM	7:25 PM	7:45 PM	7:50 PM	8:05 PM
7:15 PM	7:35 PM	7:38 PM	7:55 PM	8:15 PM	8:20 PM	8:35 PM
7:45 PM	8:05 PM	8:08 PM	8:25 PM	8:45 PM	8:50 PM	9:05 PM
8:15 PM	8:35 PM	8:38 PM	8:55 PM	9:15 PM	9:20 PM	9:35 PM
8:45 PM	9:05 PM	9:08 PM	9:25 PM	9:45 PM	9:50 PM	10:05 PM
9:15 PM	9:35 PM	9:38 PM	9:55 PM	10:15 PM	10:20 PM	10:35 PM
9:45 PM	10:05 PM	10:08 PM	10:25 PM	10:45 PM	10:50 PM	11:05 PM
10:15 PM	10:35 PM	10:38 PM	10:55 PM	11:15 PM	11:20 PM	
11:15 PM	11:35 PM	11:38 PM	11:55 PM			

SUNDAY						
			8:25 AM	8:45 AM	8:50 AM	9:05 AM
8:15 AM	8:35 AM	8:38 AM	8:55 AM	9:15 AM	9:20 AM	9:35 AM
8:45 AM	9:05 AM	9:08 AM	9:25 AM	9:45 AM	9:50 AM	10:05 AM
9:15 AM	9:35 AM	9:38 AM	9:55 AM	10:15 AM	10:20 AM	10:35 AM
9:45 AM	10:05 AM	10:08 AM	10:25 AM	10:45 AM	10:50 AM	11:05 AM
10:15 AM	10:35 AM	10:38 AM	10:55 AM	11:15 AM	11:20 AM	11:35 AM
10:45 AM	11:05 AM	11:08 AM	11:25 AM	11:45 AM	11:50 AM	12:05 PM
11:15 AM	11:35 AM	11:38 AM	11:55 AM	12:15 PM	12:20 PM	12:35 PM
11:45 AM	12:05 PM	12:08 PM	12:25 PM	12:45 PM	12:50 PM	1:05 PM
12:15 PM	12:35 PM	12:38 PM	12:55 PM	1:15 PM	1:20 PM	1:35 PM
12:45 PM	1:05 PM	1:08 PM	1:25 PM	1:45 PM	1:50 PM	2:05 PM
1:15 PM	1:35 PM	1:38 PM	1:55 PM	2:15 PM	2:20 PM	2:35 PM
1:45 PM	2:05 PM	2:08 PM	2:25 PM	2:45 PM	2:50 PM	3:05 PM
2:15 PM	2:35 PM	2:38 PM	2:55 PM	3:15 PM	3:20 PM	3:35 PM
2:45 PM	3:05 PM	3:08 PM	3:25 PM	3:45 PM	3:50 PM	4:05 PM
3:15 PM	3:35 PM	3:38 PM	3:55 PM	4:15 PM	4:20 PM	4:35 PM
3:45 PM	4:05 PM	4:08 PM	4:25 PM	4:45 PM	4:50 PM	5:05 PM
4:15 PM	4:35 PM	4:38 PM	4:55 PM	5:15 PM	5:20 PM	5:35 PM
4:45 PM	5:05 PM	5:08 PM	5:25 PM	5:45 PM	5:50 PM	6:05 PM
5:15 PM	5:35 PM	5:38 PM	5:55 PM	6:15 PM	6:20 PM	6:35 PM
5:45 PM	6:05 PM	6:08 PM	6:25 PM	6:45 PM	6:50 PM	7:05 PM
6:15 PM	6:35 PM	6:38 PM	6:55 PM	7:15 PM	7:20 PM	7:35 PM
6:45 PM	7:05 PM	7:08 PM	7:25 PM	7:45 PM	7:50 PM	8:05 PM
7:15 PM	7:35 PM	7:38 PM	7:55 PM	8:15 PM	8:20 PM	
7:45 PM	8:05 PM	8:08 PM	8:25 PM			
8:15 PM	8:35 PM	8:38 PM	8:55 PM			

*To determine when the bus serves a location, **match the numbers on the timetable to the numbers on the map** (these locations are called "timepoints").*



WEEKDAY SCHEDULE			
A.M.	10:59	11:15	11:22
	11:29	11:45	11:52
	11:59	12:15	12:22
P.M.	12:29	12:45	12:52
	12:59	1:15	1:22

To determine when the bus serves a stop in between timepoints, look at when it is due at the timepoint before your stop and the timepoint after your stop, and you can estimate when it will arrive. Always be at your stop 5 minutes early!

These symbols indicate transfer points or Superstops, which are specific stops where you can transfer to a different route. Routes serving a transfer point or Superstop are indicated at the top of the times schedule, just above the name of the stop.

Cómo leer este horario

Conecte el número dentro del círculo en el mapa con la columna del horario con el mismo número para ver cuándo el bus para en ese lugar (esos lugares se llaman "timepoints").

Para determinar cuándo un bus atiende una parada entre timepoints, mire a qué hora debería llegar al timepoint antes de su parada y el timepoint después de su parada, y podrá estimar la hora de llegada. ¡Siempre llegue a su parada con 5 minutos de antelación!

Estos símbolos indican puntos de trasbordo Superstops que son paradas específicas donde puedes trasbordar a una ruta diferente. Las rutas que atienden un punto de trasbordo o Superstop están indicadas en la parte superior del horario, justo encima del nombre de la parada.

ACCESSIBILITY
All KAT buses are lift-equipped. Paratransit service is also available to those who qualify. For more information, visit katbus.com or call 865-637-3000.

Bike racks are available on all KAT buses. Bikes ride free.

All buses have FREE Wi-Fi.

katbus.com • Customer Service: 865-637-3000

Rider Tools and Tips

Fare Information

Fare Type	Regular Fare	Discounted Fare
1-Ride pass	$1.00	$.50
1-Day pass	$2.00	$1.00
20-Ride pass	$15.00	$7.50
30-Day Pass	$30.00	$15.00

Discounted fare for seniors 65+, Medicare cardholders, and persons with disabilities. KAT ID or Medicare card required.

Children 4 and under ride free.

Knox County School Students also ride free with the Youth Freedom Pass.

To learn more about our fares, the Youth Freedom Pass, and how to buy tickets, visit katbus.com.

Riding Tips

- Plan your trip using this map, the free Transit app, or our homepage trip planner on katbus.com.
- Always arrive at your bus stop 5 minutes early.
- When you see your bus coming, wave to the operator so they know you want to board.
- Have your fare ready when the bus arrives.
- When nearing your destination, pull the cord next to the windows to alert the operator that you want to get off at the next stop.
- View our Passenger Ride Guide at katbus.com.

KAT Holidays

KAT Services do not operate on the following holidays: New Year's Day, Independence Day, Thanksgiving & Christmas.

KAT buses run on a Sunday schedule on the following holidays: Martin Luther King, Jr. Day, Memorial Day, Juneteenth, Labor Day, day after Thanksgiving, day before Christmas.

KAT's administrative offices are closed on all of the holidays listed above.

Go paperless!

PLAN your trip, PAY your fare, and SCAN your ticket, all in our FREE official app:

transit

Scan QR code to download Transit

Download on the App Store · GET IT ON Google Play

Herramientas y consejos para los pasajeros

Información sobre tarifas

Tipo de tarifa	Tarifa regular	Tarifa con descuento
Pase de 1 viaje	$1.00	$.50
Pase de 1 día	$2.00	$1.00
Pase de 20 viajes	$15.00	$7.50
Pase de 30 días	$30.00	$15.00

Tarifa descontada para mayores de 65 años, personas con tarjeta de Medicare y personas con discapacidades. Se necesita el ID de KAT o tarjeta de Medicare.

Los niños menores de 4 años viajan gratis.

Los estudiantes de las escuelas públicas del Condado de Knox también viajan gratis con el pase Youth Freedom Pass.

Visite katbus.com para averiguar más sobre nuestras tarifas, el pase para jóvenes y para comprar boletos.

Consejos para viajar

- Planifique su trayecto con este mapa, la aplicación gratuita Transit o el planificador en katbus.com.
- Siempre llegue a la parada del autobús 5 minutos antes.
- Cuando vea que llega el autobús, haga una seña al operador para que sepa que quiere subir.
- Tenga su pago listo cuando llega el autobús.
- Cuando se acerque a su destino, jale del cordón cercano a la ventana para alertar al operador de que quiere bajarse en la siguiente parada.
- Repase nuestra Guía del Pasajero en katbus.com.

Los servicios de KAT no funcionan en los siguientes días feriados: Año Nuevo, Día de la Independencia, Acción de Gracias y Navidad.

Los autobuses de KAT siguen los horarios de los domingos en los siguientes feriados: día de Martin Luther King Jr., Día de los Caídos (Memorial Day), Juneteenth, Día del Trabajador, día después del Día de Acción de Gracias, día antes de Navidad.

Las oficinas de KAT estarán cerradas en todos esos días feriados.

¡Haga todo sin papel!

PLANIFIQUE su viaje, PAGUE la tarifa y ESCANEE su boleto, todo en Transit, ¡nuestra aplicación oficial gratuita! La aplicación se configura en el mismo idioma de su teléfono. Escanee el código QR para descargar Transit.

Accesibilidad

Todos los autobuses de KAT van equipados con un elevador. También existe servicio de paratránsito para quienes cualifiquen. Para más información, visite katbus.com o llame a KAT al 865-637-3000.

34 Burlington Shopper

(Weekdays & Weekends)

Información en español en el interior

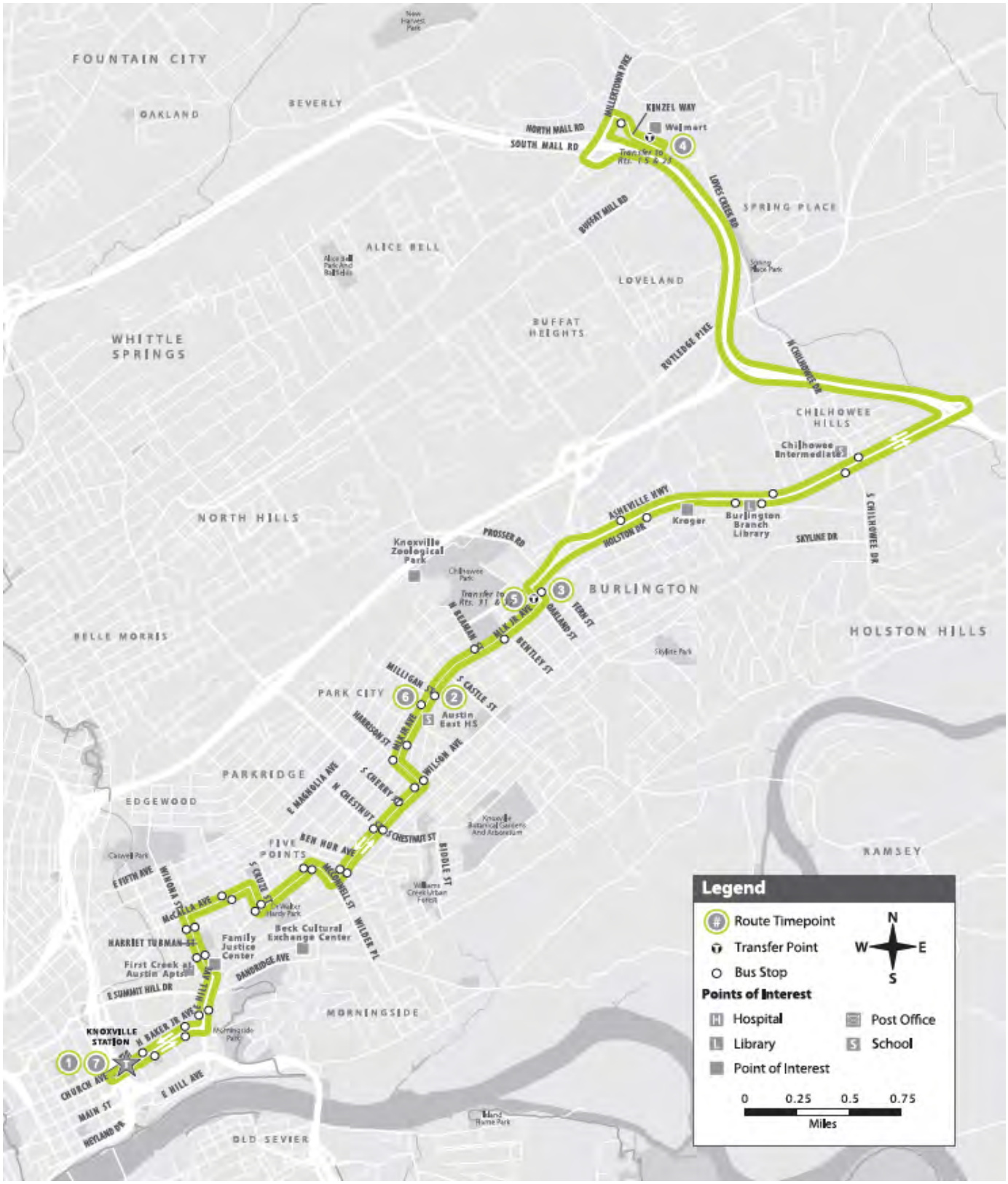
Serves/ Servir:

- Austin-East High School
- Burlington
- Chilhowee Intermediate School
- Chilhowee Park/ Jacob Building
- Civic Auditorium and Coliseum
- Dr. Walter Hardy Park
- First Creek at Austin
- Five Points Neighborhood
- Harriet Tubman Park
- Knoxville Family Justice Center
- Knoxville Station/ Downtown
- Kroger
- The Change Center
- Vine Middle Magnet School
- Walmart

KAT Reimagined

Effective Date: August 26, 2024

kat KNOXVILLE AREA TRANSIT


FOUNTAIN CITY
OAKLAND
BEVERLY
ALICE BELL
WHITTLE SPRINGS
LOVELAND
BUFFAT HEIGHTS
SPRING PLACE
CHILHOWEE HILLS
NORTH HILLS
BURLINGTON
HOLSTON HILLS
BELLE MORRIS
PARK CITY
PARKRIDGE
EDGEWOOD
FIVE POINTS
MORNINGSIDE
RAMSEY
OLD SEVIER
KNOXVILLE STATION
MILLERTOWN PIKE
KINZEL WAY
Walmart
NORTH MALL RD
SOUTH MALL RD
BUFFAT MILL RD
LOVES CREEK RD
RUTLEDGE PIKE
N CHILHOWEE DR
Chilhowee Intermediate
ASHEVILLE HWY
Kroger
Burlington Branch Library
HOLSTON DR
SKYLINE DR
S CHILHOWEE DR
PROSSER RD
Knoxville Zoological Park
OAKLAND ST
KERN ST
W BLEDSOE AVE
BENTLEY ST
MILLIGAN ST
S CASTLE ST
Austin East HS
HARRISON ST
WILSON AVE
S CHERRY ST
E MAGNOLIA AVE
N CHESTNUT ST
S CHESTNUT ST
BEN HUR AVE
RIDDLE ST
E FIFTH AVE
WINONA ST
McCALLA AVE
S CRUZE ST
McCONNELL ST
WILDER PL
HARRIET TUBMAN ST
Family Justice Center
Beck Cultural Exchange Center
First Creek at Austin Apts
DANDRIDGE AVE
S SUMMIT HILL DR
S HILL AVE
N BAKER JR AVE
CHURCH AVE
MAIN ST
E HILL AVE
NEYLAND DR
Knoxville Botanical Gardens And Arboretum
Legend
Route Timepoint
Transfer Point
Bus Stop
Points of Interest
Hospital
Library
Point of Interest
Post Office
School
N
W
E
S
0
0.25
0.5
0.75
Miles

Route 34: Burlington Shopper

WEEKDAY						
Going away from downtown			*Going toward downtown*			
Knoxville Station Bay H	**Austin East High**	**Kirkwood St Superstop WB**	**Walmart**	**Kirkwood St Superstop EB**	**MLK at Beal Bourne Street (Austin-East High School)**	**Knoxville Station Bay H**
		Transfer to Rts. 31 & 32	*Transfer to Rt. 23*	*Transfer to Rts. 31 & 32*		
1	2	3	4	5	6	7
			5:25 AM	5:45 AM	5:50 AM	6:05 AM
			5:55 AM	6:15 AM	6:20 AM	6:35 AM
			6:25 AM	6:45 AM	6:50 AM	7:05 AM
6:15 AM	6:35 AM	6:38 AM	6:55 AM	7:15 AM	7:20 AM	7:35 AM
6:45 AM	7:05 AM	7:08 AM	7:25 AM	7:45 AM	7:50 AM	8:05 AM
7:15 AM	7:35 AM	7:38 AM	7:55 AM	8:15 AM	8:20 AM	8:35 AM
7:45 AM	8:05 AM	8:08 AM	8:25 AM	8:45 AM	8:50 AM	9:05 AM
8:15 AM	8:35 AM	8:38 AM	8:55 AM	9:15 AM	9:20 AM	9:35 AM
8:45 AM	9:05 AM	9:08 AM	9:25 AM	9:45 AM	9:50 AM	10:05 AM
9:15 AM	9:35 AM	9:38 AM	9:55 AM	10:15 AM	10:20 AM	10:35 AM
9:45 AM	10:05 AM	10:08 AM	10:25 AM	10:45 AM	10:50 AM	11:05 AM
10:15 AM	10:35 AM	10:38 AM	10:55 AM	11:15 AM	11:20 AM	11:35 AM
10:45 AM	11:05 AM	11:08 AM	11:25 AM	11:45 AM	11:50 AM	12:05 PM
11:15 AM	11:35 AM	11:38 AM	11:55 AM	12:15 PM	12:20 PM	12:35 PM
11:45 AM	12:05 PM	12:08 PM	12:25 PM	12:45 PM	12:50 PM	1:05 PM
12:15 PM	12:35 PM	12:38 PM	12:55 PM	1:15 PM	1:20 PM	1:35 PM
12:45 PM	1:05 PM	1:08 PM	1:25 PM	1:45 PM	1:50 PM	2:05 PM
1:15 PM	1:35 PM	1:38 PM	1:55 PM	2:15 PM	2:20 PM	2:35 PM
1:45 PM	2:05 PM	2:08 PM	2:25 PM	2:45 PM	2:50 PM	3:05 PM
2:15 PM	2:35 PM	2:38 PM	2:55 PM	3:15 PM	3:20 PM	3:35 PM
2:45 PM	3:05 PM	3:08 PM	3:25 PM	3:45 PM	3:50 PM	4:05 PM
3:15 PM	3:35 PM	3:38 PM	3:55 PM	4:15 PM	4:20 PM	4:35 PM
3:45 PM	4:05 PM	4:08 PM	4:25 PM	4:45 PM	4:50 PM	5:05 PM
4:15 PM	4:35 PM	4:38 PM	4:55 PM	5:15 PM	5:20 PM	5:35 PM
4:45 PM	5:05 PM	5:08 PM	5:25 PM	5:45 PM	5:50 PM	6:05 PM
5:15 PM	5:35 PM	5:38 PM	5:55 PM	6:15 PM	6:20 PM	6:35 PM
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6:15 PM	6:35 PM	6:38 PM	6:55 PM	7:15 PM	7:20 PM	7:35 PM
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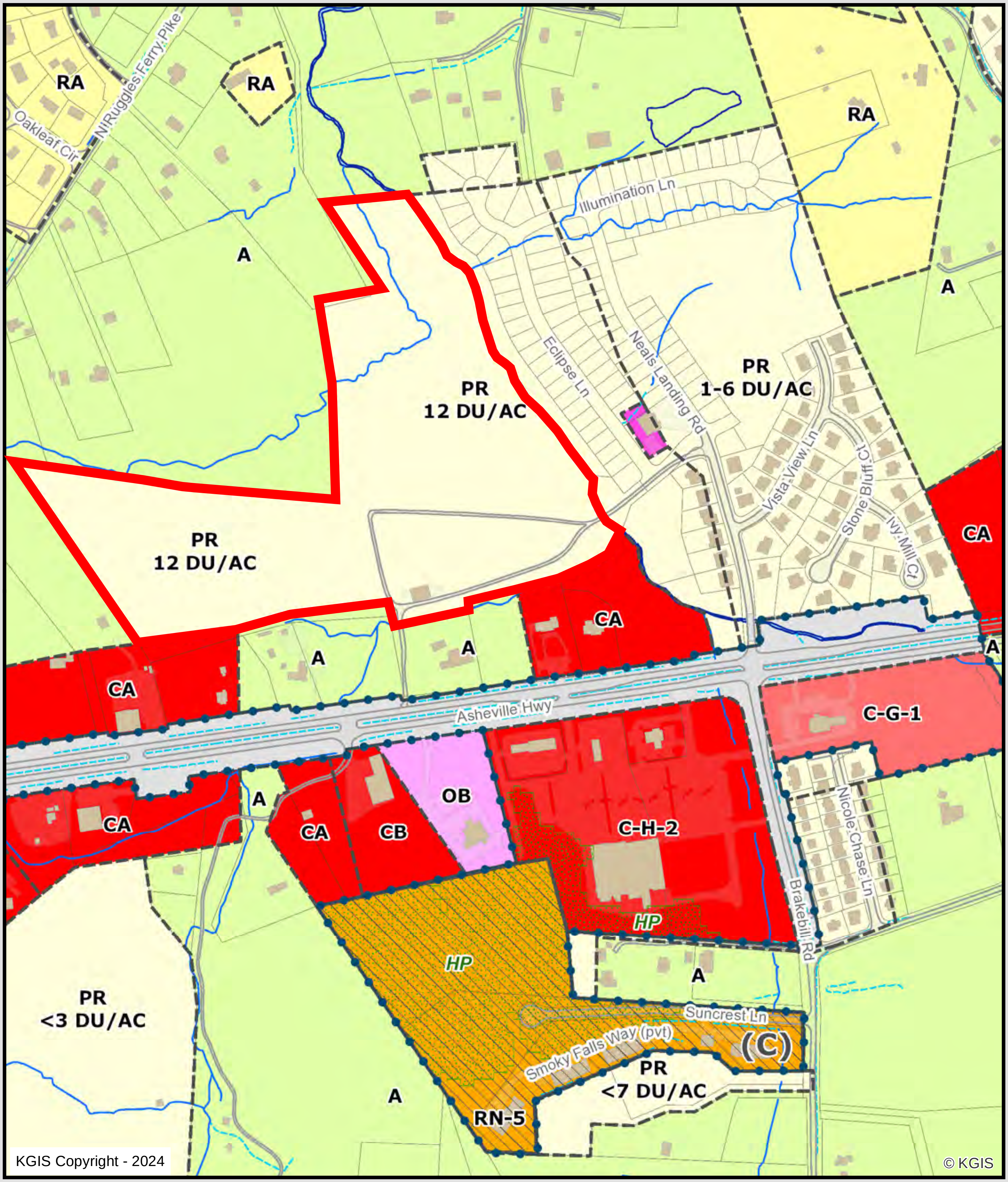
7:15 PM	7:35 PM	7:38 PM	7:55 PM	8:15 PM	8:20 PM	8:35 PM
7:45 PM	8:05 PM	8:08 PM	8:25 PM	8:45 PM	8:50 PM	9:05 PM
8:15 PM	8:35 PM	8:38 PM	8:55 PM	9:15 PM	9:20 PM	9:35 PM
8:45 PM	9:05 PM	9:08 PM	9:25 PM	9:45 PM	9:50 PM	10:05 PM
9:15 PM	9:35 PM	9:38 PM	9:55 PM	10:15 PM	10:20 PM	10:35 PM
9:45 PM	10:05 PM	10:08 PM	10:25 PM	10:45 PM	10:50 PM	11:05 PM
10:15 PM	10:35 PM	10:38 PM	10:55 PM	11:15 PM	11:20 PM	
11:15 PM	11:35 PM	11:38 PM	11:55 PM			

APPENDIX C

ZONING MAP



Zoning Map

9.10.24

Knoxville - Knox County - KUB Geographic Information System

Printed: 9/10/2024 at 1:51:59 PM

0 250 500 1,000

ft

APPENDIX D

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Asheville Highway (WB and EB)
Minor Street: Neals Landing Road (SB) and Brakebill Road (NB)
Traffic Control: Stop Control on Minor Street

9/4/2024 (Wednesday)
Partly Cloudy and Hot
Conducted by: Ajax Engineering

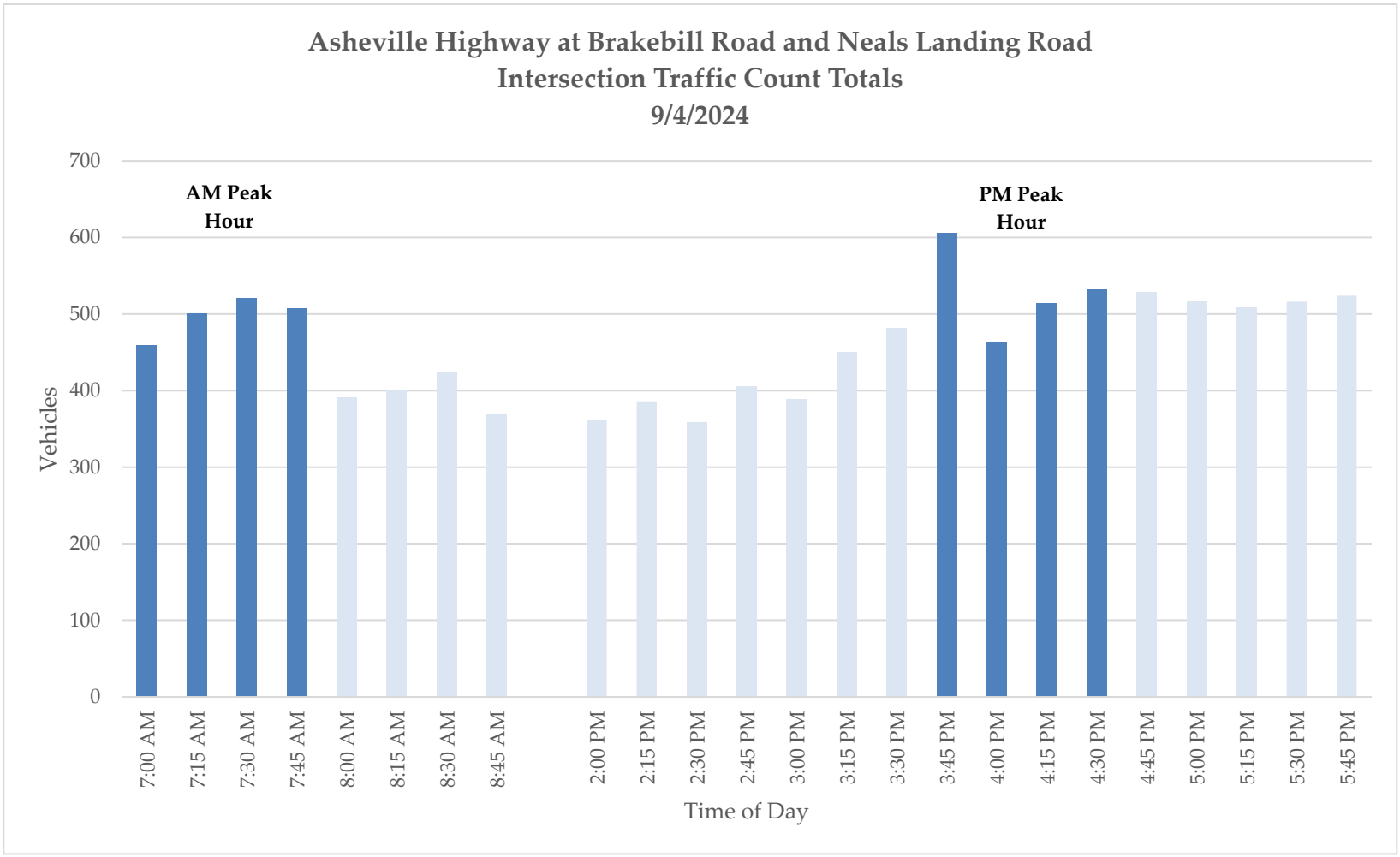
	Neals Landing Road				Asheville Highway				Brakebill Road				Asheville Highway					
TIME	SOUTHBOUND				WESTBOUND				NORTHBOUND				EASTBOUND				VEHICLE	PEAK
BEGIN	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	TOTAL	HOUR
7:00 AM	0	5	4	11	0	21	286	0	0	23	0	5	0	4	95	5	459	**7:00 AM - 8:00 AM**
7:15 AM	0	2	1	5	0	27	311	0	0	17	1	5	0	1	128	2	500	
7:30 AM	0	1	1	5	0	38	323	0	0	26	0	13	0	2	101	11	521	
7:45 AM	0	1	0	7	0	29	293	0	0	21	2	17	0	0	123	14	507	
8:00 AM	0	0	0	2	1	16	232	0	0	9	0	10	0	2	115	4	391	
8:15 AM	0	1	1	5	0	15	212	0	0	13	2	14	0	2	120	16	401	
8:30 AM	0	2	1	4	0	28	228	0	0	15	0	9	0	1	123	12	423	
8:45 AM	0	0	1	7	1	9	198	0	0	15	0	13	0	2	111	12	369	
TOTAL	0	12	9	46	2	183	2083	0	0	139	5	86	0	14	916	76	3571	
2:00 PM	0	1	1	3	1	24	141	1	0	12	0	22	1	5	141	9	362	
2:15 PM	0	0	0	6	1	19	145	0	0	18	0	25	0	2	158	12	386	
2:30 PM	0	1	0	1	0	19	129	0	0	17	1	21	0	5	149	15	358	
2:45 PM	0	2	0	6	1	23	133	1	0	21	1	28	0	2	172	16	406	
3:00 PM	0	0	1	2	0	26	122	1	0	18	1	21	0	3	174	20	389	
3:15 PM	0	1	1	0	0	22	121	2	0	18	3	27	0	6	234	15	450	
3:30 PM	0	2	1	3	0	27	161	0	0	14	2	31	0	5	228	7	481	
3:45 PM	0	1	2	1	1	30	231	7	0	14	0	37	0	2	262	17	605	**3:45 PM - 4:45 PM**
4:00 PM	0	1	3	3	0	32	156	0	0	18	1	23	1	5	208	13	464	
4:15 PM	0	0	3	4	0	22	142	1	0	14	1	28	0	3	272	24	514	
4:30 PM	0	1	0	1	1	21	145	0	0	23	1	41	0	2	276	21	533	
4:45 PM	0	1	0	1	0	21	156	1	0	17	0	32	0	2	278	19	528	
5:00 PM	0	0	3	5	0	10	159	2	0	10	3	30	0	5	272	17	516	
5:15 PM	0	1	5	7	0	17	137	0	0	17	2	27	0	3	276	16	508	
5:30 PM	0	1	1	1	0	19	144	2	0	12	2	32	0	5	283	14	516	
5:45 PM	0	1	2	2	1	18	137	2	0	21	3	33	0	5	277	22	524	
TOTAL	0	14	23	46	6	350	2359	20	0	264	21	458	2	60	3660	257	7540	

2024 AM Peak Hour **7:00 AM - 8:00 AM**

	N Wooddale Road				Asheville Highway				S Wooddale Road				Asheville Highway			
TIME	SOUTHBOUND				WESTBOUND				NORTHBOUND				EASTBOUND			
BEGIN	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT
7:00 AM	0	5	4	11	0	21	286	0	0	23	0	5	0	4	95	5
7:15 AM	0	2	1	5	0	27	311	0	0	17	1	5	0	1	128	2
7:30 AM	0	1	1	5	0	38	323	0	0	26	0	13	0	2	101	11
7:45 AM	0	1	0	7	0	29	293	0	0	21	2	17	0	0	123	14
TOTAL	**0**	**9**	**6**	**28**	**0**	**115**	**1213**	**0**	**0**	**87**	**3**	**40**	**0**	**7**	**447**	**32**
TRUCK %	**0.0%**	**0.0%**	**0.0%**	**3.6%**	**0.0%**	**2.6%**	**3.7%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**5.0%**	**0.0%**	**0.0%**	**6.3%**	**3.1%**
PHF $_{mvmt}$	**-**	**0.45**	**0.38**	**0.64**	**-**	**0.76**	**0.94**	**-**	**-**	**0.84**	**0.38**	**0.59**	**-**	**0.44**	**0.87**	**0.57**
PHF $_{app}$	**0.54**				**0.92**				**0.81**				**0.89**			
PHF $_{int}$	**0.95**															

2024 PM Peak Hour **3:45 PM - 4:45 PM**

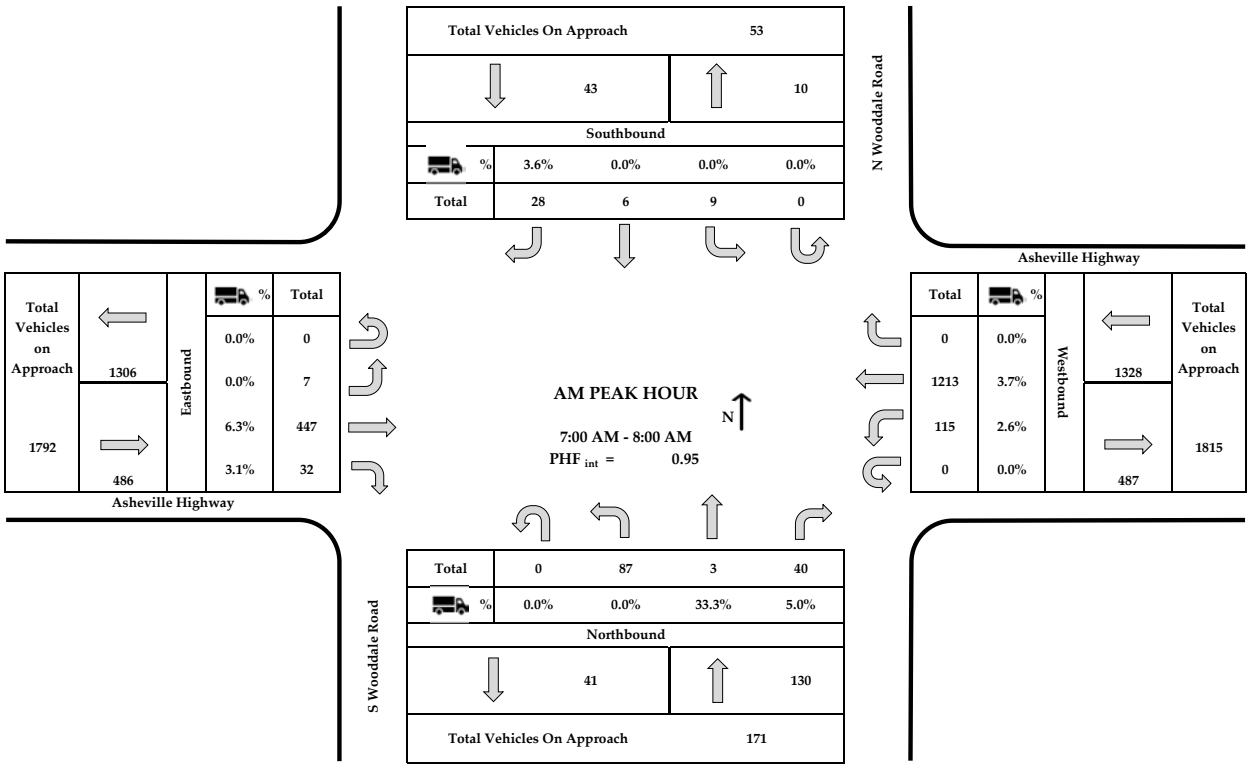
	N Wooddale Road				Asheville Highway				S Wooddale Road				Asheville Highway			
TIME	SOUTHBOUND				WESTBOUND				NORTHBOUND				EASTBOUND			
BEGIN	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT	U-TURN	LT	THRU	RT
3:45 PM	0	1	2	1	1	30	231	7	0	14	0	37	0	2	262	17
4:00 PM	0	1	3	3	0	32	156	0	0	18	1	23	1	5	208	13
4:15 PM	0	0	3	4	0	22	142	1	0	14	1	28	0	3	272	24
4:30 PM	0	1	0	1	1	21	145	0	0	23	1	41	0	2	276	21
TOTAL	**0**	**3**	**8**	**9**	**2**	**105**	**674**	**8**	**0**	**69**	**3**	**129**	**1**	**12**	**1018**	**75**
TRUCK %	**0.0%**	**0.0%**	**12.5%**	**0.0%**	**0.0%**	**1.0%**	**3.4%**	**12.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**8.3%**	**1.4%**	**1.3%**
PHF $_{mvmt}$	**-**	**0.75**	**0.67**	**0.56**	**0.50**	**0.82**	**0.73**	**0.29**	**-**	**0.75**	**0.75**	**0.79**	**0.25**	**0.60**	**0.92**	**0.78**
PHF $_{app}$	**0.71**				**0.73**				**0.77**				**0.92**			
PHF $_{int}$	**0.87**															

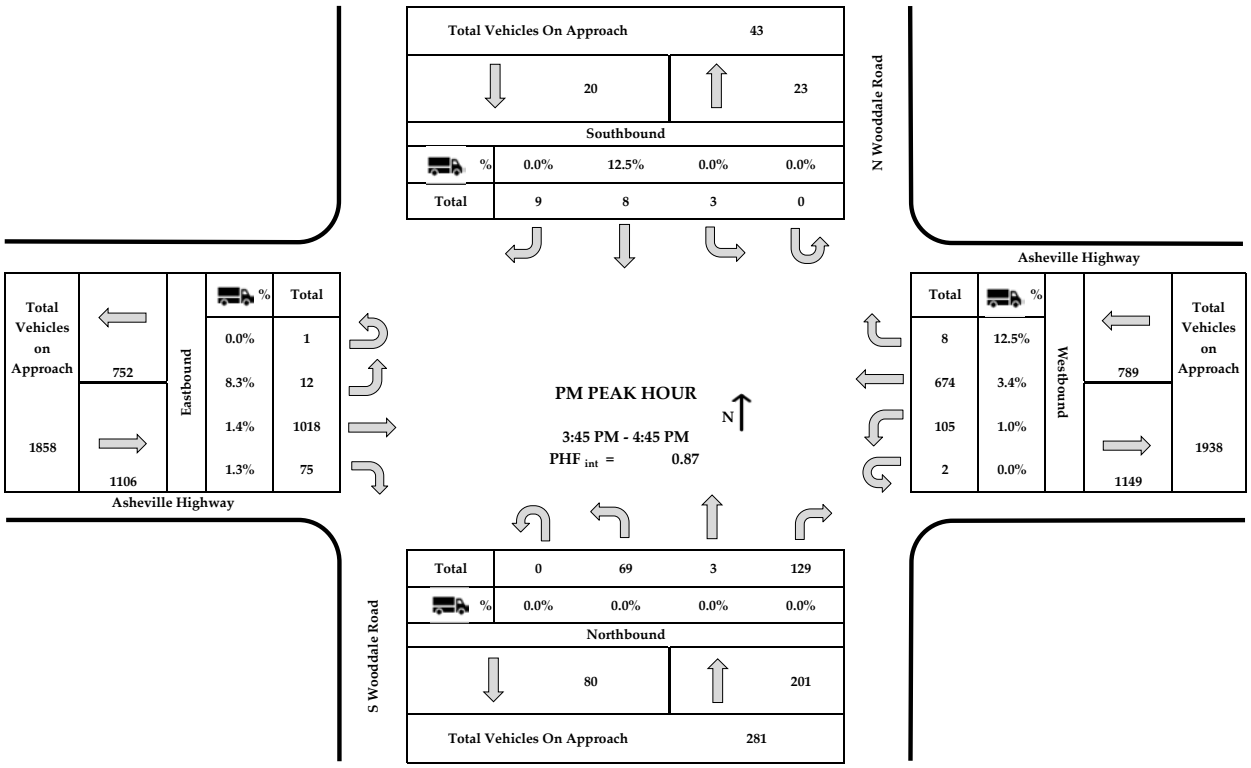

Asheville Highway at Brakebill Road and Neals Landing Road
Intersection Traffic Count Totals
9/4/2024
AM Peak Hour
PM Peak Hour
Vehicles
700
600
500
400
300
200
100
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
8:30 AM
8:45 AM
2:00 PM
2:15 PM
2:30 PM
2:45 PM
3:00 PM
3:15 PM
3:30 PM
3:45 PM
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
5:30 PM
5:45 PM
Time of Day

PEAK HOUR DATA

Major Street: Asheville Highway (WB and EB)
Minor Street: Neals Landing Road (SB) and Brakebill Road (NB)
Traffic Control: Stop Control on Minor Street

9/4/2024 (Wednesday)
Partly Cloudy and Hot
Conducted by: Ajax Engineering

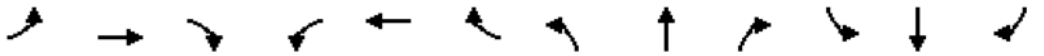




APPENDIX E

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

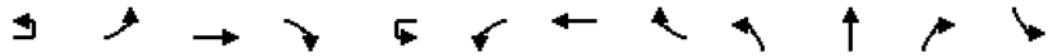


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	447	32	115	1213	0	87	3	40	9	6	28
Future Volume (vph)	7	447	32	115	1213	0	87	3	40	9	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			-1%			-7%			1%	
Storage Length (ft)	250		0	235		90	150		0	0		0
Storage Lanes	1		0	1		1	1		0	0		0
Taper Length (ft)	275			120			75			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990						0.861			0.912	
Flt Protected	0.950			0.950			0.950				0.989	
Satd. Flow (prot)	1823	3412	0	1761	3489	1909	1868	1581	0	0	1662	0
Flt Permitted	0.187			0.423			0.731				0.919	
Satd. Flow (perm)	359	3412	0	784	3489	1909	1438	1581	0	0	1544	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11						49			52	
Link Speed (mph)		55			55			30			25	
Link Distance (ft)		919			942			410			449	
Travel Time (s)		11.4			11.7			9.3			12.2	
Peak Hour Factor	0.89	0.89	0.89	0.92	0.92	0.92	0.81	0.81	0.81	0.54	0.54	0.54
Heavy Vehicles (%)	0%	6%	3%	3%	4%	0%	0%	33%	5%	0%	0%	4%
Adj. Flow (vph)	8	502	36	125	1318	0	107	4	49	17	11	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	538	0	125	1318	0	107	53	0	0	80	0
Turn Type	pm+pt	NA		pm+pt	NA	Prot	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6	6		8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	22.0		10.0	22.0	22.0	11.5	11.5		11.5	11.5	
Total Split (s)	10.0	80.0		12.0	82.0	82.0	28.0	28.0		28.0	28.0	
Total Split (%)	8.3%	66.7%		10.0%	68.3%	68.3%	23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	5.0	73.0		7.0	75.0	75.0	21.5	21.5		21.5	21.5	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	5.0	7.0		5.0	7.0	7.0	6.5	6.5			6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max	Max	None	None		None	None	
Walk Time (s)		15.0			15.0	15.0						
Flash Don't Walk (s)		0.0			0.0	0.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	80.1	73.1		86.3	83.0		13.6	13.6			13.6	
Actuated g/C Ratio	0.72	0.65		0.77	0.74		0.12	0.12			0.12	
v/c Ratio	0.02	0.24		0.19	0.51		0.61	0.23			0.34	
Control Delay (s/veh)	4.1	8.6		4.2	7.9		61.8	15.9			23.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay (s/veh)	4.1	8.6		4.2	7.9		61.8	15.9			23.3	
LOS	A	A		A	A		E	B			C	
Approach Delay (s/veh)		8.5			7.6			46.6			23.3	
Approach LOS		A			A			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 112			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay (s/veh): 11.2		Intersection LOS: B	
Intersection Capacity Utilization 64.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway



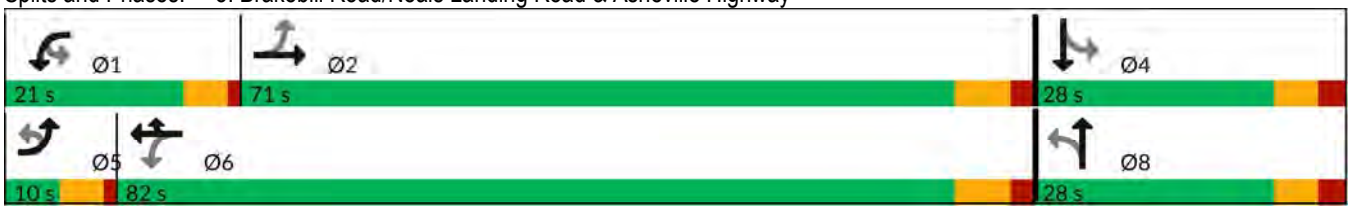
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	1	12	1018	75	2	105	674	8	69	3	129	3
Future Volume (vph)	1	12	1018	75	2	105	674	8	69	3	129	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-2%				-1%			-7%		
Storage Length (ft)		250		0		235		90	150		0	0
Storage Lanes		1		0		1		1	1		0	0
Taper Length (ft)		275				120			75			100
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt			0.990					0.850		0.853		
Flt Protected		0.950				0.950			0.950			
Satd. Flow (prot)	0	1697	3574	0	0	1796	3522	1436	1868	1677	0	0
Flt Permitted		0.309				0.180			0.739			
Satd. Flow (perm)	0	552	3574	0	0	340	3522	1436	1453	1677	0	0
Right Turn on Red				Yes				Yes			Yes	
Satd. Flow (RTOR)			10					77		168		
Link Speed (mph)			55				55			30		
Link Distance (ft)			919				942			410		
Travel Time (s)			11.4				11.7			9.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.73	0.73	0.73	0.73	0.77	0.77	0.77	0.71
Heavy Vehicles (%)	0%	8%	1%	1%	0%	1%	3%	13%	0%	0%	0%	0%
Adj. Flow (vph)	1	13	1107	82	3	144	923	11	90	4	168	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	1189	0	0	147	923	11	90	172	0	0
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA	Prot	Perm	NA		Perm
Protected Phases		5	2			1	6	6		8		
Permitted Phases	5	2			1	6			8			4
Detector Phase	5	5	2		1	1	6	6	8	8		4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0		5.0	5.0	15.0	15.0	5.0	5.0		5.0
Minimum Split (s)	10.0	10.0	22.0		10.0	10.0	22.0	22.0	11.5	11.5		11.5
Total Split (s)	10.0	10.0	71.0		21.0	21.0	82.0	82.0	28.0	28.0		28.0
Total Split (%)	8.3%	8.3%	59.2%		17.5%	17.5%	68.3%	68.3%	23.3%	23.3%		23.3%
Maximum Green (s)	5.0	5.0	64.0		16.0	16.0	75.0	75.0	21.5	21.5		21.5
Yellow Time (s)	4.0	4.0	5.0		4.0	4.0	5.0	5.0	4.0	4.0		4.0
All-Red Time (s)	1.0	1.0	2.0		1.0	1.0	2.0	2.0	2.5	2.5		2.5
Lost Time Adjust (s)		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0	7.0			5.0	7.0	7.0	6.5	6.5		
Lead/Lag	Lead	Lead	Lag		Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None	None	Max		None	None	Max	Max	None	None		None
Walk Time (s)			15.0				15.0	15.0				
Flash Don't Walk (s)			0.0				0.0	0.0				
Pedestrian Calls (#/hr)			0				0	0				
Act Effct Green (s)		73.9	66.9			81.3	75.9	75.9	11.8	11.8		
Actuated g/C Ratio		0.70	0.64			0.77	0.72	0.72	0.11	0.11		
v/c Ratio		0.03	0.52			0.40	0.36	0.01	0.55	0.51		
Control Delay (s/veh)		3.8	11.8			6.4	6.9	0.0	58.0	13.0		

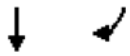
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	8	9
Future Volume (vph)	8	9
Ideal Flow (vphpl)	1900	1900
Grade (%)	1%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.937	
Flt Protected	0.993	
Satd. Flow (prot)	1674	0
Flt Permitted	0.876	
Satd. Flow (perm)	1476	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	13	
Link Speed (mph)	25	
Link Distance (ft)	449	
Travel Time (s)	12.2	
Peak Hour Factor	0.71	0.71
Heavy Vehicles (%)	13%	0%
Adj. Flow (vph)	11	13
Shared Lane Traffic (%)		
Lane Group Flow (vph)	28	0
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	5.0	
Minimum Split (s)	11.5	
Total Split (s)	28.0	
Total Split (%)	23.3%	
Maximum Green (s)	21.5	
Yellow Time (s)	4.0	
All-Red Time (s)	2.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.5	
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Don't Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	11.8	
Actuated g/C Ratio	0.11	
v/c Ratio	0.16	
Control Delay (s/veh)	30.5	

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Queue Delay		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)		3.8	11.8			6.4	6.9	0.0	58.0	13.0		
LOS		A	B			A	A	A	E	B		
Approach Delay (s/veh)			11.7				6.8			28.5		
Approach LOS			B				A			C		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 105			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay (s/veh): 11.6		Intersection LOS: B	
Intersection Capacity Utilization 62.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway

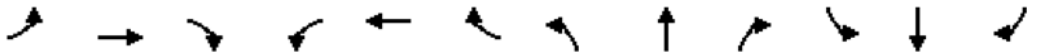




Lane Group	SBT	SBR
Queue Delay	0.0	
Total Delay (s/veh)	30.5	
LOS	C	
Approach Delay (s/veh)	30.5	
Approach LOS	C	

Intersection Summary

PROJECTED CONDITIONS WITHOUT THE PROJECT



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	483	35	124	1310	0	94	3	43	9	6	28
Future Volume (vph)	7	483	35	124	1310	0	94	3	43	9	6	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			-1%			-7%			1%	
Storage Length (ft)	250		0	235		90	150		0	0		0
Storage Lanes	1		0	1		1	1		0	0		0
Taper Length (ft)	275			120			75			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990						0.861			0.912	
Flt Protected	0.950			0.950			0.950				0.989	
Satd. Flow (prot)	1823	3412	0	1761	3489	1909	1868	1583	0	0	1662	0
Flt Permitted	0.159			0.402			0.729				0.919	
Satd. Flow (perm)	305	3412	0	745	3489	1909	1434	1583	0	0	1544	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11						53			52	
Link Speed (mph)		55			55			30			25	
Link Distance (ft)		919			942			410			449	
Travel Time (s)		11.4			11.7			9.3			12.2	
Peak Hour Factor	0.89	0.89	0.89	0.92	0.92	0.92	0.81	0.81	0.81	0.54	0.54	0.54
Heavy Vehicles (%)	0%	6%	3%	3%	4%	0%	0%	33%	5%	0%	0%	4%
Adj. Flow (vph)	8	543	39	135	1424	0	116	4	53	17	11	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	582	0	135	1424	0	116	57	0	0	80	0
Turn Type	pm+pt	NA		pm+pt	NA	Prot	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6	6		8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	22.0		10.0	22.0	22.0	11.5	11.5		11.5	11.5	
Total Split (s)	10.0	81.0		11.0	82.0	82.0	28.0	28.0		28.0	28.0	
Total Split (%)	8.3%	67.5%		9.2%	68.3%	68.3%	23.3%	23.3%		23.3%	23.3%	
Maximum Green (s)	5.0	74.0		6.0	75.0	75.0	21.5	21.5		21.5	21.5	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	5.0	7.0		5.0	7.0	7.0	6.5	6.5			6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max	Max	None	None		None	None	
Walk Time (s)		15.0			15.0	15.0						
Flash Don't Walk (s)		0.0			0.0	0.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	81.1	74.1		86.4	83.3		14.3	14.3			14.3	
Actuated g/C Ratio	0.72	0.66		0.76	0.74		0.13	0.13			0.13	
v/c Ratio	0.03	0.26		0.22	0.55		0.64	0.23			0.33	
Control Delay (s/veh)	4.3	8.7		4.6	8.8		62.8	15.3			22.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay (s/veh)	4.3	8.7		4.6	8.8		62.8	15.3			22.8	
LOS	A	A		A	A		E	B			C	
Approach Delay (s/veh)		8.6			8.4			47.2			22.8	
Approach LOS		A			A			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 113			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay (s/veh): 11.7		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway

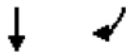
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	1	12	1099	81	2	113	728	8	75	3	139	3
Future Volume (vph)	1	12	1099	81	2	113	728	8	75	3	139	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-2%				-1%			-7%		
Storage Length (ft)		250		0		235		90	150		0	0
Storage Lanes		1		0		1		1	1		0	0
Taper Length (ft)		275				120			75			100
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt			0.990					0.850		0.853		
Flt Protected		0.950				0.950			0.950			
Satd. Flow (prot)	0	1697	3574	0	0	1796	3522	1436	1868	1677	0	0
Flt Permitted		0.287				0.156			0.739			
Satd. Flow (perm)	0	513	3574	0	0	295	3522	1436	1453	1677	0	0
Right Turn on Red				Yes				Yes			Yes	
Satd. Flow (RTOR)			10					77		181		
Link Speed (mph)			55				55			30		
Link Distance (ft)			919				942			410		
Travel Time (s)			11.4				11.7			9.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.73	0.73	0.73	0.73	0.77	0.77	0.77	0.71
Heavy Vehicles (%)	0%	8%	1%	1%	0%	1%	3%	13%	0%	0%	0%	0%
Adj. Flow (vph)	1	13	1195	88	3	155	997	11	97	4	181	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	1283	0	0	158	997	11	97	185	0	0
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA	Prot	Perm	NA		Perm
Protected Phases		5	2			1	6	6		8		
Permitted Phases	5	2			1	6			8			4
Detector Phase	5	5	2		1	1	6	6	8	8		4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0		5.0	5.0	15.0	15.0	5.0	5.0		5.0
Minimum Split (s)	10.0	10.0	22.0		10.0	10.0	22.0	22.0	11.5	11.5		11.5
Total Split (s)	10.0	10.0	74.0		20.0	20.0	84.0	84.0	26.0	26.0		26.0
Total Split (%)	8.3%	8.3%	61.7%		16.7%	16.7%	70.0%	70.0%	21.7%	21.7%		21.7%
Maximum Green (s)	5.0	5.0	67.0		15.0	15.0	77.0	77.0	19.5	19.5		19.5
Yellow Time (s)	4.0	4.0	5.0		4.0	4.0	5.0	5.0	4.0	4.0		4.0
All-Red Time (s)	1.0	1.0	2.0		1.0	1.0	2.0	2.0	2.5	2.5		2.5
Lost Time Adjust (s)		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0	7.0			5.0	7.0	7.0	6.5	6.5		
Lead/Lag	Lead	Lead	Lag		Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None	None	Max		None	None	Max	Max	None	None		None
Walk Time (s)			15.0				15.0	15.0				
Flash Don't Walk (s)			0.0				0.0	0.0				
Pedestrian Calls (#/hr)			0				0	0				
Act Effct Green (s)		76.3	69.2			84.1	78.6	78.6	12.5	12.5		
Actuated g/C Ratio		0.70	0.64			0.78	0.73	0.73	0.12	0.12		
v/c Ratio		0.03	0.56			0.46	0.39	0.01	0.58	0.52		
Control Delay (s/veh)		4.0	12.8			7.9	7.3	0.0	60.1	12.8		

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	8	9
Future Volume (vph)	8	9
Ideal Flow (vphpl)	1900	1900
Grade (%)	1%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.937	
Flt Protected	0.993	
Satd. Flow (prot)	1674	0
Flt Permitted	0.833	
Satd. Flow (perm)	1404	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	13	
Link Speed (mph)	25	
Link Distance (ft)	449	
Travel Time (s)	12.2	
Peak Hour Factor	0.71	0.71
Heavy Vehicles (%)	13%	0%
Adj. Flow (vph)	11	13
Shared Lane Traffic (%)		
Lane Group Flow (vph)	28	0
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	5.0	
Minimum Split (s)	11.5	
Total Split (s)	26.0	
Total Split (%)	21.7%	
Maximum Green (s)	19.5	
Yellow Time (s)	4.0	
All-Red Time (s)	2.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.5	
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Don't Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	12.5	
Actuated g/C Ratio	0.12	
v/c Ratio	0.16	
Control Delay (s/veh)	30.9	

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Queue Delay		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)		4.0	12.8			7.9	7.3	0.0	60.1	12.8		
LOS		A	B			A	A	A	E	B		
Approach Delay (s/veh)			12.7				7.3			29.1		
Approach LOS			B				A			C		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 108.4			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay (s/veh): 12.3		Intersection LOS: B	
Intersection Capacity Utilization 65.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway



Lane Group	SBT	SBR
Queue Delay	0.0	
Total Delay (s/veh)	30.9	
LOS	C	
Approach Delay (s/veh)	30.9	
Approach LOS	C	

Intersection Summary

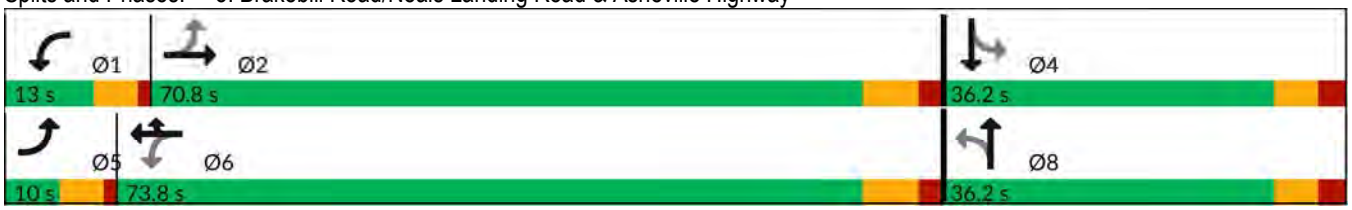
PROJECTED CONDITIONS WITH THE PROJECT

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	519	35	152	1434	6	94	8	51	29	22	94
Future Volume (vph)	27	519	35	152	1434	6	94	8	51	29	22	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			-1%			-7%			1%	
Storage Length (ft)	250		0	235		90	150		0	0		0
Storage Lanes	1		0	1		1	1		0	0		0
Taper Length (ft)	275			120			75			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991				0.850		0.871			0.913	
Flt Protected	0.950			0.950			0.950				0.990	
Satd. Flow (prot)	1823	3415	0	1761	3489	1623	1868	1574	0	0	1666	0
Flt Permitted	0.107			0.370			0.356				0.911	
Satd. Flow (perm)	205	3415	0	686	3489	1623	700	1574	0	0	1533	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				77		63			73	
Link Speed (mph)		55			55			30			25	
Link Distance (ft)		919			942			410			449	
Travel Time (s)		11.4			11.7			9.3			12.2	
Peak Hour Factor	0.89	0.89	0.89	0.92	0.92	0.92	0.81	0.81	0.81	0.54	0.54	0.54
Heavy Vehicles (%)	0%	6%	3%	3%	4%	0%	0%	33%	5%	0%	0%	4%
Adj. Flow (vph)	30	583	39	165	1559	7	116	10	63	54	41	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	622	0	165	1559	7	116	73	0	0	269	0
Turn Type	pm+pt	NA		pm+pt	NA	Prot	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6	6		8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	22.0		10.0	22.0	22.0	11.5	11.5		11.5	11.5	
Total Split (s)	10.0	70.8		13.0	73.8	73.8	36.2	36.2		36.2	36.2	
Total Split (%)	8.3%	59.0%		10.8%	61.5%	61.5%	30.2%	30.2%		30.2%	30.2%	
Maximum Green (s)	5.0	63.8		8.0	66.8	66.8	29.7	29.7		29.7	29.7	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	5.0	7.0		5.0	7.0	7.0	6.5	6.5			6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max	Max	None	None		None	None	
Walk Time (s)		15.0			15.0	15.0						
Flash Don't Walk (s)		0.0			0.0	0.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	71.1	64.1		77.5	70.9	70.9	19.7	19.7			19.7	
Actuated g/C Ratio	0.65	0.58		0.71	0.65	0.65	0.18	0.18			0.18	
v/c Ratio	0.15	0.31		0.30	0.69	0.01	0.93	0.22			0.81	
Control Delay (s/veh)	7.9	12.9		7.3	16.9	0.0	108.4	13.1			49.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay (s/veh)	7.9	12.9		7.3	16.9	0.0	108.4	13.1			49.5	
LOS	A	B		A	B	A	F	B			D	
Approach Delay (s/veh)		12.7			15.9			71.6			49.5	
Approach LOS		B			B			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 109.9			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay (s/veh): 22.0		Intersection LOS: C	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway



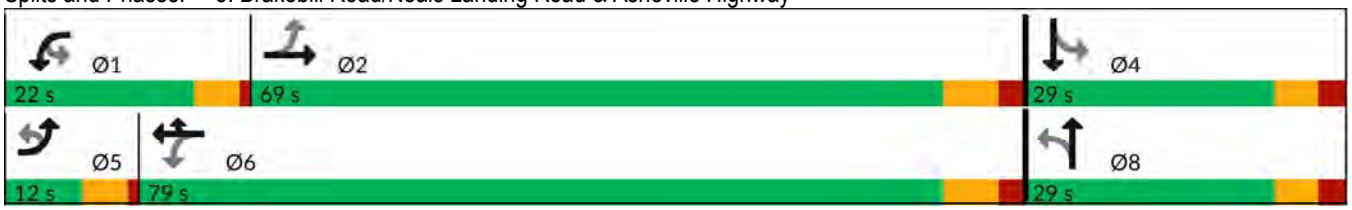
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	1	83	1225	81	2	135	826	30	75	19	168	18
Future Volume (vph)	1	83	1225	81	2	135	826	30	75	19	168	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-2%				-1%			-7%		
Storage Length (ft)		250		0		235		90	150		0	0
Storage Lanes		1		0		1		1	1		0	0
Taper Length (ft)		275				120			75			100
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt			0.991					0.850		0.865		
Flt Protected		0.950				0.950			0.950			
Satd. Flow (prot)	0	1689	3578	0	0	1796	3522	1436	1868	1701	0	0
Flt Permitted		0.228				0.112			0.557			
Satd. Flow (perm)	0	405	3578	0	0	212	3522	1436	1095	1701	0	0
Right Turn on Red				Yes				Yes			Yes	
Satd. Flow (RTOR)			8					77		202		
Link Speed (mph)			55				55			30		
Link Distance (ft)			919				942			410		
Travel Time (s)			11.4				11.7			9.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.73	0.73	0.73	0.73	0.77	0.77	0.77	0.71
Heavy Vehicles (%)	0%	8%	1%	1%	0%	1%	3%	13%	0%	0%	0%	0%
Adj. Flow (vph)	1	90	1332	88	3	185	1132	41	97	25	218	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	91	1420	0	0	188	1132	41	97	243	0	0
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA	Prot	Perm	NA		Perm
Protected Phases		5	2			1	6	6		8		
Permitted Phases	5	2			1	6			8			4
Detector Phase	5	5	2		1	1	6	6	8	8		4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0		5.0	5.0	15.0	15.0	5.0	5.0		5.0
Minimum Split (s)	10.0	10.0	22.0		10.0	10.0	22.0	22.0	11.5	11.5		11.5
Total Split (s)	12.0	12.0	69.0		22.0	22.0	79.0	79.0	29.0	29.0		29.0
Total Split (%)	10.0%	10.0%	57.5%		18.3%	18.3%	65.8%	65.8%	24.2%	24.2%		24.2%
Maximum Green (s)	7.0	7.0	62.0		17.0	17.0	72.0	72.0	22.5	22.5		22.5
Yellow Time (s)	4.0	4.0	5.0		4.0	4.0	5.0	5.0	4.0	4.0		4.0
All-Red Time (s)	1.0	1.0	2.0		1.0	1.0	2.0	2.0	2.5	2.5		2.5
Lost Time Adjust (s)		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0	7.0			5.0	7.0	7.0	6.5	6.5		
Lead/Lag	Lead	Lead	Lag		Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None	None	Max		None	None	Max	Max	None	None		None
Walk Time (s)			15.0				15.0	15.0				
Flash Don't Walk (s)			0.0				0.0	0.0				
Pedestrian Calls (#/hr)			0				0	0				
Act Effct Green (s)		74.8	66.1			83.1	72.8	72.8	14.4	14.4		
Actuated g/C Ratio		0.68	0.60			0.75	0.66	0.66	0.13	0.13		
v/c Ratio		0.26	0.66			0.59	0.49	0.04	0.68	0.61		
Control Delay (s/veh)		6.6	17.9			16.1	11.4	0.5	69.2	17.0		

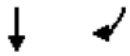
Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	19	58
Future Volume (vph)	19	58
Ideal Flow (vphpl)	1900	1900
Grade (%)	1%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.917	
Flt Protected	0.991	
Satd. Flow (prot)	1674	0
Flt Permitted	0.383	
Satd. Flow (perm)	647	0
Right Turn on Red		Yes
Satd. Flow (RTOR)	58	
Link Speed (mph)	25	
Link Distance (ft)	449	
Travel Time (s)	12.2	
Peak Hour Factor	0.71	0.71
Heavy Vehicles (%)	13%	0%
Adj. Flow (vph)	27	82
Shared Lane Traffic (%)		
Lane Group Flow (vph)	134	0
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	5.0	
Minimum Split (s)	11.5	
Total Split (s)	29.0	
Total Split (%)	24.2%	
Maximum Green (s)	22.5	
Yellow Time (s)	4.0	
All-Red Time (s)	2.5	
Lost Time Adjust (s)	0.0	
Total Lost Time (s)	6.5	
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Don't Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	14.4	
Actuated g/C Ratio	0.13	
v/c Ratio	0.99	
Control Delay (s/veh)	105.8	

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Queue Delay		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)		6.6	17.9			16.1	11.4	0.5	69.2	17.0		
LOS		A	B			B	B	A	E	B		
Approach Delay (s/veh)			17.2				11.7			31.9		
Approach LOS			B				B			C		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 110.1			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay (s/veh): 20.0		Intersection LOS: C	
Intersection Capacity Utilization 81.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway





Lane Group	SBT	SBR
Queue Delay	0.0	
Total Delay (s/veh)	105.8	
LOS	F	
Approach Delay (s/veh)	105.8	
Approach LOS	F	

Intersection Summary

PROJECTED CONDITIONS WITH THE PROJECT AND IMPROVEMENTS

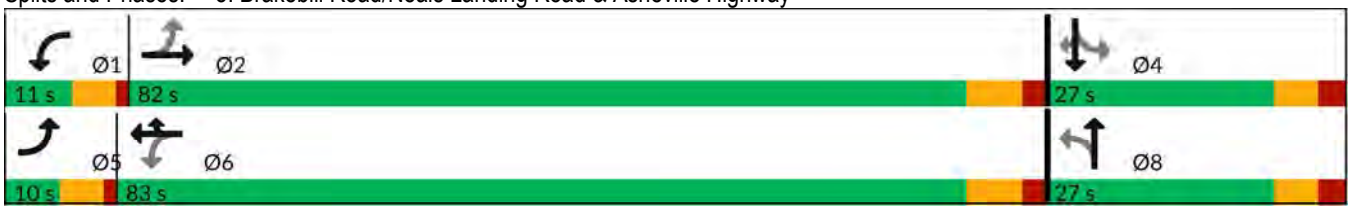
Lanes, Volumes, Timings
5: Brakebill Road/Neals Landing Road & Asheville Highway

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	519	35	152	1434	6	94	8	51	29	22	94
Future Volume (vph)	27	519	35	152	1434	6	94	8	51	29	22	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			-1%			-7%			1%	
Storage Length (ft)	250		0	235		90	150		0	0		75
Storage Lanes	1		0	1		1	1		0	0		1
Taper Length (ft)	275			120			75			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991				0.850		0.871				0.850
Flt Protected	0.950			0.950			0.950				0.972	
Satd. Flow (prot)	1823	3415	0	1761	3489	1623	1868	1574	0	0	1838	1545
Flt Permitted	0.121			0.391			0.695				0.783	
Satd. Flow (perm)	232	3415	0	725	3489	1623	1367	1574	0	0	1480	1545
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				77		63				105
Link Speed (mph)		55			55			30			25	
Link Distance (ft)		919			942			410			449	
Travel Time (s)		11.4			11.7			9.3			12.2	
Peak Hour Factor	0.89	0.89	0.89	0.92	0.92	0.92	0.81	0.81	0.81	0.54	0.54	0.54
Heavy Vehicles (%)	0%	6%	3%	3%	4%	0%	0%	33%	5%	0%	0%	4%
Adj. Flow (vph)	30	583	39	165	1559	7	116	10	63	54	41	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	622	0	165	1559	7	116	73	0	0	95	174
Turn Type	pm+pt	NA		pm+pt	NA	Prot	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6	6		8			4	
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	22.0		10.0	22.0	22.0	11.5	11.5		11.5	11.5	11.5
Total Split (s)	10.0	82.0		11.0	83.0	83.0	27.0	27.0		27.0	27.0	27.0
Total Split (%)	8.3%	68.3%		9.2%	69.2%	69.2%	22.5%	22.5%		22.5%	22.5%	22.5%
Maximum Green (s)	5.0	75.0		6.0	76.0	76.0	20.5	20.5		20.5	20.5	20.5
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	2.5	2.5		2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	5.0	7.0		5.0	7.0	7.0	6.5	6.5			6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	Max	Max	None	None		None	None	None
Walk Time (s)		15.0			15.0	15.0						
Flash Don't Walk (s)		0.0			0.0	0.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	82.1	75.1		85.8	80.3	80.3	14.6	14.6			14.6	14.6
Actuated g/C Ratio	0.72	0.66		0.75	0.70	0.70	0.13	0.13			0.13	0.13
v/c Ratio	0.13	0.28		0.28	0.64	0.01	0.66	0.29			0.50	0.60
Control Delay (s/veh)	5.1	8.8		5.0	12.1	0.0	65.7	16.5			55.5	28.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay (s/veh)	5.1	8.8		5.0	12.1	0.0	65.7	16.5			55.5	28.5
LOS	A	A		A	B	A	E	B			E	C
Approach Delay (s/veh)		8.7			11.4			46.7			38.1	
Approach LOS		A			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 114.3			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay (s/veh): 15.6		Intersection LOS: B	
Intersection Capacity Utilization 71.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway



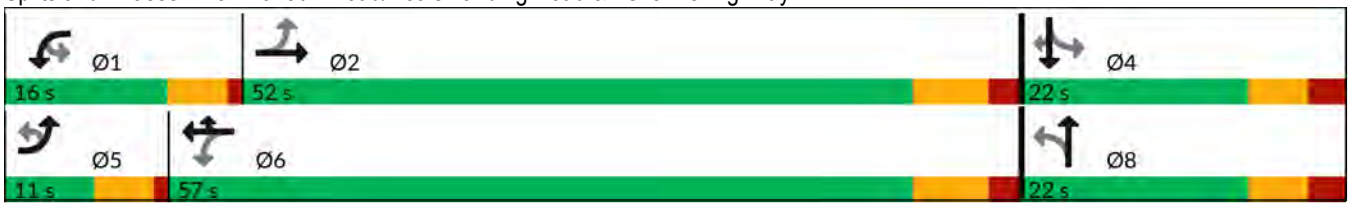
Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	1	83	1225	81	2	135	826	30	75	19	168	18
Future Volume (vph)	1	83	1225	81	2	135	826	30	75	19	168	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			-2%				-1%			-7%		
Storage Length (ft)		250		0		235		90	150		0	0
Storage Lanes		1		0		1		1	1		0	0
Taper Length (ft)		275				120			75			100
Lane Util. Factor	0.95	1.00	0.95	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00
Frt			0.991					0.850		0.865		
Flt Protected		0.950				0.950			0.950			
Satd. Flow (prot)	0	1689	3578	0	0	1796	3522	1436	1868	1701	0	0
Flt Permitted		0.222				0.099			0.723			
Satd. Flow (perm)	0	395	3578	0	0	187	3522	1436	1422	1701	0	0
Right Turn on Red				Yes				Yes			Yes	
Satd. Flow (RTOR)			11					103		152		
Link Speed (mph)			55				55			30		
Link Distance (ft)			919				942			410		
Travel Time (s)			11.4				11.7			9.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.73	0.73	0.73	0.73	0.77	0.77	0.77	0.71
Heavy Vehicles (%)	0%	8%	1%	1%	0%	1%	3%	13%	0%	0%	0%	0%
Adj. Flow (vph)	1	90	1332	88	3	185	1132	41	97	25	218	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	91	1420	0	0	188	1132	41	97	243	0	0
Turn Type	custom	pm+pt	NA		custom	pm+pt	NA	Prot	Perm	NA		Perm
Protected Phases		5	2			1	6	6		8		
Permitted Phases	5	2			1	6			8			4
Detector Phase	5	5	2		1	1	6	6	8	8		4
Switch Phase												
Minimum Initial (s)	5.0	5.0	15.0		5.0	5.0	15.0	15.0	5.0	5.0		5.0
Minimum Split (s)	10.0	10.0	22.0		10.0	10.0	22.0	22.0	11.5	11.5		11.5
Total Split (s)	11.0	11.0	52.0		16.0	16.0	57.0	57.0	22.0	22.0		22.0
Total Split (%)	12.2%	12.2%	57.8%		17.8%	17.8%	63.3%	63.3%	24.4%	24.4%		24.4%
Maximum Green (s)	6.0	6.0	45.0		11.0	11.0	50.0	50.0	15.5	15.5		15.5
Yellow Time (s)	4.0	4.0	5.0		4.0	4.0	5.0	5.0	4.0	4.0		4.0
All-Red Time (s)	1.0	1.0	2.0		1.0	1.0	2.0	2.0	2.5	2.5		2.5
Lost Time Adjust (s)		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)		5.0	7.0			5.0	7.0	7.0	6.5	6.5		
Lead/Lag	Lead	Lead	Lag		Lead	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None	None	Max		None	None	Max	Max	None	None		None
Walk Time (s)			15.0				15.0	15.0				
Flash Don't Walk (s)			0.0				0.0	0.0				
Pedestrian Calls (#/hr)			0				0	0				
Act Effct Green (s)		54.1	46.1			61.2	51.6	51.6	10.9	10.9		
Actuated g/C Ratio		0.64	0.54			0.72	0.61	0.61	0.13	0.13		
v/c Ratio		0.27	0.73			0.61	0.53	0.04	0.53	0.69		
Control Delay (s/veh)		6.4	18.0			18.9	11.8	0.1	45.5	24.9		

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	19	58
Future Volume (vph)	19	58
Ideal Flow (vphpl)	1900	1900
Grade (%)	1%	
Storage Length (ft)		75
Storage Lanes		1
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt		0.850
Flt Protected	0.977	
Satd. Flow (prot)	1730	1607
Flt Permitted	0.383	
Satd. Flow (perm)	678	1607
Right Turn on Red		Yes
Satd. Flow (RTOR)		109
Link Speed (mph)	25	
Link Distance (ft)	449	
Travel Time (s)	12.2	
Peak Hour Factor	0.71	0.71
Heavy Vehicles (%)	13%	0%
Adj. Flow (vph)	27	82
Shared Lane Traffic (%)		
Lane Group Flow (vph)	52	82
Turn Type	NA	Perm
Protected Phases	4	
Permitted Phases		4
Detector Phase	4	4
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	11.5	11.5
Total Split (s)	22.0	22.0
Total Split (%)	24.4%	24.4%
Maximum Green (s)	15.5	15.5
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.5	2.5
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.5	6.5
Lead/Lag		
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0
Recall Mode	None	None
Walk Time (s)		
Flash Don't Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	10.9	10.9
Actuated g/C Ratio	0.13	0.13
v/c Ratio	0.60	0.27
Control Delay (s/veh)	62.8	6.1

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Queue Delay		0.0	0.0			0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)		6.4	18.0			18.9	11.8	0.1	45.5	24.9		
LOS		A	B			B	B	A	D	C		
Approach Delay (s/veh)			17.3				12.4			30.8		
Approach LOS			B				B			C		

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 84.6			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay (s/veh): 17.1		Intersection LOS: B	
Intersection Capacity Utilization 76.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Brakebill Road/Neals Landing Road & Asheville Highway



Lane Group	SBT	SBR
Queue Delay	0.0	0.0
Total Delay (s/veh)	62.8	6.1
LOS	E	A
Approach Delay (s/veh)	28.1	
Approach LOS	C	

Intersection Summary

INTERSECTION SIGNAL TIMING INFORMATION

Filename: DATA\INT#2812.EL
Intersection: ASHEVILLE/BRAKEBILL1/3/09 Fri Sep 13 09:35:26 2024

Startup Data:

	Ring 1	Ring 2
Start Phases	2	6
UCF Entry Phases	4	8
UCF Exit Phases	2	6

Start Overlaps Yellow at Power-up?	NO	
Start in All Red at Power-up?	NO	
Zone ID:	0	
Controller ID:	0	
Hold 2 sec. Minimum Red Revert?	YES	Red Revert Time: 4.0 sec.
Override Holds if		
Uniform Code Flash Active?	YES	
Dual Entry 1256?	YES	
Dual Entry 3478?	YES	
Passage Interval Sequential?	YES	
Simultaneous Gap?	NO	
Conditional Service set by Input?	NO	
Conditional Service 1256?	NO	
Conditional Service 3478?	NO	

Timing Data:

Interval	Time by Phase (sec.)							
	1	2	3	4	5	6	7	8
Initial	5	15	15	5	5	15	0	5
Passage	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0
Yellow	4.0	5.0	5.0	4.0	4.0	5.0	0.0	4.0
Red Clear	1.0	3.0	3.0	2.5	1.0	3.0	0.0	2.5
Max 1	15	40	40	15	20	40	0	15
Max 2	20	50	50	25	20	50	0	25
Walk	0	15	0	0	0	15	0	0
Ped Clear	0	0	0	0	0	0	0	0

Max 3 Parameters

	1	2	3	4	5	6	7	8
Adjust (sec.)	0	0	0	0	0	0	0	0
Limit (sec.)	0	0	0	0	0	0	0	0
Set (max outs)	0	0	0	0	0	0	0	0
Clr (gap outs)	0	0	0	0	0	0	0	0

Functions:

	1	2	3	4	5	6	7	8
Min. Recall	N	Y	N	N	N	Y	N	N
Max. Recall	N	Y	N	N	N	Y	N	N

Ped. Recall	N	N	N	N	N	N	N	N
Det. Non-lock	Y	N	N	Y	Y	N	N	Y
CNA I Active	N	Y	N	N	N	Y	N	N

CNA II Active	N	N	N	N	N	N	N	N
Flashing Walks	N	N	N	N	N	N	N	N
Phase Omitted	N	N	Y	N	N	N	Y	N
Ped Omitted	Y	N	Y	Y	Y	N	Y	Y
Soft Recall	N	N	N	N	N	N	N	N
Ped Cl thru Yel	N	N	N	N	N	N	N	N
Ped Cl thru Red	N	N	N	N	N	N	N	N

Begin Daylight Savings in week: 15
End Daylight Savings in week: 45

Time of Day Changepoints:
Base Day Plan 0

Time	Cycle	Offset	Ckt 1 (Flash)	Ckt 0 (Free)	Ckt 9
00:00	1	3	.	X	.
06:00	4	1	.	.	.
09:00	3	1	.	X	.
15:00	4	2	.	.	.
19:00	3	1	.	X	.
23:00	1	3	.	X	.

Base Day Plan 1

Time	Cycle	Offset	Ckt 1 (Flash)	Ckt 0 (Free)	Ckt 9
00:00	1	3	.	X	.
07:00	3	1	.	.	.
18:00	1	3	.	X	.
22:00	1	3	.	X	.

Base Day Plan 2

Time	Cycle	Offset	Ckt 1 (Flash)	Ckt 0 (Free)	Ckt 9
00:00	1	3	.	X	.
09:00	3	1	.	.	.
18:00	1	3	.	X	.
21:00	1	3	.	X	.

Week Plan:

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Plan: 0	2	0	0	0	0	0	1
Plan: 1	0	0	0	0	0	0	0

Plan: 2 0 0 0 0 0 0 0
Plan: 3 0 0 0 0 0 0 0
Plan: 4 0 0 0 0 0 0 0
Plan: 5 0 0 0 0 0 0 0
Plan: 6 0 0 0 0 0 0 0
Plan: 7 0 0 0 0 0 0 0
Plan: 8 0 0 0 0 0 0 0

Plan: 9 0 0 0 0 0 0 0

Week Plan Implementation:

Week 1: 0	Week 14: 0	Week 27: 0	Week 40: 0
Week 2: 0	Week 15: 0	Week 28: 0	Week 41: 0
Week 3: 0	Week 16: 0	Week 29: 0	Week 42: 0
Week 4: 0	Week 17: 0	Week 30: 0	Week 43: 0
Week 5: 0	Week 18: 0	Week 31: 15	Week 44: 0
Week 6: 0	Week 19: 0	Week 32: 0	Week 45: 0
Week 7: 0	Week 20: 0	Week 33: 0	Week 46: 0
Week 8: 0	Week 21: 0	Week 34: 0	Week 47: 0
Week 9: 0	Week 22: 0	Week 35: 0	Week 48: 15
Week 10: 0	Week 23: 0	Week 36: 0	Week 49: 0
Week 11: 0	Week 24: 0	Week 37: 0	Week 50: 0
Week 12: 0	Week 25: 0	Week 38: 0	Week 51: 0
Week 13: 0	Week 26: 0	Week 39: 0	Week 52: 0

Special Day Plan Implementation (Plan-Week-Day):

Slot 1 0 - 0 - 0	Slot 18 0 - 0 - 0	Slot 35 0 - 0 - 0
Slot 2 0 - 0 - 0	Slot 19 0 - 0 - 0	Slot 36 0 - 0 - 0
Slot 3 0 - 0 - 0	Slot 20 0 - 0 - 0	Slot 37 0 - 0 - 0
Slot 4 0 - 0 - 0	Slot 21 0 - 0 - 0	Slot 38 0 - 0 - 0
Slot 5 0 - 0 - 0	Slot 22 0 - 0 - 0	Slot 39 0 - 0 - 0
Slot 6 0 - 0 - 0	Slot 23 0 - 0 - 0	Slot 40 0 - 0 - 0
Slot 7 0 - 0 - 0	Slot 24 0 - 0 - 0	Slot 41 0 - 0 - 0
Slot 8 0 - 0 - 0	Slot 25 0 - 0 - 0	Slot 42 0 - 0 - 0
Slot 9 0 - 0 - 0	Slot 26 0 - 0 - 0	Slot 43 0 - 0 - 0
Slot 10 0 - 0 - 0	Slot 27 0 - 0 - 0	Slot 44 0 - 0 - 0
Slot 11 0 - 0 - 0	Slot 28 0 - 0 - 0	Slot 45 0 - 0 - 0
Slot 12 0 - 0 - 0	Slot 29 0 - 0 - 0	Slot 46 0 - 0 - 0
Slot 13 0 - 0 - 0	Slot 30 0 - 0 - 0	Slot 47 0 - 0 - 0
Slot 14 0 - 0 - 0	Slot 31 0 - 0 - 0	Slot 48 0 - 0 - 0
Slot 15 0 - 0 - 0	Slot 32 0 - 0 - 0	Slot 49 0 - 0 - 0
Slot 16 0 - 0 - 0	Slot 33 0 - 0 - 0	Slot 50 0 - 0 - 0
Slot 17 0 - 0 - 0	Slot 34 0 - 0 - 0	

Coordination Operating Modes:

4 Splits / 4 Cycles?	NO
Unused Cycle Time to Side St.?	NO
Ckt 4 enables Aux TOD?	NO
Offset Interruption?	NO
Cycle 4 = 2 A.M. Sync?	NO
Split 2 = 2 A.M. Sync?	NO
Flash with Ckt 1?	NO
Invert Free Output?	NO

Auto Permissive?	YES
Cycle 4 = Flash?	NO
Enable Max 2 with Ckt 9?	NO
Conditional Service with Ckt 9?	NO
Invert Free Input?	NO
Activate CNA 1?	YES
Activate Walk Rest Modifier?	YES
Inhibit Max Termination?	YES
Enhanced Permissive?	NO
Use Split Matrix?	YES
Use Yellow Offset Timer?	NO
Interconnect?	NO
Maximum Dwell Time:	25 sec.
Full Dwell?	NO
Short Route?	YES

Phase Relationships:

	Ring 1 - 2
Hold 1 Phases	2 - 6
Hold 1 Omit Phases	0 - 0
Hold 2 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Omit Phases	0 - 0
Hold 3 Ped Omit	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Non Early Release Phases	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Phases Omitted w/ Ckt 9	0 - 0
Peds Omitted w/ Ckt 9	0 - 0

Phase Reverse by	Cyc - Ofst
1 - 2	0 - 0

1 - 2	0	- 0
5 - 6	0	- 0
5 - 6	0	- 0
3 - 4	0	- 0
3 - 4	0	- 0
7 - 8	0	- 0
7 - 8	0	- 0

Split Plans:

	Percent per Phase								Permissives					
	1	2	3	4	5	6	7	8	Begin	End	Begin	End	Begin	End
Split 1	13	53	22	12	0	66	0	0	0	20	0	30	0	40
Split 2	14	50	22	14	0	64	0	0	0	20	0	30	0	40

Split 3	16	48	23	13	0	64	0	0	0	20	0	30	0	40
Split 4	14	51	22	13	0	65	0	0	0	20	0	30	0	40
Split 5	15	51	22	12	0	66	0	0	0	20	0	30	0	40
Split 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Split 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split Matrix:

	Offset				
Cycle	1	2	3	4	5
1	0	0	0	0	0
2	0	0	0	0	0
3	2	0	0	0	0
4	1	3	4	5	0
5	0	0	0	0	0
6	0	0	0	0	0

Offset Times:

	Offset				
Cycle	1	2	3	4	5

1	0	0	0	0	0
2	0	0	0	0	0
3	90	0	0	0	0
4	95	66	84	89	0
5	0	0	0	0	0
6	0	0	0	0	0

Cycle Times:

Cycle	
1	90 sec.
2	100 sec.
3	110 sec.
4	120 sec.
5	130 sec.
6	180 sec.

Closed Loop Options:

TOD Flash/Aux? NO
Free w/ Ckt 0? YES

Report Channel Failures to Central

Conflict Flash	(3) Occurence and Resume Normal
Manual/Auto Flash	(3) Occurence and Resume Normal
MCE	(3) Occurence and Resume Normal
Preempt	(0) Auto-log only
Channel # 5	(0) Auto-log only
Channel # 6	(0) Auto-log only
Channel # 7	(0) Auto-log only
Channel # 8	(0) Auto-log only
Door Open	(3) Occurence and Resume Normal

Main Street Phs for Out of Step Test
Ring 1 - 2
2 - 6

Speed Trap Sensor Pairs

1-2	3-4	5-6	7-8
NO	NO	NO	NO

Standard Overlaps:

Internal Overlap Program? YES

```
              Phase
Program 1 2 3 4 5 6 7 8
Ovl A   . . . . . . . .
Ovl B   . . . . . . . .
Ovl C   . . . . . . . .
Ovl D   . . . . . . . .
```

Detector Switching:

```
Programmed Active?      NO
No Detector Switching is Programmed
```

Signals to Overlaps (Diamond Seq.):

```
Programmed Active?      NO
Dual Input Enabled?     NO
                     Phases
                1 2 3 4 5 6 7 8
Overlap 1       . . . . . . . .
Overlap 2       . . . . . . . .
Overlap 3       . . . . . . . .
Overlap 4       . . . . . . . .
Overlap 5       . . . . . . . .
```



```
Overlap 6       . . . . . . . .
Overlap 7       . . . . . . . .
Overlap 8       . . . . . . . .
```

Second Sequence

```
                     Phases
                1 2 3 4 5 6 7 8
Overlap 1       . . . . . . . .
Overlap 2       . . . . . . . .
Overlap 3       . . . . . . . .
Overlap 4       . . . . . . . .
Overlap 5       . . . . . . . .
Overlap 6       . . . . . . . .
Overlap 7       . . . . . . . .
Overlap 8       . . . . . . . .
```

Call/Switch Detector Settings (call copy):

```
Programmed Active?      NO
Dual Input Enabled?     NO
When Phase 1 is Green   1 2 3 4 5 6 7 8
```

```
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 2 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 3 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 4 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 5 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 6 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
```

```
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 7 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0

When Phase 8 is Green   1 2 3 4 5 6 7 8
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0
Detectors               . . . . . . . .  Place Call on Phase 0


Second Sequence
When Phase 1 is Green   1 2 3 4 5 6 7 8
Spec. Detectors         . . . . . . . .  Place Call on Phase 0
Spec. Detectors         . . . . . . . .  Place Call on Phase 0
Spec. Detectors         . . . . . . . .  Place Call on Phase 0
```

When Phase 2 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 3 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 4 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 5 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 6 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 7 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

When Phase 8 is Green 1 2 3 4 5 6 7 8
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0
Spec. Detectors   . . . . Place Call on Phase 0

APPENDIX F

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	L	TR	LTR
Maximum Queue (ft)	32	142	92	76	188	176	141	86	74
Average Queue (ft)	4	54	22	36	85	64	61	26	28
95th Queue (ft)	20	110	62	68	160	138	114	63	62
Link Distance (ft)		886	886		900	900		354	378
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	250			235			150		
Storage Blk Time (%)					0	2	0		
Queuing Penalty (veh)					0	0	0		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	UL	T	TR	UL	T	T	R	L	TR	LTR
Maximum Queue (ft)	42	242	216	106	128	100	22	117	123	68
Average Queue (ft)	9	120	83	51	56	33	1	56	50	16
95th Queue (ft)	31	207	173	92	110	77	10	104	92	48
Link Distance (ft)		886	886		900	900			354	378
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			235			90	150		
Storage Blk Time (%)		0				0		0	0	
Queuing Penalty (veh)		0				0		0	0	

Network Summary

Network wide Queuing Penalty: 0

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	L	TR	LTR
Maximum Queue (ft)	30	138	90	88	192	187	150	92	86
Average Queue (ft)	5	61	25	42	93	73	67	28	27
95th Queue (ft)	21	115	66	74	168	150	122	66	62
Link Distance (ft)		886	886		900	900		354	378
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	250			235			150		
Storage Blk Time (%)					0	3	0	0	
Queuing Penalty (veh)					0	0	0	0	

Network Summary

Network wide Queuing Penalty: 0

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	UL	T	TR	UL	T	T	R	L	TR	LTR
Maximum Queue (ft)	42	266	230	131	131	110	20	135	140	65
Average Queue (ft)	9	125	93	57	58	35	1	59	54	17
95th Queue (ft)	30	224	187	108	112	81	10	112	105	49
Link Distance (ft)		886	886		900	900			354	378
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			235			90	150		
Storage Blk Time (%)		0				0		0	0	
Queuing Penalty (veh)		0				0		0	0	

Network Summary

Network wide Queuing Penalty: 1

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	R	L	TR	LTR
Maximum Queue (ft)	61	166	124	135	290	258	19	133	100	166
Average Queue (ft)	18	80	41	54	138	117	1	66	34	77
95th Queue (ft)	47	147	94	103	239	218	10	119	73	138
Link Distance (ft)		886	886		900	900			354	378
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			235			90	150		
Storage Blk Time (%)					1	8		0	0	
Queuing Penalty (veh)					1	0		0	0	

Network Summary

Network wide Queuing Penalty: 1

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	UL	T	TR	UL	T	T	R	L	TR	LTR
Maximum Queue (ft)	106	323	313	146	207	187	60	138	170	133
Average Queue (ft)	44	165	139	69	99	68	9	61	78	55
95th Queue (ft)	86	272	253	124	175	144	37	114	141	111
Link Distance (ft)		886	886		900	900			354	378
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			235			90	150		
Storage Blk Time (%)		1		0	0	3	0	0	1	
Queuing Penalty (veh)		1		0	0	1	0	1	1	

Network Summary

Network wide Queuing Penalty: 3

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	52	149	114	109	260	244	24	145	123	107	96
Average Queue (ft)	17	66	30	50	125	108	1	71	35	38	46
95th Queue (ft)	43	124	79	88	219	202	9	129	84	83	87
Link Distance (ft)		878	878		900	900			354	378	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	250			235			90	150			75
Storage Blk Time (%)					0	6		0	0	2	2
Queuing Penalty (veh)					1	0		0	0	2	1

Network Summary

Network wide Queuing Penalty: 4

Intersection: 5: Brakebill Road/Neals Landing Road & Asheville Highway

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	L	TR	LT	R
Maximum Queue (ft)	91	269	249	137	173	145	52	116	158	78	57
Average Queue (ft)	41	153	126	62	93	65	9	53	72	27	24
95th Queue (ft)	80	242	219	110	153	124	34	99	130	63	48
Link Distance (ft)		878	878		900	900			354	378	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	250			235			90	150			75
Storage Blk Time (%)		0			0	2		0	0	1	0
Queuing Penalty (veh)		0			0	1		0	0	1	0

Network Summary

Network wide Queuing Penalty: 2

APPENDIX G

TRIP GENERATION DATA

Local Apartment
Trip Generation Study

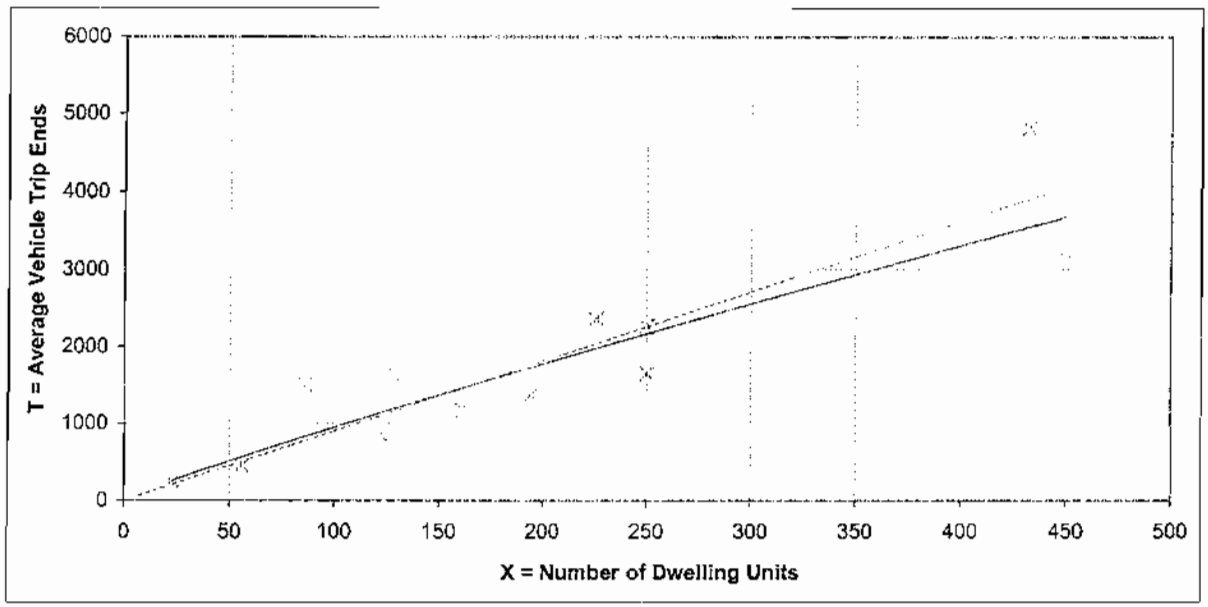
Average Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

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



X Actual Data Points ——— Fitted Curve Average Rate

Fitted Curve Equation: $T = 15.193(X)^{0.899}$ $R^2 = 0.88$

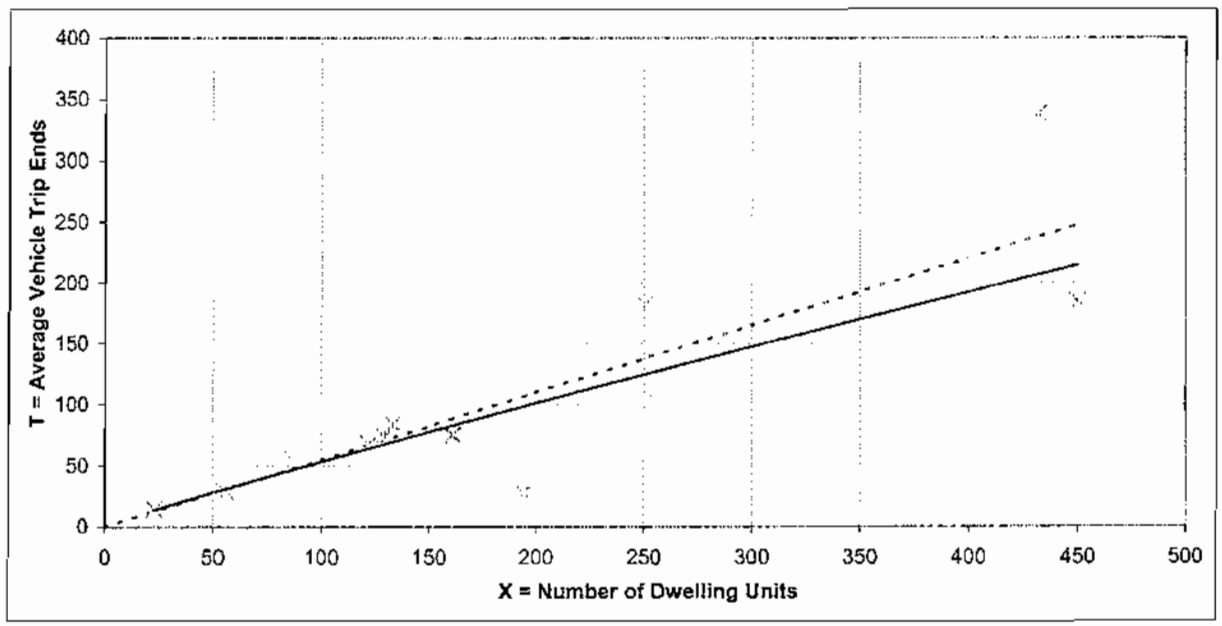
Local Apartment
Trip Generation Study

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



X Actual Data Points ——— Fitted Curve Average Rate

Fitted Curve Equation: $T = 0.758(X)^{0.924}$ $R^2 = 0.75$

Local Apartment
Trip Generation Study

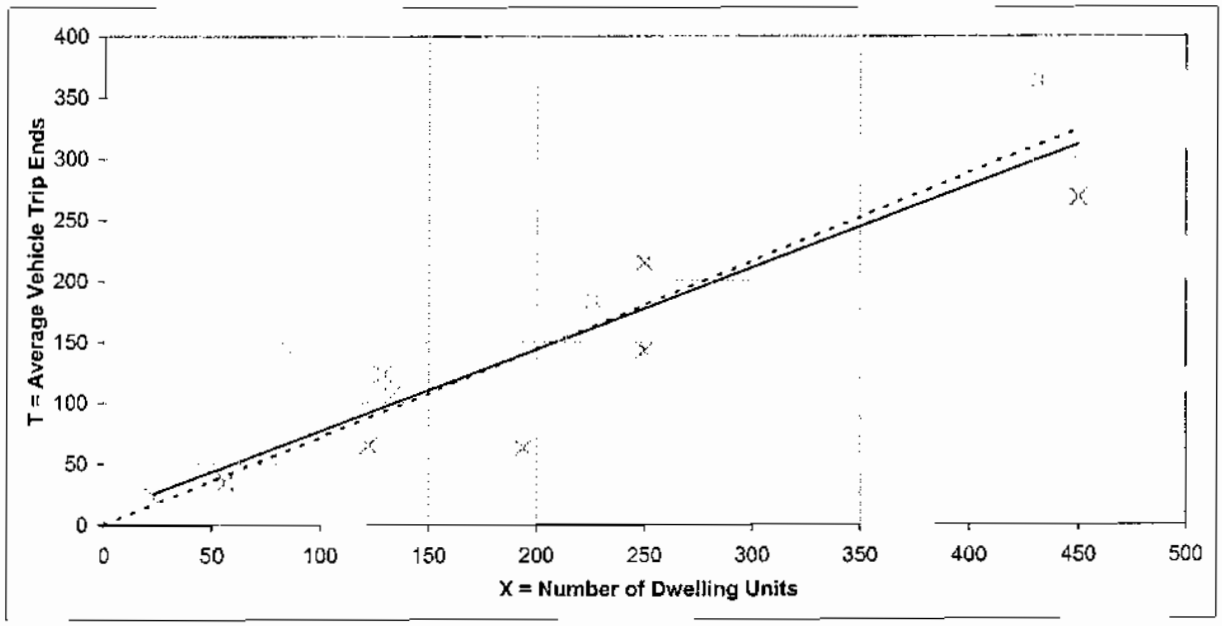
Average Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

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



X Actual Data Points ——— Fitted Curve Average Rate

Fitted Curve Equation: T = 0.669(X) + 10.069 **R^2 = 0.79**

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)

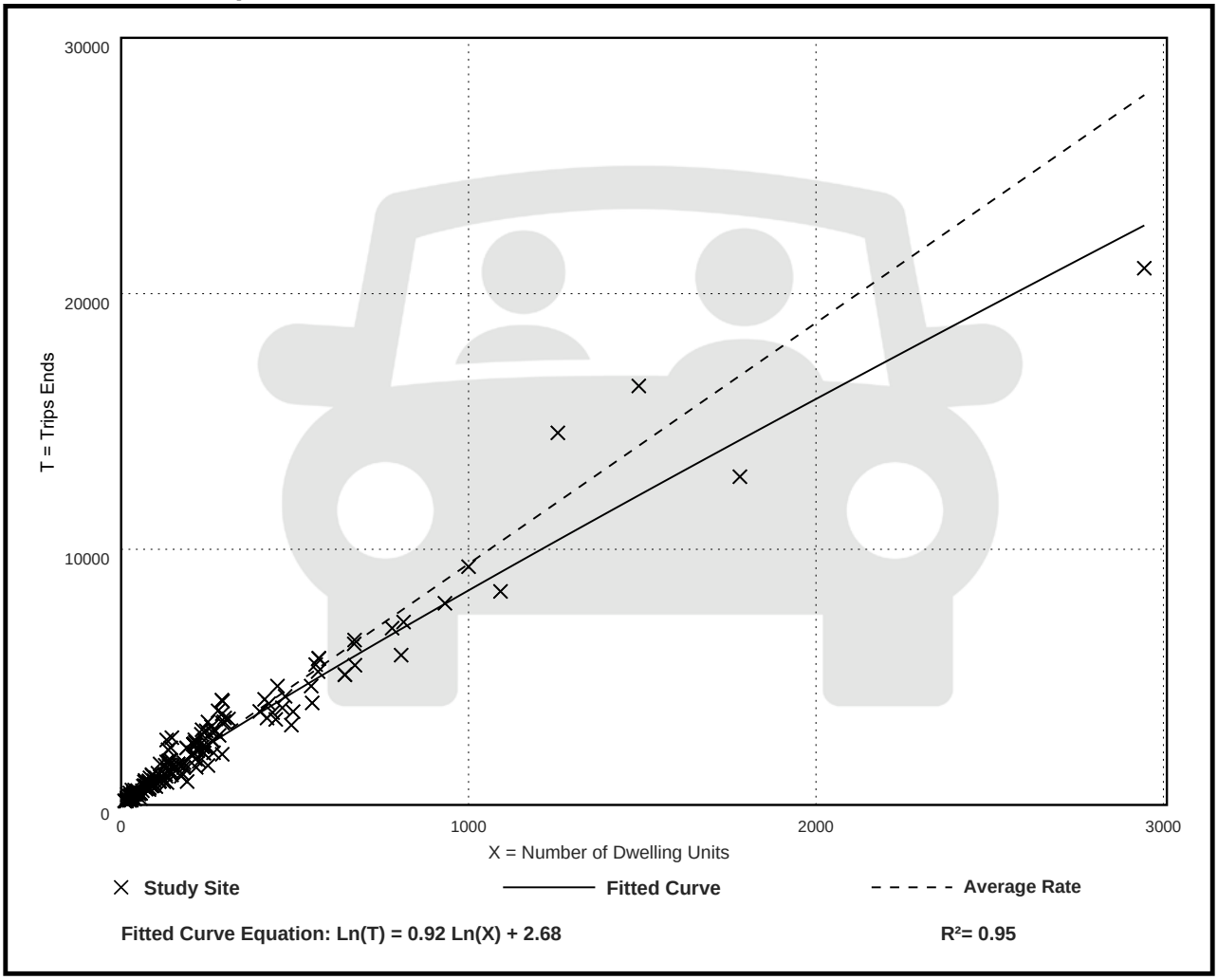
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

R^2= 0.95

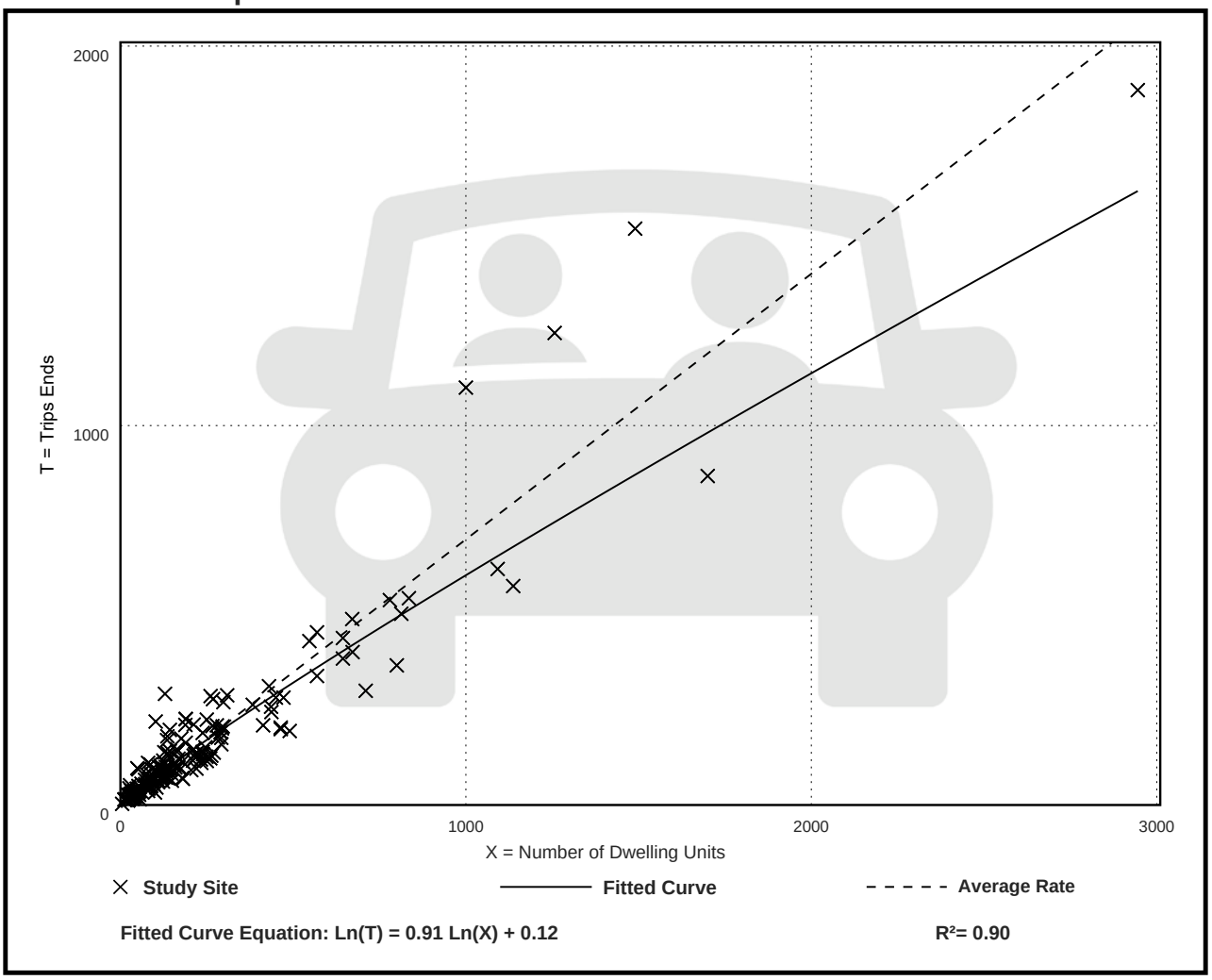
Single-Family Detached Housing
(210)

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

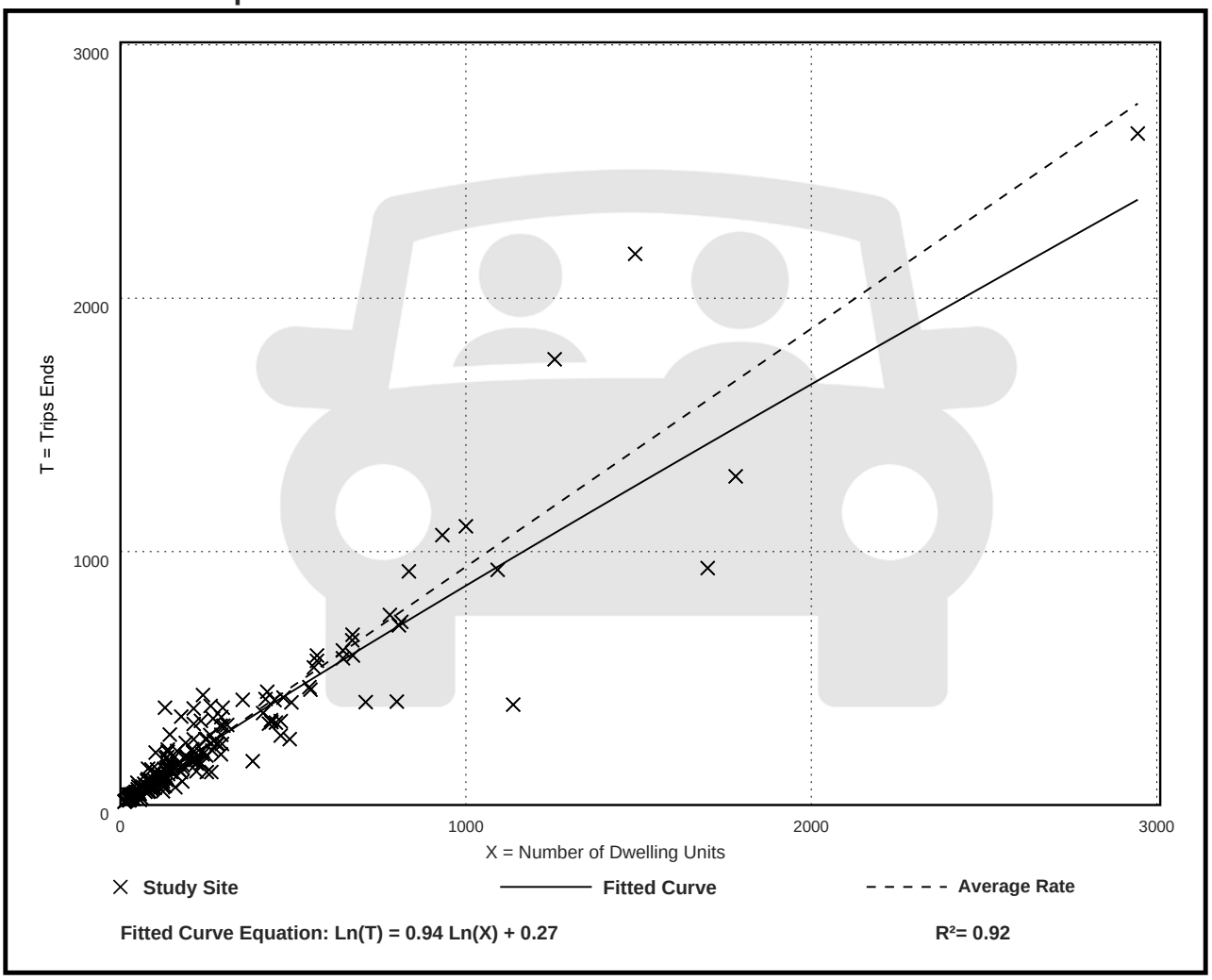


TABLE 6a
TRIP GENERATION FOR THE RIDGE AT NEALS LANDING - UNIT 3 SUBDIVISION
111 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Townhouses	111	1,049	22%	78%		55%	45%	
				13	46	59	47	38	85
Total New Volume Site Trips			**1,049**	**13**	**46**	**59**	**47**	**38**	**85**

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

TRIP GENERATION FOR THE RIDGE AT NEALS LANDING - UNIT 3 SUBDIVISION

111 Multi-Family Attached Townhouses

111 Units = X

Weekday:

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

T = 15.193 * 68.98

T = 1,049 trips

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

T = 0.758 * 78

T = 59 trips

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

T = 0.669 * 111 + 10.07

T = 85 trips

TABLE 6b

TRIP GENERATION FOR REMAINING LOTS IN NEAL'S LANDING (UNIT 3) SUBDIVISION & THE RIDGE AT NEALS LANDING SUBDIVISION (UNITS 1 AND 2)

100 Single-Family Detached Houses Remaining to be Built and Occupied

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	100 Houses Remaining to be Occupied	1,009	25%	75%		63%	37%	
				18	56	74	62	37	99
Total New Volume Site Trips			**1,009**	**18**	**56**	**74**	**62**	**37**	**99**

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR REMAINING LOTS IN NEAL'S LANDING (UNIT 3) SUBDIVISION & THE RIDGE AT NEALS LANDING SUBDIVISION (UNITS 1 AND 2) HOUSE LOTS

100 Single-Family Detached Houses Remaining to be Built and Occupied

100 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

Ln(T) =	0.92	*	4.61	+	2.68
Ln(T) =	6.92				
T =	**1,009**	**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	*	5	+	0.12
Ln(T) =	4.31				
T =	**74**	**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	*	4.61	+	0.27
Ln(T) =	4.60				
T =	**99**	**trips**			

APPENDIX H

2021 CENSUS BUREAU DATA

OnTheMap

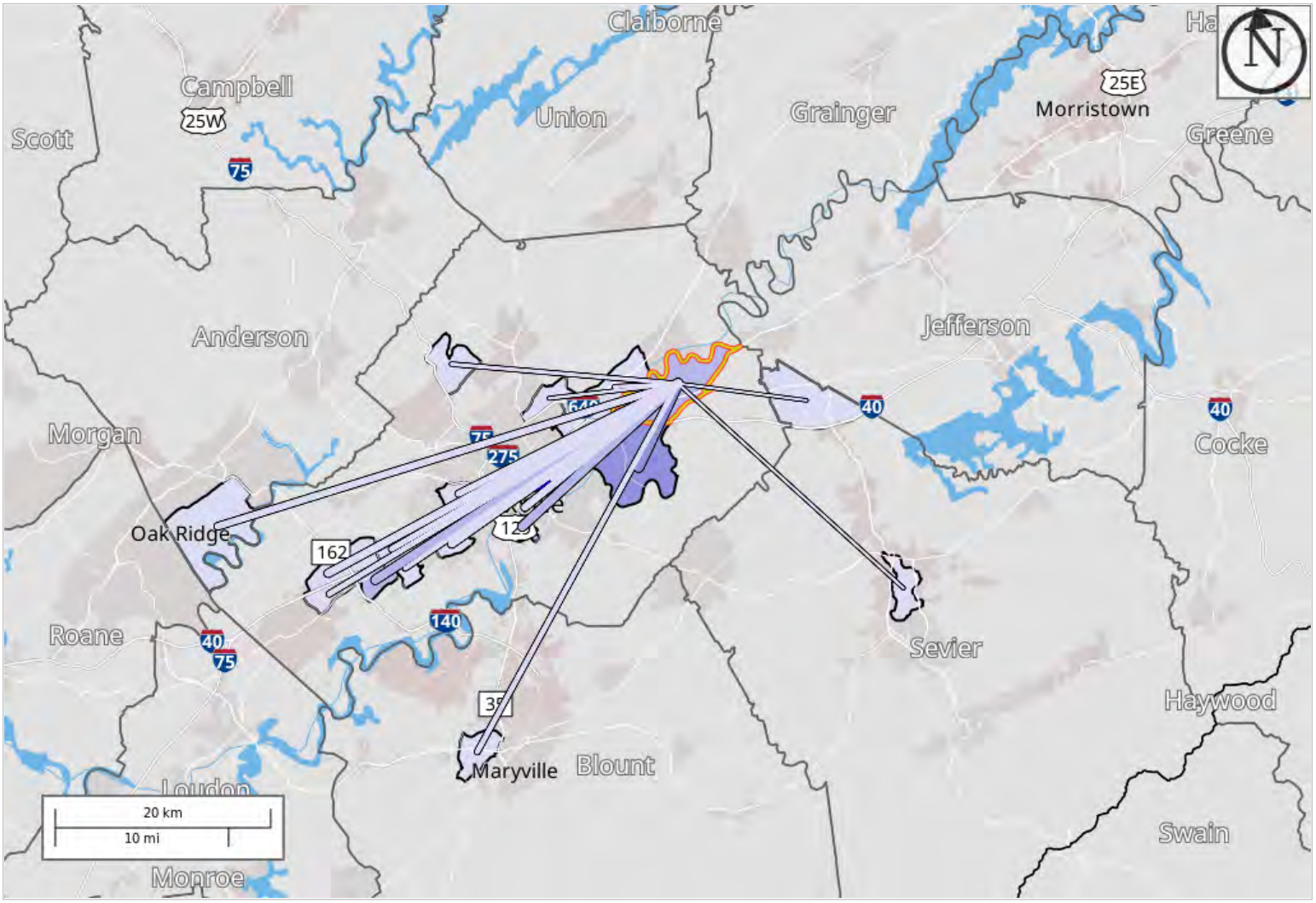
Destination Analysis

Workers: *Living in 53.01 (Knox, TN)*
Showing: *Employment locations grouped by Census Tracts*

Created by the U.S. Census Bureau's OnTheMap `https://onthemap.ces.census.gov` on 09/10/2024

Counts of All Jobs from Home Selection Area to Work Census Tracts in 2021

All Workers



Map Legend

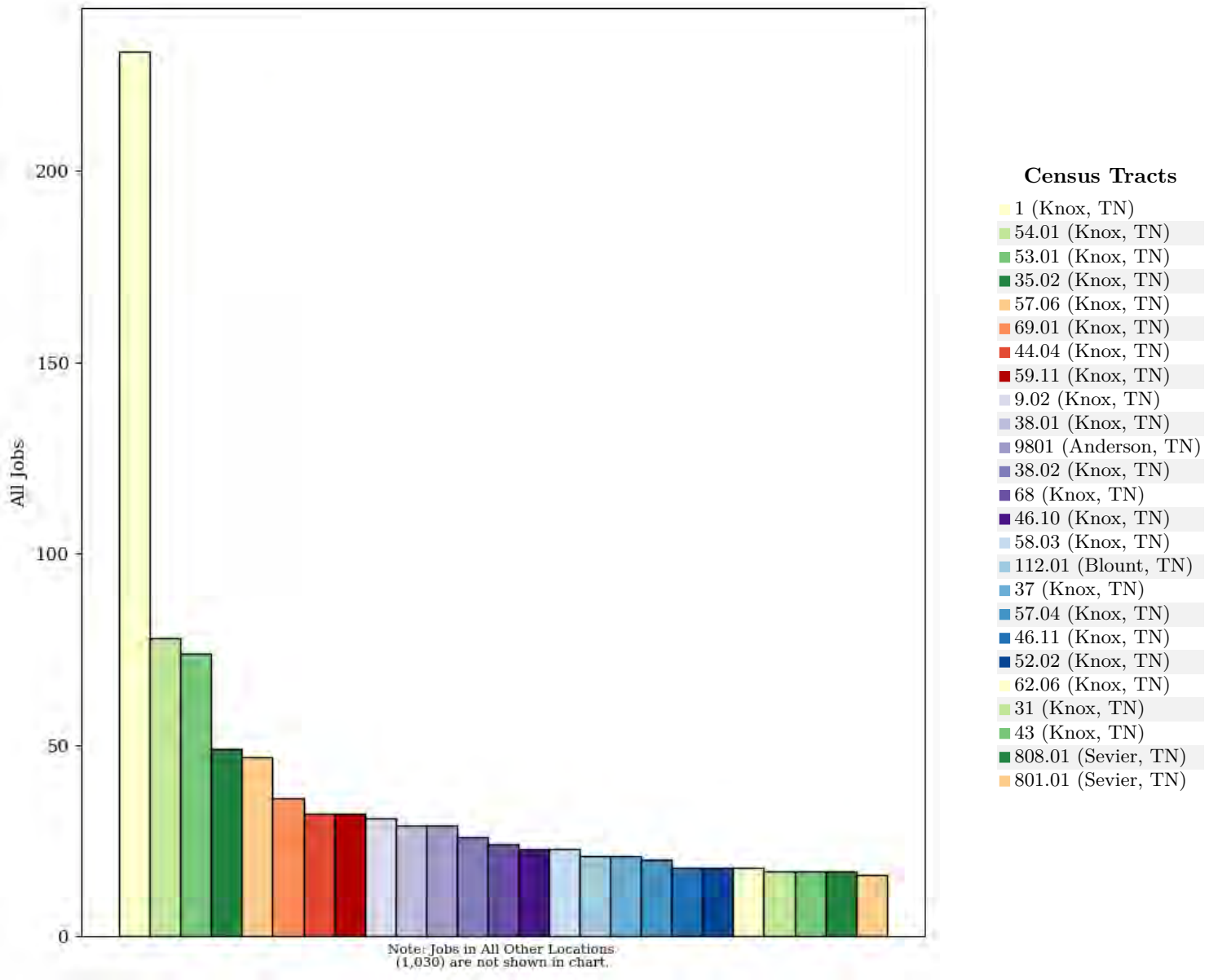
Job Count
- 201 - 231
- 170 - 200
- 139 - 169
- 109 - 138
- 78 - 108
- 47 - 77
- 16 - 46

Selection Areas
- Home Area

Job Count
- 201 - 231
- 170 - 200
- 139 - 169
- 109 - 138
- 78 - 108
- 47 - 77
- 16 - 46

All Jobs from Home Selection Area to Work Census Tracts in 2021

All Workers



All Jobs from Home Selection Area to Work Census Tracts in 2021

All Workers

Census Tracts as Work Destination Area	2021 Count	2021 Share
All Census Tracts	1,977	100.0%
1 (Knox, TN)	231	11.7%
54.01 (Knox, TN)	78	3.9%
53.01 (Knox, TN)	74	3.7%
35.02 (Knox, TN)	49	2.5%
57.06 (Knox, TN)	47	2.4%
69.01 (Knox, TN)	36	1.8%
44.04 (Knox, TN)	32	1.6%
59.11 (Knox, TN)	32	1.6%
9.02 (Knox, TN)	31	1.6%
38.01 (Knox, TN)	29	1.5%

Census Tracts as Work Destination Area	2021 Count	2021 Share
9801 (Anderson, TN)	29	1.5%
38.02 (Knox, TN)	26	1.3%
68 (Knox, TN)	24	1.2%
46.10 (Knox, TN)	23	1.2%
58.03 (Knox, TN)	23	1.2%
112.01 (Blount, TN)	21	1.1%
37 (Knox, TN)	21	1.1%
57.04 (Knox, TN)	20	1.0%
46.11 (Knox, TN)	18	0.9%
52.02 (Knox, TN)	18	0.9%
62.06 (Knox, TN)	18	0.9%
31 (Knox, TN)	17	0.9%
43 (Knox, TN)	17	0.9%
808.01 (Sevier, TN)	17	0.9%
801.01 (Sevier, TN)	16	0.8%
All Other Locations	1,030	52.1%

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2021
Job Type	All Jobs
Selection Area	53.01 (Knox, TN) from Census Tracts
Selected Census Blocks	122
Analysis Generation Date	09/10/2024 10:26 - OnTheMap 6.24.1
Code Revision	bc639735180b6b7ade65403c2bedfe53b70b1e56
LODES Data Vintage	20231016_1512

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2021).

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

LETTER RESPONSE TO ADDRESS COMMENTS

AJAX ENGINEERING
CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

November 22, 2024

PROJECT NAME: The Ridge at Neals Landing – Unit 3 Subdivision
(11-SD-24-C / 11-F-24-DP)
TO: Knoxville-Knox County Planning
SUBJECT: Response Document for The Ridge at Neals Landing – Unit 3 Subdivision TIS Review Comments

Knoxville-Knox County Planning, City of Knoxville Department of Engineering, Knox County Engineering and Public Works, and Tennessee Department of Transportation Staff:

The following response document addresses the comments in a memorandum from Mike Conger, PE, dated October 21, 2024. This letter is added to the end of the revised report in Appendix I.

1) **A comment is being provided to the site engineer/developer that a secondary access point to a public road may be required based on the total lot count of the overall development with this subdivision's additional lots as shown in the current plan. If a secondary access is added then the analyses for the TIS will need to be updated accordingly.**

   Response: The developer is aware of this potential secondary access point, and they have indicated to the County that they would be agreeable to create one if any future development occurs beyond what is proposed in Unit 3. A general statement regarding this discussion was added on Pages 2 and 52.

2) **The City of Knoxville is concerned that the 60-second cycle recommended by the TIS would generate complaints for queueing on Asheville Hwy along with other extremely short splits for some of the phases. In general a shorter cycle than existing may be supported, but they would prefer greater than 60-seconds and in particular longer splits for phases 1 and 5. Please update this recommendation accordingly.**

   Response: This concern has been reflected in the revised report. The recommended cycle length has been increased to 90 seconds in the 2028 PM peak hour, and the subsequent results were revised on Pages 2, 48-49, and in Tables 8, 9, and 10.

In addition to the revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- Minor grammatical errors were corrected
- Updated worksheets in Appendix E and F due to revision to 2028 PM peak hour recommended signal timing
- Added Appendix I to include this response letter

If you have any questions or further comments, don't hesitate to contact me. We look forward to your approval.

Sincerely,

Ajax Engineering, LLC
Robert W. Jacks, P.E.

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