

Transportation Impact Study The Rowan Knox County, Tennessee



Revised June 2022

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EXECUTIVE SUMMARY

Preface:

Fiser, Inc. is proposing a residential development between N Gallaher View Road and Walker Springs Road in West Knox County, TN. This proposed development is named "The Rowan". The development will include 320 multi-family apartments on 14.3 +/- acres. It is anticipated to be fully built out and occupied by 2026 and proposes an entrance on N Gallaher View Road and one on Walker Springs Road. This study's primary purpose is to determine and evaluate the potential impacts of the development on the adjacent transportation system. The study includes a review of the primary access roads and intersections and is a Level 1 study established by Knoxville/Knox County Planning. Recommendations and mitigation measures are offered if transportation operations are projected to be below recognized engineering standards.

Study Results:

The findings of this study include the following:

- The Rowan development with 320 multi-family apartments is estimated to generate 2,715 trips on an average weekday at full build-out and occupancy. Of these daily trips, 156 are estimated to occur during the AM peak hour and 224 in the PM peak hour in 2026.
- The 2026 projected level of service calculations for the signalized intersection of N Gallaher View Road at Walker Springs Road resulted in low to average vehicle delays during the AM and PM peak hours. Based on the study analyses and review, no specific recommendations are proposed for this intersection.
- The Proposed East and West Entrances on N Gallaher View Road and Walker Springs Road have been calculated in the projected 2026 conditions to operate with low vehicle delays in the AM and PM peak hours. The construction of right-turn lanes on N Gallaher View Road or Walker Springs Road for entering traffic is not warranted in the projected conditions at either entrance. A single exiting lane will be sufficient at both proposed entrances. Left-turns entering the development will be adequately served by the existing two-way left-turn lanes in the center of N Gallaher View Road and Walker Springs Road.



Recommendations:

The following recommendations are offered based on the study analyses. The recommendations are to minimize the impacts of the proposed development on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.

- It is recommended that Stop Signs (R1-1) be installed, and 24" white stop bars be applied to the proposed entrance approaches at N Gallaher View Road and Walker Springs Road. The stop bars should be applied a minimum of 4 feet away from the edge of the intersecting roadway and placed at the desired stopping point that maximizes the sight distance.
- Sight distances at the proposed entrance approaches must not be impacted by future landscaping, signage, or vegetation. Based on a posted speed limit of 40-mph on N Gallaher View Road and Walker Springs Road, the desirable intersection sight distance is 500 feet looking in each direction at each entrance. The required stopping sight distance is 300 feet looking to the north and 305 feet to the south at the Proposed East Entrance. The required stopping sight distance is 310 feet looking to the north and 295 feet to the south at the Proposed West Entrance. A visual inspection determined that the intersection and stopping sight distances are available. The site designer must ensure that these sight distances are accounted for and provided in the design plans.
- A 15-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance driveways off N Gallaher View Road and Walker Springs Road.
- Stop Signs (R1-1) and 24" white stop bars are recommended to be installed on the new internal aisleways and locations, as shown in the report.
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 15-mph in the development, the internal intersection sight distance is 170 feet. The required stopping sight distance is 80 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met.
- With long and straight internal parking lot aisleways, it is recommended that speed humps or tables be considered to reduce internal traffic speeds in the development. Alternatively, parking lot islands could be extended toward the aisleways. Extending the parking lot islands a few feet would narrow the aisleway widths and reduce the available driving surface. A narrower aisleway design would reduce driver comfort and internal vehicle speeds.



- All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- Internal sidewalks are proposed throughout the development. The internal sidewalk system should connect to the existing external sidewalk system provided on N Gallaher View Road and Walker Springs Road. Sidewalks should have appropriate ADA-compliant ramps at intersection corners, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations. White crosswalks should be marked on the road pavement internally where pedestrians are expected to cross.
- To ensure that entering vehicles are not impeded, or backups spill onto Walker Spring Road at the Proposed West Entrance, it is recommended that the first pair of parallel parking spaces off Walker Springs Road be removed from the design. This removal would result in a spacing of 70 feet between Walker Springs Road and the beginning of the parallel parking spaces along the Proposed West Entrance driveway. This design change would result in a total of ten parallel parking spaces at this entrance.
- A request should be submitted to Knoxville Area Transit (KAT) officials if a bus stop is desired at the development. With a KAT route available nearby, a new bus stop closer to the proposed development could be installed if desired, providing more convenient transit access for the development residents and reducing vehicle trips.
- All road grade and intersection elements should be designed to AASHTO, TDOT, Knoxville, and Knox County specifications and guidelines to ensure proper operation.



DESCRIPTION OF EXISTING CONDITIONS

STUDY AREA:

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located between N Gallaher View Road and Walker Springs Road just north of a Walmart Supercenter and a Sam's Club in West Knox County, TN. A small portion of the development property and the public roads on the northeast side are located within the City of Knoxville limits. The development has proposed one entrance on Gallaher View Road on the east side and one on Walker Springs Road on the west side. This development will be located south of the existing signalized t-intersection of N Gallaher View Road at Walker Springs Road. Transportation impacts associated with the proposed development were analyzed at the two proposed entrances and at the signalized intersection of N Gallaher View Road at Walker Springs Road, as Knoxville/Knox County Planning requested.



The proposed development property is in a suburbanized area of West Knox County, TN, and in a transitional area between residential and commercial properties. This development property is bound on the south side by Ten Mile Creek and the Ten Mile Creek Greenway. To the south, the property is located near large pockets of businesses and commercial developments fronting Interstate 40/75. In addition to the Walmart Supercenter and Sam's Club, these businesses and commercial developments include a McDonald's restaurant, a fitness center, a self-storage center, gas stations, and office buildings. The residential developments are to the north, east, and west and include other apartment complexes, standalone single-family residences, and the Crestwood Hills and West Hills Subdivisions. The proposed development site is currently undeveloped and nearly without vegetation except for grass. Grading operations have occurred in the recent past, which included constructing sediment ponds for erosion control and areas for topsoil storage.





Figure 1 Location Map



• EXISTING ROADWAYS:

Table 1 lists the characteristics of the existing primary access roadways adjacent to 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
N Gallaher View Road	Minor Arterial	40 mph	4 undivided with TWLTL	62 feet	Route 90	Sidewalk on west side	No bike lanes
Walker Springs Road	Minor Arterial	40 mph	4 undivided with TWLTL	62 feet	Route 90	Sidewalk on both sides	No bike lanes

¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² Measured from face of curbs near project site

³ According to Knoxville Area Transit System Map

<u>N Gallaher View Road</u> is classified as a Minor Arterial and generally traverses north to south and is crossed by significant roadways along its route, including Middlebrook Pike, Interstate 40/75, and Kingston Pike. S Gallaher View Road begins at a t-intersection with Westland Drive near a railroad crossing and, to the north, transitions to N Gallaher View Road at Kingston Pike. N Gallaher View Road formally ends on its north side at the signalized intersection of Middlebrook Pike at Landmark Drive. Gallaher View Road (N & S) has a total length of 3.5 miles.

Closer to the study area, N Gallaher View Road provides convenient access to Middlebrook Pike to the north for travel to the east and west. Towards the south, N Gallaher View Road provides access to Interstate 40/75 for external destinations, especially travel to the east towards downtown Knoxville, TN. Also to the south, N Gallaher View Road provides access to Kingston Pike, filled with numerous commercial and business developments. The posted speed limit on N Gallaher View Road is 40 mph near the project site.

N Gallaher View Road is a 4-lane undivided roadway with a continuous center two-way left-turn lane (TWLTL) adjacent to the proposed development site. The TWLTL has a width of 12 feet with 11.5-foot wide dual-thru lanes in both directions. Each side of N Gallaher View Road is flanked by curb and gutter, and the east side has utility lights provided for roadway illumination. The west side of N Gallaher View Road has a 6-foot concrete sidewalk along the development property frontage.





The proposed development will tie from the east side onto N Gallaher View Road, approximately 470 feet to the south of Walker Springs Road and 235 feet to the north of Broome Road.

N Gallaher View Road intersects Walker Springs at a signalized t-intersection. This intersection has signal heads on span wires and provides pedestrian pushbuttons with crosswalks. The painted white crosswalks and pedestrian pushbuttons are provided only for the Walker Springs Road approach and the south approach of N Gallaher View Road at the intersection.

<u>Walker Springs Road</u> is classified as a Minor Arterial and traverses in several directions over its entire length. Walker Springs Road was relocated and modified approximately 25 years ago. It originally looped around the Walmart Supercenter and Sam's Club to the east. When the Interstate interchange and surrounding roads were reconstructed, Walker Springs Road was cut into two distinct roads but maintained its name over both sections. Walker Springs Road begins at Fox Lonas Road to the northwest in Crestwood Hills Subdivision and ends at N Gallaher View Road at a t-intersection. Five hundred feet to the south of this unsignalized intersection, Walker Springs Road begins again at N Gallaher View Road at the signalized intersection. Walker Springs Road then continues to the south across Interstate 40/75 and ends at Kingston Pike.

Walker Springs Road is a 4-lane undivided roadway with a TWLTL adjacent to the proposed development site. The TWLTL has a width of 12 feet with 11.5-foot wide dual-thru lanes in both directions. Both sides of Walker Springs Road near the development site are flanked by curb and gutter and 6-foot sidewalks. Near the project site, Walker Springs Road does not provide access to any other developments on the western side. Utility road lights are not provided on Walker Springs Road.

Figure 2 shows the existing lane configurations of the roadways 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.





PHOTO EXHIBITS



Walker Springs Road at N Gallaher View Road







Transportation Impact Study The Rowan







View of Project Site on East Side (Looking West)



EXISTING TRANSPORTATION VOLUMES PER MODE:

One vehicular traffic count location exists near the development site, and this count is conducted by the Knoxville Transportation Planning Organization (TPO) approximately every other year. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:
 The TPO reported an Average Daily Traffic (ADT) on N Gallaher View Road to the north of the intersection of Walker Springs Road at 22,750 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a 0.8% average annual traffic growth rate.
- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic is unknown along N Gallaher View Road and Walker Springs Road. Due to the long walking distances between the adjacent residential properties and the amenities to the south, large amounts of pedestrians and bicyclists are not expected on the roadways or sidewalks. During the traffic counts for this project at the intersection of N Gallaher View Road at Walker Springs Road, two bicyclists and eight pedestrians were observed over 8 hours. Nearly all the pedestrian activity appeared to be exercise-related.

An online website, <u>strava.com</u>, provides "heat" maps detailing exercise routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with lighter colors signifying higher activity. Based on the Strava heat map data, some bicycle traffic occurs in the study area, but higher amounts of pedestrians and joggers have been recorded. Most of the non-vehicle travel in the area is recorded on the nearby greenways located to the south and east of the development site.







• <u>ON-STREET PARKING</u>:

On-street parking was not observed during the site review and is not allowed on N Gallaher View Road and Walker Springs Road adjacent to the project site.

PEDESTRIAN AND BICYCLE FACILITIES:

Bicycle lanes are not available within the project study area, but greenways generously surround the development site. These greenways include the Ten Mile Creek Greenway, Jean Teague Greenway, and Cavet Station Greenway. These greenways are located directly to the south and east of the project site for travel by bicycle and foot.

The Ten Mile Creek Greenway allows for travel to the southwest underneath Interstate 40/75 towards N Peters Road at an AMC movie theatre and Lowe's Home



Improvement Center. Ten Mile Creek Greenway is 1.6 miles long, provides access to Ten Mile Creek Park and Walker Springs Park, and intersects Jean Teague Greenway just to the east of the



project site. This connection is provided via an underpass tunnel adjacent to Ten Mile Creek. A similar underpass tunnel is provided for the Ten Mile Creek Greenway at Walker Springs Road.





The main path of Jean Teague Greenway is 1.9 miles in length (with several loops) and connects to the Ten Mile Creek Greenway and Cavet Station Greenway just to the east of the project site. From this point, the Jean Teague Greenway traverses through West Hills Park over to Vanosdale Road to the east. Cavet Station Greenway begins at the intersection of the other two greenways and travels to the north, where it terminates at Middlebrook Pike. Its total length is just under a mile. All of these greenways are paved and approximately 10 feet in width.

The sidewalk system along N Gallaher View Road and Walker Springs Road allows pedestrians and joggers to travel north up to Middlebrook Pike. The sidewalk system on Middlebrook Pike allows travel to the west to Cedar Bluff Road and the northwest up to Hardin Valley Road near Ball Camp Pike. To the east on Middlebrook Pike, sidewalks allow pedestrian travel to just short of Weisgarber Road. The adjacent existing sidewalks also allow pedestrians to travel to Kingston Pike to the south. Past Kingston Pike, on S Gallaher View Road,





the sidewalks extend southward to Gleason Road. This sidewalk allows for pedestrian travel from the project site to Bearden High School, located on the south side of Kingston Pike.



The Knoxville TPO provided a 2020 update to bicycle and pedestrian crash data for Knox County, Blount County, and other surrounding counties. According to the data, a few incidents occurred near the study area in the past couple of years. One occurred on Walker Springs Road involving a pedestrian on December 19, 2015, resulting in an injury. The details listed that this crash was due to the pedestrian crossing mid-block.

The other incident involved a bicyclist on September 9, 2009, at Broome Road and N

Gallaher View Road. There was one injury, and the reason for the crash indicated a lack of facilities. Other incidents have occurred in the Walmart and Sam's Club parking areas.



The Knoxville TPO also provides data related to "Life-Altering Traffic Crashes". This data lists "the location of 2,326 traffic crashes in the Knoxville region that resulted in a fatality or serious injury between January 2016 and June 2019." Two crashes are shown on this TPO mapping near the proposed development site. One is listed as "Serious" and the other is listed as a "Fatal" crash. The "Serious" crash is listed as DUI-related. An online search revealed that the fatal crash occurred in November 2016 when a vehicle from the Walmart/Sam's Club

parking lot entered another vehicle's path on N Gallaher View Road. The entering vehicle was struck on the driver's side and killed the single occupant.



WALK SCORE:

A private company offers an online website at <u>walkscore.com</u> 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.



Appendix B shows maps and other information for the Walk Score, Bike Score, and Transit Score at the approximate development property address (331 Walker Springs Road). The project site location is graded with a Walk Score of 47. The average walk score in the City of Knoxville is 31. This Walk Score indicates that most errands require a vehicle for travel at the property site due to the travel lengths required to amenity locations. The site is graded with a Bike Score of 43, which means there is minimal bike infrastructure, but it is somewhat bikeable. The site is given a Transit Score of 25, which indicates some public transportation is available nearby.

• <u>TRANSIT SERVICES</u>:

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). Bus service is available in the development area, and the overall KAT bus system map is in Appendix C. The nearby KAT bus stop is on Route 90, "Crosstown Connector". This bus stop is to the northwest of the N Gallaher View Road at Walker Springs Road intersection. This bus stop is only marked with a sign and does not provide a covered or paved area. This route operates on weekdays and weekends, and this route map is also included in Appendix C. 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.





PROJECT DESCRIPTION

LOCATION AND SITE PLAN:

The proposed plan layout with 320 apartments is designed by SGN+A and is shown in Figure 3. As shown in the figure, two new driveways will be constructed for the development, with one to the east at N Gallaher View Road and one to the west at Walker Springs Road. The driveway entrances and internal aisleways will have a width of 26 feet. The Proposed East Entrance on N Gallaher View Road is approximately 235 feet to the northwest of the existing Broome Road unsignalized t-intersection.

The plan shown in Figure 3 shows four buildings containing 320 apartment units. All four buildings will contain apartment units, and the largest building will include a clubhouse constructed for numerous uses for the residents. These uses include a fitness center, business center with a conference room, and mail center. It will also contain the development leasing office. Other on-site amenities will include a dog park, swimming pool, and a pickleball court. The composition of the four buildings is subject to change but is planned to be the following:

Building	<u>1 BR</u>	<u>2 BR</u>	<u>3 BR</u>
1	40	24	-
2	40	24	-
3	72	36	20
4	40	24	-
Totals	192	108	20

A total of 499 parking spaces are shown in the site plan. These will be provided in several internal parking lots and will include the appropriate number of ADA-accessible parking spaces. Concrete sidewalks are proposed internally for this development.

The schedule for completing The Rowan development depends on economic factors and construction timelines. Currently, the area's real estate and housing market is experiencing incredible amounts of activity and growth. This project is contingent on permitting, design, and other regulatory approvals. This study assumed that the total construction build-out of the development and full occupancy would occur within the next four years (2026).







PROPOSED USES AND ZONING REQUIREMENTS:

The Rowan development property is currently zoned as General Business (CA) within Knox County. It is requested to be rezoned to the Planned Residential (PR) zone with up to 23 units per acre. The southern fringe of the development property along Ten Mile Creek is currently zoned as Floodway (F). This zoning designation will remain unchanged. The most recent published online KGIS zoning map is provided in Appendix D. The Planned Residential (PR) zone allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments.

The existing adjacent surrounding zoning and land uses are the following:

- N Gallaher View Road binds the development property to the northeast and east. The properties across N Gallaher View Road are within the City of Knoxville and are zoned as Multi-Family Residential Neighborhood (RN-6). These properties consist of multi-family apartment complexes, including The Meridian located off Broome Road and Bell Walker's Crossing off N Gallaher View Road.
- Only one property is directly located to the north of the development site. It consists of the southern corner of the signalized intersection of N Gallaher View Road at Walker Springs Road. This property is undeveloped and is also zoned General Business (CA). Site signage lists the property as being for sale.
- Two large properties to the south and southeast of the development property are in the City of Knoxville and are occupied by a Walmart Supercenter and a Sam's Club. These properties are zoned as Regional Commercial (C-R-2). These commercial developments have access to Walker Springs Road, N Gallaher View Road, and Walbrook Drive, with nearby access to Interstate 40/75.
- The property to the southwest and across Ten Mile Creek and Greenway is within Knox County and is zoned General Business (CA). This property is undeveloped except for a driveway that provides access to the Walmart Supercenter from Walker Springs Road.
- Walker Springs Road binds the development property to the west. For the most part, the property on the western side of Walker Springs is undeveloped and located in a low-lying drainage area. Across and west of Walker Springs Road, the properties are in Knox County and are zoned as General Business (CA), Low Density Residential (RA), Planned Residential (PR), and Floodway (F). The



properties zoned as Planned Residential (PR) further to the west of the properties adjacent to Walker Springs Road consist of attached townhouses in the Kidder Court townhouse development. These residences only have external road access via Kidder Lane to the north.





DEVELOPMENT DENSITY:

The Rowan development's proposed density is based on a maximum of 320 apartments on 14.3 acres. The density computes to 22.4 dwelling units per acre, less than the requested zoning of 23 units per acre.

• <u>ON-SITE CIRCULATION</u>:

The driveway and parking lot aisleways will be designed and constructed to Knox County, TN specifications. The internal drives and aisleways will be asphalt paved and include 6" concrete curbs. The lane widths will be 13 feet each for a total 26-foot pavement driveway and parking lot aisle width. Concrete sidewalks are being proposed internally along the parking lot aisleways and around the apartment unit buildings. The driveway entrances and aisleways will be private and will be maintained in the future by the development.

• <u>SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION:</u>

Besides residential passenger vehicles, the apartment driveways and aisleways will also provide access to service, delivery, maintenance, and fire protection/rescue vehicles. None of these other



vehicle types will impact roadway operations other than when they occasionally enter and exit the development.

A trash collection area is designed for the apartment residents in the development complex. A concrete pad is shown in front of the trash collection areas to provide a heavy-duty pavement to resist surface damage from trash collection trucks.

The new driveways and parking lot aisleways will be designed and constructed to Knox County specifications and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's internal drive will accommodate the larger vehicle types and residents' standard passenger vehicles.



ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

EXISTING CONDITIONS:

For this study, a traffic count was conducted at the signalized intersection of N Gallaher View Road at Walker Springs Road on Thursday, March 24, 2022. The manual traffic counts tabulated the morning and afternoon peak period volumes and travel directions. Based on the traffic volumes collected, the AM and PM peak hours were observed at 7:30 – 8:30 am and 4:45 – 5:45 pm at the intersection. Local county public schools were in session when the traffic counts were conducted.

The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix E, and some observations are listed below.

- Most of the observed traffic was passenger vehicles, but the traffic stream also included public school buses, KAT buses, and a few tractor-trailers.
- The southbound approach of N Gallaher View Road contained many right-turning vehicles onto Walker Springs Road but does not have a separate turn lane. The AM and PM peak hour volumes had splits of approximately 40%/60% for vehicles turning right versus going thru at this approach. Due to this lack of a turning lane and large volumes, vehicle backups were observed past the intersection of N Gallaher View Road at Walker Springs Road (Northern Section).



• Two bicyclists were observed during the traffic counts. One of the bicyclists crossed the Walker Springs Road approach at the crosswalk and then the N Gallaher View Road approach crosswalk. The other observed bicyclist rode in the actual vehicle stream from Walker Springs Road to the north on N Gallaher View Road. A total of 8 pedestrians and/or joggers were observed crossing the crosswalks on N Gallaher View Road and Walkers Springs Road during the traffic count. Most individuals traveling by foot appeared to be exercise-related.





Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2022 traffic volumes shown in Figure 4 at the signalized intersection of N Gallaher View Road and Walker Springs Road. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and utilizing Synchro Traffic Software (Version 11).

<u>Methodology</u>:

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 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, and this delay would represent 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 having 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 is an attempt to quantify delay that includes 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.

LOS is based upon delay (in seconds) for approaches within the intersection and vehicles' overall operation entering an intersection for signalized intersections. This delay measures driver discomfort, frustration, fuel consumption, and lost travel time and depends on traffic signal cycle lengths, lengths of green phases, and traffic progression quality. 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.

Intersection capacity results from the existing 2022 peak hour traffic are shown in Table 4. 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 F includes the worksheets for the existing 2022 peak hour capacity analyses. Appendix F also contains the signal timing information used in the analysis that the City of Knoxville provided.

As shown in Table 4, all the traffic approaches at the signalized intersection are calculated to operate with good to average LOS and vehicle delays in the existing 2022 conditions.



TABLE 2 LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS



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

Source: Highway Capacity Manual, 6th Edition





TABLE 3LEVEL OF SERVICE AND DELAY FOR SIGNALIZED INTERSECTIONS

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

Source: Highway Capacity Manual, 6th Edition





TABLE 42022 INTERSECTION CAPACITY ANALYSIS RESULTS -EXISTING CONDITIONS

	TRAFFIC	APPROACH/	AM PEAK			PM PEAK		
INTERSECTION	CONTROL	MOVEMENT	LOS ^a	DELAY ^b	v/c °	LOS ^a	DELAY ^b	v/c °
				(seconds)			(seconds)	
N Gallaher View Road at 🚽		Eastbound	С	27.2		С	29.8	
Walker Springs Road	alize 📕	Northbound	А	6.4		А	9.5	
	Signa	Southbound	С	29.7		С	21.8	
		Summary	С	24.7	0.810	В	19.9	0.750

Note: All signalized analyses were calculated in Synchro 11 software and reported with HCM 2000 methodology

^a Level of Service

^b Average Delay (sec/vehicle)

° Volume-to-Capacity Ratio



PROJECTED HORIZON YEAR 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). The build-out and full occupancy for this proposed development is assumed to occur by 2026. This horizon year corresponds to four years for this development to reach full capacity and occupancy.

Vehicular traffic on N Gallaher View Road in the study area has shown lower but stable annual growth over the past ten years (0.8%), according to the semi-annual TPO traffic count station and as shown in Appendix A. A slightly higher annual growth rate of 1.0% was used to calculate future growth on N Gallaher View Road and Walker Springs up



to 2026 to account for potential traffic growth in the study area and provide a conservative analysis. Future higher growth rates on these roadways are not expected since this is in an established area with most nearby developments and subdivisions completely built out.

Capacity analyses were undertaken to determine the projected LOS in 2026 without the project at the intersection, and the results are shown in Table 5. The results shown in Table 5 are similar to the existing 2022 results; however, the southbound approach of N Gallaher View Road drops to LOS D in the AM peak hour projected conditions without the project. Figure 5 shows the projected 2026 horizon year traffic volumes without the project at the intersection during the AM and PM peak hours.

TABLE 52026 INTERSECTION CAPACITY ANALYSIS RESULTS -PROJECTED HORIZON YEAR (WITHOUT THE PROJECT)

	TRAFFIC	APPROACH/	AM PEAK			PM PEAK				
INTERSECTION CONTROL MC		MOVEMENT	LOS ^a	DELAY ^b	v/c °	LOS ^a	DELAY ^b	v/c ^c		
				(seconds)			(seconds)			
N Gallaher View Road at	pa	Eastbound	С	27.1		С	30.1			
Walker Springs Road	alize	lize 📕	lize 📕	Northbound	А	6.6		А	10.0	
	ign 🗧	Southbound	D	40.1		С	23.8			
	X	Summary	С	31.9	0.840	С	21.0	0.780		

Note: All signalized analyses were calculated in Synchro 11 software and reported with HCM 2000 methodology

* Level of Service

^b Average Delay (sec/vehicle)

° Volume-to-Capacity Ratio





• <u>TRIP GENERATION</u>:

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated number of trips that the 320 multi-family apartments will generate was calculated based on Knoxville/Knox County Planning equations. These equations were developed from local studies to estimate apartment (and townhouse) trip generation in the surrounding area and were published in December 1999. For Knox County, these are the preferred trip generation rates to use for apartments and townhouses. The data and calculations for the proposed land use are shown in Appendix G. A summary of this information is presented in the following table:

TABLE 6TRIP GENERATION FOR THE ROWAN320 Multi-Family Apartment Units

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GI PM	ENERATE TRAFFIC PEAK HC	D DUR
2				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip	Multi-Family			22%	78%		55%	45%	
Rate	Apartments	320	2,715	34	122	156	123	101	224
Total New Volume Site Trips		2,715	34	122	156	123	101	224	

Calculated from Local Trip Rates

Trips calculated by using Fitted Curve Equations

For the proposed residential development, with 320 multi-family apartments, it is estimated that 34 vehicles will enter and 122 will exit, for a total of 156 generated trips during the AM peak hour in the year 2026. Similarly, it is estimated that 123 vehicles will enter and 101 will exit, for a total of 224 generated trips during the PM peak hour in the year 2026. The calculated trips generated for an average weekday are estimated to be 2,715 vehicles for the proposed development. No vehicle trip reductions were included in the analysis even though transit and pedestrian facilities are available near the development site.


• <u>TRIP DISTRIBUTION AND ASSIGNMENT</u>:

The projected trip distribution and assignment for The Rowan are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed directions of travel collected at the intersection of N Gallaher View Road at Walker Springs Road adjacent to the proposed development site. The trip distribution was also established from an auxiliary traffic count conducted at a nearby, similar land use. This auxiliary count was conducted for The Meridian



apartments located just to the northeast at Broome Road. This apartment complex only has one entrance, has 217 apartments, and the entrance is located at Broome Road, 285 feet to the northeast of N Gallaher View Road.

The results of this additional count are shown in Figure 6a. This traffic count was conducted for the same AM and PM peak hours observed at the signalized intersection of N Gallaher View Road at Walker Springs Road. The counts shown in Figure 6a are a tabulation of all The Meridian residents entering and exiting to and from Broome Road, N Gallaher View Road, and Walker Springs Road. Overall, it was determined that the residents in the nearby The Meridian apartments traveled in roughly the following percentages in the AM and PM peak hours:

- To and from Broome Road, 10%
- To and from the southern side of N Gallaher View Road, 40%
- To and from Walker Springs Road, 25%
- To and from the northern side of N Gallaher View Road, 25%

The exact percentages of this extra count are shown in Figure 6b. The travel to and from Broome Road is assumed to be an alternative route that The Meridian residents use to access Middlebrook Pike and Kingston Pike (including West Town Mall) to the east through West Hills Subdivision.









The second source for projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for generated trips by the development, and these trips are more likely to travel to and from the west, northwest, and east. This assertion is based on data from the United States Bureau website for Census Tract 46.10, where the development property is located. Based on 2019 (latest available) census data and as shown in Appendix H, most work-based trips in the surrounding area correspond to Oak Ridge, Oak Ridge National Labs (ORNL), downtown Knoxville (including the University of Tennessee), and other areas of West Knoxville. Smaller amounts are shown traveling to the south towards Maryville and Alcoa.

In addition to employment centers, some generated traffic will travel to and from various public and private schools. These public and other private schools in the area will be another impetus for external trip-making.

This development site is currently zoned for Cedar Bluff Elementary, Cedar Bluff Middle, and Bearden High School. Cedar Bluff Elementary and Middle School are located by roadway

approximately 3 miles away to the west of the development site. Bearden High School is located directly to the south off Kingston Pike and less than a mile away from the development site via N Gallaher View Road.

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 1.5 miles for grades 6 – 12 and 1.0 miles for grades K – 5



Development Property



from the point where the students' parcel is accessed to the point where the buses unload at the school. This development will be outside the PRZ for the Cedar Bluff Elementary and Middle Schools. All school-age children attending public schools from K - 8th grades in the development will be able to utilize this service if desired. However, students attending Bearden High School will be required to provide their own transportation since the development will be within the PRZ of 1.5 miles.

the distribution assumptions Finally, also included reasonable expectations of future travel based on the location of the proposed entrances. example, for residents entering For the development from the north side of N Gallaher View Road, it was assumed that the most direct path would be for the residents to go thru the signalized intersection of N Gallaher View Road at Walker Springs Road and turn right into the development at the Proposed East Entrance. Alternatively, the other vehicle path from this



direction would include turning right at the signalized intersection and then turning left at the Proposed West Entrance on Walker Springs Road. The alternative path is estimated to produce longer vehicle travel times with more vehicle conflicts. This is especially true since the southbound approach on N Gallaher View Road at the traffic signal does not have a separate right-turn lane. Thus, a greater weight (%) was assigned to the southbound right-turn movement at the Proposed East Entrance on N Gallaher View Road versus a southbound left-turn at the Proposed West Entrance on Walker Springs Road. The same logic was applied for the opposite exiting movements.

Figure 6c shows the projected distribution of traffic entering and exiting the proposed development at the respective East and West Proposed Entrances. The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the local trip rates.

Overall, the study analysis for The Rowan assumed a 5% split to/from Broome Road, 25% to/from the north side of N Gallaher View Road, 45% to/from the south side of N Gallaher View Road, and 25% to/from the south side of Walker Springs Road. The attraction to and from the south to Interstate 40/75, Kingston Pike, and the nearby shopping centers are assumed to be greater than



the attraction to and from the north.

Figure 7 shows the traffic assignment of the computed trips generated by the development (Table 6) based on the assumed distribution of trips shown in Figure 6c.







PROJECTED HORIZON YEAR CONDITIONS (WITH THE PROJECT):

Overall, several additive steps were taken to estimate the <u>total</u> projected horizon year traffic volumes at the studied intersections when The Rowan development is entirely constructed and occupied by 2026. The steps are illustrated below for clarity and review:



The calculated peak hour traffic (Table 6) generated by The Rowan development was added to the 2026 horizon year traffic (Figure 5) by following the predicted trip distributions and assignments (Figures 6c and 7). This procedure was completed to obtain the <u>total</u> projected traffic volumes when the proposed development is fully built out and occupied in 2026. Figure 8 shows the projected 2026 AM and PM peak hour volumes with the generated development traffic at the studied intersections.





Capacity analyses were conducted to determine the projected LOS at the studied intersections with the development traffic in 2026. Appendix F includes the worksheets for these capacity analyses. The additional traffic generated from the proposed development in 2026 only slightly increased the calculated vehicle delays at the signalized intersection of N Gallaher View Road at Walker Springs Road. The analysis used the existing signal timing. The capacity analyses for the proposed unsignalized intersections at the Proposed East and West Entrances resulted in good LOS with low vehicle delays. The projected 2026 peak hour capacity results for the intersections with the project can be seen in Table 7.

A summary of the N Gallaher View Road and Walker Springs Road intersection analysis results is presented in Table 8. This table provides a side-by-side summary and comparison of the intersection for the following: 2022 existing conditions, projected conditions in the year 2026 without the project, and the projected conditions in the year 2026 with the project.

TABLE 72026 INTERSECTION CAPACITY ANALYSIS RESULTS -PROJECTED HORIZON YEAR (WITH THE PROJECT)

	TRAFFIC	APPROACH/		AM PEAK		PM PEAK			
INTERSECTION CONTROL		MOVEMENT	LOS ^a	DELAY ^b	v/c °	LOS ^a	DELAY ^b	v/c °	
				(seconds)			(seconds)		
N Gallaher View Road at	pa	Eastbound	С	27.0		С	30.5		
Walker Springs Road	lize 📕	Northbound	А	6.7		В	10.2		
	ign	Southbound	D	44.2		С	25.2		
	Ś	Summary	С	34.5	0.850	С	21.8	0.800	
I Gallaher View Road at		Eastbound Left/Right	С	15.9	0.197	В	14.3	0.149	
Proposed East Entrance	STOP TE	Northbound Left	В	10.8	0.029	В	10.2	0.090	
	Unsig								
Walker Springs Road at	zed	Westbound Left/Right	В	12.1	0.097	С	15.2	0.112	
Proposed West Entrance	STOP	Southbound Left	А	7.9	0.003	А	9.3	0.016	
	Unsig								

Note: All signalized intersection analyses were calculated in Synchro 11 software and reported with HCM 2000 methodology. Unsignalized intersections are reported with HCM 2010 methodology.

^a Level of Service

^b Average Delay (sec/vehicle)

^c Volume-to-Capacity Ratio



TABLE 8 INTERSECTION CAPACITY ANALYSIS SUMMARY N GALLAHER VIEW ROAD AT WALKER SPRINGS ROAD

LOCATION / PEAK	2022 EXISTING			2026 WII	HOUT THE	PROJECT	2026 WITH THE PROJECT		
HOUR MOVEMENT	LOS*	Delay	v/c ^c	LOS*	Delay ^h	v/c ^c	LOS*	Delay ^b	v/c ^c
N Gallaher View Road at Wall	ker Springs I	Road							
Fasthound	L c	27.2		6	27.1	_	c	27.0	
Northbound	A	61		A	66		A	67	
Southbound		29.7		n	40.1			44.2	
Soundound	C	29.7		D	40.1		D	44.2	
Summary	C	24.7	0.810	C	31.9	0.840	C	34.5	0.850
PM Peak									
Eastbound	C	29.8		С	30.1		С	30.5	
Northbound	A	9.5		A	10.0		В	10.2	
Southbound	C	21.8		С	23.8		С	25.2	
Summary	В	19.9	0.750	С	21.0	0.780	С	21.8	0.800
				-					

Note: All analyses were calculated in Synchro 11 software and reported with HCM 2000 methodology for signalized intersections * Level of Service

^b Average Delay (sec/vehicle)

* Volume-to-Capacity Ratio







POTENTIAL TRANSPORTATION SAFETY ISSUES:

The study area was investigated for potential existing and future safety issues when the development is completed. A couple of features of the adjacent transportation system are discussed in the following pages.

EVALUATION OF SIGHT DISTANCE

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

<u>Methodology</u>:

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

ISD is considered the <u>desirable</u> visibility distance standard for evaluating the safety of an intersection. ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver. Three traffic maneuvers are available for



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



With a posted speed limit of 40-mph on N Gallaher View Road and Walker Springs Road, the ISD is 500 feet calculated based on AASHTO's (American Association of State Highway Transportation Officials) guidance. (Alternatively, with a posted speed limit of 40-mph, the ISD would be 400 feet based on Knox County's rule of 10 feet of sight distance per 1-mph of the posted speed.)

N Gallaher View Road has a 0.6% road grade downhill to the north at the Proposed East Entrance location. Based on the posted speed limit of 40-mph on N Gallaher View Road and the existing road grade, the SSD is calculated to be 300 feet looking to the north and 305 feet to the south.

Walker Springs Road has a 1.3% road grade downhill to the south at the Proposed West Entrance location. Based on the posted speed limit of 40-mph on Walker Springs Road and the existing road grade, the SSD is calculated to be 310 feet looking to the north and 295 feet to the south.

Visual observations of the sight distances at the proposed entrance locations on N Gallaher View Road and Walker Springs Road were undertaken. Using a Nikon Laser Rangefinder at the Proposed East Entrance location, the ISD was visually estimated to be 999+ feet (limit of the rangefinder) to the south and 700 feet to the north. The intersection sight and stopping sight distances from the Proposed East Entrance will be adequate based on visual observation.

At the Proposed West Entrance location, the ISD was visually estimated to be 999+ feet (limit of the rangefinder) to the south and 550 feet to the north. The intersection sight and stopping sight distances from the Proposed West Entrance will be adequate based on visual observation.

Images of the existing sight distances at the Proposed Entrance locations are presented in the following, labeled with the ISD and SSD and the rangefinder measured sight distances.









EVALUATION OF TURN LANE THRESHOLDS

An evaluation of the need for separate entering turn lanes into the development in the projected 2026 conditions was conducted for the proposed entrances on N Gallaher View Road and Walker Springs Road. The evaluation did not include left-turn movements since an existing TWLTL is already provided in the center of both existing roadways.

The criteria used for this turn lane evaluation were based on Knox County's "Access Control and Driveway Design Policy". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. This Knox County policy follows TDOT and nationally accepted guidelines for unsignalized intersections.

With a posted speed limit of 40-mph on N Gallaher View Road and Walker Springs Road, separate right-turn entering lanes are not warranted at the proposed entrances based on the projected 2026 AM and PM peak hour traffic volumes. The worksheets for these evaluations are provided in Appendix I.



CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of the proposed The Rowan development on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.

- N Gallaher View Road at Walker Springs Road: The 2026 projected level of service calculations for the signalized intersection of N Gallaher View Road at Walker Springs Road resulted in low to average vehicle delays during the AM and PM peak hours using the existing signal timing. Based on the study analyses and review, no specific recommendations are proposed for this intersection.
- N Gallaher View Road and Walker Springs Road at Proposed East Entrance and West Entrance: The results of the 2026 projected level of service calculations for the Proposed East and West Entrances intersections at N Gallaher View Road at Walker Springs Road were determined to be relatively low with respect to vehicle delays. The construction of right-turn lanes for entering traffic is not warranted at either entrance. A single exiting lane will be sufficient at both proposed entrances. Entering left-turns into the development will be adequately served by the existing two-way left-turn lanes in the center of N Gallaher View Road and Walker Springs Road.
 - 2a) It is recommended that Stop Signs (R1-1) be installed, and 24" white stop bars be applied to the proposed entrance approaches at N Gallaher View Road and Walker Springs Road. The stop bars should be applied a minimum of 4 feet away from the edge of the intersecting roadway and placed at the desired stopping point that maximizes the sight distance.
 - 2b) Sight distances at the proposed entrance approaches must not be impacted by future landscaping, signage, or vegetation. Based on a posted speed limit of 40-mph on N Gallaher View Road and Walker Springs Road, the desirable ISD is 500 feet looking in each direction at each entrance. The required SSD is calculated to be 300 feet looking to the north and 305 feet to the south at the Proposed East Entrance. The required SSD is calculated to be 310 feet looking to the north and 295 feet to the south at the Proposed West Entrance. A visual inspection determined that the intersection and stopping sight distances are available. The site designer must ensure that these sight distances are accounted for and provided in the design plans.



2c) The City of Knoxville requires specific corner clearance distances between intersecting streets. The intersection of N Gallaher View Road at the Proposed East Entrance will be within the City's boundary. The Proposed East Entrance will be a private driveway and located 235 feet away from Broome Road. This distance is greater than the required City of Knoxville spacing requirement of 150 feet.

Furthermore, based on the calculations provided from the Synchro software, the projected 2026 AM and PM peak hour volumes turning left from N Gallaher View Road in the TWLTL at the Proposed East Entrance will have limited vehicle queues and should not interfere with the traffic operations to the southeast at the intersection of N Gallaher View Road at Broome Road. As shown in the reports produced from the Synchro software, the maximum 95th percentile queue length for this left-turn movement in the TWLTL occurs in the PM peak hour and is calculated to be 7.5 feet.





- 3a) A 15-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance driveways off N Gallaher View Road and Walker Springs Road. Since the entrance driveways will not be public roads, a posted speed limit of less than 25-mph is acceptable.
- 3b) Stop Signs (R1-1) with 24" white stop bars and other traffic signage are recommended to be installed at the internal locations, as shown below:



- 3c) Sight distance at the new internal intersections must not be impacted by signage, parked cars, or future landscaping. With a speed limit of 15-mph in the development, the internal intersection sight distance is 170 feet. The required stopping sight distance is 80 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met.
- 3d) With long and straight internal parking lot aisleways, it is recommended that speed humps or tables be considered to reduce internal traffic speeds in the development. Alternatively, parking lot islands could be extended toward the aisleways. Extending the parking lot islands a few feet would narrow the aisleway widths and reduce the available driving surface. A narrower aisleway design would reduce driver comfort and internal vehicle speeds.

It is not expected that the construction of the development will lead to cut-thru traffic between N Gallaher View Road and Walker Springs Road. It is expected that the existing roadways will provide greater access control with fewer potential impediments and will dissuade outside motorists to cut-thru The Rowan development. The travel route required to and from N Gallaher View Road and Walker Springs Road via The Rowan internal aisleways will require longer travel times due to the lack of access control, including residents backing out of their parking spots and pedestrian activity. Other cut-thru traffic impediments include the recommended internal Stop Signs (R1-1) and potential speed humps or tables.

- 3e) All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- 3f) Internal sidewalks are proposed throughout the development. The internal sidewalk system should connect to the existing external sidewalk system provided on N Gallaher View Road and Walker Springs Road. Sidewalks should have appropriate ADA-compliant ramps at intersection corners, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations. White crosswalks should be marked on the road pavement internally where pedestrians are expected to cross.
- 3g) As shown in Figure 3, twelve parallel parking spaces are proposed adjacent to the Proposed West Entrance, with six on each side of the entrance driveway. The site design



at the Proposed West Entrance also shows approximately 50 feet between the beginning of the parallel parking spaces and Walker Springs Road. The Synchro software capacity calculations in the projected 2026 conditions included 95th percentile vehicle queue length results. The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. At the Proposed West Entrance, the 95th percentile queue length in the 2026 projected conditions was calculated to be 0.3 vehicles in the AM peak hour and 0.4 vehicles in the PM peak hour for exiting vehicles. These values are shown in the capacity calculation worksheets in Appendix F. Assuming a standard passenger vehicle length of 25 feet, this would correspond to queue lengths of 7.5 feet in the AM peak hour and 10 feet in the PM peak hour. These lengths indicate that the site design showing approximately 50 feet of separation would be sufficient.

However, to provide a factor of safety to ensure that entering vehicles are not impeded, or backups spill onto Walker Spring Road at the Proposed West Entrance, it is recommended that the first pair of parallel parking spaces off Walker Springs Road be removed from the site design. This removal would result in a spacing of 70 feet between Walker Springs Road and the beginning of the parallel parking spaces along the Proposed West Entrance driveway. This change would result in a total of ten parallel parking spaces at the driveway entrance. It should be recognized that providing this extra spacing would be beneficial due to the greater complexity of parallel parking maneuvers and the associated additional time to park and would allow for at least two passenger vehicles to queue between the parallel parking spaces and Walker Springs Road.

3h) Transit availability is near the development site. The closest bus stop is approximately ¼ mile to the northwest near the N Gallaher View Road at Walker Springs Road intersection. It is unknown if the developer of The Rowan is interested in potentially utilizing this existing transit system for future residents of the complex. According to discussions with KAT, if desired, a new bus stop could be feasible on the west side of the development along Walker





Springs Road, where the KAT route, "Crosstown Connector", currently exists. A new bus stop at this location would carry passengers toward Middlebrook Pike and further destinations to the east on the route.

With a KAT route available nearby, a new bus stop closer to the proposed development could be installed, which would provide more convenient transit access for the residents in the development and reduce vehicle trips. If a bus stop is desired at the development, a request should be submitted to KAT officials.

3i) All road grade and intersection elements should be designed to AASHTO, TDOT, Knoxville, and Knox County specifications and guidelines to ensure proper operation.



APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

Organization: TPO

Station ID #: 093C533

Location: North Gallaher View Road, north of Walker Springs Road









APPENDIX B

WALK SCORE

WALKSCORE

(from walkscore.com)



Scores for 331 Walker Springs Road

×







Walk S	core	Transit Score	Bike Score							
Transit Scor based on th	e measures l e distance ar	now well a location is ser nd type of nearby transit	ved by public transi lines.							
<mark>90-1</mark> 00	Rider's Para	Rider's Paradise								
70-89	Excellent Transit									
50-69	Transit is cor Good Trans	:onvenient for most trips nsit								
	Many nearb	y public transportation opti	ons							
25-49	Some Transit A few nearby public transportation options									
0-24	Minimal Transit									
	lt is possible	to get on a bus								

Some Transit

Add to your site

331 Walker Springs Road has some transit which means a few nearby public transportation options.



Bus lines:

90 90 Crosstown Connector 0.2 mi 16 Cedar Bluff Connector 1... 0.3 mi

Scores for 331 Walker Springs Road



Travel Time Map

Add to your site

Explore how far you can travel by car, bus, bike and foot from 331 Walker Springs Road.





APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION



FARE INFORMATION

With a base fare of \$1.50, KAT offers a variety of passes. Please note that only the fares marked with an asterisk can be purchased when boarding the bus. Others are available at KAT's Customer Service Counter at Knoxville Station (301 Church Ave.) or by mail via katbus.com.

FARE TYPE	REGULAR FARE	REDUCED FARE	
One-Ride Pass*	\$1.50	\$0.75	
1 Day Pass*	\$4.00	\$2.00	5
7 Day Pass	\$15.00	\$7.50	
30 Day Pass	\$50.00	\$25.00	
20 Ride Pass	\$25.00	\$12.50	-
Transfer*	\$0.50	\$0.25	
	the second se		

REDUCED FARE INFORMATION

A reduced fare is available to those who qualify. Qualifying individuals include seniors age 65 or over, Medicare card holders, students under the age of 18, and persons with disabilities. Proper identification (Medicare card or a valid KAT I.D. card) is required before boarding. For more information on how to obtain a discounted-fare I.D. visit katbus.com/fares or call 637-3000.

BUS STOPS ONLY!

KAT buses stop ONLY at locations designated by bus stop signs. Generally, bus stops are located at least every ¼ mile along the route.

Ride for change

KAT HOLIDAYS

KAT buses do not run on the following holidays:

- Thanksgiving • New Year's Day
- Independence Day
- Christmas

Please note that KAT's Knoxville Station Customer Service counter is also closed during those days.

- KAT buses run on a Saturday schedule on the following holidays:
- Martin Luther King, Jr. Day
 Day after Thanksgiving Memorial Day
 - Christmas Eve
- Labor Day
- KAT's administrative offices are closed on all holidays listed above.





CROSSTOWN CONNECTOR (Weekdays and Saturdays)

SERVES:

- 640 Plaza
- Fountain City Branch Library
- Knoxville Center Mall
- Knox Road/Kroger

Northgate Shopping Center Northgate Terrace Norwood Branch Library Walmart



Information Updated: February 1, 2021

	Going toward wai Mart West					Going toward Knoxville Center Mall									
	Transfer	to:	Rts. 22 & 24	Rt. 20	Rt. 12			Rts. 11 & 16			Rt. 12	Rt. 20	Rts. 22 & 24		Rt. 23 & 33
	Knoxville Center Mall	Northgate Terrace	Fountain City Superstop	Merchants at Marguerite	Industrial Parkway	I-640 Plaza	Middlebrook at Francis	Walbrook	Middlebrook at Piney Grove	l-640 Plaza	Industrial Parkway	Merchants at Marguerite	Fountain City Superstop	Northgate Terrace	Knoxville Center Mall
		2	3	4	5	6	7	8	9	10	11	12	13	14	15
	WEEKDAY SCHEDULE														
A.M.								5:55	6:05	6:13	6:25	6:35	7:05	7:11	7:25
			6:05	6:15	6:25	6:34	6:42	6:55	7:05	7:13	7:25	7:35	8:05	8:11	8:25
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:05	8:13	8:25	8:35	9:05	9:11	9:25
	7:30	7:45	8:05	8:15	8:25	8:34	8:42	8:55	9:05	9:13	9:25	9:35	10:05	10:11	10:25
	8:30	8:45	9:05	9:15	9:25	9:34	9:42	9:55	10:05	10:13	10:25	10:35	11:05	11:11	11:25
	9:30	9:45	10:05	10:15	10:25	10:34	10:42	10:55	11:05	11:13	11:25	11:35	12:05	12:11	12:25
	10:30	10:45	11:05	11:15	11:25	11:34	11:42	11:55	12:05	12:13	12:25	12:35	1:05	1:11	1:25
	11:30	11:45	12:05	12:15	12:25	12:34	12:42	12:55	1:05	1:13	1:25	1:35	2:05	2:11	2:25
P.M.	12:30	12:45	1:05	1:15	1:25	1:34	1:42	1:55	2:05	2:13	2:25	2:35	3:05	3:11	3:25
	1:30	1:45	2:05	2:15	2:25	2:34	2:42	2:55	3:05	3:13	3:25	3:35	4:05	4:11	4:25
	2:30	2:45	3:05	3:15	3:25	3:34	3:42	3:55	4:05	4:13	4:25	4:35	5:05	5:11	5:25
	3:30	3:45	4:05	4:15	4:25	4:34	4:42	4:55	5:05	5:13	5:25	5:35	6:05	6:11	6:25
	4:30	4:45	5:05	5:15	5:25	5:34	5:42	5:55	6:05	6:13	6:25	6:35	7:05	7:11	7:25
	5:30	5:45	6:05	6:15	6:25	6:34	6:42	6:55	7:05	7:13	7:25	7:35	8:15	8:21	8:35
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:05	8:13					
	7:30	7:45	8:05	8:15	8:25	8:34	8:42		To Garage						
	1	0	i.	1		SATUF	RDAY S	CHED	ULE						
A.M.								6:55	7:05	7:13	7:25	7:35	8:05	8:11	8:25
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:05	8:13	8:25	8:35	9:05	9:11	9:25
	7:30	7:45	8:05	8:15	8:25	8:34	8:42	8:55	9:05	9:13	9:25	9:35	10:05	10:11	10:25
	8.30	8:45	9:05	9:15	9:25	9:34	9:42	9:55	10:05	10:13	10:25	10:35	11:05	11:11	11:25
	9:30	9:45	10:05	10:15	10:25	10:34	10:42	10:55	11:05	11:13	11:25	11:35	12:05	12:11	12:25
	10:30	10:45	11:05	11:15	11:25	11:34	11:42	11:55	12:05	12:13	12:25	12:35	1:05	1:11	1:25
	11:30	11:45	12:05	12:15	12:25	12:34	12:42	12:55	1:05	1:13	1:25	1:35	2:05	2:11	2:25
P.M.	12:30	12:45	1:05	1:15	1:25	1:34	1:42	1:55	2:05	2:13	2:25	2:35	3:05	3:11	3:25
	1:30	1:45	2:05	2:15	2:25	2:34	2:42	2:55	3:05	3:13	3:25	3:35	4:05	4:11	4:25
	2:30	2:45	3:05	3:15	3:25	3:34	3:42	3:55	4:05	4:13	4:25	4:35	5:05	5:11	5:25
	3:30	3:45	4:05	4:15	4:25	4:34	4:42	4:55	5:05	5:13	5:25	5:35	6:05	6:11	6:25
	4:30	4:45	5:05	5:15	5:25	5:34	5:42	5:55	6:05	6:13	6:25	6:35	7:05	7:11	7:25
	5:30	5:45	6:05	6:15	6:25	6:34	6:42	6:55	7:05	7:13	7:25	7:35	8:05	8:11	8:25
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:05	8:13	8:25	8:35	9:05	9:11	9:25
	7:30	7:45	8:05	8:15	8:25	8:34	8:42	8:55	9:05	9:13	To Garage				

Need help reading this schedule?

Need other general information on how to ride? Visit www.katbus.com or call 865-637-3000

APPENDIX D

ZONING MAP


APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: N Gallaher View Road (NB and SB) Minor Street: Walker Springs Road (EB) Traffic Control: Traffic Signal 3/24/2022 (Thursday) Mostly Sunny/Mild Conducted by: Ajax Engineering

	N Gallaher	View Road	N Gallaher	View Road	Walker Springs Road			
TIME	SOUTH	BOUND	NORTH	BOUND	EASTB	OUND	VEHICLE	PEAK
BEGIN	THRU	RT	LT	THRU	LT	RT	TOTAL	HOUR
7:00 AM	112	114	18	44	38	2	328	
7:15 AM	164	147	9	68	32	8	428	
7:30 AM	199	189	28	68	47	8	539	7:30 AM - 8:30 AM
7:45 AM	259	178	18	79	56	14	604	
8:00 AM	233	157	9	104	59	10	572	
8:15 AM	215	141	28	88	59	7	538	
8:30 AM	169	142	20	63	57	7	458	
8:45 AM	156	137	12	67	52	6	430	
TOTAL	1507	1205	142	581	400	62	3897	
11:00 AM	105	80	9	83	64	9	350	
11:15 AM	117	63	7	72	62	8	329	
11:30 AM	117	70	11	84	51	10	343	
11:45 AM	109	94	7	74	72	9	365	
12:00 PM	103	84	13	113	84	10	407	12:00 PM - 1:00 PM
12:15 PM	134	65	5	93	77	13	387	
12:30 PM	127	94	9	111	75	11	427	
12:45 PM	113	103	7	114	89	17	443	
TOTAL	925	653	68	744	574	87	3051	
2:00 PM	112	80	15	115	88	15	425	
2:15 PM	130	82	14	124	88	9	447	
2:30 PM	128	103	11	137	104	16	499	
2:45 PM	119	75	9	121	87	10	421	
3:00 PM	130	89	15	127	94	16	471	
3:15 PM	126	94	13	148	117	17	515	
3:30 PM	127	86	8	165	89	12	487	
3:45 PM	178	96	20	183	109	12	598	
4:00 PM	142	107	8	136	125	14	532	
4:15 PM	150	108	10	187	101	17	573	
4:30 PM	157	106	19	169	112	15	578	
4:45 PM	161	133	15	175	124	13	621	4:45 PM - 5:45 PM
5:00 PM	163	115	21	177	122	15	613	
5:15 PM	189	113	18	214	160	16	710	
5:30 PM	182	116	26	202	169	19	714	
5:45 PM	158	104	27	182	117	22	610	
TOTAL	2352	1607	249	2562	1806	238	8814	

2022 AM Peak Hour

7:30 AM - 8:30 AM

	N Gallaher	View Road	N Gallaher	View Road	Walker Springs Road		
TIME	SOUTH	BOUND	NORTH	BOUND	EASTBOUND		
BEGIN	THRU	RT	LT	THRU	LT	RT	
7:30 AM	199	189	28	68	47	8	
7:45 AM	259	178	18	79	56	14	
8:00 AM	233	157	9	104	59	10	
8:15 AM	215	141	28	88	59	7	
TOTAL	906	665	83	339	221	39	
PHF	0.87	0.88	0.74	0.81	0.94	0.70	

2022 PM Peak Hour

4:45 PM - 5:45 PM

	N Gallaher	View Road	N Gallaher	View Road	Walker Springs Road		
TIME	SOUTH	BOUND	NORTH	BOUND	EASTBOUND		
BEGIN	THRU	RT	LT	THRU	LT	RT	
4:45 PM	161	133	15	175	124	13	
5:00 PM	163	115	21	177	122	15	
5:15 PM	189	113	18	214	160	16	
5:30 PM	182	116	26	202	169	19	
TOTAL	695	477	80	768	575	63	
PHF	0.92	0.90	0.77	0.90	0.85	0.83	



APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

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Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ሻሻ	1	5	**	≜t ⊾			
Traffic Volume (vph)	221	39	83	339	906	665		
Future Volume (vph)	221	39	83	339	906	665		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95			
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			
Frt	1.00	0.85	1.00	1.00	0.94			
Flt Protected	0.95	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3502	1589	1805	3539	3343			
Flt Permitted	0.95	1.00	0.10	1.00	1.00			
Satd. Flow (perm)	3502	1589	185	3539	3343			
Peak-hour factor, PHF	0.94	0.70	0.74	0.81	0.87	0.88		
Adj. Flow (vph)	235	56	112	419	1041	756		
RTOR Reduction (vph)	0	48	0	0	111	0		
Lane Group Flow (vph)	235	8	112	419	1686	0		
Confl. Peds. (#/hr)	2	2	2					
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%		
Turn Type	Prot	Perm	pm+pt	NA	NA			
Protected Phases	4		1	6	2			
Permitted Phases		4	6	2				
Actuated Green, G (s)	9.9	9.9	46.7	46.7	36.0			
Effective Green, g (s)	9.9	9.9	46.7	46.7	36.0			
Actuated g/C Ratio	0.14	0.14	0.68	0.68	0.52			
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	505	229	260	2409	1754			
v/s Ratio Prot	c0.07		c0.04	0.12	c0.50			
v/s Ratio Perm		0.01	0.26					
v/c Ratio	0.47	0.04	0.43	0.17	0.96			
Uniform Delay, d1	26.9	25.2	13.6	4.0	15.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.7	0.1	1.1	0.2	14.1			
Delay (S)	27.6	25.3	14.7	4.1	29.7			
Level of Service		C	В	A	C 20 7			
Approach Delay (S)	21.2			6.4	29.7			
Approach LUS	C			A	C			
Intersection Summary								
HCM 2000 Control Delay			24.7	Н	CM 2000	Level of Service		С
HCM 2000 Volume to Capaci	ity ratio		0.81					
Actuated Cycle Length (s)			68.6	Si	um of lost	time (s)	17	.0
Intersection Capacity Utilizati	on		71.4%	IC	CU Level c	of Service		С
Analysis Period (min)			15					

c Critical Lane Group

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Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ሻሻ	1	5	^	≜t ≽			
Traffic Volume (vph)	575	63	80	768	695	477		
Future Volume (vph)	575	63	80	768	695	477		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95			
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			
Frt	1.00	0.85	1.00	1.00	0.94			
Flt Protected	0.95	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3502	1615	1805	3539	3347			
Flt Permitted	0.95	1.00	0.10	1.00	1.00			
Satd. Flow (perm)	3502	1615	192	3539	3347			
Peak-hour factor, PHF	0.85	0.83	0.77	0.90	0.92	0.90		
Adj. Flow (vph)	676	76	104	853	755	530		
RTOR Reduction (vph)	0	57	0	0	124	0		
Lane Group Flow (vph)	676	19	104	853	1161	0		
Confl. Peds. (#/hr)	2		2			• • •		
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%		
Turn Type	Prot	Perm	pm+pt	NA	NA			
Protected Phases	4		1	6	2			
Permitted Phases		4	6	2				
Actuated Green, G (s)	19.4	19.4	45.6	45.6	34.6			
Effective Green, g (s)	19.4	19.4	45.6	45.6	34.6			
Actuated g/C Ratio	0.25	0.25	0.59	0.59	0.45			
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	882	406	239	2095	1503			
v/s Ratio Prot	c0.19	0.01	0.03	c0.24	c0.35			
v/s Ratio Perm	0 77	0.01	0.22	0.44	0 77			
v/c Ratio	0.77	0.05	0.44	0.41	0.//			
Uniform Delay, d I	26.7	21.8	11./	8.4	17.9			
Progression Factor	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	4.0	0.0	1.3	0.6	3.9			
Delay (S)	30.7	21.9	13.0	9.0	21.8			
Level of Service		C	В	A				
Approach Delay (S)	29.8			9.5	21.8			
Approach LOS	L			A	L			
Intersection Summary								
HCM 2000 Control Delay			19.9	H	CM 2000	Level of Service	:	
HCM 2000 Volume to Capaci	ity ratio		0.75					
Actuated Cycle Length (s)			77.0	Si	um of lost	time (s)		
Intersection Capacity Utilizati	on		69.5%	IC	CU Level o	of Service		
Analysis Period (min)			15					

c Critical Lane Group

PROJECTED HORIZON YEAR (WITHOUT THE PROJECT)

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ሻሻ	1	5	**	≜t ≽		
Traffic Volume (vph)	230	41	86	353	942	692	
Future Volume (vph)	230	41	86	353	942	692	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0		
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95		
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.85	1.00	1.00	0.94		
Flt Protected	0.95	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	3502	1589	1805	3539	3344		
Flt Permitted	0.95	1.00	0.10	1.00	1.00		
Satd. Flow (perm)	3502	1589	186	3539	3344		
Peak-hour factor, PHF	0.94	0.70	0.74	0.81	0.87	0.88	
Adj. Flow (vph)	245	59	116	436	1083	786	
RTOR Reduction (vph)	0	50	0	0	112	0	
Lane Group Flow (vph)	245	9	116	436	1757	0	
Confl. Peds. (#/hr)	2	2	2				
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%	_
Turn Type	Prot	Perm	pm+pt	NA	NA		
Protected Phases	4		1	6	2		
Permitted Phases		4	6	2			
Actuated Green, G (s)	10.1	10.1	46.6	46.6	35.8		
Effective Green, g (s)	10.1	10.1	46.6	46.6	35.8		
Actuated g/C Ratio	0.15	0.15	0.68	0.68	0.52		
Clearance Lime (s)	6.0	6.0	5.0	6.0	6.0		
Venicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	514	233	262	2400	1742		
v/s Ratio Prot	c0.07		c0.04	0.12	c0.53		
v/s Ratio Perm	0.10	0.01	0.26	0.10	4.04		
V/C Ratio	0.48	0.04	0.44	0.18	1.01		
Uniform Delay, d'I	26.9	25.1	14.3	4.1	16.5		
Progression Factor	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.7	0.1	1.2	0.2	23.7		
Delay (S)	27.6	25.2	15.5	4.2	4U. I		
Level OF Service	ل 1 ک	C	В	A	U 40.1		
Approach LOS	27.1			0.0	4U. I		
Approach LOS				A	U		
Intersection Summary							
HCM 2000 Control Delay			31.9	H	CM 2000	Level of Service	С
HCM 2000 Volume to Capaci	ity ratio		0.84				
Actuated Cycle Length (s)			68.7	Si	um of lost	time (s)	17.0
Intersection Capacity Utilizati	on		73.7%	IC	CU Level o	of Service	D
Analysis Period (min)			15				

c Critical Lane Group

2026 Projected Conditions without the Project - AM Peak Hour RWJ

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ካካ	1	5	**	4 15	-	
Traffic Volume (vph)	598	66	83	799	723	496	
Future Volume (vph)	598	66	83	799	723	496	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0		
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95		
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.85	1.00	1.00	0.94		
Flt Protected	0.95	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	3502	1615	1805	3539	3347		
Flt Permitted	0.95	1.00	0.10	1.00	1.00		
Satd. Flow (perm)	3502	1615	192	3539	3347		
Peak-hour factor, PHF	0.85	0.83	0.77	0.90	0.92	0.90	
Adj. Flow (vph)	704	80	108	888	786	551	
RTOR Reduction (vph)	0	59	0	0	125	0	
Lane Group Flow (vph)	704	21	108	888	1212	0	
Confl. Peds. (#/hr)	2		2				
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%	
Turn Type	Prot	Perm	pm+pt	NA	NA		
Protected Phases	4		1	6	2		
Permitted Phases		4	6	2			
Actuated Green, G (s)	20.1	20.1	45.7	45.7	34.6		
Effective Green, g (s)	20.1	20.1	45.7	45.7	34.6		
Actuated g/C Ratio	0.26	0.26	0.59	0.59	0.44		
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	904	417	239	2078	1488		
v/s Ratio Prot	c0.20		0.04	c0.25	c0.36		
v/s Ratio Perm		0.01	0.23				
v/c Ratio	0.78	0.05	0.45	0.43	0.81		
Uniform Delay, d1	26.8	21.7	12.7	8.8	18.8		
Progression Factor	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	4.3	0.0	1.4	0.6	5.0		
Delay (s)	31.1	21.7	14.0	9.5	23.8		
Level of Service	С	С	В	А	С		
Approach Delay (s)	30.1			10.0	23.8		
Approach LOS	С			A	С		
Intersection Summary							
HCM 2000 Control Delay			21.0	H	CM 2000	Level of Service	С
HCM 2000 Volume to Capac	city ratio		0.78				
Actuated Cycle Length (s)			77.8	Si	um of lost	time (s)	17.0
Intersection Capacity Utilizat	tion		71.7%	IC	CU Level o	of Service	С
Analysis Period (min)			15				

c Critical Lane Group

2026 Projected Conditions without the Project - PM Peak Hour RWJ

PROJECTED HORIZON YEAR (WITH THE PROJECT)

	≯	\mathbf{r}	1	1	Ŧ	-	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	ሻሻ	1	5	**	≜t ⊾		
Traffic Volume (vph)	248	41	86	365	947	695	
Future Volume (vph)	248	41	86	365	947	695	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0		
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95		
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.85	1.00	1.00	0.94		
Flt Protected	0.95	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	3502	1589	1805	3539	3344		
Flt Permitted	0.95	1.00	0.10	1.00	1.00		
Satd. Flow (perm)	3502	1589	187	3539	3344		
Peak-hour factor, PHF	0.94	0.70	0.74	0.81	0.87	0.88	
Adj. Flow (vph)	264	59	116	451	1089	790	
RTOR Reduction (vph)	0	50	0	0	113	0	
Lane Group Flow (vph)	264	9	116	451	1766	0	
Confl. Peds. (#/hr)	2	2	2				
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%	
Turn Type	Prot	Perm	pm+pt	NA	NA		
Protected Phases	4		1	6	2		
Permitted Phases	40 5	4	6	2	05 (
Actuated Green, G (s)	10.5	10.5	46.4	46.4	35.6		
Effective Green, g (s)	10.5	10.5	46.4	46.4	35.6		
Actuated g/C Ratio	0.15	0.15	0.67	0.67	0.52		
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0		
Venicle Extension (s)	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (Vpn)	533	242	262	2383	1/2/		
V/S Rallo Prol	CO.08	0.01	CU.U4	0.13	CU.53		
V/S Rallo Perm		0.01	0.20	0.10	1.00		
V/C RallU Uniform Doloy, d1	0.50	0.04	0.44	0.19	1.0Z		
Drigorossion Eactor	20.0	24.9	14.3	4.2	10.7		
Incremental Delay, d2	0.7	0.1	1.00	0.2	27.5		
nolay (s)	0.7 27 5	25.0	1.Z 15.5	0.2	27.5		
Level of Service	27.5	23.0	15.5 B	4.4	44.2 D		
Approach Delay (s)	27.0	U	U	67	44.2		
Approach LOS	27.0 C			Δ	л. <u>г</u>		
	Ŭ						
Intersection Summary			0.1.5		014 6000		
HCM 2000 Control Delay	., .,		34.5	Н	CM 2000	Level of Service	
HCIVI 2000 Volume to Capa	city ratio		0.85				
Actuated Cycle Length (S)	tion		68.9	SI	um of lost	time (s)	
Analysis Deried (min)	110[1		/4.5%	IC			
Analysis Period (min)			15				

c Critical Lane Group

2026 Projected Conditions with the Project - AM Peak Hour RWJ

Intersection						
Int Delay, s/veh	0.9					
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	_ ≜ î≽		- ሽ	- 11	۰¥	
Traffic Vol, veh/h	983	5	17	439	12	61
Future Vol, veh/h	983	5	17	439	12	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage	, # 0	-	-	0	1	-
Grade, %	1	-	-	-1	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	1092	6	19	488	13	68

Major/Minor	Major1		Major2	١	Minor1	
Conflicting Flow All	0	0	1098	0	1377	549
Stage 1	-	-	-	-	1095	-
Stage 2	-	-	-	-	282	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	643	-	138	485
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	747	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver		-	643	-	134	485
Mov Cap-2 Maneuver	-	-	-	-	233	-
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	725	-
Approach	SE		NW		NE	
HCM Control Delay, s	s 0		0.4		15.9	
HCM LOS					С	
Minor Long/Major Ma	no t		N I\ A /I		CET	
	m		INVVL	INANI	SET	SER
Capacity (veh/h)		412	643	-	-	-
HCM Lane V/C Ratio	、 	0.197	0.029	-	-	-
HCM Control Delay (s	5)	15.9	10.8	-	-	-
HCM Lane LOS		С	B	-	-	-
HCM 95th %tile Q(ve	h)	0.7	0.1	-	-	-

Intersection Int Delay, s/veh 0.5 Movement WBL WBR NBT NBR SBL SBT **↑↑,** 271 ***** 3 **††** 778 Lane Configurations ¥ 31 Traffic Vol, veh/h 9 18 Future Vol, veh/h 31 18 271 9 3 778 Conflicting Peds, #/hr 0 0 0 0 0 0 Sign Control Stop Stop Free Free Free Free RT Channelized None -None -None -Storage Length 0 50 ----Veh in Median Storage, # 1 -0 --0 Grade, % 1 0 -1 ---Peak Hour Factor 90 90 90 90 90 90 Heavy Vehicles, % 0 0 2 0 0 2 Mvmt Flow 34 20 301 10 3 864

Major/Minor	Minor1	M	ajor1	N	lajor2	
Conflicting Flow All	744	156	0	0	311	0
Stage 1	306	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	354	868	-	-	1261	-
Stage 1	726	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	353	868	-	-	1261	-
Mov Cap-2 Maneuver	⁻ 465	-	-	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	623	-	-	-	-	-
Approach	WB		NB		SB	

Approach	WB	NB	SB	
HCM Control Delay, s	12.1	0	0	
HCM LOS	В			

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT	
Capacity (veh/h)	-	- 561	1261	-	
HCM Lane V/C Ratio	-	- 0.097	0.003	-	
HCM Control Delay (s)	-	- 12.1	7.9	-	
HCM Lane LOS	-	- B	А	-	
HCM 95th %tile Q(veh)	-	- 0.3	0	-	

	٦	\mathbf{r}	1	1	Ŧ	-		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	ሻሻ	1	5	* *	≜t ≽	-		
Traffic Volume (vph)	613	66	83	809	741	508		
Future Volume (vph)	613	66	83	809	741	508		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	6.0	6.0	5.0	6.0	6.0			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95			
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			
Frt	1.00	0.85	1.00	1.00	0.94			
Flt Protected	0.95	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3502	1615	1805	3539	3348			
Flt Permitted	0.95	1.00	0.10	1.00	1.00			
Satd. Flow (perm)	3502	1615	192	3539	3348			
Peak-hour factor, PHF	0.85	0.83	0.77	0.90	0.92	0.90		
Adj. Flow (vph)	721	80	108	899	805	564		
RTOR Reduction (vph)	0	59	0	0	125	0		
Lane Group Flow (vph)	721	21	108	899	1244	0		
Confl. Peds. (#/hr)	2		2					
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%		
Turn Type	Prot	Perm	pm+pt	NA	NA			
Protected Phases	4		1	6	2			
Permitted Phases		4	6	2				
Actuated Green, G (s)	20.4	20.4	45.8	45.8	34.6			
Effective Green, g (s)	20.4	20.4	45.8	45.8	34.6			
Actuated g/C Ratio	0.26	0.26	0.59	0.59	0.44			
Clearance Time (s)	6.0	6.0	5.0	6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	913	421	240	2072	1481			
v/s Ratio Prot	c0.21		0.04	c0.25	c0.37			
v/s Ratio Perm		0.01	0.23					
v/c Ratio	0.79	0.05	0.45	0.43	0.84			
Uniform Delay, d1	26.9	21.6	13.2	9.0	19.3			
Progression Factor	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	4.6	0.0	1.3	0.7	5. 9			
Delay (s)	31.5	21.7	14.5	9.7	25.2			
Level of Service	С	С	В	А	С			
Approach Delay (s)	30.5			10.2	25.2			
Approach LOS	С			В	С			
Intersection Summary								
HCM 2000 Control Delay			21.8	Н	CM 2000	Level of Service	С	
HCM 2000 Volume to Capac	ity ratio		0.80					
Actuated Cycle Length (s)			78.2	Si	um of lost	time (s)	17.0	
Intersection Capacity Utilizat	ion		73.0%	IC	U Level o	of Service	D	
Analysis Period (min)			15					

c Critical Lane Group

2026 Projected Conditions with the Project - PM Peak Hour RWJ

Int Delay, s/veh 0.8 Movement SET SER NWL NWT NEL NEF
Movement SET SER NWL NWT NEL NER
Lane Configurations 17 17 17
Traffic Vol, veh/h 789 18 62 882 10 51
Future Vol, veh/h 789 18 62 882 10 51
Conflicting Peds, #/hr 0 0 0 0 0
Sign Control Free Free Free Stop Stop
RT Channelized - None - None - None
Storage Length 50 - 0
Veh in Median Storage, # 0 0 1
Grade, % 11 0
Peak Hour Factor 90 90 90 90 90 90
Heavy Vehicles, % 2 0 0 2 0 (
Mvmt Flow 877 20 69 980 11 57

Major/Minor	Major1	Ν	/lajor2	Ν	Ainor1		
Conflicting Flow All	0	0	897	0	1515	449	
Stage 1	-	-	-	-	887	-	
Stage 2	-	-	-	-	628	-	
Critical Hdwy	-	-	4.1	-	6.8	6.9	
Critical Hdwy Stg 1	-	-	-	-	5.8	-	
Critical Hdwy Stg 2	-	-	-	-	5.8	-	
Follow-up Hdwy	-	-	2.2	-	3.5	3.3	
Pot Cap-1 Maneuver	-	-	765	-	112	563	
Stage 1	-	-	-	-	368	-	
Stage 2	-	-	-	-	500	-	
Platoon blocked, %	-	-		-			
Mov Cap-1 Maneuver	-	-	765	-	102	563	
Mov Cap-2 Maneuver	-	-	-	-	232	-	
Stage 1	-	-	-	-	368	-	
Stage 2	-	-	-	-	455	-	
Approach	SE		NW		NE		
HCM Control Delay, s	0		0.7		14.3		
HCM LOS					В		
Minor Lano/Major Mun	nt NE	l n1			SET	SED	
Consolity (yeh/h)	IIL INE				JLT	JLK	
Capacity (ven/n)	^	456	/65	-	-	-	
HUM Cantral Dalay (a))	.149 14.2	0.09	-	-	-	
HCM Long LOS)	14.3 D	10.2	-	-	-	
HUIVI LAITE LUS		В	В	-	-	-	

0.5

0.3

HCM 95th %tile Q(veh)

Intersection

Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		- † 1-		۳	^
Traffic Vol, veh/h	25	15	664	31	12	579
Future Vol, veh/h	25	15	664	31	12	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage	, # 1	-	0	-	-	0
Grade, %	0	-	1	-	-	-1
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	28	17	738	34	13	643

Major/Minor	Minor1	М	ajor1	Μ	ajor2		
Conflicting Flow All	1103	386	0	0	772	0	
Stage 1	755	-	-	-	-	-	
Stage 2	348	-	-	-	-	-	
Critical Hdwy	6.8	6.9	-	-	4.1	-	
Critical Hdwy Stg 1	5.8	-	-	-	-	-	
Critical Hdwy Stg 2	5.8	-	-	-	-	-	
Follow-up Hdwy	3.5	3.3	-	-	2.2	-	
Pot Cap-1 Maneuver	209	618	-	-	852	-	
Stage 1	430	-	-	-	-	-	
Stage 2	692	-	-	-	-	-	
Platoon blocked, %			-	-		-	
Mov Cap-1 Maneuver	r 206	618	-	-	852	-	
Mov Cap-2 Maneuver	r 327	-	-	-	-	-	
Stage 1	430	-	-	-	-	-	
Stage 2	682	-	-	-	-	-	

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	0.2
HCM LOS	С		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT	
Capacity (veh/h)	-	- 397	852	-	
HCM Lane V/C Ratio	-	- 0.112	0.016	-	
HCM Control Delay (s)	-	- 15.2	9.3	-	
HCM Lane LOS	-	- C	А	-	
HCM 95th %tile Q(veh)	-	- 0.4	0	-	

APPENDIX G

LOCAL TRIP GENERATION RATES

Local Apartment Trip Generation Study

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

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



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





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Local Apartment Trip Generation Study

Average Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Number of Studies:	13
Average Number of Dwelling Units:	193
Directional Distribution:	22% entering, 78% exiting

Trip Generation Per Dwelling Unit

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

Data Plot and Equation



Local Apartment Trip Generation Study

Average Vehicle Trip Ends vs: On a:	Dwelling Units 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



TRIP GENERATION FOR THE ROWAN

320 Multi-Family Apartment Units

LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR		GI PM	ENERATE TRAFFIC PEAK HO	DUR	
			ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Multi-Family			22%	78%		55%	45%	
Apartments	320	2,715	34	122	156	123	101	224
New Volume Site	Trips	2,715	34	122	156	123	101	224
	LAND USE DESCRIPTION Multi-Family Apartments New Volume Site	LAND USE DESCRIPTION# OF UNITSMulti-Family Apartments320New Volume Site Trips	LAND USE DESCRIPTION# OF UNITSGENERATED DAILY TRAFFICMulti-Family Apartments3202,715New Volume Site Trps2,715	LAND USE # OF UNITS GENERATED GENERATED DAILY AM TO A CONTRAPPORT OF UNITS DAILY AM TO A CONTRAPPORT OF UNITS AND ADDRESS TO A CONTRAPPORT OF UNITS AND ADDRESS AN	LAND USE # OF UNITS GENERATED GENERATED DAILY DAILY TRAFFIC DAILY TRAFFIC DAILY TRAFFIC DAILY TRAFFIC DAILY	LAND USE DESCRIPTION $*$ OF UNITSGENERATED DAILY TRAFFICGENERATED AUIT $TRAFFICAM PEAK HURMulti-FamilyApartments3202,71522%78%340122156New Volume Site Trips$	LAND USE DESCRIPTION \bullet OF UNITSGENERATED GENERATED DAILY TRAFFIC $GENERATEDTRAFFICTRAFFICAMDAILYTRAFFICTRAFFICAMDAILYTRAFFICTRAFFICAMTRAFFICTRAFFICAMTRAFFICTOTALENTERSTATMulti-FamilyApartments3202,71522%78%55%34122156123New Volume Site Trips2,71534122156123$	LAND USE DESCRIPTION \sharp OF UNITSGENERATED GENERATED DAILY TRAFFIC $GENERATEDCHAILYAMHI-FamilyApartments\sharp OF UNITSGENERATEDDAILYTRAFFICGENERATEDCHAILYAMHI-FAMILYApartmentsGENERATEDCHAILYTRAFFICGENERATEDCHAILYTRAFFICGENERATEDCHAILYTRAFFICGENERATEDCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYTRAFFICGENERATEDCHAILYCHAILYCHAILYCHAILYTRAFFICGENERATEDCHAILYC$

Calculated from Local Trip Rates

Trips calculated by using Fitted Curve Equations

TRIP GENERATION FOR THE ROWAN 320 Multi-Family Apartment Units

320 Apartments = X

<u>Weekday:</u>

				_
	T =	2,715	trips	=
	T =	15	*	178.70
Fitted Curve Equation:	T = 15.	193(X) ^{0.}	899	

Peak Hour of Adjacent Traffic between 7 and 9 am:

	T =	156	trips	=
	T =	0.758	*	206
Fitted Curve Equation:	T = 0.7	58(X) ^{0.92}	24	

Peak Hour of Adjacent Traffic between 4 and 6 pm:

	T =	224 trips		
	T =	0.669 *	320	+ 10.07
itted Curve Equation: $T = 0.669(X)+10.069$				

APPENDIX H

2019 CENSUS BUREAU DATA

Census OnTheMap

Work Destination Report - Home Selection Area to Work Census Tracts All Jobs for All Workers in 2019

Created by the U.S. Census Bureau's OnTheMap https://onthemap.ces.census.gov on 03/30/2022



Map Legend

Selection Areas

✤ Analysis Selection

Job	Count
000	Count

- **94 106**
- **82 93**
- 70 81
- **57 69**
- 45 56
- **33 -** 44
- 20 32

JOD	Count
№ 94	- 106
№ 82	2 - 93
№ 70	- 81
₩ 57	- 69
₩ 45	- 56
₩ 33	6 - 44
≥ 20	- 32







All Workers

All Jobs from Home Selection Area to Work Census Tracts in 2019 All Workers

Note: Jobs in All Other Locations (1,059) are not shown in chart.

	20	19
Census Tracts as Work Destination Area	Count	Share
All Census Tracts	2,240	100.0
46.10 (Knox, TN)	106	4.7
57.06 (Knox, TN)	102	4.6
1 (Knox, TN)	96	4.3
59.04 (Knox, TN)	79	3.5
58.03 (Knox, TN)	75	3.3
57.04 (Knox, TN)	68	3.0
44.04 (Knox, TN)	58	2.6
9801 (Anderson, TN)	57	2.5
59.08 (Knox, TN)	57	2.5
44.03 (Knox, TN)	54	2.4



0

	2019	
Census Tracts as Work Destination Area	Count	Share
46.11 (Knox TN)	48	21
9.02 (Knox, TN)	38	1.7
69 (Knox, TN)	37	1.7
37 (Knox, TN)	35	1.6
48 (Knox, TN)	32	1.4
58.13 (Knox, TN)	31	1.4
103.02 (Blount, TN)	28	1.2
38.01 (Knox, TN)	28	1.2
$204 (\mathrm{Anderson, TN})$	23	1.0
201 (Anderson, TN)	22	1.0
112 (Blount, TN)	22	1.0
58.07 (Knox, TN)	22	1.0
66 (Knox, TN)	22	1.0
202.02 (Anderson, TN)	21	0.9
57.10 (Knox, TN)	20	0.9
All Other Locations	1,059	47.3



Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2019
Job Type	All Jobs
Selection Area	46.10 (Knox, TN) from Census Tracts
Selected Census Blocks	67
Analysis Generation Date	03/30/2022 13:01 - On The Map 6.8.1
Code Revision	f9358819d46a60bb89052036516a1c8fe8bbbeac
LODES Data Version	20211018_1647

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2019).

Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.

2. Educational Attainment is only produced for workers aged 30 and over.

3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011.



APPENDIX I

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

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

983/2 * 1.05 = 516

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *							
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600		
Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes		
100 - 149 150 - 199		Yes	Yes N Gallaher View Road	Yes Yes	Yes Yes	Yes Yes		
200 - 249 250 - 299	Yes Yes	Yes Yes	at Proposed East Entrance	Yes Yes	Yes Yes	Yes Yes		
300 - 349 350 - 399	Yes Yes	Yes Yes	2026 Projected AM SB Right Turns = 5	Yes Yes	Yes Yes	Yes Yes		
400 - 449 450 - 499	Yes Yes	Yes Yes	Right Turn Lane NOT Warranted	Yes Yes	Yes Yes	Yes Yes		
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes	Yes Yes	Yes Yes	Yes Yes		
600 ar More	Yes	Yes	Yes	Yes	Yes	Yes		

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

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

		271/2 * 1.05 = 14	12			Control Print (1997) Inc. on State Surger
RIGHT-TURN	THR	OUGH VOLUM	IE PLUS LEI	T-TURN	VOLUME	, *
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199		Wal	ker Springs Road Proposed West Entrance	at		
200 - 249 250 - 299			2026 Projected AM			Yes Yes
300 - 349 350 - 399		Rig	ht Turn Lane NO	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Warranted		Yes Yes	Yes Yes
500 - 549 550 - 599 *	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *						
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600	
Fewer Than 25 25 - 49 50 - 99		8		Yes	Yes Yes	Yes Yes	
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
200 - 249 250 - 299	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
600 ar More	Yes	Yes	Yes	Yes	Yes	Yes	

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

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RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

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

789/2 * 1.05 = 414

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *						
VOLUME	350 - 399	400 - 449		450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes	Yes Yes
100 - 149 150 - 199	10-21-211 V	l x	N Gallal at Pro	ner View Road	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes	Y	Entrance			Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Y	2026 Projected PM SB Right Turns = 18 Right Turn Lane NOT Warranted		Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	**			Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Ye	s s	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 ar More	Yes	Ye	s	Yes	Yes	Yes	Yes

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

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *							
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399		
Fewer Than 25 25 - 49 50 - 99								
100 - 149 150 - 199		Walker Sp	rings Road at					
200 - 249 250 - 299		Propo En	sed West { trance }		Yes	Yes Yes		
300 - 349 350 - 399		2026 Projected PM NB Right Turns = 31		Yes Yes	Yes Yes	Yes Yes		
400 - 449 450 - 499		Right Tur Wat	n Lane NOT	Yes Yes	Yes Yes	Yes Yes		
500 - 549 550 - 599	Yes	Yes	Yes	Yes Yes	Yes Yes	Yes Yes		
600 or More	Yes	Yes	Yes	Yes	Yes	Yes		

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

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

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APPENDIX J

RESPONSE LETTER TO ADDRESS KNOXVILLE/KNOX COUNTY PLANNING REVIEW COMMENTS



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

June 13, 2022

PROJECT NAME: The Rowan

TO: Knoxville-Knox County Planning

SUBJECT: Comment Response Document for The Rowan TIS -From Email Comments dated June 9, 2022

Knoxville-Knox County Planning, Knox County Engineering, and City of Knoxville Staff:

The following response document addresses comments from an email from Mike Conger, PE, dated June 9, 2022. This letter is added to the end of the revised report in Appendix J.

1. In Table 5, the PM peak summary delay is shown as 71.0 seconds. It should be 21.0 and is just a typo.

<u>Response</u>: In Table 5, on Page 29, the PM peak summary delay has been corrected to 21.0 (seconds).

- 2. We would prefer a different organization of the Trip Distribution section of the report as it is currently very difficult to follow. In the current version the final distribution numbers are presented first and then subsequent information and figures provide the background that went into its derivation. It would be preferable to reorganize such that the final numbers are presented last and it is clearly stated which factors were used to inform those.
 - <u>Response</u>: The Trip Distribution section has been revised as requested. During the revision of this section, Figures 6a, 6b, and 6c were re-arranged, and Figure 6b was renamed. This revision also resulted in changes to the page numbers and was updated in the Table of Contents.
- 3. Please note the presence of on-street parallel parking as shown on the submitted site plans along the driveway to Walker Springs Rd and assess the sufficiency of throat storage depth and other operational factors to determine if the parking locations do

not create potential conflicts or cause queuing into the public right of way on Walker Springs Rd.

Response: A discussion regarding this issue has been added to the end of the report at the end of Page 51. It is recommended that the first pair of parallel parking spaces be removed to provide a factor of safety to ensure parking operations do not cause operational issues on Walker Springs Road. This recommendation has also been added on Page 3.

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

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- Added Appendix J to include this response letter

If you have any questions or further comments, please feel free to contact me. I look forward to your review and approval.

Sincerely,

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


