

Introduction

This section details the existing transportation conditions within the study area and provides analysis of future conditions in and around the study area. The mobility analysis is designed to evaluate the potential impact development within the study area will have on the surrounding area. Two development scenarios are evaluated based on the results of the market study documented in previous sections. The overall objectives of the transportation study are to:

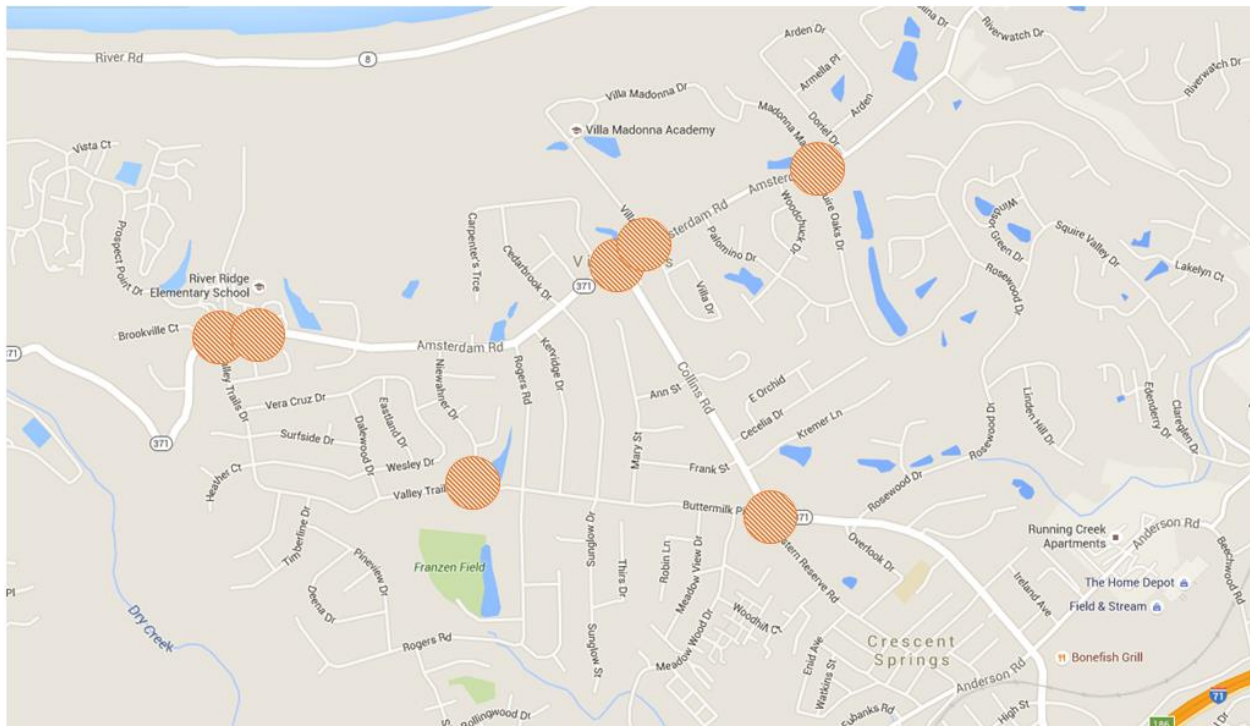
- Identify existing capacity constraints
- Determine location and design of access points to the Areas 1 and 2
- Identify development constraints based on existing transportation issues
- Identify necessary improvements to the transportation infrastructure to support background traffic growth and development of the subject property.

Transportation Study Area

The transportation study area was established to include primary intersections near the study area and evaluate impacts to minor streets. In total seven intersections were included within the study area primarily along Amsterdam Road and Collins Roads. The intersection of Niewahner Drive and Valley Trails Drive was also included to identify the potential impact of cut through traffic within the lower order street system. The full list of study intersections are shown below and displayed in **Figure 1**.

- Amsterdam Road at River Road
- Amsterdam Road at River Ridge Elementary School Drive 1
- Amsterdam Road at River Ridge Elementary School Drive 2
- Amsterdam Road at Collins Road
- Amsterdam Road at Villa Drive
- Amsterdam Road at Madonna Manor/Squire Oaks Dr.
- Collins Road at Buttermilk Pike

Figure 1: Study Intersections



Existing Conditions

The primary roadways within the study area, (Collins Road and Amsterdam Road) are state maintained and both are designated as KY 371. Figure 2 summarizes Average Daily Traffic Volume counts collected by the Kentucky Transportation Cabinet within the area. As can be seen in Figure 2, volume on Amsterdam Road varies greatly from 955 vehicles per day (VPD) west of Villa Hills to 5,240 VPD near the intersection with Collins Road. Collins Road maintains the highest traffic volume in the area with a count of 7,874 VPD recorded in 2011. Despite the fact that these roadways serve as the primary access to and from Villa Hills, they also provide unrestricted residential access to single family properties on both sides of the street via driveway access points.

Amsterdam Road is a narrow roadway measuring nominally 22 feet in width with little to no shoulder. Collins Road maintains a 23 foot cross section with a 3-4 foot shoulder through the study area. Remaining roadways within Villa Hills have been designed as residential streets with unlimited access and on-street parking.

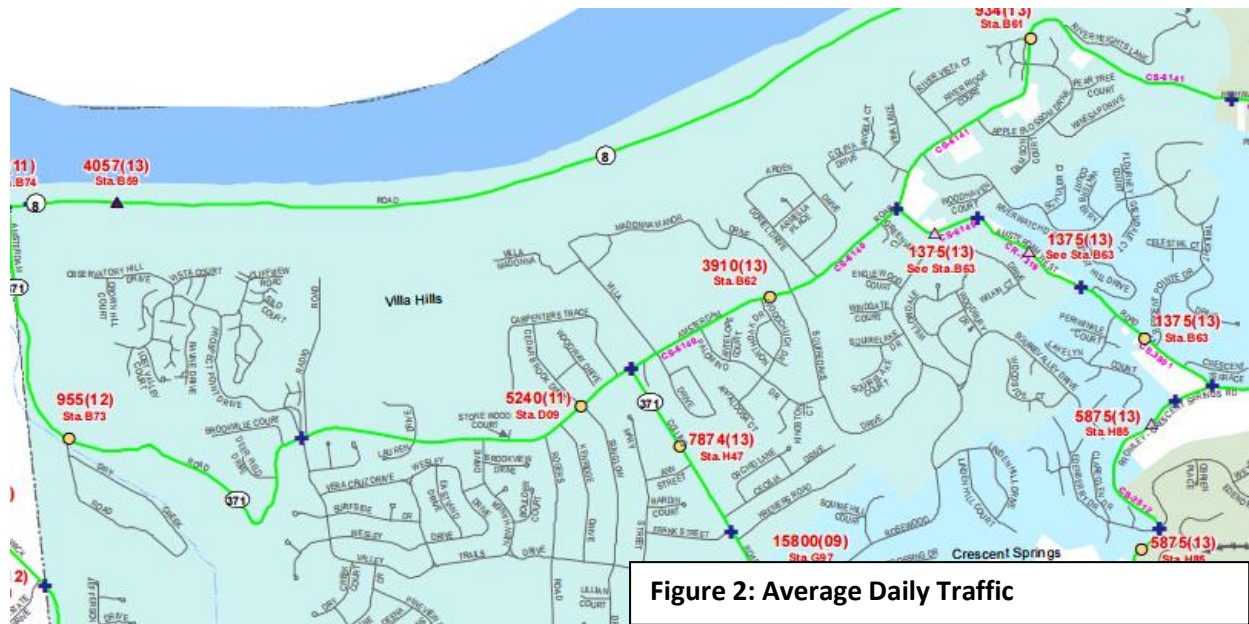


Figure 3 below shows the typical section of Amsterdam Road in the vicinity of the study area. The narrow lanes and minimal shoulders are easily recognizable. Moreover, several section of the roadway demonstrate poor pavement conditions with failing pavement and potholes. These conditions have been observed to force vehicles towards the center lane away from the road edge.



Based on existing traffic volumes, level of service analysis was conducted at all fully controlled intersections. Level of Service (LOS) is a letter grade designation based on the delay users experience waiting at intersections and ranges from LOS A to F. LOS A has less than 10 seconds of delay at all intersections, whereas LOS F has greater than 50 seconds of delay at stop controlled intersections and greater than 80 seconds of delay at signal control intersections.

The results of the LOS analysis for this study are summarized below in Table 1. As can be seen from the table, the intersections of Collins Road at Buttermilk Pike and Amsterdam Road at Valley Trails Drive currently operate with a high LOS. However, the current 3-way stop at the intersection of Amsterdam Road and Collins Road is shown to operate at LOS D, indicating that during the peak hours it operates close to capacity.

Table 1: Existing LOS Analysis

Intersection	Existing	
	LOS	Delay
Buttermilk at Collins	B	19.6
Collins at Amsterdam	D	25.3
Amsterdam at Valley Trails	A	8.5

Mobility Impact Analysis

Scenario 1 – Market Based Analysis

The market analysis for this study identified primarily residential uses with some neighborhood commercial development designed to support the area. In addition, the market analysis determined that approximately 10 acres of the 82 acre site was assumed to be reserved for park and/or civic uses.

Based on these recommendations, a trip generation analysis was conducted to evaluate the total number of trips that may be expected to be generated by the development of the property. Trip Generation analysis was conducted using the *TripGeneration.xls* tool used by the Kentucky Transportation Cabinet (KYTC). This tool estimates the number of trips based on empirical data collected by the Institute of Transportation Engineers (ITE) and documented in the ITE Trip Generation Manual.

In total, utilizing the market study analysis the site is expected to generate approximately 600 trips, both entering and exiting. Table 2, below summarizes the proposed land uses and entering and exiting trips. It should be noted that commercial trips resulting from neighborhood shopping centers and/or office or medical uses may not necessarily be additional trips placed on the network, but may replace existing medical or shopping related trips currently travelling outside the area.

Additionally, the number of trips generated by residential uses can also vary depending on the type of residence, such as detached single family having higher peak hour trip generations than retirement communities. However, in order to provide a robust analysis higher ends of the trips generation were used and displaced trips were not addressed in the analysis.

Table 1: PM Peak Hour Trip Generation (Scenario 1, Market Analysis)

<i>ITE Land Use Code</i>	<i>Land Use Description</i>	<i>Ind. Var. (X)</i>	<i>Ind. Var. Units</i>	<i>Entering/ Exiting</i>	<i>Trips Generated</i>
TOTAL	ALL	--	--	Total entering	307
		--	--	Total exiting	293
820	Shopping Center	10	1000 sf GLA	entering	66
				exiting	71
720	Medical-Dental Office Building	6	1000 sf GFA	entering	11
				exiting	16
710	General Office Building	6	1000 sf GFA	entering	15
				exiting	71
851	Convenience Market (Open 24 Hours)	1	1000 sf GFA	entering	27
				exiting	26
210	Single-Family Housing	238	Dwelling Units	entering	154
				exiting	86
220	Apartment	68	Dwelling Units	entering	36
				exiting	23

Scenario 2 – High-Intensity Analysis

In addition to the trip generation analysis listed above, an additional exploration was performed to reflect a “worst-case” scenario for traffic impact. This analysis doubles the level of commercial trips and introduces higher density residential uses. In addition, the remaining 30 acres along Radio Tower Drive adjacent to the development is also assumed to be redeveloped as residential property. This analysis is detailed in Table 3.

As can be seen from this analysis, the “worst-case” scenario only adds approximately 180 trips during the peak hour. This additional traffic is largely due to the increased residential properties assumed and not related to the commercial uses, as commercial uses typically operate with higher volumes outside of the peak hours.

Table 3: PM Peak Hour Trip Generation (Scenario 2; High-Intensity)

<i>ITE Land Use Code</i>	<i>Land Use Description</i>	<i>Ind. Var. (X)</i>	<i>Ind. Var. Units</i>	<i>Entering/ Exiting</i>	<i>Trips Generated</i>
TOTAL	ALL	--	--	Total entering	402
		--	--	Total exiting	388
820	Shopping Center	20	1000 sf GLA	entering	104
				exiting	113
720	Medical-Dental Office Building	12.5	1000 sf GFA	entering	22
				exiting	34
710	General Office Building	12.5	1000 sf GFA	entering	16
				exiting	77
851	Convenience Market (Open 24 Hours)	1	1000 sf GFA	entering	27
				exiting	26
210	Single-Family Housing	200	Dwelling Units	entering	132
				exiting	74
220	Apartment	250	Dwelling Units	entering	102
				exiting	65

Scenario LOS Impacts

Based on the trips generated in both Scenarios 1 and 2, a level of service analysis was again conducted to determine the impact of the development over the existing conditions. This LOS analysis indicates what would occur on the existing roadway if no improvements were implemented. Generated trips were distributed to the roadway network based on existing traffic patterns with the majority of the traffic traveling east towards Interstate 75 along Amsterdam Road and Collins Road. LOS analysis for these scenarios is presented in Table 4, along with the existing conditions LOS for comparison.

Intersection	Existing		Proposed (Alt 1)		Proposed (Alt 2)	
	LOS	Delay	LOS	Delay	LOS	Delay
Buttermilk at Collins	B	19.6	C	23.4	C	24
Collins at Amsterdam	D	25.3	F	57.2	F	58.5
Amsterdam at Valley Trails	A	8.5	B	13.8	C	15.6

As can be seen from this analysis, the only intersection that demonstrates a significant increase in operational delay is the intersection of Collins Road at Amsterdam Road. It is noted that there is very minimal difference between the delay in both development scenarios with only 1.3 seconds of delay difference between Scenarios 1 and 2, even though Scenario 2 is considered a higher-intensity use.

Recommended Improvements

Based on the level of service analysis above, the level of delay and operations on the existing roadway network would be unacceptable to accommodate the long term development potential within Villa Hills. Therefore, alternatives were evaluated to determine the levels of improvement necessary to accommodate the increased traffic. Based on both development scenarios, total average daily traffic

(ADT) along Amsterdam Road would be between 12,000-13,000 vehicles per day, which is still within the operational threshold of a two-lane roadway. However, the critical intersection of Amsterdam Road at Collins Road, will need improvements. Two alternative improvement schemes were evaluated for the intersection.

The first alternative looked at traditional intersection improvements, including the addition of traffic signal control and the addition of auxiliary turn lanes for all approaches. A schematic of this design is shown in **Figure 4**. Based on these improvements, the intersection is anticipated to operate at LOS C with an average of 26.9 seconds of delay.

Figure 4: Amsterdam Road at Collins Road (Alternative Improvement 1)



The second alternative examined the implementation of a modern roundabout at the intersection. This type of design would minimize impacts to the residential property on the southwest quadrant of the intersection by removing the need to develop auxiliary turn lanes. The special geometry of the roundabout would necessitate increased impacts to the AT&T property on the opposite side of Collins Road. This alternative is shown in **Figure 5**. The roundabout alternative is anticipated to operate at LOS A with less than 10 seconds of delay.

Figure 5: Amsterdam Road at Collins Road (Alternative Improvement 2)



Other Recommendations

In addition to the improvements detailed above, other improvements are summarized below to minimize the impact of the development at to enhance the transportation in and around Villa Hills.

1. A primary consideration for the proposed development is the placement of the access from the property to Amsterdam Road. The primary frontage of the property is between Valley Trails Drive and Niewahner Drive. However, this southern side of Amsterdam Road in this area has a large number of residential access points. Providing the primary access to the development near these access points could impede access to residential properties or cause safety concerns. Therefore, it is recommended that access be aligned across Niewahner Road to consolidate major intersections along the corridor.

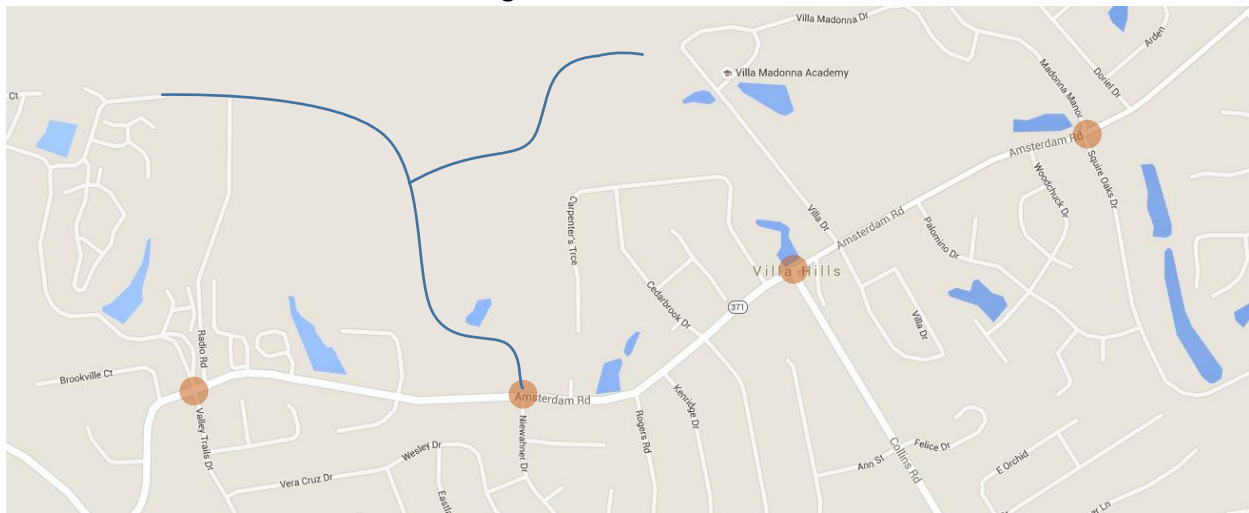
Due to the size of the development it is also recommended that secondary access be provided to the parcels. It is recommended that any street system be designed to connect with Prospect Point subdivision through Cliffview Court, where a street stub currently exists.

2. Trip generation analysis for both development scenarios indicates that a traffic signal may be warranted at the new primary access point based on peak hour traffic signal control warrants.

However, delay may be manageable without a signal.

Similar to the intersection at Collins Road, an alternative would be the use of a roundabout at the new access point to the development. In addition to serving intersection traffic volumes efficiently, roundabouts have also been shown to be effective in speed management and traffic calming and may blend well within the residential nature of Amsterdam Road within Villa Hills. It may even be possible to create a roundabout corridor, with additional installations at Amsterdam Road and Valley Trails Drive, possibly extending east to include Villa Madonna Drive as well (**Figure 6**). These installations could serve as a gateway to Villa Hills and enforce the lower speed limits and enhance the residential nature of the area.

Figure 6: Corridor Traffic Control



3. As indicated in the review of the existing conditions, Amsterdam road maintains a narrow section with little to no shoulders and poor pavement conditions. It is recommended that Amsterdam Road be reconstructed from Prospect Point/Valley Trails to Madonna Manor to provide minimal shoulders 1-2 feet with improved pavement conditions.