

TRAFFIC IMPACT STUDY FOR

Proposed Mixed Use Development Kenwood Road, City of Blue Ash, Ohio

Prepared For:

9617 Kenwood Road Development, LLC
10988 Deerfield Road
Blue Ash, Ohio 45242

Prepared By:

*Jamal Adhami, PE, PTOE
SHA Engineering, LLC
June 08, 2022*



Table of Contents

1. Executive Summary1

2. Introduction5

3. Scope of Work7

4. Existing Conditions7

5. Proposed Development9

6. Trip Generation10

7. Trip Distribution10

8. Analysis.....11

Turn Lane Warrants..... 11

Capacity Analysis..... 11

Kenwood Road at SR-126 EB Ramp/YMCA Drive..... 13

Kenwood Road at Blue Ash Road Connector/Towne Square (Signalized)..... 16

Kenwood Road at Cooper Road..... 20

Kenwood Road at Malsbury..... 24

Cooper Road at Monroe Avenue/Wynnecrest Drive..... 28

Kenwood Road at Laurel Avenue/Access Drive 1..... 31

Cooper Road at Blue Ash Road/Access Drive 2..... 32

Storage Length 35

9. Findings and Conclusions36

Kenwood Road at SR 126 EB Ramps/YMCA Drive..... 36

Kenwood Road at SR 126 WB Ramps (Blue Ash Connector)/Towne Square Drive 36

Kenwood Road at Cooper Road..... 36

Kenwood Road at Malsbury Road/Aldine Drive 37

Cooper Road at Monroe Avenue/Wynnecrest Drive 38

Kenwood Road at Laurel Avenue/Access Drive 1..... 38

Cooper Road at Blue Ash Road/Access Drive 2..... 39

Cooper Road at Access Drive 3 and 4..... 39

Recommendations..... 40

General..... 40

Kenwood Road at Laurel Avenue/Access Drive 1 40

Cooper Road at Blue Ash Road/Access Drive 2..... 40

Cooper Road at Kenwood Road..... 40

Figures

Figure 1 - Site Location..... 6

Tables

Table 1 - Signalized Intersection LOS Criteria (Exhibit 18-4 HCM)..... 12

Table 2 - Unsignalized Intersection LOS Criteria (Exhibit 19-1 HCM) 12

Table 3 – Capacity Analysis – AM Peak – 2025/2035 No-Build – Kenwood Rd at SR 126 EB/YMCA .. 13

Table 4 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Rd at SR 126 EB/YMCA	14
Table 5 – Capacity Analysis – PM Peak – 2025/2035 No-Build – Kenwood Rd at SR 126 EB/YMCA...	15
Table 6 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Rd at SR 126 EB/YMCA	16
Table 7 – Capacity Analysis – AM Peak – 2025/2035 No-Build – Kenwood Rd at Blue Ash. Conn.	17
Table 8 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Rd at Blue Ash Conn.....	18
Table 9 – Capacity Analysis – PM Peak – 2025/2035 No-Build – Kenwood Rd at Blue Ash Conn.	19
Table 10 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Rd at Blue Ash Conn.	20
Table 11 – Capacity Analysis – AM Peak – 2025/2035 No Build/Build – Kenwood Rd at Cooper Rd....	21
Table 12 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Rd at Cooper Road	22
Table 13 – Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Rd at Cooper Rd.....	23
Table 14 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Rd at Cooper Rd.....	24
Table 15 – Capacity Analysis – AM Peak – 2025/2035 No Build – Kenwood Rd at Malsbury Rd.	25
Table 16 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Rd at Malsbury Rd	26
Table 17–Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Rd at Malsbury Rd	27
Table 18 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Rd at Malsbury Rd.....	28
Table 19—Capacity Analysis – AM Peak – 2025/2035 No Build – Copper Rd at Monroe Ave.	29
Table 20—Capacity Analysis – AM Peak – 2025/2035 Build – Copper Rd at Monroe Ave.	29
Table 21—Capacity Analysis – PM Peak – 2025/2035 No Build – Copper Rd at Monroe Ave.	30
Table 22—Capacity Analysis – PM Peak – 2025/2035 Build – Copper Rd at Monroe Ave	30
Table 23—Capacity Analysis – AM Peak – 2025/2035 No Build – Kenwood Rd at Laurel Avenue.....	31
Table 24—Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Rd at Laurel Ave./ Drive 1	31
Table 25—Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Rd at Laurel Ave	32
Table 26—Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Rd at Laurel Ave/ Drive 1.....	32
Table 27—Capacity Analysis – AM Peak – 2025/2035 No Build – Cooper Rd at Blue Ash Road.....	33
Table 28—Capacity Analysis – AM Peak – 2025/2035 Build – Cooper Rd at Blue Ash Rd/ Drive 2	33
Table 29—Capacity Analysis – PM Peak – 2025/2035 No Build – Cooper Rd at Blue Ash Rd	34
Table 30—Capacity Analysis – PM Peak – 2025/2035 Build – Cooper Rd at Blue Ash Rd/ Drive 2.....	34
Table 31 - Storage length Calculations – (2035 Build Scenarios).....	35
Table 32—Capacity Analysis – 2035 PM Peak - Kenwood Rd at Cooper Rd/w Parking on SB lanes.....	37
Table 33—Capacity Analysis –AM/PM Peak – 2035 Build - Kenwood Rd at Laurel Ave/Drive 1	39

Appendix

- A. Site Plan
- B. Memorandum of Understanding
- C. Traffic Data and Traffic Scenarios
- D. Trip Generation Summary
- E. Turn Lane Warrants
- F. Capacity Analysis
- G. Trip Signal Warrant
- H. Schematic Plan

1. Executive Summary

This study was prepared to evaluate the traffic impact of a retail/residential development located at the northwest quadrant of the intersection of Cooper Road and Kenwood Road in City of Blue Ash, Ohio. The new development will include retail stores, apartments, and offices. A multi-level parking garage will be built as part of the development to serve the proposed development exclusively. The proposed development will include the following:

- 65,000 SFT of retail that will include specialty retail shops, fast casual restaurants, sit down restaurants
- 35,000 SFT Office space and amenities
- 250 Residential units

The new development will be served with 4 access locations. The location of the proposed development and access drives are shown in Figure 1 in section 2 of the report. The study area intersections are shown in the MOU exhibits included as Appendix B to this report.

The traffic data collection for the intersections in study area were completed on March 29, 2022. The traffic counts were used for estimating 2025 and 2035 No Build traffic scenarios. The future year traffic volumes were estimated using an annual growth rate of 1%/year.

The new trips were estimated using the 11th edition of ITE Trip Generation Manual. The summary of estimated new trips is included in Appendix D.

The estimated new trips were combined with 2025 No Build and Build scenarios. Traffic data and Traffic scenarios exhibits are shown in Appendix C. The intersections included in the study area were analyzed for the 2025 and 2035 No Build and Build scenarios. The results of the analysis and findings are summarized below.

Kenwood Road at SR 126 EB Ramps/YMCA Drive

The capacity analysis completed for the intersection shows acceptable LOS at the intersection for all scenarios. The intersection shows LOS B for all scenarios included in the analysis. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ratio observed at the intersection indicate that the existing storage lengths for all turn lanes at the intersections are adequate. All scenarios show queue/storage ratio below 1.0 for exclusive turn lanes at the intersection.

Kenwood Road at SR 126 WB Ramps (Blue Ash Connector)/Towne Square Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis show intersection will operate at LOS B for AM Peak Hour No Build and Build scenarios. The analysis with PM Peak Hour Build scenarios shows LOS C for all scenarios. The results of the

capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ration observed at the intersection indicate that the existing storage lengths for the northbound left turns exceeds 1 with the analysis completed for the 2035 No Build and Build scenarios. All other turn lanes at the intersection show queue/storage ratio below 1.0.

Kenwood Road at Cooper Road

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis shows that the intersection will operate at LOS C for AM Peak Hour No Build and Build scenarios. The analysis with PM Peak Hour Build scenarios shows LOS C for all scenarios except 2035 Build scenario which show LOS D at the intersection. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ratio observed at the intersection indicates that the existing storage lengths for the southbound left turns exceeds 1 with the analysis completed for the 2035 PM Peak Hour No Build and Build scenario. The eastbound left turn also shows queue storage ration of 1.14 for the 2035 PM Peak Hour Build scenario. All other turn lanes at the intersection show a queue/storage ratio below 1.0. The pavement markings at the intersection can be modified to provide additional storage for the southbound left turns.

The parallel parking is proposed along southbound approach at the intersection in front of the retail development on Kenwood Road. The capacity analysis for the PM Peak Hour at the intersection is also completed assuming 30 parking maneuvers. The results of the analysis completed for the 2035 PM Peak Hour are summarized in Table 32 (Section 9).

The results of the analysis with parking maneuvers indicate a slight increase in the average delay at the intersection. An increase of 1.1 seconds/vehicles is observed from 37.9 seconds/vehicles to 39.0 seconds/vehicles. The average delay on the southbound approach shows an increase of 3.5 seconds/vehicles from 30.2 seconds/vehicles to 33.7 seconds/vehicles.

Kenwood Road at Malsbury Road/Aldine Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis shows that the intersection will operate at LOS C for AM Peak Hour No Build and Build scenarios. The analysis with the PM Peak Hour Build scenarios shows LOS C for all scenarios except the 2035 Build scenario which show LOS D at the intersection. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new development.

The queue/storage ratio observed at the intersection indicate that the existing storage lengths for all turn lanes at the intersections are adequate. All scenarios show a queue/storage ratio below 1.0 for exclusive turn lanes at the intersection.

Cooper Road at Monroe Avenue/Wynnecrest Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic and LOS on the northbound and southbound approaches at the intersection for all scenarios.

Kenwood Road at Laurel Avenue/Access Drive 1

Capacity analysis completed at the intersection show LOS C and D on the westbound approach on Laurel Avenue with the analysis completed with AM Peak Hour 2025/2035 No Build scenarios. The AM Peak Hour Build scenarios show LOS F for the stopped control approaches (eastbound and westbound). Similar results are obtained for the analysis completed with the PM Peak Hour scenarios.

The delays on the side streets are caused by the lack of gaps available required for making left and right turns from the side street. Additional lanes on the side street approaches will not result in significant reduction of average delay.

The analysis at the intersection was also completed assuming a traffic signal is installed at this location. The summary of the analysis completed at the intersection is included in Table 33 (Section 9). The analysis at the intersection with traffic signal is completed using the existing geometry on the southbound approach on Kenwood Road.

The analysis at the intersection indicates an acceptable flow of traffic. The 2035 AM Peak Hour scenario shows LOS B at the intersection with an average delay of 19.1 seconds/vehicles. The analysis with the PM Peak Hour 2035 Build scenario show LOS C with an average delay of 24.2 seconds/vehicle.

Traffic Signal Warrants for the intersection were completed for the opening day traffic. The trips on the eastbound approach on Access Drive 1 were estimated using hourly distribution included in *Appendix A (estimated hourly distribution) of ITE Trip Generation Manual*. The estimated hourly distribution on Access Drive 1 and traffic signal warrants completed are included in Appendix G.

Cooper Road at Blue Ash Road/Access Drive 2

The capacity analysis completed at the intersection shows an acceptable LOS on the northbound and southbound stop-controlled intersection for the analysis completed with the AM Peak Hour No Build and Build scenarios. The capacity analysis with the PM Peak Hour Build scenarios shows LOS F on the southbound and northbound approaches at the intersection.

The delays on the side streets are caused by the lack of gaps available required for making left and right turns from the side street. Additional lanes on the side street approaches will not result in significant reduction of average delays on the southbound and northbound approaches.

Cooper Road at Access Drive 3 and 4

The access drives 3 and 4 are intended for limited use. Access Drive 3 is primarily intended to be used by the utility vehicles for garbage collection. The access on Cooper Road will be restricted to right turn in/out only. Similarly, access drive 4 is intended for deliveries (such as Amazon, Uber etc.) and the pickup and drop off area. Detailed construction plans shall be developed and submitted to the City for their review and approval.

Recommendations

General

Implementation of all work to be completed as part of the recommendations in this report shall be built using the standards followed by ODOT. This will include the construction for installation of new lanes, pavement markings, signage, and construction of the Access Drives.

Kenwood Road at Laurel Avenue/Access Drive 1

The analysis completed at the intersection show a traffic signal will allow safe and satisfactory flow of traffic at the intersections. The following improvements are recommended at the intersection.

- A new traffic signal shall be installed at the intersection. The traffic signal shall be designed and built as per the requirements and standards followed by City of Blue Ash.
- A pedestrian cross walk for Kenwood crossing shall be provided on the north leg of the intersection.
- The existing pavement markings on Kenwood Road should be modified to provide a 150' (including 50' storage) long northbound left turn lane.
- The west leg of intersection (Access Drive 1) shall be built to provide one inbound lane and two outbound lanes. The two lanes on eastbound approach on Access Drive 1 shall be designated as an exclusive lane for the eastbound left turns, and a shared lane for the through and right turns.
- The westbound approach on Laurel Avenue shall be modified to operate with a single lane shared for the left, through and right turns.
- The proposed parallel parking on Kenwood Road in front of the development shall start 50' (or as required by City of Blue Ash) south of the intersection of Kenwood Road and Laurel Avenue/Access Drive 1.

Cooper Road at Blue Ash Road/Access Drive 2

- A 100' (including 50' taper) long lane for the southbound left turn shall be built for the left turns from West Road to eastbound on Access Drive 2.
- The south leg on Blue Ash Road shall be modified to provide an exclusive lane for the northbound left turns and a lane shared for the through and right turns.
- The north leg of intersection (Access Drive 2) shall be built to provide one inbound lane and two outbound lane. The southbound approach on Access Drive 2 shall be built with two outbound lanes, an exclusive lane for the southbound left turns, and a shared lane for the through and right turns.

Kenwood Road at Cooper Road

- The existing pavement marking on the southbound approach should be modified to extend Storage for the southbound left turn (approximately 220' including 50' taper).

2. Introduction

The purpose of this Traffic Analysis Study is to:

*Describe and measure the impact of traffic generated by the proposed retail/residential development on the adjacent existing public street system; and
Provide a list of conclusions and recommendations related to traffic operations and analysis at the intersections included in the study area.*

This study was prepared to evaluate the traffic impact of a retail/residential development located at the northwest quadrant of the intersection of Cooper Road and Kenwood Road in City of Blue Ash, Ohio. The new development will include retail stores, apartments, and offices. A multi-level parking garage will be built as part of the development to serve the proposed development exclusively. The proposed development will include the following.

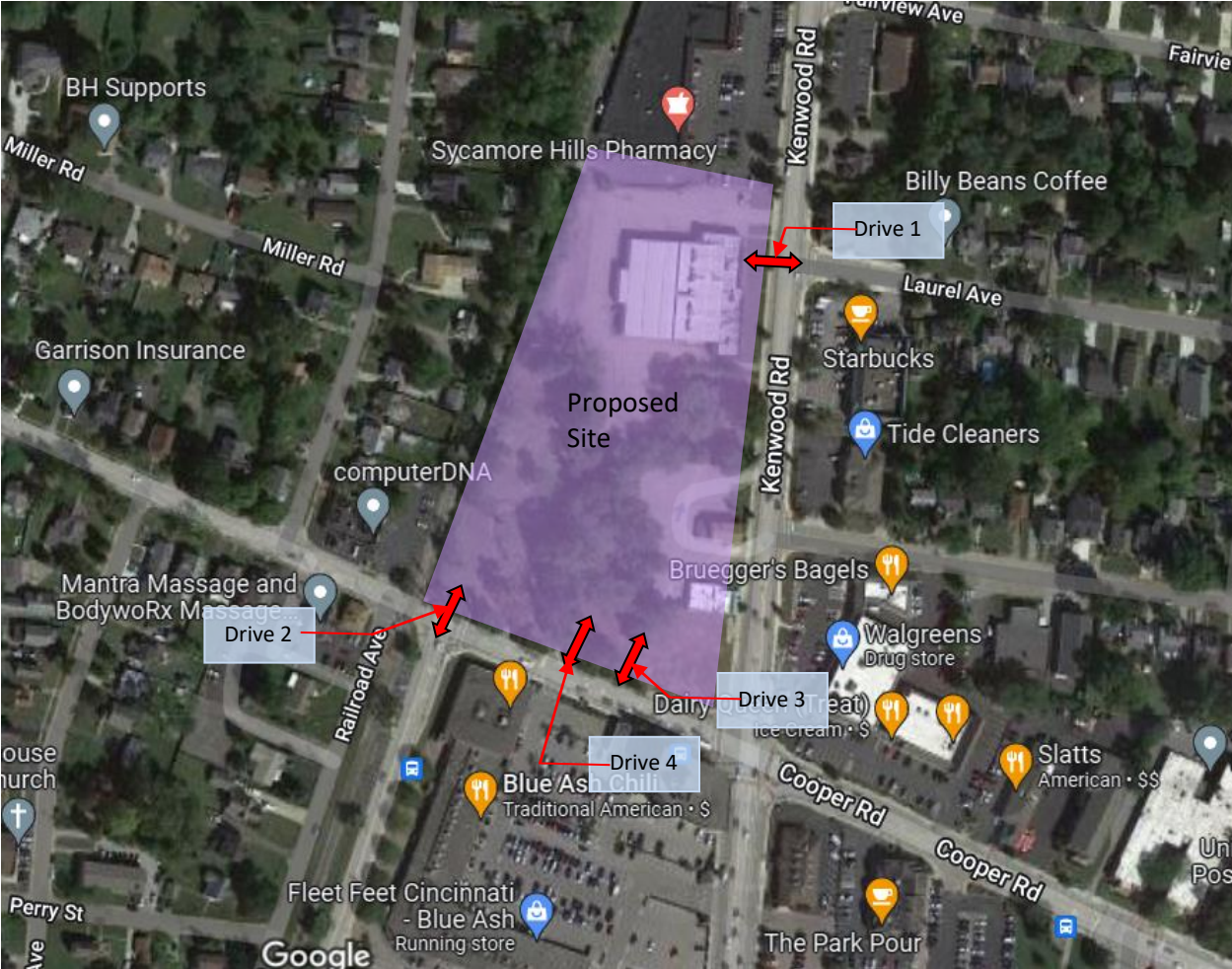
- 65,000 SFT of retail that will include specialty retail shops, fast casual restaurants, sit down restaurants
- 35,000 SFT Office space and amenities
- 250 residential units.

The access to the new development is proposed through four access locations. Access Drive 1 is located on Kenwood Road across from Laurel Avenue. This access location will operate as a full access drive. Access Drive 2 is located on Cooper Road across from Blue Ash Road. Access Drive 2 will also operate as a full access Drive. Access Drive 3 and 4 are also located on Cooper Road. Access Drive 3 is intended as a service drive to serve garbage trucks and other service vehicles. The access will operate as a right turn in/out only. Access Drive 4 is intended for deliveries and serve as a pickup/drop off area. The access will be built to operate as one-way with a right turn in only at the east and right turn out at the west end.

Access Drives 3 and 4 are expected to serve a small portion of estimated trips for the site, therefore the analyses at these access drives are not included in the TIS. However, the design at these access drives will be coordinated with the city to ensure safe operations of traffic at these locations.

Figure 1 below shows the location of the proposed development and location of access drives for the proposed development. The site plan is included in Appendix A.

Figure 1 - Site Location



3. Scope of Work

SHA Engineering LLC prepared the Memorandum of Understanding and coordinated with the City of Blue Ash Engineers. The approved MOU is included in Appendix B.

4. Existing Conditions

The proposed development is in the City of Blue Ash, Hamilton County, Ohio. The City of Blue Ash has jurisdictional authority on the roads included in the study area.

Kenwood Road is carrying traffic in the north-south directions. It is classified as a major collector and is posted at 25 mph in the vicinity of the proposed development. North of Cooper Road it is carrying traffic with a single lane for the northbound and southbound directions. Kenwood Road south of the intersection is operating with two lanes each for the northbound and southbound directions.

Cooper Road is carrying traffic in the east-west directions. It is also classified as a major collector and is posted at 25 mph in the vicinity of the proposed development. It is operating with a single lane for the eastbound and westbound traffic.

The intersection of Kenwood Road and State Route 126 eastbound ramps/YMCA Drive is operating with a traffic signal installed. An exclusive lane for the left turns exists on the northbound, southbound, and westbound approaches. The eastbound approach is operating with a lane shared for the left turns and through traffic and an exclusive lane for the right turns.

The intersection of Kenwood Road and Blue Ash Connector/Towne Square Avenue is operating with a traffic signal installed. An exclusive lane for the left turns exists on the northbound and southbound approaches. The eastbound approach is operating with a lane shared for the left turns and through traffic and an exclusive lane for the right turns. The westbound approach is operating with a shared lane for the left turns, through traffic and right turns.

The intersection of Kenwood Road and Cooper Road is operating with a traffic signal installed. An exclusive lane for the left turns exists on all approaches. The northbound approach on Kenwood Road is operating with an exclusive lane for the northbound right turns.

The intersection of Kenwood Road and Malsbury Road/Aldine Drive is operating with a traffic signal installed. Exclusive lane for the left turns exists on all approaches. The southbound approach on Kenwood Road is operating with an exclusive lane for the southbound right turns.

The intersection of Cooper Road and Monroe Avenue/Wynnecrest Drive is operating with a stop control on the northbound and southbound approaches. The eastbound and westbound approaches on Cooper Road are operating with an exclusive lane for the left turns.

The intersection of Kenwood Road and Laurel Avenue is operating with a stop control on the westbound approach on Laurel Avenue. The southbound approach on Kenwood Road is operating with an exclusive lane for the southbound left turns.

The intersection of Cooper Road and Blue Ash Road is operating with stop control on the northbound approach on Blue Ash Road. The westbound approach on Cooper Road is operating with an exclusive lane for the left turns. The northbound approach is operating with a lane each for the northbound left and right turns.

The existing traffic counts were completed for the study on March 29, 2022. The review of counts indicated an AM Peak hour from 7:30 to 8:30 AM and a PM Peak hour between 4:30 – 5:30 PM.

Existing traffic counts recorded at the intersection are shown in Exhibit 01 in Appendix D of this report. The 2025 and 2035 No Build traffic volumes are shown in Exhibits 02 and 03. The projected traffic volumes were estimated using 1%/year growth factor. The traffic data is included in Appendix C.

5. Proposed Development

This study was prepared to evaluate the traffic impact of a retail/residential development located at the northwest quadrant of the intersection of Cooper Road and Kenwood Road in the City of Blue Ash, Ohio. The new development will include retail stores, apartments, and offices. A multi-level parking garage will be built as part of the development to serve the proposed development exclusively. The proposed development will include the following.

- Shopping Plaza - 40,000 SFT
- Fine Dining Restaurant - 5000 SFT x 2
- Fast Casual Restaurant - 2,000 SFT x 2
- Coffee/Donuts Shop - 1,000 SFT
- Drinking Place - 5,000 SFT x 2
- Medical and Dental Office - 35,000 SFT
- Low-Rise Apartments - 250 Dwelling Units

The access to the new development is proposed through four access locations. Access Drive 1 is located on Kenwood Road across from Laurel Avenue. The existing intersection will be modified to add the west leg at the intersection. The eastbound approach on Access Drive 1 will operate with an exclusive lane for the left turns, and a lane shared for the through and right turns. The westbound approach on Laurel Avenue will operate with a lane shared for the left turns, through traffic and right turns. The existing center turn lane on Kenwood Road will be modified to serve as an exclusive northbound left turn lane at Access Drive 1.

Access Drive 2 is located on Cooper Road across from Blue Ash Road. Access Drive 2 will also operate as a full access Drive. The existing intersection of Cooper Road and Blue Ash Road will be modified to with addition of north leg at the intersection. The southbound approach on Access Drive 2 will operate with an exclusive lane for the southbound left turns and a shared lane for the southbound through and right turns.

Access Drives 3 and 4 are also located on Cooper Road. Access Drive 3 is intended as a service drive to serve garbage trucks and other service vehicles. The access will operate as a right turn in/out only. Access Drive 4 is intended for deliveries and will serve as pickup/drop off area. The access will be built to operate as a one-way with right turn in only at the east and right turn out at the west end. Since nominal traffic is expected at Access drives 3 and 4, these locations are not analyzed as part of this report.

6. Trip Generation

New trips were estimated using the information available in the 11th edition of ITE Trip Generation Manual. Summary of estimated new trips are included in Appendix D. The appendix also includes summary of tables developed using ITE Trip Generation Manual.

The summary of trips shows Primary trips, Internal and Pass-by trips.

Primary Trips - Primary trips are made for the specific purpose of visiting the generator. The origin/destination at the generator is the primary reason for the trip. The trip typically goes from origin to generator and then returns to the origin.

Pass-By Trips - Pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator. Pass-by trips are not expected for the proposed residential development.

Internal Trips – Internal trips are made between various land uses located within the boundaries of the development and will not use access locations on existing roadway infrastructure.

7. Trip Distribution

The 2022 existing traffic data was used for estimating trip distribution for the additional trips estimated for the new development. The trip distribution was completed with the following assumptions.

- To and from north on Kenwood Road - 35%
- To and from south on Kenwood Road - 30%
- To and from west on Cooper Road - 20%
- To and from east on Cooper Road - 15%

Exhibit 04 and 05 in Appendix C shows the trip distribution percentage (entering and existing traffic), and estimated new trips are shown in Exhibits 06 and 07.

The existing traffic counts were also used for estimating Pass-by Trips for the AM and PM peak hours. Exhibit 08 shows the Pass-by trips percentages and Exhibit 09 shows Pass-by trips for the AM and PM Peak Hours. Exhibits 10 and 11 show 2025 and 2035 Build traffic volumes.

8. Analysis

Turn Lane Warrants

The turn lane warrants were examined for the turn lanes at Access Drives 1 and 2 for the proposed development. The turn lane warrants were analyzed using the procedure identified in ODOT Location and Design Manual, Volume 1. The results of the turn lane warrants are summarized below and turn lane warrants are included in Appendix E. The turn lane warrants were completed for the movements at unsignalized locations not controlled by the stop sign.

Kenwood Road at Laurel Avenue/Access Drive 1

The turn lane warrants completed at the intersections are summarized below. Since the existing center turn lane will be used for the northbound left turns from Kenwood Road to westbound on Access Drive 1, the turn lane warrants were not completed for this movement.

- The southbound right turn lane from Kenwood Road to westbound on Access Drive 1 **is warranted.**

Cooper Road at Blue Ash Road/Access Drive 2

- The eastbound left turn lane from Cooper Road to northbound on Access Drive 1 **is warranted.**
- The westbound right turn lane from Cooper Road to northbound on Access Drive 1 **is not warranted.**

Capacity Analysis

A capacity analysis was performed for the study area intersections as indicated in the previous sections of this report. All the analyses were completed for existing conditions/opening day traffic using the Highway Capacity Software (HCS). A capacity of an intersection is quantified by the Level of Service (LOS) which is based upon the amount of delay a vehicle experience while at an intersection. The criterion for both signalized and unsignalized intersections are listed below as defined in Chapter 18 and 19 of the most recent Highway Capacity Manual (HCM 2010), Volume 3.

Table 1 and Table 2 - Level of Service Criteria

Table 1 - Signalized Intersection LOS Criteria (Exhibit 18-4 HCM)	
Level of Service	Control Delay (seconds/vehicle)
<i>A</i>	<i>0-10</i>
<i>B</i>	<i>>10 – 20</i>
<i>C</i>	<i>>20 – 35</i>
<i>D</i>	<i>>35 – 55</i>
<i>E</i>	<i>>55 – 80</i>
<i>F</i>	<i>>80</i>

Table 2 - Unsignalized Intersection LOS Criteria (Exhibit 19-1 HCM)	
LOS	Control Delay per Vehicle (seconds/vehicle)
<i>A</i>	<i>< 10</i>
<i>B</i>	<i>>10 – 15</i>
<i>C</i>	<i>>15 – 25</i>
<i>D</i>	<i>>25 – 35</i>
<i>E</i>	<i>>35 – 50</i>
<i>F</i>	<i>>50</i>

For signalized intersections, a LOS is given for the lane, group, intersection approach and entire intersection. However, for the un-signalized intersection LOS criteria apply to each lane on a given approach and to each approach on Side Street. LOS is not calculated for the major-street approaches or for the intersection.

The following is a list of code definitions that are used in the capacity analysis results:

- EB/WB/NB/SB – Eastbound/Westbound/Northbound/Southbound
- L – Left Turn Movement (exclusive left-turn lane or lanes)
- T – Through Movement (exclusive through lane or lanes)
- R – Right Turn Movement (exclusive right turn lane or lanes)
- LT– Shared left turn and through movement lane.
- LTR – This provides movements in all directions.
- TR – Shared through and right turn movement lane.

The capacity analysis was completed for the 2025 and 2035 No Build and Build scenarios for the AM and PM Peak Hour traffic volumes. The results of the capacity analysis for all intersections are included Appendix F.

Kenwood Road at SR-126 EB Ramp/YMCA Drive

The analysis completed for the intersection is summarized in Tables 3, 4, 5 and 6. The intersection is operating with a traffic signal installed.

The results of the analysis completed for the 2025 and 2035 AM Peak Hour No Build and Build scenarios show LOS B for the intersection for all scenarios. All approaches at the intersection are operating with LOS C or better.

The analysis completed for the 2025 and 2035 AM Peak hour No-Build and Build scenarios show LOS B for the intersection. The intersection with 2025 Build traffic scenario shows an average delay of 16.4 seconds/vehicles compared to 16.3 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, the intersection with the 2035 Build scenario shows an average delay of 16.8 seconds/vehicles compared to 16.7 seconds/vehicles observed for the 2035 No Build scenario.

Table 3 – Capacity Analysis – AM Peak – 2025/2035 No-Build – Kenwood Road at SR 126 EB Ramps/YMCA Drive

	2025 AM - No Build (Signal, 85s)					2035 AM - No Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	B	16.3	.40	.44	132	B	16.7	.37	.49	148
EBR	B	16.4	.39	.50	150	B	16.8	.43	.56	169
EB Approach	B	16.4				B	16.7			
WBLTR	B	13.9	.06	.06	23	B	14.0	.07	.06	25
WB Approach	B	13.9				B	14.0			
NBL	C	21.1	.20	.31	47	C	22.4	.24	.36	54
NBT	B	15.6	.27	.24	118	B	15.8	.30	.27	133
NBTR	B	15.6	.27	.23	117	B	15.8	.30	.26	131
NB Approach	B	16.4				B	16.7			
SBL	B	18.3	.08	.15	19	B	18.9	.09	.17	22
SBT	B	16.3	.36	.25	162	B	16.6	.40	.28	183
SBTR	B	16.3	.36	.23	150	B	16.7	.40	.26	169
SB Approach	B	16.4				B	16.8			
Intersection	B	16.3				B	16.7			

Table 4 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Road at SR 126 EB Ramps/YMCA Drive

	2025 AM - Build (Signal, 85s)					2035 AM - Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	B	16.4	.34	.44	132	B	16.9	.37	.37	149
EBR	B	16.5	.39	.50	151	B	16.9	.43	.57	170
EB Approach	B	16.5				B	16.9			
WBLTR	B	14.1	.06	.06	23	B	14.1	.07	.06	25
WB Approach	B	14.1				B	14.1			
NBL	C	21.8	.21	.32	48	C	23.1	.25	.37	55
NBT	B	15.7	.31	.27	135	B	15.9	.33	.30	149
NBTR	B	15.7	.31	.27	133	B	16.0	.33	.30	148
NB Approach	B	16.5				B	16.9			
SBL	B	18.8	.08	.15	20	B	19.4	.10	.17	22
SBT	B	16.4	.39	.28	178	B	16.8	.43	.31	198
SBTR	B	16.5	.39	.26	166	B	16.8	.43	.29	186
SB Approach	B	16.6				B	16.9			
Intersection	B	16.4				B	16.8			

The analysis completed for the 2025 and 2035 PM Peak hour No-Build and Build scenarios show LOS B and C for the intersection. The intersection with 2025 No-Build and Build scenario shows an average delay of 19.7 seconds/vehicles. Similarly, intersection with 2035 Build scenario show an average delay of 20.2 seconds/vehicles compared to 20.8 seconds/vehicles observed for the 2035 No Build scenario.

Table 5 – Capacity Analysis – PM Peak – 2025/2035 No-Build – Kenwood Road at SR 126 EB Ramps/YMCA Drive

	2025 PM - No Build (Signal, 100s)					2035 PM - No Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	B	19.4	.28	.43	129	C	20.6	.32	.49	147
EBR	C	20.1	.38	.60	179	C	21.4	.43	.68	204
EB Approach	B	19.8				C	21.1			
WBLTR	B	17.3	.07	.08	30	B	18.1	.08	.09	35
WB Approach	B	17.3				B	18.1			
NBL	C	27.6	.33	.53	79	C	29.0	.39	.60	90
NBT	B	19.9	.57	.65	324	C	20.1	.62	.71	355
NBTR	B	19.9	.57	.64	322	C	20.1	.62	.71	355
NB Approach	C	20.6				C	20.9			
SBL	C	27.8	.12	.17	22	C	29.0	.14	.19	25
SBT	B	18.4	.48	.41	266	B	18.2	.52	.45	290
SBTR	B	18.4	.48	.39	250	B	18.3	.52	.42	272
SB Approach	B	18.7				B	18.6			
Intersection	B	19.7				C	20.1			

Table 6 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Road at SR 126 EB Ramps/YMCA Drive

	2025 PM - Build (Signal, 85s)					2035 PM - Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	C	20.2	.29	.44	132	C	21.3	.33	.50	150
EBR	C	21.0	.39	.61	184	C	22.2	.44	.69	207
EB Approach	C	20.7				C	21.8			
WBLTR	B	18.1	.07	.08	31	B	18.7	.08	.09	19
WB Approach	B	18.1				B	18.7			
NBL	C	28.0	.35	.53	80	C	29.8	.41	.61	92
NBT	B	19.8	.60	.69	347	C	20.3	.65	.76	382
NBTR	B	19.8	.60	.69	346	C	20.3	.65	.76	381
NB Approach	C	20.5				C	21.0			
SBL	C	28.4	.13	.17	23	C	29.9	.15	.19	30
SBT	B	18.1	.51	.44	283	B	18.1	.55	.48	308
SBTR	B	18.1	.51	.41	267	B	18.2	.55	.45	290
SB Approach	B	18.4				B	18.5			
Intersection	B	19.7				C	20.2			

Kenwood Road at Blue Ash Road Connector/Towne Square (Signalized)

The analysis completed for the intersection is summarized in Tables 7, 8, 9 and 10. The intersection is operating with a traffic signal installed.

The analysis completed with 2025 and 2035 AM Peak Hour No Build and Build scenarios show LOS B for the intersection. All movements show LOS C or better. The intersection with 2025 Build traffic scenario shows an average delay of 17.0 seconds/vehicles compared to 16.8 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, intersection with 2035 Build scenario show an average delay of 17.3 seconds/vehicles compared to 17.1 seconds/vehicles observed for the 2035 No Build scenario.

Table 7 – Capacity Analysis – AM Peak – 2025/2035 No-Build – Kenwood Road at Blue Ash Road Connector/Towne Square

	2025 AM - No Build (Signal, 85s)					2035 AM - No Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	C	20.7	.39	.47	142	C	21.2	.43	.53	159
EBR	B	19.6	.31	.33	98	B	19.8	.34	.37	110
EB Approach	C	20.2				C	20.7			
WBLTR	B	18.1	.12	.10	38	B	18.2	.14	.11	43
WB Approach	B	18.1				B	18.2			
NBL	B	13.3	.20	.13	40	B	13.6	.23	.15	44
NBT	B	12.6	.33	.21	135	B	12.8	.37	.24	152
NBTR	B	12.6	.33	.21	132	B	12.9	.37	.23	149
NB Approach	B	12.7				B	13.0			
SBL	B	17.2	.0	.0	0	B	17.2	.0	.0	0
SBT	B	19.8	.36	.21	137	C	20.2	.39	.24	154
SBTR	B	19.9	.36	.21	135	C	20.2	.40	.23	151
SB Approach	B	19.8				C	20.2			
Intersection	B	16.8				B	17.1			

Table 8 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Road at Blue Ash Road Connector/Towne Square

	2025 AM - Build (Signal, 85s)					2035 AM - Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	C	20.7	.39	.47	142	C	21.2	.43	.53	159
EBR	B	19.8	.34	.37	110	C	20.1	.37	.41	123
EB Approach	C	20.3				C	20.8			
WBLTR	B	18.1	.12	.10	38	B	18.2	.14	.11	43
WB Approach	B	18.1				B	18.2			
NBL	B	13.5	.22	.15	44	B	13.8	.25	.16	49
NBT	B	12.8	.36	.23	148	B	13.1	.40	.26	166
NBTR	B	12.8	.36	.23	146	B	13.1	.40	.25	163
NB Approach	B	12.9				B	13.2			
SBL	B	17.2	.0	.0	0	B	17.2	.0	.0	0
SBT	C	20.1	.38	.23	150	C	20.4	.42	.26	168
SBTR	C	20.1	.39	.23	147	C	20.5	.43	.25	164
SB Approach	C	20.1				C	20.5			
Intersection	B	17.0				B	17.3			

The analysis completed with 2025 and 2035 AM Peak Hour No Build and Build scenarios show LOS C for the intersection. All movements except for the northbound left turns show LOS C or better. The northbound left turn shows LOS D for the 2035 No-Build and Build scenarios. The intersection with the 2025 Build traffic scenario shows an average delay of 24.5 seconds/vehicles compared to 24.1 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, intersection with the 2035 Build scenario show an average delay of 27.6 seconds/vehicles compared to 26.3 seconds/vehicles observed for the 2035 No Build scenario.

The analysis also indicates the 95th percentile queue for the northbound left turns exceeds the storage length available with the analysis completed with 2035 PM Peak Hour Build traffic volumes.

Table 9 – Capacity Analysis – PM Peak – 2025/2035 No-Build – Kenwood Road at Blue Ash Road Connector/Towne Square

	2025 PM - No Build (Signal, 100s)					2035 PM - No Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	C	28.6	.31	.39	118	C	32.4	.39	.47	140
EBR	C	28.1	.28	.32	95	C	31.6	.36	.38	113
EB Approach	C	28.4				C	32.0			
WBLTR	C	27.7	.23	.21	86	C	31.2	.29	.25	102
WB Approach	C	27.7				C	31.2			
NBL	D	37.7	.89	.87	262	D	42.0	.90	1.06	317
NBT	B	10.3	.39	.29	190	A	8.6	.41	.29	186
NBTR	B	10.3	.39	.28	183	A	8.6	.41	.28	180
NB Approach	B	19.0				B	19.2			
SBL	B	18.4	.01	.02	3	B	18.5	.02	.03	3
SBT	C	28.9	.72	.59	378	C	32.8	.80	.68	439
SBTR	C	29.2	.72	.54	351	C	33.4	.80	.63	409
SB Approach	C	29.0				C	33.0			
Intersection	C	24.1				C	26.3			

Table 10 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Road at Blue Ash Road Connector/Towne Square

	2025 PM - Build (Signal, 100s)					2035 PM - Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB LT	C	30.3	.33	.41	122	C	33.3	.41	.47	142
EBR	C	30.2	.36	.40	120	C	33.	.44	.46	138
EB Approach	C	30.3				C	33.2			
WBLTR	C	29.3	.5	.22	88	C	32.0	.30	.26	103
WB Approach	C	29.3				C	32.0			
NBL	D	37.4	.88	.91	274	D	50.8	.94	1.58	473
NBT	A	9.6	.41	.30	195	A	8.4	.43	.30	196
NBTR	A	9.6	.41	.29	190	A	8.4	.43	.30	191
NB Approach	B	18.1				C	21.5			
SBL	B	18.4	.01	.02	3	B	17.9	.02	.03	3
SBT	C	30.4	.76	.63	405	C	33.1	.81	.71	458
SBTR	C	30.8	.76	.59	377	C	33.7	.81	.66	428
SB Approach	C	30.6				C	33.3			
Intersection	C	24.5				C	27.6			

Kenwood Road at Cooper Road.

The analysis completed for the intersection is summarized in Tables 11, 12, 13 and 14. The intersection is operating with a traffic signal installed.

The analysis completed with 2025 and 2035 AM Peak Hour No-Build and Build scenarios show LOS C for the intersection. All movements show LOS D or better. The intersection with 2025 Build traffic scenario shows an average delay of 28.5 seconds/vehicles compared to 27.2 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, intersection with 2035 Build scenario show an average delay of 32.2 seconds/vehicles compared to 29.5 seconds/vehicles observed for the 2035 No Build scenario.

Table 11 – Capacity Analysis – AM Peak – 2025/2035 No Build/Build – Kenwood Road at Cooper Road

	2025 AM – No Build (Signal, 85s)					2035 AM – No Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	21.6	.41	.72	97	C	23.1	.51	.82	111
EBTR	C	25.7	.31	.21	102	C	26.7	.35	.24	116
EB Approach	C	23.5				C	24.8			
WBL	B	19.5	.14	.18	40	C	20.4	.16	.20	44
WBTR	C	33.0	.67	.18	223	D	39.8	.78	.21	264
WB Approach	C	30.3				D	35.9			
NBL	B	16.2	.20	.32	46	B	15.9	.22	.34	50
NBT	D	36.3	.83	.38	378	D	40.7	.88	.43	434
NBR	B	15.4	.10	.07	34	B	14.8	.11	.07	37
NB Approach	C	31.2				C	34.5			
SBL	B	18.9	.31	.34	51	B	19.3	.36	.37	56
SBT	C	23.5	.40	.28	159	C	23.1	.43	.31	175
SBTR	C	23.6	.41	.27	152	C	23.1	.43	.30	167
SB Approach	C	22.7				C	22.4			
Intersection	C	27.2				C	29.5			

Table 12 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Road at Cooper Road

	2025 AM - Build (Signal, 85s)					2035 AM - Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	22.5	.49	.82	111	C	24.8	.58	.95	129
EBTR	C	26.4	.36	.24	117	C	27.1	.40	.26	130
EB Approach	C	24.4				C	25.9			
WBL	B	19.9	.14	.18	40	C	20.4	.17	.20	44
WBTR	D	36.7	.74	.20	249	D	44.5	.83	.24	294
WB Approach	C	33.5				D	39.9			
NBL	B	16.2	.24	.38	55	B	16.2	.27	.41	60
NBT	D	38.9	.86	.41	410	D	47.8	.92	.49	490
NBR	B	15.1	.10	.07	34	B	14.8	.11	.07	37
NB Approach	C	32.9				C	39.6			
SBL	B	19.2	.35	.37	56	B	19.7	.41	.40	60
SBT	C	23.4	.42	.31	172	C	23.4	.46	.34	190
SBTR	C	23.4	.43	.29	164	C	23.4	.46	.32	180
SB Approach	C	22.7				C	22.7			
Intersection	C	28.5				C	32.2			

The analysis completed with 2025 PM Peak Hour No-Build and Build scenarios show LOS C for the intersection. The analysis completed with 2035 PM Peak Hour No Build and Build scenarios show LOS C and D for the intersection. All movements show LOS D or better. The intersection with the 2025 Build traffic scenario shows an average delay of 32.6 seconds/vehicles compared to 30.6 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, intersection with the 2035 Build scenario shows an average delay of 37.9 seconds/vehicles compared to 33.7 seconds/vehicles observed for the 2035 No Build scenario.

Table 13 – Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Road at Cooper Road

	2025 PM – No Build (Signal, 100s)					2035 PM – No Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	23.7	.42	.77	104	C	25.8	.53	.89	120
EBTR	C	32.1	.63	.59	290	D	36.2	.72	.68	335
EB Approach	C	29.6				C	33.1			
WBL	C	23.5	.42	.48	106	C	25.3	.52	.55	121
WBTR	C	35.7	.70	.25	308	D	42.4	.80	.29	365
WB Approach	C	32.0				D	37.3			
NBL	B	19.9	.30	.43	63	B	19.9	.33	.47	68
NBT	D	40.1	.83	.46	464	D	45.9	.89	.54	539
NBR	B	18.7	.22	.19	97	B	18.3	.24	.21	105
NB Approach	C	33.3				D	37.2			
SBL	C	23.6	.52	.64	96	C	26.7	.62	1.23	185
SBT	C	28.8	.58	.51	286	C	29.1	.62	.56	315
SBTR	C	28.9	.58	.48	270	C	29.3	.62	.53	297
SB Approach	C	27.9				C	28.8			
Intersection	C	30.6				C	33.7			

Table 14 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Road at Cooper Road

	2025 PM – Build (Signal, 100s)					2035 PM – Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	26.0	.54	.94	128	C	30.9	.67	1.14	153
EBTR	D	35.3	.70	.65	322	D	40.1	.79	.76	371
EB Approach	C	32.3				D	37.2			
WBL	C	24.6	.46	.49	108	C	26.9	.56	.57	125
WBTR	D	41.2	.78	.28	353	D	51.0	.87	.34	422
WB Approach	D	36.5				D	44.1			
NBL	C	20.0	.37	.55	79	C	20.5	.42	.59	85
NBT	D	43.3	.87	.51	514	D	54.1	.94	.62	618
NBR	B	18.1	.22	.19	95	B	18.0	.24	.21	104
NB Approach	D	35.3				D	42.6			
SBL	C	25.5	.59	1.18	177	C	32.3	.72	1.40	211
SBT	C	28.6	.60	.54	304	C	29.7	.65	.60	337
SBTR	C	28.8	.61	.51	286	C	29.9	.65	.56	316
SB Approach	C	28.1				C	30.2			
Intersection	C	32.6				D	37.9			

Kenwood Road at Malsbury

The analysis completed for the intersection is summarized in Tables 15, 16,17 and 18. The intersection is operating with a traffic signal installed.

The analysis completed with 2025 and 2035 AM Peak Hour No-Build and Build scenarios show LOS C for the intersection. All movements show LOS D or better. The intersection with the 2025 Build traffic scenario shows an average delay of 28.0 seconds/vehicles compared to 26.5 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, the intersection with the 2035 Build scenario shows an average delay of 31.0 seconds/vehicles compared to 28.8 seconds/vehicles observed for the 2035 No Build scenario.

Table 15 – Capacity Analysis – AM Peak – 2025/2035 No Build – Kenwood Road at Malsbury Road/Aldine Drive

	2025 AM – No Build (Signal, 85s)					2035 AM – No Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	23.3	.04	.08	11	C	24.5	.05	.09	12
EBTR	C	29.1	.17	.20	40	C	30.5	.20	.22	45
EB Approach	C	27.8				C	29.1			
WBL	C	23.9	.17	.30	53	C	25.2	.20	.35	61
WBTR	C	34.2	.55	.21	129	D	41.0	.68	.27	161
WB Approach	C	30.7				D	35.5			
NBL	B	14.6	.28	.44	53	B	14.5	.32	.47	57
NBTR	C	34.4	.86	.45	449	D	38.9	.91	.52	520
NB Approach	C	31.1				C	34.8			
SBL	B	18.8	.49	.50	61	B	19.3	.54	.45	67
SBT	C	23.0	.63	.51	288	C	23.0	.67	.56	314
SBR	B	12.3	.16	.63	54	B	11.6	.17	.67	57
SB Approach	C	20.4				C	20.3			
Intersection	C	26.5				C	28.8			

Table 16 – Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Road at Malsbury Road/Aldine Drive

	2025 AM – Build (Signal, 85s)					2035 AM – Build (Signal, 85s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	24.0	.05	.08	11	C	25.3	.06	.09	13
EBTR	C	30.4	.24	.28	56	C	31.9	.29	.20	61
EB Approach	C	29.2				C	30.6			
WBL	C	24.7	.18	.31	54	C	26.1	.22	.36	62
WBTR	D	36.4	.60	.22	134	D	46.9	.75	.29	175
WB Approach	C	32.3				D	39.6			
NBL	B	14.9	.34	.50	60	B	14.8	.38	.53	63
NBTR	D	37.5	.89	.50	498	D	43.3	.94	.58	578
NB Approach	C	33.5				D	38.3			
SBL	B	18.7	.49	.50	59	B	19.2	.54	.43	65
SBT	C	23.6	.68	.57	319	C	23.7	.71	.62	346
SBR	B	11.8	.15	.61	52	B	11.1	.16	.65	56
SB Approach	C	20.8				C	20.8			
Intersection	C	28.0				C	31.0			

The analysis completed with 2025 PM Peak Hour No-Build and Build scenarios show LOS C for the intersection. The analysis completed with 2035 PM Peak Hour No Build and Build scenarios show LOS C and D for the intersection. All movements show LOS D or better. The intersection with 2025 Build traffic scenario shows an average delay of 34.4 seconds/vehicles compared to 31.4 seconds/vehicles observed for the 2025 No Build scenarios. Similarly, intersection with 2035 Build scenario show an average delay of 39.2 seconds/vehicles compared to 32.2 seconds/vehicles observed for the 2035 No Build scenario.

Table 17–Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Road at Malsbury Road/Aldine Drive

	2025 PM – No Build (Signal,100s)					2P035 M – No Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	30.2	.22	.57	80	C	32.8	.27	.65	92
EBTR	D	37.9	.50	.71	141	D	46.5	.67	.90	180
EB Approach	C	34.8				D	41.1			
WBL	C	29.1	.05	.07	12	C	31.6	.06	.08	15
WBTR	D	36.5	.12	.05	29	D	39.2	.16	.05	32
WB Approach	C	34.0				D	36.5			
NBL	B	15.8	.10	.12	15	B	15.6	.11	.12	15
NBTR	D	35.9	.89	.62	623	D	37.7	.92	.70	696
NB Approach	D	35.1				D	36.8			
SBL	C	21.0	.13	.21	31	C	21.1	.14	.23	35
SBT	C	26.9	.77	.86	481	C	26.5	.80	.93	523
SBR	B	10.7	.04	.16	14	A	9.3	.04	.16	14
SB Approach	C	26.0				C	25.5			
Intersection	C	31.4				C	32.8			

Table 18 – Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Road at Malsbury Road/Aldine Drive

	2025 PM – Build (Signal,100s)					2P035 M – Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	31.4	.23	.58	81	C	33.2	.27	.66	92
EBTR	D	44.1	.66	.94	188	D	52.8	.76	1.10	220
EB Approach	D	39.6				D	45.8			
WBL	C	30.4	.05	.07	13	C	32.2	.07	.09	15
WBTR	D	37.8	.13	.05	29	D	38.7	.15	.05	32
WB Approach	D	35.3				D	36.5			
NBL	B	17.0	.17	.20	23	B	17.8	.19	.20	23
NBTR	D	40.0	.93	.70	700	D	47.8	.97	.83	826
NB Approach	D	38.6				D	46.0			
SBL	C	21.0	.13	.21	31	C	21.1	.14	.11	16
SBT	C	29.1	.83	.98	547	D	31.0	.87	1.09	613
SBR	A	10.0	.04	.16	13	A	9.5	.04	.17	14
SB Approach	C	28.0				C	29.8			
Intersection	C	34.4				D	39.2			

Cooper Road at Monroe Avenue/Wynnecrest Drive.

The analysis completed for the intersection is summarized in Tables 19, 20,21 and 22. The intersection is operating with a stop control on the northbound and southbound approaches.

The analysis completed with 2025 and 2035 AM Peak Hour No Build scenarios show LOS B on the northbound and southbound approaches at the intersection. The analysis completed with 2025 AM Peak Hour Build scenarios show LOS B for the northbound and southbound approaches. The analysis with 2035 AM Peak Hour Build traffic show LOS C on the southbound approach on Monroe Avenue. The eastbound and westbound left turns show LOS A for all scenarios.

Table 19—Capacity Analysis – AM Peak – 2025/2035 No Build – Copper Road at Monroe Avenue/Wynnecrest Drive

	2025 AM No -Build (Unsignalized)					2035 AM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.1	.01		0	A	8.2	.01		0
WBL	A	7.8	.0		0	A	7.9	.01		0
NB LTR	B	13.1	.04		0	B	13.9	.05		5
NB Approach	B	13.1				B	13.9			
SBLTR	B	13.1	.07		5	B	14.0	.08		8
SB Approach	B	13.1				B	14.0			
Intersection	N/A					N/A				

Table 20—Capacity Analysis – AM Peak – 2025/2035 Build – Copper Road at Monroe Avenue/Wynnecrest Drive

	2025 AM Build (Unsignalized)					2035 AM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.1	.01		0	A	8.3	.01		0
WBL	A	7.8	.0		0	A	7.9	.01		0
NB LTR	B	13.6	.05		3	B	14.5	.06		5
NB Approach	B	13.6				B	14.5			
SBLTR	B	14.4	.10		8	C	15.5	.12		10
SB Approach	B	14.4				C	15.5			
Intersection	N/A					N/A				

The analysis completed with the 2025 and 2035 PM Peak Hour No Build scenarios show LOS C on the northbound and southbound approaches at the intersection. The analysis completed with the 2025 PM Peak Hour Build scenarios show LOS C for the northbound and southbound approaches. The analysis with the 2035 AM Peak Hour Build traffic shows LOS D on the northbound approach on Wynnecrest Drive. The eastbound and westbound left turns show LOS A for all scenarios.

Table 21—Capacity Analysis – PM Peak – 2025/2035 No Build – Copper Road at Monroe Avenue/Wynnecrest Drive

	2025 PM No -Build (Unsignalized)					2025 PM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.2	.02		3	A	8.3	.03		3
WBL	A	8.6	.0		0	A	8.8	.0		0
NB LTR	C	21.4	.04		3	C	24.2	.04		3
NB Approach	C	21.4				C	24.2			
SBLTR	C	16.1	.16		15	C	17.3	.17		15
SB Approach	C	16.1				C	17.3			
Intersection	N/A					N/A				

Table 22—Capacity Analysis – PM Peak – 2025/2035 Build – Copper Road at Monroe Avenue/Wynnecrest Drive

	2025 PM No -Build (Unsignalized)					2025 PM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.2	.02		3	A	8.3	.03		3
WBL	A	8.6	.0		0	A	8.8	.0		0
NB LTR	C	21.4	.04		3	C	24.2	.04		3
NB Approach	C	21.4				C	24.2			
SBLTR	C	16.1	.16		15	C	17.3	.17		15
SB Approach	C	16.1				C	17.3			
Intersection	N/A					N/A				

Avenue/Wynnecrest Drive

	2025 PM Build (Unsignalized)					2025 PM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.3	.02		3	A	8.5	.03		3
WBL	A	8.7	.03		0	A	8.9	.03		0
NB LTR	C	22.1	.03		3	D	26.2	.05		5
NB Approach	C	22.1				D	26.2			
SBLTR	C	19.3	.1		20	C	22.3	.26		25
SB Approach	C	19.3				C	22.3			
Intersection	N/A					N/A				

Kenwood Road at Laurel Avenue/Access Drive 1.

The analysis completed for the intersection is summarized in Tables 23, 24, 25 and 26. The intersection is operating with a stop control on the westbound approach on Laurel Avenue. For the Build scenarios the intersection is analyzed with stop control on the eastbound approach on Access Drive 1.

The analysis completed with the 2025 and 2035 AM Peak Hour No Build scenarios show LOS C and D on the westbound approach on Laurel Avenue. The analysis with the 2025 AM Peak Hour Build scenarios show LOS E on the eastbound and westbound approaches. The results of the analysis with 2035 AM Peak Hour Build traffic volumes show LOS F on the eastbound and westbound approaches. The northbound and southbound left turns show LOS A for all scenarios.

Table 23—Capacity Analysis – AM Peak – 2025/2035 No Build – Kenwood Road at Laurel Avenue

Table 24—Capacity Analysis – AM Peak – 2025/2035 Build – Kenwood Road at Laurel

	2025 AM No -Build (Unsignalized)					2035 AM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBLR	C	21.3	.2		18	D	25.2	.26		25
WB Approach	C	21.3				D	25.2			
SBL	A	9.3	.04		3	A	9.6	.04		3
Intersection	N/A					N/A				

Avenue/Access Drive 1

	2025 AM Build (Unsignalized)					2035 AM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBLTR	E	39.7	.39		43	F	54.8	.51		35
WB Approach	E	39.7				F	54.8			
EBL	F	80.8	.50		30	F	127.7	.66		73
EBTR	C	17.6	.13		13	C	19.9	.15		13
EB Approach	E	49.6				F	74.4			
NBL	A	8.8	.04		3	A	9.0	.04		3
SBL	A	9.4	.04		3	A	9.7	.04		3
Intersection	N/A					N/A				

The analysis completed with the 2025 and 2035 PM Peak Hour No Build scenarios show LOS D and E on the westbound approach on Laurel Avenue. The analysis with the 2025 and 2035 AM Peak Hour Build scenarios show LOS F on the eastbound and westbound approaches. The southbound left turns show LOS A for all scenarios. The northbound left turns show LOS B for the 2025 and 2035 Build scenarios.

Table 25—Capacity Analysis – PM Peak – 2025/2035 No Build – Kenwood Road at Laurel Avenue

	2025 PM No -Build (Unsignalized)					2035 PM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBLR	D	32.0	.15	.5	13	E	42.7	.22	.8	20
WB Approach	D	32.0				E	42.7			
SBL	A	9.5	.01	0	0	A	9.9	.02	.1	3
Intersection	N/A					N/A				

Table 26—Capacity Analysis – PM Peak – 2025/2035 Build – Kenwood Road at Laurel Avenue/Access Drive 1

	2025 PM Build (Unsignalized)					2035 PM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBLTR	F	139.9	.63		65	F	282.6	.98		95
WB Approach	F	139.9				F	282.6			
EBL	F	605.1	1.83		195	F	1056.1	2.68		225
EBTR	D	31.5	.35		38	E	41.2	.42		48
EB Approach	F	324.6				F	599.9			
NBL	B	10.6	.1		8	B	11.1	.11		10
SBL	A	9.5	.01		0	A	9.9	.02		3
Intersection	N/A					N/A				

Cooper Road at Blue Ash Road/Access Drive 2.

The analysis completed for the intersection is summarized in Tables 27, 28, 29 and 30. The intersection is operating with a stop control on the northbound approach on Blue Ash Road. For the Build scenarios the intersection is analyzed with stop control on the southbound approach on Access Drive 2.

The analysis completed with the 2025 and 2035 AM Peak Hour No Build scenarios show LOS B on the northbound approach on Blue Ash Road. The analysis with the 2025 AM Peak Hour Build scenarios show LOS B and C on the northbound and southbound approaches. The results of the analysis with the 2035 AM Peak Hour Build traffic volumes show LOS C on the northbound and southbound approaches. The eastbound and westbound left turns show LOS A for all scenarios.

Table 27—Capacity Analysis – AM Peak – 2025/2035 No Build – Cooper Road at Blue Ash Road

	2025 AM No -Build (Unsignalized)					2035 AM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBL	A	7.8	.04		3	A	7.9	.04		3
NBL	B	14.0	.16		13	C	15.2	.18		15
NBR	B	10.1	.15		3	B	10.4	.17		15
NB Approach	B	11.5				B	12.1			
Intersection	N/A					N/A				

Table 28—Capacity Analysis – AM Peak – 2025/2035 Build – Cooper Road at Blue Ash Road/Access Drive 2

	2025 AM Build (Unsignalized)					2035 AM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	7.9	.03		3	A	8.0	.03		3
WBL	A	7.8	.04		3	A	7.9	.04		3
NBL	C	19.7	.22		20	C	22.3	.27		28
NBTR	B	10.7	.17		15	B	11.0	.19		18
NB Approach	B	13.8				C	15.0			
SBL	C	20.2	.13		10	C	22.7	.15		13
SBTR	B	12.3	.1		8	B	12.8	.1		8
SB Approach	C	15.4				C	16.7			
Intersection	N/A					N/A				

The analysis completed with the 2025 and 2035 PM Peak Hour No Build scenarios show LOS C on the northbound approach on Blue Ash Road. The analysis with the 2025 PM Peak Hour Build scenario show LOS D and E on the northbound and southbound approaches at the intersection. The analysis with the 2035 PM Peak Hour scenario show LOS E and F on the northbound and southbound approaches respectively. The eastbound and westbound left turns show LOS A for all scenarios.

Table 29—Capacity Analysis – PM Peak – 2025/2035 No Build – Cooper Road at Blue Ash Road

	2025 PM No -Build (Unsignalized)					2035 PM No-Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
WBL	A	9.0	.13		10	A	9.3	.15		13
NBL	D	27.1	.26		25	D	34.2	.34		35
NBR	B	12.5	.21		20	B	13.3	.25		25
NB Approach	C	17.0				C	19.7			
Intersection	N/A					N/A				

Table 30—Capacity Analysis – PM Peak – 2025/2035 Build – Cooper Road at Blue Ash Road/Access Drive 2

	2025 PM Build (Unsignalized)					2035 PM Build (Unsignalized)				
	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay ((Sec/veh)	v/c	QSR	95 th %ile queue
EBL	A	8.3	.05		5	A	8.4	.05		5
WBL	A	9.0	.13		10	A	9.2	.14		13
NBL	F	69.3	.54		60	F	114.4	.71		28
NBTR	C	16.0	.30		33	C	17.9	.36		33
NB Approach	D	31.4				E	45.5			
SBL	F	80.9	.54		60	F	130.3	.71		80
SBTR	C	19.9	.24		22	C	23.0	.25		28
SB Approach	E	44.0				F	65.4			
Intersection	N/A					N/A				

Storage Length

The storage lengths were estimated using the information shown in Figures 401-9 and 401-10 in ODOT Location and Design Manual, volume 1. Table 31 provides the details on the estimated storage lengths for the exclusive turn lanes.

Table 31 - Storage length Calculations – (2035 Build Scenarios)						
Kenwood Road at Access Drive 1 Unsignalized - (25 mph)						
AM Cycle Length 60 seconds, PM Cycle Length 60 seconds						
Movement	Period	Turn Volume	Storage Length (Ft.) *		Through Vol. (veh./hr.)	Blocked
			Required	Recommended		
SB Right Turn Lane	AM	52	100	150	534	N/A
	PM	88	150		868	N/A
NB Left Turn Lane	AM	35	100	150	752	N/A
	PM	67	150		820	N/A
Kenwood Road at Access Drive 1 Unsignalized - (25 mph)						
AM Cycle Length 60 seconds, PM Cycle Length 60 seconds						
EB Left Turn Lane	AM	35	100	150**	187	N/A
	PM	54	100		374	N/A
<i>*All recommended lengths include a 50' taper</i>						
<i>** Existing conditions may pose challenges. The turn lane may be reduced to avoid impact on the adjacent properties</i>						

9. Findings and Conclusions

The preceding analysis and recommendations listed below are based on the typical procedure used for evaluating the impact of the proposed development on the adjacent roadway infrastructure and usual customary traffic engineering standards.

The findings of the analysis completed for the intersections within the study area are summarized below.

Kenwood Road at SR 126 EB Ramps/YMCA Drive

The capacity analysis completed for the intersection shows acceptable LOS at the intersection for all scenarios. The intersection shows LOS B for all scenarios included in the analysis. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ratio observed at the intersection indicate that the existing storage lengths for all turn lanes at the intersections are adequate. All scenarios show queue/storage ratio below 1.0 for exclusive turn lanes at the intersection.

Kenwood Road at SR 126 WB Ramps (Blue Ash Connector)/Towne Square Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis show intersection will operate at LOS B for AM Peak Hour No Build and Build scenarios. The analysis with PM Peak Hour Build scenarios shows LOS C for all scenarios. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ration observed at the intersection indicate that the existing storage lengths for the northbound left turns exceeds 1 with the analysis completed for the 2035 No Build and Build scenarios. All other turn lanes at the intersection show queue/storage ratio below 1.0.

Kenwood Road at Cooper Road

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis shows that the intersection will operate at LOS C for AM Peak Hour No Build and Build scenarios. The analysis with PM Peak Hour Build scenarios shows LOS C for all scenarios except 2035 Build scenario which show LOS D at the intersection. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new the development.

The queue/storage ratio observed at the intersection indicates that the existing storage lengths for the southbound left turns exceeds 1 with the analysis completed for the 2035 PM Peak Hour No Build and Build scenario. The eastbound left turn also shows queue storage ration of 1.14 for the 2035 PM Peak Hour Build scenario. All other turn lanes at the intersection show a queue/storage ratio below 1.0. The

pavement markings at the intersection can be modified to provide additional storage for the southbound left turns.

The parallel parking is proposed along southbound approach at the intersection in front of the retail development on Kenwood Road. The capacity analysis for the PM Peak Hour at the intersection is also completed assuming 30 parking maneuvers. The results of the analysis completed for the 2035 PM Peak Hour are summarized in Table 32.

The results of the analysis with parking maneuvers indicate a slight increase in the average delay at the intersection. An increase of 1.1 seconds/vehicles is observed from 37.9 seconds/vehicles to 39.0 seconds/vehicles. The average delay on the southbound approach shows an increase of 3.5 seconds/vehicles from 30.2 seconds/vehicles to 33.7 seconds/vehicles.

Table 32–Capacity Analysis – 2035 PM Peak Hour Build - Kenwood Road at Cooper Road with Parking Maneuvers on Southbound Approach.

2035 PM - Build (Signal, 100s) – With Parkng Maneuvers					
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	30.9	.67	1.14	153
EBTR	D	40.1	.79	.76	371
EB Approach	D	37.2			
WBL	C	26.9	.56	.57	125
WBTR	D	51.0	.87	.34	422
WB Approach	D	44.1			
NBL	C	21.6	.46	.59	86
NBTR	D	54.1	.94	.62	618
NB Approach	D	42.8			
SBL	C	32.3	.72	1.4	210
SBT	C	33.2	.75	.71	400
SBTR	D	35.2	.75	.54	300
SB Approach	C	33.7			
Intersection	D	39.0			

Kenwood Road at Malsbury Road/Aldine Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic at the intersection. The analysis shows that the intersection will operate at LOS C for AM Peak Hour No Build and Build scenarios. The analysis with the PM Peak Hour Build scenarios shows LOS C for all scenarios except the

2035 Build scenario which show LOS D at the intersection. The results of the capacity analysis indicate that the existing geometry and signal operations is adequate to accommodate additional traffic generated by the new development.

The queue/storage ratio observed at the intersection indicate that the existing storage lengths for all turn lanes at the intersections are adequate. All scenarios show a queue/storage ratio below 1.0 for exclusive turn lanes at the intersection.

Cooper Road at Monroe Avenue/Wynnecrest Drive

The capacity analysis completed at the intersection shows acceptable flow of traffic and LOS on the northbound and southbound approaches at the intersection for all scenarios.

Kenwood Road at Laurel Avenue/Access Drive 1

Capacity analysis completed at the intersection show LOS C and D on the westbound approach on Laurel Avenue with the analysis completed with AM Peak Hour 2025/2035 No Build scenarios. The AM Peak Hour Build scenarios show LOS F for the stopped control approaches (eastbound and westbound). Similar results are obtained for the analysis completed with the PM Peak Hour scenarios.

The delays on the side streets are caused by the lack of gaps available required for making left and right turns from the side street. Additional lanes on the side street approaches will not result in significant reduction of average delay.

The analysis at the intersection was also completed assuming a traffic signal is installed at this location. The summary of the analysis completed at the intersection is included in Table 33. The analysis at the intersection with traffic signal is completed using the existing geometry on the southbound approach on Kenwood Road.

The analysis at the intersection indicates an acceptable flow of traffic. The 2035 AM Peak Hour scenario shows LOS B at the intersection with an average delay of 19.1 seconds/vehicles. The analysis with the PM Peak Hour 2035 Build scenario show LOS C with an average delay of 24.2 seconds/vehicle.

Traffic Signal Warrants for the intersection were completed for the opening day traffic. The trips on the eastbound approach on Access Drive 1 were estimated using hourly distribution included in *Appendix A (estimated hourly distribution) of ITE Trip Generation Manual*. The estimated hourly distribution on Access Drive 1 and traffic signal warrants completed are included in Appendix

Table 33–Capacity Analysis –AM/PM Peak Hour – 2035 Build - Kenwood Road at Laurel Avenue/Access Drive 1

	2035 AM – Build (Signal,85s)					2035 PM - Build (Signal, 100s)				
	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue	LOS	Delay (Sec/veh)	v/c	QSR	95 th %ile queue
EB L	C	21.5	.09	.19	28	D	38.0	.26	.49	73
EBTR	B	19.6	.08	.09	26	C	34.4	.23	.22	66
EB Approach	C	20.6				D	36.3			
WBLTR	B	20.0	.12	.11	43	C	33.6	.11	.09	36
WB Approach	B	20.0				Cc	33.6			
NBL	D	43.9	.45	.24	37	C	22.2	.30	.30	45
NBTR	C	20.6	.81	.93	463	A	9.9	.68	.73	365
NB Approach	C	21.6				B	10.8			
SBL	C	30.1	.17	.22	28	B	17.0	0.04	.07	9
SBTR	B	14.7	.63	.48	309	C	34.7	.95	1.3	808
SB Approach	B	15.5				C	34.5			
Intersection	B	19.1				C	24.2			

Cooper Road at Blue Ash Road/Access Drive 2

The capacity analysis completed at the intersection shows an acceptable LOS on the northbound and southbound stop-controlled intersection for the analysis completed with the AM Peak Hour No Build and Build scenarios. The capacity analysis with the PM Peak Hour Build scenarios shows LOS F on the southbound and northbound approaches at the intersection.

The delays on the side streets are caused by the lack of gaps available required for making left and right turns from the side street. Additional lanes on the side street approaches will not result in significant reduction of average delays on the northbound and southbound approaches.

Cooper Road at Access Drive 3 and 4

The access drives 3 and 4 are intended for limited use. Access Drive 3 is primarily intended to be used by the utility vehicles for garbage collection. The access on Cooper Road will be restricted to right turn in/out only. Similarly, access drive 4 is intended for deliveries (such as Amazon, Uber etc.) and the pickup and drop off area. Detailed construction plans shall be developed and submitted to the City for their review and approval.

Recommendations

General

Implementation of all work to be completed as part of the recommendations in this report shall be built using the standards followed by ODOT. This will include the construction for installation of new lanes, pavement markings, signage, and construction of the Access Drives.

Kenwood Road at Laurel Avenue/Access Drive 1

The analysis completed at the intersection show a traffic signal will allow safe and satisfactory flow of traffic at the intersections. The following improvements are recommended at the intersection.

- A new traffic signal shall be installed at the intersection. The traffic signal shall be designed and built as per the requirements and standards followed by City of Blue Ash.
- A pedestrian cross walk for Kenwood crossing shall be provided on the north leg of the intersection.
- The existing pavement markings on Kenwood Road should be modified to provide a 150' (including 50' storage) long northbound left turn lane.
- The west leg of intersection (Access Drive 1) shall be built to provide one inbound lane and two outbound lanes. The two lanes on eastbound approach on Access Drive 1 shall be designated as an exclusive lane for the eastbound left turns, and a shared lane for the through and right turns.
- The westbound approach on Laurel Avenue shall be modified to operate with a single lane shared for the left, through and right turns.
- The proposed parallel parking on Kenwood Road in front of the development shall start 50' (or as required by City of Blue Ash) south of the intersection of Kenwood Road and Laurel Avenue/Access Drive 1.

Cooper Road at Blue Ash Road/Access Drive 2

- A 100' (including 50' taper) long lane for the southbound left turn shall be built for the left turns from West Road to eastbound on Access Drive 2.
- The south leg on Blue Ash Road shall be modified to provide an exclusive lane for the northbound left turns and a lane shared for the through and right turns.
- The north leg of intersection (Access Drive 2) shall be built to provide one inbound lane and two outbound lane. The southbound approach on Access Drive 2 shall be built with two outbound lanes, an exclusive lane for the southbound left turns, and a shared lane for the through and right turns.

Cooper Road at Kenwood Road

- The existing pavement marking on the southbound approach should be modified to extend Storage for the southbound left turn (approximately 220' including 50' taper).