

TRAFFIC IMPACT STUDY

# HoM FLATS AT MUR-LEN

OLATHE, KANSAS

Prepared For:  
Phelps Engineering

Prepared By:  
Michael Hare, PE, PTOE

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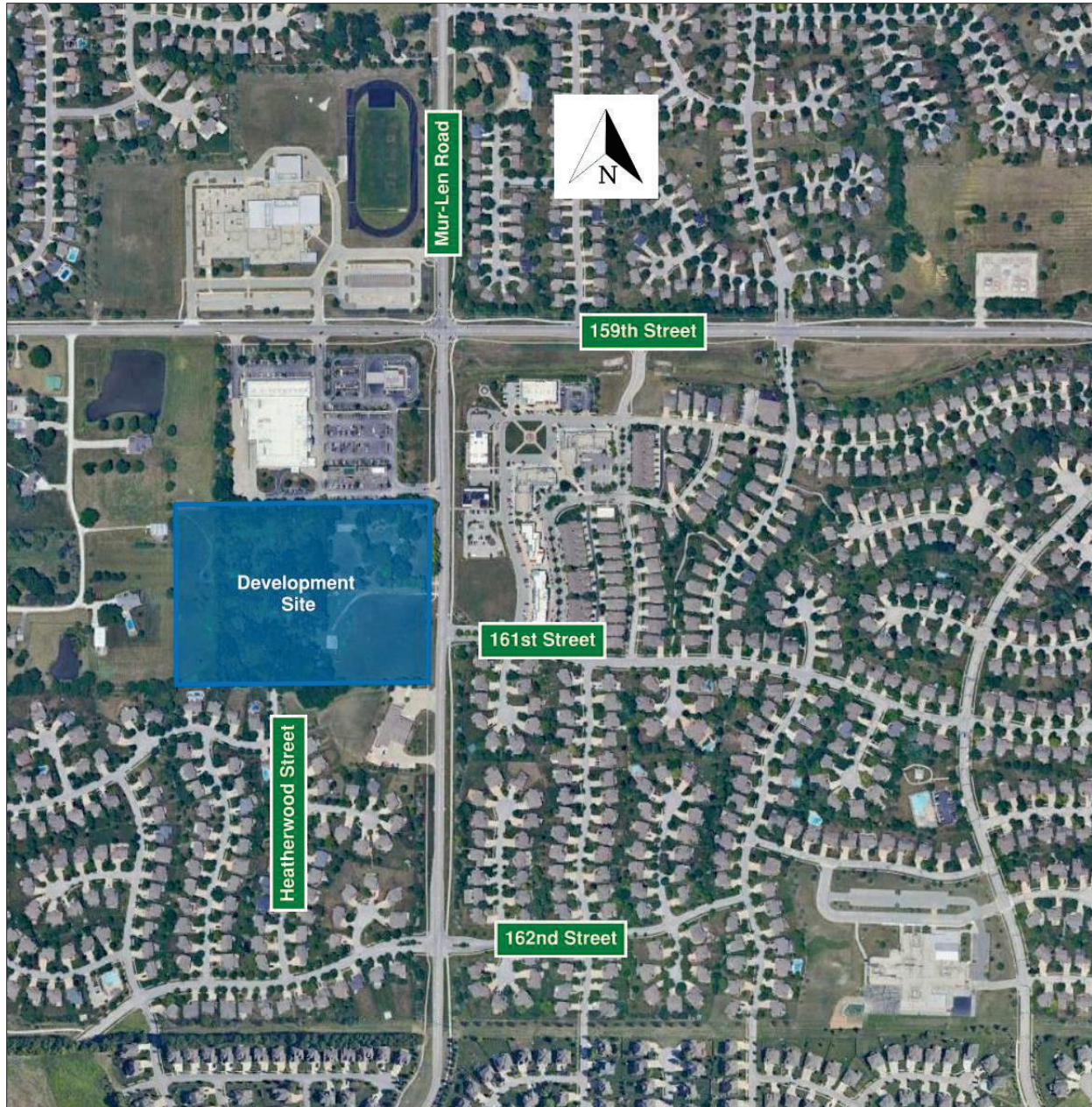
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## INTRODUCTION

This traffic impact study has been completed for the proposed HoM Flats at Mur-Len development to be located generally on the west side of Mur-Len Road between 159<sup>th</sup> Street and 162<sup>nd</sup> Street in Olathe, Kansas. The location of the proposed development relative to major streets in the area is shown below on **Figure 1**. This study includes a description of the proposed development, existing and future conditions, intersection capacity analyses, and a summary of findings.

**Figure 1: Location Map**



Source: Google Earth

# EXISTING CONDITIONS

**Existing Traffic Volumes:** Existing weekday turning-movement traffic-volume counts were collected at the following study intersections via video camera:

- 159<sup>th</sup> Street & Mur-Len Road
- 161<sup>st</sup> Street & Mur-Len Road
- 162<sup>nd</sup> Street & Mur-Len Road

Peak-period counts were collected at the study intersections during the hours of 7:00 A.M to 9:00 A.M. and 4:00 P.M. to 6:00 P.M. on Tuesday, September 10, 2024. Based on the data, the AM peak hour occurs between 7:15 and 8:15 A.M., and the PM peak hour generally occurs between 5:00 and 6:00 P.M. The existing AM and PM peak-hour volumes are shown in **Appendix A** on **Figure A-1**. The raw traffic counts were processed by Miovision Technologies, Inc. and can be found in **Appendix B**.

**Existing Land Use:** The existing property consists of mostly vacant land with one building used for agricultural purposes. This building will be removed as part of the development. A shopping center is located north of the development site. The site is surrounded on the west side and south sides with single-family residential homes. A fire station is also located directly south of the development site. To the east, across Mur-Len Road, are single-family and multi-family residences along with some retail shops.

**Existing Roadway Network:** Current roadway characteristics near the study area are summarized below in **Table 1**.

**Table 1: Existing Roadway Characteristics**

Roadway	Classification <sup>1</sup>	Section	Median Type	Posted Speed Limit
159 <sup>th</sup> Street	Arterial	2-lane curb and gutter	Undivided	40 mph
Mur-Len Road	Arterial	3-lane curb and gutter to the north 2-lane curb and gutter to the south	Two-way left-turn lane to the north undivided to the south	40 mph
161 <sup>st</sup> Street	Collector	2-lane curb and gutter	Undivided	30 mph
162 <sup>nd</sup> Street	Collector	2-lane curb and gutter	Undivided	25 mph

<sup>1</sup> - Classifications as listed on Olathe’s [Major Street Map](#)

The 159<sup>th</sup> Street & Mur-Len Road study intersection currently operates under signal control with left-turn lanes on all four intersection approaches. The 161<sup>st</sup> Street & Mur-Len Road intersection is a three-leg intersection that currently operates under stop control on the westbound intersection approach. This intersection includes a southbound left-turn lane. The 162<sup>nd</sup> Street & Mur-Len Road intersection operates under two-way stop-control on the eastbound and

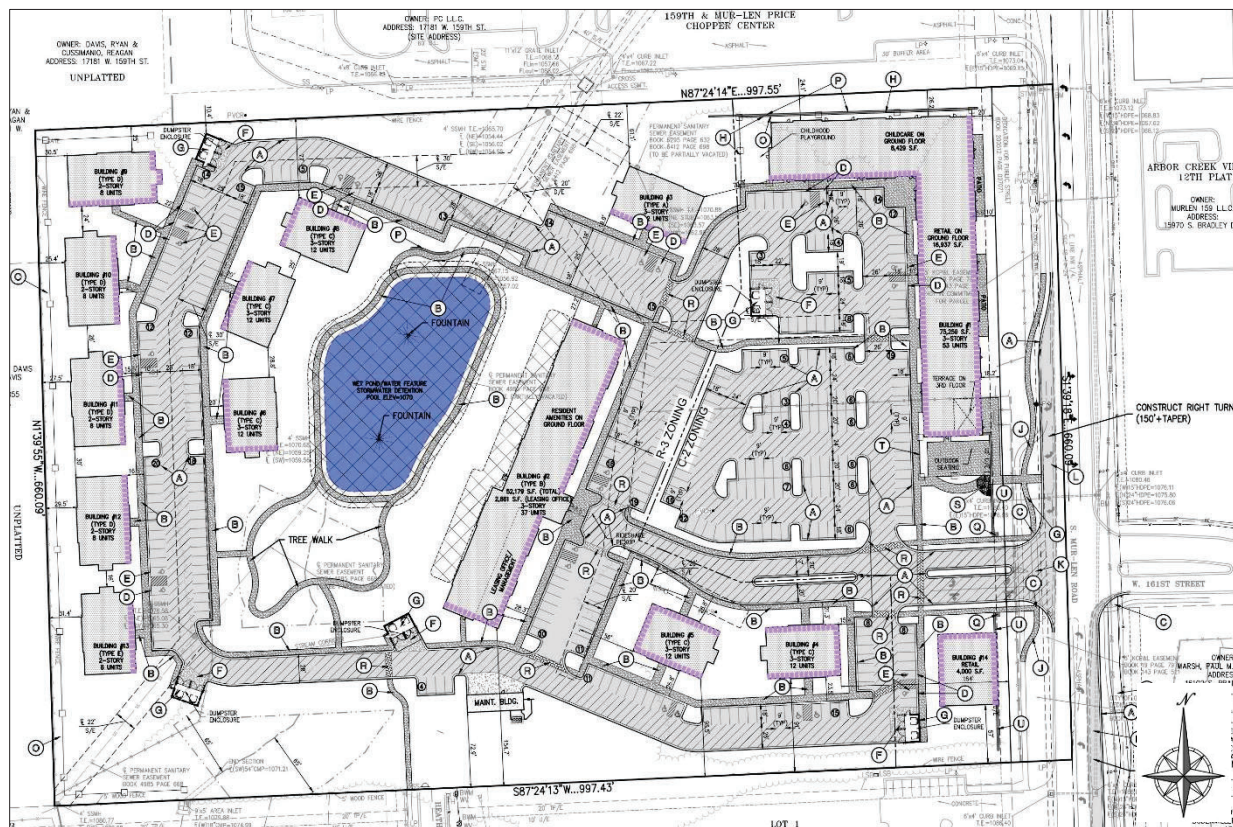


westbound intersection approaches. This intersection includes northbound and southbound left-turn lanes and a southbound right-turn lane.

## PROPOSED CONDITIONS

**Proposed Land Use:** The proposed HoM Flats at Mur-Len development consists of 202 apartment units, a day care center, and some retail shops. The daycare center and some retail shops are located on the ground floor in one of the buildings with apartments on the top two floors. An additional retail building is located in the south east corner of the site. A copy of the proposed site plan is included below on **Figure 2**. A full-size version is included at the end of this report.

**Figure 2: Proposed Site Plan**



**Proposed Access Plan:** The proposed development will be accessed from one site drive along Mur-Len Road that aligns with 161<sup>st</sup> Street. This drive will provide full access to Mur-Len Road. In addition, there is a sidewalk connection from the development to the residential neighborhood to the south.

The City of Olathe's *Access Management Plan*, dated August 2003, outlines criteria for the spacing of proposed driveway locations along public roadways. This criterion indicates that no driveway is allowed within an intersection influence area, or within the taper or storage area of a turn lane. The proposed site drive along Mur-Len Road aligns with 161<sup>st</sup> Street, and it is outside the intersection influence areas of the 159<sup>th</sup> Street & Mur-Len Road intersection and 162<sup>nd</sup> Street

& Mur-Len Road intersection. Additionally, there are no existing turn lanes present near the proposed site drive location.

The Plan provides criteria on private driveway throat distances from an arterial roadway. Based on this guidance, internal drives and parking stalls must be at least 250' from an arterial street along a private driveway. The site plan shows the first internal drive is approximately 145' from Mur-Len Road measured between the near edges of pavement along the site drive. This distance is 105' shy of meeting the criteria. Based on the operational analysis discussed in subsequent sections, the queues along the site drive are not expected to extend back to the first internal drive during the peak hours.

Olathe's Plan indicates dedicated left-turn and right-turn lanes are required along arterial streets at intersecting streets or driveways. The left-turn lanes on arterials should include 200' of storage plus taper, and the right-turn lanes should include 150' of storage plus taper. To meet this criterion, it would be appropriate to construct a northbound left-turn lane and southbound right-turn lane along Mur-Len Road at the site drive. The left-turn lane should include 200' of storage plus appropriate taper, and the right-turn lane should include 150' of storage plus appropriate taper. It should be noted that the 200' northbound left-turn lane will most likely extend into the adjacent fire station driveway to the south. As discussed in subsequent sections, northbound queues are not expected to extend back to this driveway. Additionally, the Plan identifies that an eastbound left-turn lane should be constructed along the site drive.

**Intersection Sight Distance:** Intersection sight-distance measurements were taken in the field for the site driveway approach to Mur-Len Road. The sight-distance measurements were recorded in accordance with guidance in the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* 7<sup>th</sup> Edition. Based on criteria outlined in Olathe's *Access Management Plan*, the amount of sight distance that is desirable in both directions from a stop-sign-controlled driveway intersecting Mur-Len Road, which has a 40-mph posted speed limit, is 472'.

The results of the intersection sight distances recorded in the field are summarized below. It should be noted that if available sight distance was excessively over the recommended value, a field measured value of ">distance" is recorded below. If the sight-distance requirements were not easily reached by simple observation, actual distances were recorded.

#### Mur-Len Road & Site Drive

	<u>Olathe Recommended</u>	<u>Field Measured</u>
Left-Turning Vehicle	472'	>472'
Right-Turning Vehicle	472'	>472'



Mur-Len Road & Site Drive:  
Looking Right (S) –Left-Turn



Mur-Len Road & Site Drive:  
Looking Left (N) – Right-Turn

**Trip Generation:** The estimated trip generation for the proposed HoM Flats at Mur-Len development was based upon the 11<sup>th</sup> Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. Outputs from this manual are included in **Appendix C**.

Internal trip capture was estimated for the development in the AM and PM peak hours, since when constructed, the site will contain multiple uses, and some trips would be anticipated to stay within the development and not leave the site between land uses. NCHRP 8-51 worksheets were used to determine the internal capture rates for the AM and PM peak hours and are included in the **Appendix C**. An overall 1% internal reduction was utilized for the AM peak hour, and a 14% overall reduction was utilized for the PM peak hour for the proposed development.

All the anticipated trips to and from the development are not all new trips on the roadway network. Some of the trips associated with the development will be “pass-by” trips that were already on the adjacent street network. A pass-by trip is made when drivers stop at a destination in route to their final destination without a route diversion; therefore, they are not making a specific trip to the site. Pass-by trip reductions were determined utilizing the ITE *Trip Generation Handbook* for the day care center and strip retail plaza. The *Trip Generation Handbook* only includes a pass-by rate for the day care center during the PM peak hour. For this analysis, it was assumed that pass-by trips would also occur during the AM peak hour, so the PM peak hour pass-by rate was used to develop trip reductions for the morning peak hour. Additionally, no pass-by data is provided for the strip retail plaza (<40k) in the *Trip Generation Handbook*. Therefore, pass-by trip reductions were developed utilizing data from the shopping plaza (40-150k) land use. **Table 2** depicts the resulting trip generation for the proposed development with the appropriate internal capture and pass-by reductions.



**Table 2: Proposed Trip Generation**

Land Use	Qty	Unit	Week day ADT (VPD)	AM Peak Hour (VPH)			PM Peak Hour (VPH)		
				TOTAL	IN	OUT	TOTAL	IN	OUT
				220 – Multifamily Housing (Low-Rise)	202	D.U.	1,370	85	21
565 – Day Care Center	8,429	Sq. Ft.	401	93	49	44	94	44	50
822 – Strip Retail Plaza (<40k)	20,937	Sq. Ft.	1,140	49	30	19	132	66	66
<i>Subtotal Development Trips</i>			<i>2,911</i>	<i>227</i>	<i>100</i>	<i>127</i>	<i>333</i>	<i>178</i>	<i>155</i>
<i>Internal Capture</i>				<i>2</i>	<i>1</i>	<i>1</i>	<i>46</i>	<i>23</i>	<i>23</i>
<i>Total External Trips</i>				<i>225</i>	<i>99</i>	<i>126</i>	<i>287</i>	<i>155</i>	<i>132</i>
<i>Day Care Pass-By Reduction</i>				<i>41</i>	<i>22</i>	<i>19</i>	<i>41</i>	<i>19</i>	<i>22</i>
<i>Strip Retail Plaza Pass-by Reduction</i>							<i>52</i>	<i>26</i>	<i>26</i>
<b>Total External, Non-Pass-By Development Trips</b>			<b>2,911</b>	<b>184</b>	<b>77</b>	<b>107</b>	<b>194</b>	<b>110</b>	<b>84</b>

**Trip Distribution:** The estimated trips generated by the HoM Flats at Mur-Len development were distributed onto the surrounding street system based on the trip distributions summarized in **Table 3**. The distributions are based primarily on the existing traffic flow and engineering judgement. The detailed distributions through the study intersections are included in **Appendix C**.

**Table 3: Trip Distribution**

Direction To/From	Percentage
North on Mur-Len Road	20%
South on Mur-Len Road	15%
East on 159 <sup>th</sup> Street	25%
West on 159 <sup>th</sup> Street	40%
<b>Total</b>	<b>100%</b>

**Existing + Site Traffic Volumes:** The expected development-related traffic volumes were assigned to the existing street system based on the trip distributions discussed above and then added to the existing traffic volumes to develop the *Existing + Site* AM and PM peak-hour volumes. These volumes are shown in **Appendix A** on **Figures A-2** and **A-3**, respectively.

**Existing + Site + Planned Traffic Volumes:** The nearby Heritage Ranch residential development located in the southeast quadrant of the 159<sup>th</sup> Street & Brougham Drive intersection has been approved by the City. Therefore, additional trips to and from this development are expected to travel through the 159<sup>th</sup> Street & Mur-Len Road intersection. The number of additional trips were calculated using the *Trip Generation Manual* along with information from the preliminary plat. Based on this information, it is anticipated that the planned development will generate 206 trips during the AM peak hour and 283 trips during the PM peak hour. Not all of these trips will travel



through the 159th Street & Mur-Len Road intersection. It is estimated that approximately 30% of the trips during the AM and PM peak hours will travel through the intersection. These *Planned* traffic volumes were added to the *Existing + Site* volumes to determine the *Existing + Site + Planned* AM and PM peak-hour volumes. The resulting volumes are shown in **Appendix A** on **Figures A-4** and **A-5**, respectively.

**Future Year 2044 + Site + Planned Traffic Volumes:** To account for potential traffic volume growth at the study intersections, traffic projections were developed using an estimated 2.0% annual growth rate. This growth rate is based on traffic volume outputs from the base year (2016) and future year (2050) Mid-America Regional Council (MARC) travel demand models (TDM), and historical traffic data from Olathe’s traffic count map. The growth rate was applied to the existing traffic counts to develop base traffic volumes for future year 2044. These volumes were added to the site traffic and the planned traffic to develop the *Future Year 2044 + Site + Planned* AM and PM peak-hour traffic volumes. The volumes are shown in **Appendix A** on **Figures A-6** and **A-7**, respectively.

## ANALYSES

This study analyzes the traffic impacts of the proposed HoM Flats at Mur-Len development on the surrounding roadway network for the following scenarios:

- Existing Conditions
- Existing + Site Conditions
- Existing + Site + Planned Conditions
- Future Year 2044 + Site + Planned Conditions

Intersection capacity analyses were completed using the Synchro 12 traffic analysis software package based on methodologies outlined in the Transportation Research Board’s (TRB) *Highway Capacity Manual (HCM)*, 7<sup>th</sup> Edition. The operating conditions at an intersection are evaluated by the level of service (LOS) experienced by drivers, with LOS “A” representing little or no delay and LOS “F” representing excessive delays. LOS B, C, D, and E reflect incremental increases in delay per vehicle. The control delay thresholds in seconds-per-vehicle for the varying LOS for signalized and unsignalized intersections are shown below in **Table 4**.

**Table 4: Level of Service Delay Thresholds**

Level of Service (LOS)	Signalized Intersection Average Control Delay (sec/veh)	Unsignalized Intersection Average Control Delay (sec/veh)
A	<10	<10
B	<20	<15
C	<35	<25
D	<55	<35
E	<80	<50
F	≥80	≥50

Source: HCM 7<sup>th</sup> Edition

Queues were also evaluated as part of this study. The 95<sup>th</sup> percentile queue, or the queue that has only a 5% chance of being exceeded during the peak hour, was used for this analysis. All capacity analysis output files are included in **Appendix D**.

**Existing Conditions:** The results of the *Existing* analysis scenario are shown in **Appendix A** on **Figures A-8** and **A-9** for the AM and PM peak-hour traffic volumes, respectively. The City of Olathe provided the existing signal timings at the 159<sup>th</sup> Street & Mur-Len Road intersection for use in this analysis scenario.

As shown on the figures, all individual movements at the unsignalized study intersections currently operate at LOS “C” or better during the AM and PM peak hours. The signalized intersection of 159<sup>th</sup> Street & Mur-Len Road currently operates at an overall acceptable LOS “C” during the AM peak hour and LOS “D” during the PM peak hour. However, the individual southbound shared through/right-turn lane currently operates at LOS “F” during the PM peak hour. All the 95<sup>th</sup> percentile vehicle queues are contained in existing storage. However, long queues greater than 450’ form in the eastbound shared through/right-turn lane and in the southbound shared through/right-turn lane during the PM peak hour. These queues currently extend back through adjacent intersections.

The City of Olathe has identified a project in their Capital Improvement Plan (CIP) to improve 159<sup>th</sup> Street from 1000’ west of Mur-Len Road to Black Bob Road. This project includes widening 159<sup>th</sup> Street to a 4-lane arterial with appropriate turn lanes. Based on the CIP, the project is planned to be constructed in 2027. These improvements would be expected to improve the LOS and reduce the queues at the intersection of 159<sup>th</sup> Street & Mur-Len Road.

**Existing + Site Conditions:** The results of the *Existing + Site* analysis scenario are shown in **Appendix A** on **Figures A-10** and **A-11** for the AM and PM peak-hour traffic volumes, respectively. This analysis included optimized signal timing splits at the 159<sup>th</sup> Street & Mur-Len Road intersection. Per the City of Olathe’s *Access Management Plan*, this analysis scenario included the following improvements:

#### 161<sup>st</sup> Street/Site Drive & Mur-Len Road

- Constructing a northbound left-turn lane with 200’ of storage plus appropriate taper
- Constructing a southbound right-turn lane with 150’ of storage plus appropriate taper
- Constructing an eastbound left-turn lane between Mur-Len Road and the first internal drive

As shown on **Figures A-10** and **A-11** all individual movements at the unsignalized study intersections are projected to operate at LOS “D” or better during the AM and PM peak hours except the eastbound left-turn movements at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection. The eastbound left-turn is projected to operate at LOS “F” during the AM and PM peak hours with approximately a 100’ queue in the morning and evening.

In an effort to mitigate the unacceptable LOS at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection, the approach volumes were analyzed in accordance with criteria outlined in the Federal Highway Administration’s (FHWA) *Manual on Uniform Traffic Control Devices*, 11<sup>th</sup>

Edition, to determine if the peak-hour traffic signal warrant (Warrant 3) is met. The *Existing + Site* traffic volumes at this location do not meet the peak-hour signal warrant during either the AM or PM peak hours indicating a traffic signal should not be installed at this location. Details of the signal warrant analysis are included in **Appendix E**.

Since this location does not meet signal warrants, no mitigation strategies were included in the analysis. The delays for these movements are less than 80 seconds, and the queues are somewhat short and do not extend back to the next street or internal drive. Additionally, it is not uncommon for side-street stop-controlled approaches to operate at lower levels of service during peak-hour conditions.

The signalized intersection of 159<sup>th</sup> Street & Mur-Len Road is projected to operate at an overall LOS “C” during the AM peak hour and LOS “D” during the PM peak hour with optimized signal timing splits. However, the individual southbound through/right-turn lane is projected to operate at LOS “F” during the PM peak hour. All the 95<sup>th</sup>-percentile vehicle queues are contained in existing storage except the northbound left-turn queue during the AM and PM peak hours. Furthermore, long queues greater than 450’ continue to form in the eastbound and southbound shared through/right-turn lanes during the PM peak hour. These projected queues are about one vehicle or less longer than the existing queues. No mitigation strategies were included in this analysis scenario to alleviate the long queues at the 159<sup>th</sup> Street & Mur-Len Road intersection as the additional intersection capacity associated with the CIP project is anticipated to address this concern.

**Existing + Site + Planned Conditions:** The results of the *Existing + Site + Planned* analysis scenario are shown in **Appendix A** on **Figures A-12** and **A-13** for the AM and PM peak-hour traffic volumes, respectively. This analysis scenario included all the turn-lane improvements discussed above along with optimized signal timing splits at the 159<sup>th</sup> Street & Mur-Len Road intersection.

Since *Planned* traffic volumes were only added to the eastbound and westbound through movements at the 159<sup>th</sup> Street & Mur-Len Road intersection, the unsignalized study intersections along Mur-Len Road are anticipated to operate the same as the *Existing + Site* analysis scenario. All movements are projected to operate acceptably except the eastbound left-turn movement at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection during the AM and PM peak hours.

The signalized intersection of 159<sup>th</sup> Street & Mur-Len Road is projected to operate at an overall LOS “D” during the AM and PM peak hours with optimized signal timing splits. However, the individual southbound through/right-turn lane and eastbound through/right-turn lane are projected to operate at LOS “F” during the PM peak hour. All the 95<sup>th</sup> percentile vehicle queues are contained in existing storage except the northbound left-turn queue during the AM and PM peak hours. Similar to the previous analysis scenarios, long queues greater than 450’ will continue to form in the eastbound and southbound shared through/right-turn lanes during the PM peak hour. Additionally, long queues will form in the eastbound shared through/right-turn lane during the AM peak hour. However, no mitigation strategies were included in this analysis scenario to alleviate the long queues at this location, as the additional intersection capacity associated with 159<sup>th</sup> Street, Mur-Len to Black Bob, CIP project is anticipated to address this concern.



**Future Year 2044 + Site + Planned Conditions:** The results of the *Future Year 2044 + Site + Planned* analysis scenario are shown in **Appendix A** on **Figures A-14** and **A-15** for the AM and PM peak-hour traffic volumes, respectively. In addition to the turn-lane improvements discussed above, additional through lanes and turn lanes were included at the 159<sup>th</sup> Street & Mur-Len Road intersection per Olathe’s CIP. Due to these changes, the signal timing cycle length and splits were optimized during the AM and PM peak hours at this location. To accommodate the increase in projected traffic volume in the area, two northbound and two southbound through lanes on Mur-Len Road were carried south from 159<sup>th</sup> Street to 162<sup>nd</sup> Street. With these improvements, a northbound right-turn lane was also included at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection.

As shown on **Figures A-14** and **A-15**, most of the individual movements at the unsignalized study intersections are projected to operate at LOS “D” or better during the AM and PM peak hours except for the following:

#### 161<sup>st</sup> Street/Site Drive & Mur-Len Road

- The eastbound left-turn is projected to operate at LOS “E” during the AM peak hour and LOS “F” during the PM peak hour. No mitigation strategies were implemented at this location since the intersection approach volumes do not meet the peak-hour signal warrant (Warrant 3) criteria outlined in the MUTCD. Details of the signal-warrant analysis are included in **Appendix E**. The delays for these movements are less than 90 seconds, and the queues are somewhat short and do not extend back to the next street or internal drive. Additionally, it is not uncommon for side-street stop-controlled approaches to operate at lower levels of service during peak-hour conditions.

#### 162<sup>nd</sup> Street & Mur-Len Road

- The eastbound left-turn is projected to operate at LOS “E” during the AM peak hour and LOS “F” during the PM peak hour. No mitigation strategies were implemented at this location since vehicle queues are three vehicles or less, and it is not uncommon for side-street stop-controlled approaches to operate at lower levels of service during peak-hour conditions.

The signalized study intersection of 159<sup>th</sup> Street & Mur-Len Road is projected to operate at LOS “C” or better during the AM and PM peak hours with queues that are contained in the existing and proposed storage.

## SUMMARY & RECOMMENDATIONS

This traffic study summarizes the anticipated traffic impacts of the HoM Flats at Mur-Len development on the surrounding transportation system.

The results of the *Existing* analysis scenario indicate that all individual movements at the unsignalized study intersections currently operate acceptably during both peak hours. The signalized intersection of 159<sup>th</sup> Street & Mur-Len Road currently operates at an overall acceptable level of service during both peak hours. However, the individual southbound shared

through/right-turn lane at this location currently operates at lower levels of service during the PM peak hour. Long queues form in the eastbound shared through/right-turn lane and in the southbound shared through/right-turn lane during the PM peak hour. These queues currently extend back through adjacent intersections.

Per Olathe's *Access Management Plan*, a southbound right-turn lane and northbound left-turn lane should be included at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection. In addition, the Plan indicates that an eastbound left-turn lane should be constructed along the site drive. It should be noted that the site drive throat distance is approximately 105' shy of meeting spacing criteria outlined in Olathe's Plan; however, the projected queues along the site drive are not anticipated to extend back to the first internal drive during the peak hours.

The results of the *Existing + Site* analysis scenario indicate all individual movements at the unsignalized study intersections are projected to operate at LOS "D" or better during both peak hours, except for the eastbound left-turn movements at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection. No mitigation strategies were included in the analysis, since this location does not meet signal warrants. The delays for these movements are fairly low and the queue is 100' or less which do not extend back to the next street or internal drive. Additionally, it is not uncommon for side-street stop-controlled approaches to operate at lower levels of service during peak-hour conditions. The signalized intersection of 159<sup>th</sup> Street & Mur-Len Road is projected to operate at an overall acceptable level of service with optimized signal-timing splits. However, some individual movements operate unacceptably during the PM peak hours. Similar to the *Existing* scenario, long queues form in some of the shared through/right-turn lanes during the PM peak hour. It should be noted that the City has identified a project in their CIP which includes improving the 159<sup>th</sup> Street & Mur-Len Road intersection by 2027; therefore, no mitigation strategies were included in this analysis scenario to alleviate the long queues at this location.

The results of the *Existing + Site + Planned* analysis scenario indicate the study intersections along Mur-Len Road are projected to operate similarly to the *Existing + Site* conditions since *Planned* traffic volumes were only added to the eastbound and westbound through movements at the 159<sup>th</sup> Street & Mur-Len Road intersection. Similar to the previous analysis scenarios, long queues continue to form in some of the shared through/right-turn lanes during the PM peak hour. However, no mitigation strategies were included to alleviate the long queues as the additional intersection capacity associated with 159<sup>th</sup> Street, Mur-Len to Black Bob CIP project is anticipated to address this concern.

The *Future Year 2044 + Site + Planned* analysis scenario included intersection improvements at the 159<sup>th</sup> Street & Mur-Len Road intersection associated with the CIP project along with the turn-lane improvements at the 161<sup>st</sup> Street/Site Drive & Mur-Len Road intersection associated with the proposed development. The results of this scenario indicate most of the individual movements at the unsignalized study intersections are projected to operate acceptably during both peak hours. However, due to the increase in background traffic in this scenario, some unacceptable levels of service may occur on the side-street intersection approaches. The 159<sup>th</sup> Street & Mur-Len Road signalized study intersection is projected to operate acceptably during both peak hours in the future.

In summary, it would be appropriate to construct the following improvements in accordance with criteria outlined in the City of Olathe's *Access Management Plan* at the time the development is built:

161<sup>st</sup> Street/Site Drive & Mur-Len Road

- A northbound left-turn lane with 200' of storage plus appropriate taper
- A southbound right-turn lane with 150' of storage plus appropriate taper
- An eastbound left-turn lane between Mur-Len Road and the first internal drive

We appreciate the opportunity to serve you on this very important project. Please feel free to contact us if you should have any questions.

Respectfully submitted,

**Merge Midwest Engineering, LLC**



Michael Hare, P.E., PTOE  
Sr. Engineer



Janelle M. Clayton, P.E., PTOE  
Manager / Co-Owner