

Vista Creek TIS Responses: 12-02-2021

- 1) Thank you for the review of the Vista Creek traffic study.
- 2) In the revised traffic study, a southbound left turn lane has been included in the 2024 background evaluation at the 6th Avenue and Gun Club Road intersection.
- 3) Site plan is included in the report of the revised traffic study.
- 4) Traffic volumes from the Aurora Crossroads traffic study were not used in the previous traffic study. The City of Aurora required two percent annual growth was used in addition to directly adding project traffic volumes from the E-470 and 6th Parkway FDP, Cross Creek, and Lamar Landing projects. The revised traffic study has included aforementioned traffic studies plus the City of Aurora two percent annual growth for the short term 2024 buildout. As the Aurora Crossroads is a master development with a 2030 buildout, traffic volumes have been used from this study for the 2045 horizon. These volumes align more closely to the traffic volumes in the NEATS study.
- 5) The City of Aurora requires two percent annual growth to be applied to existing traffic volumes. However, as stated above, traffic volumes from the Aurora Crossroads traffic study have been used as background traffic volumes in 2045 to align more closely to traffic projections in the NEATS study. Based on existing volumes and future development of FDP, Cross Creek, Lamar Landing, Aurora Crossroads, and the current proposal, it is believed that traffic volumes along Gun Club Road will exceed the projections in the NEATS study. However, the traffic volumes along Gun Club Road in the revised traffic study no longer double the NEATS projections.
- 6) Trip distribution has been refined to include additional percentage to and from the north. This aligns to existing traffic volumes from the east of project with the same residential uses.
- 7) The traffic assignment volumes have balancing differences of one vehicle due to rounding in the analysis software.
- 8) Movement delays have been added to the level of service tables of the signalized intersections. All LOS E and LOS F have been discussed and potentially mitigated in the revised traffic study.
- 9) The turn lane length recommendations in the Aurora Crossroads TIS have been checked for consistency purposes and appropriate discussion has been included in the revised traffic study.
- 10) A multi-modal section has been added in the revised traffic study.
- 11) Please see individual responses throughout this document.

Comments 10.7.21:

- 1) The format of the report is appropriate and well organized.
- 2) The SB left-turn at Gun Club Road and 6th Avenue is discussed to be needed in the existing conditions, but then not included in the 2024 background and included in the 2024 with project. Please update.
- 3) Please move the site plan from the Appendix to the Report.
- 4) Did the background volumes include Aurora Crossroads to the north? Also, please provide methodology and percentages used to forecast future volumes.
- 5) Revisit the background volumes since they are significantly different than NEATS. Gun Club Road volumes are double NEATS and 6th Parkway is half of NEATS.
- 6) Provide clarification on trip distribution percentages since they are not similar to existing travel patterns at 5th or 6th Avenues. Update as appropriate.
- 7) Check balancing of trips between intersections.
- 8) For signalized intersections, add all movement delay/LOS to the tables in Section 5.0. Any LOS E/F needs to be discussed, including if mitigation is needed and if not, why.
- 9) Check if the recommended auxiliary lane lengths are consistent with those in the Aurora Crossroads TIS.
- 10) Provide a section on alternative mode access and connections for employees to/from the site.
- 11) See comments throughout.

T R A F F I C I M P A C T S T U D Y

Vista Creek Multi-Family

Aurora, Colorado

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August 2021

This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.

1.0 EXECUTIVE SUMMARY

Vista Creek Multi-Family is proposed to be located on the southwest corner of the 6th Avenue and Gun Club Road intersection in Aurora, Colorado. For the purposes of this analysis, the project is anticipated to include 318 multifamily dwelling units. It is expected that Vista Creek Multi-Family will be completed in the next several of years; therefore, analysis was conducted for the 2024 and 2045 horizons.

The purpose of this traffic study is to identify project traffic generation characteristics and potential project traffic related impacts on the local street system, as well as to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study in accordance with City of Aurora standards and requirements:

- 6th Avenue and Gun Club Road
- 5th Avenue and Gun Club Road
- 6th Parkway and Gun Club Road

Why wasn't the intersection of Gun Club and I-70 Frontage Road/ Colfax evaluated?

Regional access to Vista Creek Multi-Family will be provided by Interstate 70 (I-70), E-470, and Interstate 225 (I-225). Primary access to the project is provided by 6th Parkway and Gun Club Road. Direct access is proposed from the future west legs of 5th Avenue and 6th Avenue at Gun Club Road.

Vista Creek Multi-Family is expected to generate 106 of these trips occurring during the afternoon peak hour.

Based on the analysis presented, the proposed project can be successfully incorporated into the existing street network, the proposed project requires the following recommendations:

The intersection of Colfax Avenue and Gun Club Road/ I-70 Frontage Road was previously not included due to this intersection not being required in adjacent development traffic studies and this development being a much lower trip generator than those developments. Further, this intersection is being realigned in the future and was evaluated in detail in the Aurora Crossroads traffic study.

However, since this development is one parcel closer to this intersection and travel patterns from the residential areas to east demonstrate a higher percentage of traffic to and from the north, this intersection has been included for evaluation in the revised traffic study.

2024 Recommendations

- With the buildout of the project, the west leg and a northbound left turn lane will be constructed at the intersection of 6th Avenue and Gun Club Road. The west leg of this intersection will

what criteria was applied?

provide access to the project. It is recommended that a R1-1 "STOP" sign be installed at the eastbound approach of the 6th Avenue and Gun Club Road intersection. To meet City of Aurora turn lane length requirements, the northbound left turn lane is recommended to provide 275 feet of storage with a 160-foot taper. Of note, the existing southbound left volumes warrant a turn lane, and it is recommended a southbound left turn lane is also at this intersection. It should be noted that project traffic does not contribute to the left turn movement at the 6th Avenue and Gun Club Road intersection.

City of Aurora defaults to CDOT standards for implementation of turn lanes. Additional clarification has been provided in the revised traffic study.

- It is anticipated that the proposed adjacent development to the south of the Subdivision, will be built out prior to the project and will construct the northbound left turn lane at the 5th Avenue and Gun Club Road intersection. The intersection of 5th Avenue and Gun Club Road is anticipated to meet four-hour vehicular volume warrants in 2024; therefore, signalization is anticipated to be the appropriate control at this intersection by 2024. If signalized, the eastbound and westbound approaches of this intersection should provide designated left turn lanes and a shared through/right turn lane.
- It is recommended that the eastbound left turn lane at the 6th Parkway and Gun Club Road intersection be extended from 125 feet to 250 feet.

2045 Recommendations

- By 2045, the City of Aurora six-lane cross section is expected to be provided along 6th Parkway within the project limits. Further, Gun Club Road is expected to be constructed to the ultimate street section of two through lanes in each direction.
- Northbound and westbound dual left turn lanes may be needed at the 6th Parkway and Gun Club Road intersection by 2045 and should be studied further as traffic volumes materialize in the future.

General Recommendations:

- Any on-site and off-site roadway, signing, striping, and signal improvements should be incorporated into the Civil Drawings, and conform to City of Aurora standards as well as the Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD).

2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of the Traffic Study for the proposed Vista Creek Multi-Family project to be located on the southwest corner of the 6th Avenue and Gun Club Road intersection in Aurora, Colorado. A vicinity map illustrating the Vista Creek Multi-Family development area site Aurora is shown in **Figure 1**. For the purposes of this analysis, Vista Creek Multi-Family is anticipated to include 318 multifamily dwelling units. A conceptual land use plan is attached in **Appendix G**. It is expected that Vista Creek Multi-Family will be completed in the next several years; therefore, analysis was conducted for the 2024 short term horizon as well as the 2045 long-term horizon.

The purpose of this traffic study is to identify project traffic generation characteristics and potential project traffic related impacts on the local street system, as well as to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study in accordance with City of Aurora standards and requirements:

- 6th Avenue and Gun Club Road
- 5th Avenue and Gun Club Road
- 6th Parkway and Gun Club Road

Regional access to Vista Creek Multi-Family will be provided by Interstate 70 (I-70), E-470, and Interstate 225 (I-225). Primary access to the project is provided by 6th Parkway and Gun Club Road. Direct access is proposed from the future west legs of 5th Avenue and 6th Avenue at Gun Club Road.



Move the site plan from the Appendix to this section. Update the site plan to show the future geometry and lane use

A site plan with off-site improvements has been provided in the body of the report.

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area/Site Visit

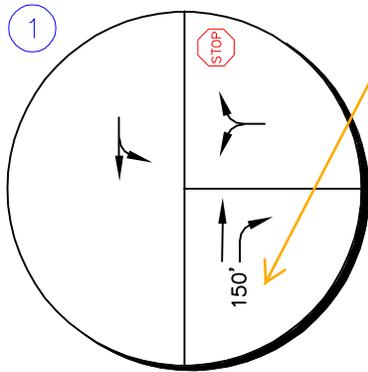
The existing site is comprised of vacant land. The project location is mainly surrounded by vacant land with some residential housing to the east. To the south is the proposed Lamar Landing Subdivision and directly to the east are multifamily homes. The project site backs up to E-470 to the west. Buckley Air Force Base is located in the extended area west of the project.

3.2 Existing Roadway Network

6th Parkway provides one through lane eastbound and westbound with a 45 mile per hour posted speed. Gun Club Road provides one lane of travel in each direction, northbound and southbound, with a speed limit of 45 miles per hour. 6th Parkway and Gun Club Road both provide a striped centerline and include left turn lanes at major intersections. The east leg of 6th Parkway at Gun Club Road provides a raised median and is built to the ultimate configuration of three through lanes in each direction. 5th Avenue and 6th Avenue both are collector streets extending eastbound and westbound with one through lane of travel in each direction.

Update to "at 5th Avenue" since there are no left-turns at 6th.

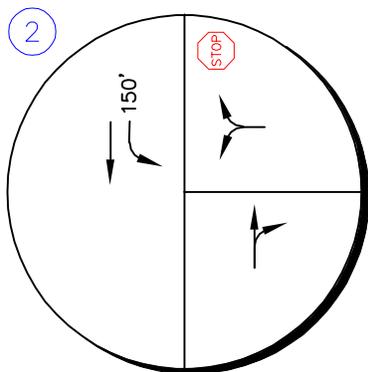
Revised.



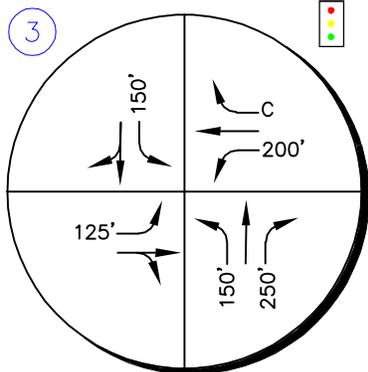
6TH AVENUE & GUN CLUB ROAD

It appears that all storage length measurements include the unusable taper lengths. Either update the lengths or update the legend

Turn lane lengths have been updated to provide storage lengths and not overall lengths



5TH AVENUE & GUN CLUB ROAD



6TH PKWY & GUN CLUB ROAD



Revised.

Add 'C' to the legend

LEGEND	
(X)	Study Area Key Intersection
Signalized Intersection Symbol	Signalized Intersection
STOP	Stop Controlled Approach
Speed Limit Sign	Roadway Speed Limit
100'	Turn Lane Length (feet)

VISTA CREEK MULTI-FAMILY
AURORA, COLORADO
EXISTING GEOMETRY AND CONTROL

FIGURE 2

3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the study intersections on Wednesday, July 21, 2021 during the morning and afternoon peak hours. Counts were conducted in 15-minute intervals during the morning and afternoon peak hours of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. The existing intersection traffic volumes are shown in **Figure 3** with count sheets provided in **Appendix A**.

By what rate? Please provide methodology, rates, and where growth data was derived from.

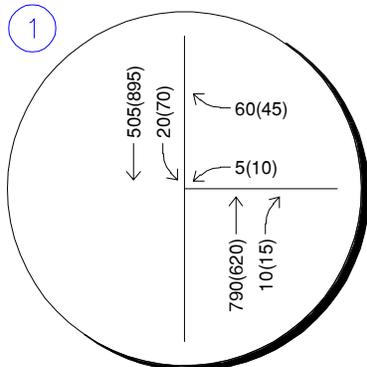
3.4 Unspecified Development Traffic Growth

To generate 2024 and 2045 background volumes, the 2022 and 2040 total traffic volumes from the *Lamar Landing Subdivision Traffic Impact Study* completed in September 2020 were grown to 2024 and 2045, respectively. The *Lamar Landing* study included site traffic volumes from the E-470 and 6th Avenue projects. The City of Aurora standard annual growth rate of 2 percent was applied at the intersection of 6th Avenue and Gun Club Road while increasing the growth rate to 3 percent through volumes to balance with the traffic volumes from the *Lamar Landing* study. Applicable documents from the Lamar Landing Subdivision with the E-470 and 6th Pkwy FDP and the proposed development east of Gun Club Road are included in **Appendix B**. Background traffic volumes for 2024 and 2045 are shown in **Figures 4** and **5**, respectively.

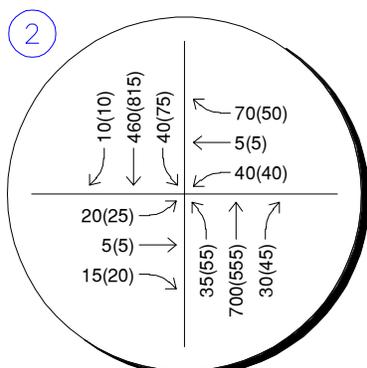
This has been clarified in the revised traffic study with the City of Aurora two percent traffic annual growth requirement.

Did the background traffic include Aurora Crossroads to the north?

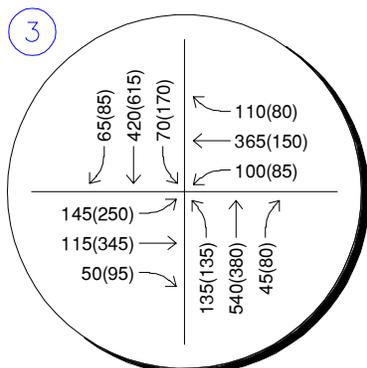
Traffic volumes from the Aurora Crossroads traffic study were not used in the previous traffic study. The City of Aurora required two percent annual growth was used in addition to directly adding project traffic volumes from the E-470 and 6th Parkway FDP, Cross Creek, and Lamar Landing projects. The revised traffic study has included aforementioned traffic studies plus the City of Aurora two percent annual growth for the short term 2024 buildout. As the Aurora Crossroads is a master development with a 2030 buildout, traffic volumes have been used from this study for the 2045 horizon. These volumes align more closely to the traffic volumes in the NEATS study.



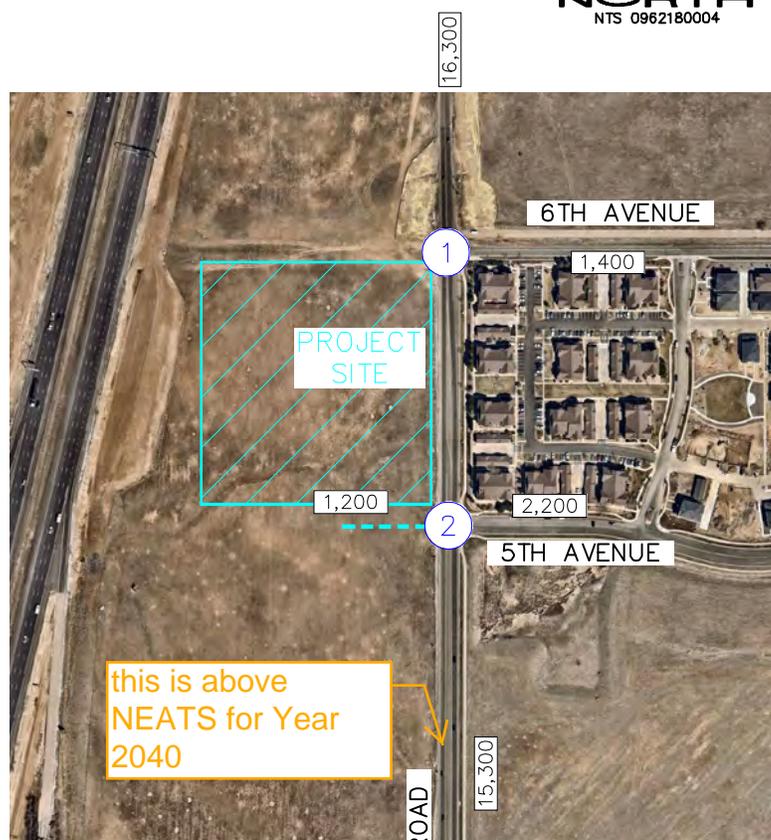
6TH AVENUE & GUN CLUB ROAD



5TH AVENUE & GUN CLUB ROAD



6TH PKWY & GUN CLUB ROAD



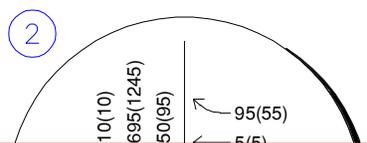
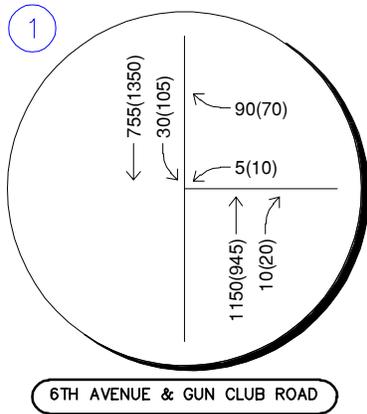
The City of Aurora requires two percent annual growth to be applied to existing traffic volumes. However, traffic volumes from the Aurora Crossroads traffic study have been used as background traffic volumes in 2045 to align more closely to traffic projections in the NEATS study. Based on existing volumes and future development of FDP, Cross Creek, Lamar Landing, Aurora Crossroads, and the current proposal, it is believed that traffic volumes along Gun Club Road will exceed the projections in the NEATS study. However, the traffic volumes along Gun Club Road in the revised traffic study no longer double the NEATS projections.

LEGEND

- (X) Study Area Key Intersection
- xxx(xxx) Weekday AM(PM) Peak Hour Traffic Volumes
- xx,x00 Estimated Daily Traffic Volume

VISTA CREEK MULTI-FAMILY
 AURORA, COLORADO
 2024 BACKGROUND TRAFFIC VOLUMES

FIGURE 4



The City of Aurora requires two percent annual growth to be applied to existing traffic volumes. However, traffic volumes from the Aurora Crossroads traffic study have been used as background traffic volumes in 2045 to align more closely to traffic projections in the NEATS study. Based on existing volumes and future development of FDP, Cross Creek, Lamar Landing, Aurora Crossroads, and the current proposal, it is believed that traffic volumes along Gun Club Road will exceed the projections in the NEATS study. However, the traffic volumes along Gun Club Road in the revised traffic study no longer double the NEATS projections.



LEGEND

(X) Study Area Key Intersection

xxx(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes

xx,x00 Estimated Daily Traffic Volume

VISTA CREEK MULTI-FAMILY
 AURORA, COLORADO
 2045 BACKGROUND TRAFFIC VOLUMES

FIGURE 5

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report fitted curve equations that applies to Multifamily Mid-Rise Housing (ITE Land Use Code 221), for traffic associated with the development.

Vista Creek Multi-Family is expected to generate approximately 1,732 weekday daily trips, with 106 of these trips occurring during the morning peak hour and 135 of these trips occurring during the afternoon peak hour. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10th Edition – Volume 1: User’s Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the Vista Creek Multi-Family. The trip generation worksheets are included in **Appendix C**.

Table 1 – Vista Creek Multi-Family Traffic Generation

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (221) – 318 Dwelling Units	1,732	28	78	106	82	53	135

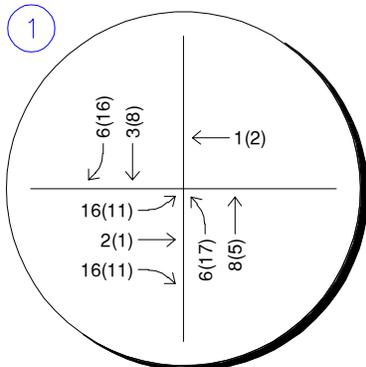
4.2 Trip Distribution

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 6**.

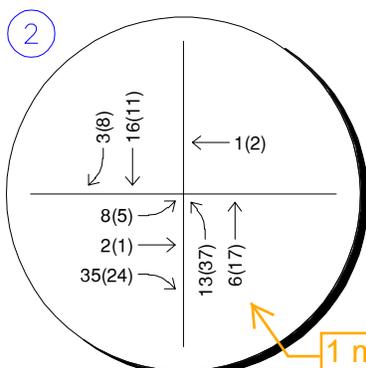
¹ Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10th Edition – Volume 1: User’s Guide and Handbook, 2017.

Provide additional clarification and methodology on the trip distribution. There percentages utilized do not reflect existing traffic patterns.

Trip distribution has been refined to include additional percentage to and from the north. This aligns to existing traffic volumes from the east of project with the same residential uses.



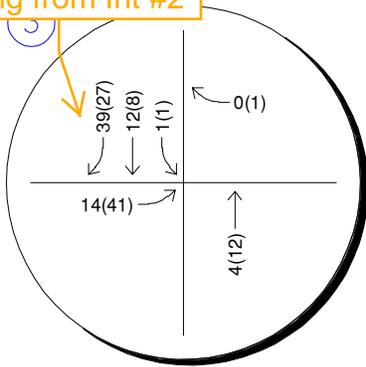
6TH AVENUE & GUN CLUB ROAD



5TH AVENUE & GUN CLUB ROAD

1 more than coming from Int #3

1 more than coming from Int #2



6TH PKWY & GUN CLUB ROAD

The traffic assignment volumes have balancing differences of one vehicle due to rounding in the analysis software.



LEGEND

- (X) Study Area Key Intersection
- XXX(XXX) Weekday AM(PM) Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

VISTA CREEK MULTI-FAMILY
 AURORA, COLORADO
 PROJECT TRAFFIC ASSIGNMENT

FIGURE 7

By 2045, Gun Club Road is expected to be constructed to the ultimate street section of two through lanes in each direction. With two through lanes in each direction along Gun Club Road, all movements at this intersection are anticipated to operate with LOS E or better during both the morning and afternoon peak hours in 2045. A four-hour signal warrant evaluation was conducted at this intersection, and it was determined that a signal is not anticipated to be warranted with 2045 total traffic projections (meets 0 out of 4 hours). Signal warrant analysis worksheets are included in **Appendix F**. There is expected to be light travel demand on the eastbound approach of this intersection (35 vehicles during the peak hour) and drivers can re-route to 6th Avenue if vehicle delays are experienced during the peak hour in 2045. **Table 3** provides the results of the LOS analysis conducted at this intersection.

& Gun Club Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Existing				
Westbound Approach	12.4	B	11.8	B
Southbound Left	8.5	A	8.4	A
2024 Background				
Westbound Approach	17.3	C	16.2	C
Southbound Left	9.7	A	9.8	A
2024 Background Plus Project#				
Northbound Left		A	10.4	B
Eastbound Approach		C	27.9	D
Westbound Approach		C	19.8	C
Southbound Left		A	9.4	A
2045 Background \$				
Westbound Approach		C	16.1	C
Southbound Left	11.7	B	9.0	A
2045 Background Plus Project # \$				
Northbound Left	9.6	A	13.5	B
Eastbound Approach	17.6	C	43.8	E
Westbound Approach	13.9	B	16.4	C
Southbound Left	9.3	A	8.9	A

In the Synchro reports, the southbound lane is shared left/through. Is the SB left begin constructed since it is warranted in the existing condition.

A southbound left turn lane has been included in the 2024 background scenario.

Synchro includes SB Left in "Total" condition but not background.

= Addition of a SB Left Turn Lane
 \$ = Two NB and SB Through Lanes

Table 4 – 5th Avenue & Gun Club Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Existing				
Westbound Approach	11.4	B	12.6	B
Southbound Left	8.5	A	8.1	A
2024 Background				
Northbound Left	8.5	A	10.1	B
Eastbound Approach	21.5	C	33.2	D
Westbound Approach	21.8	C	36.8	E
Southbound Left	10.3	B	9.3	A
2024 Background Plus Project				
Northbound Left	8.6	A	10.5	B
Eastbound Approach	22.3	C	44.7	E
Westbound Approach	24.4	C	76.5	F
Southbound Left	10.3	B	9.3	A
2024 Background Plus Project #	10.8	B	15.0	B
2025 Background \$				
Northbound Left	9.3	A	12.9	B
Eastbound Approach	17.4	C	81.3	F
Westbound Approach	16.9	C	32.6	D
Southbound Left	8.9	A	8.7	A
2025 Background Plus Project # \$	8.5	A	12.1	B

= Signalized with Separate EB/WB Left Turn Lanes

\$ = Two NB and SB Through Lanes

All movements need to be listed not just the overall LOS for signalized analyses. All movements will LOS E/F need to be discussed and mitigation measures need to be evaluated as appropriate.

Movement delays have been added to the level of service tables of the signalized intersections. All LOS E and LOS F have been discussed and potentially mitigated in the revised traffic study.

6th Parkway and Gun Club Road

The 6th Parkway and Gun Club Road intersection is a four-leg signalized intersection. This intersection currently operates at LOS C during the morning and afternoon peak hour. With the addition of the project traffic in 2024, the intersection is expected to operate at LOS C during the morning peak hour and LOS D during the afternoon peak hour. It should be noted a southbound right turn lane is planned to be constructed at the 6th Parkway and Gun Club Road intersection and was incorporated in the analysis. By 2045, the City of Aurora ultimate cross sections of three eastbound and westbound through lanes, and two northbound and southbound through lanes should be provided at this intersection. In addition, northbound and westbound dual left turn lanes may be needed at this intersection by 2045. With these improvements by 2045, this intersection is anticipated to operate acceptably during the peak hours. **Table 5** provides the results of the level of service at this intersection.

Table 5 – 6th Parkway & Gun Club Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Existing	24.8	C	31.0	C
2024 Background	30.7	C	41.4	D
2024 Background Plus Project \$	30.2	C	37.6	D
2045 Background #	32.8	C	44.4	D
2045 Background Plus Project #	33.5	C	46.8	D

\$ = Separate SB Right Turn Lane

= Includes Dual NB and WB Left Turn Lanes, Three EB and WB Through Lanes, and Two NB and SB Through Lanes

All movements need to be listed not just the overall LOS for signalized analyses. All movements will LOS E/F need to be discussed and mitigation measures need to be evaluated as appropriate.

Movement delays have been added to the level of service tables of the signalized intersections. All LOS E and LOS F have been discussed and potentially mitigated in the revised traffic study.

5.3 Turn Lane Requirements Analysis

The City of Aurora has directed Kimley-Horn to use the Colorado Department of Transportation (CDOT) State Highway Access Code (SHAC) guidelines to determine if turn lanes are warranted for access into the project accesses. CDOT classifies their state highways based on roadway types. The Non-Rural Arterial Category NR-B (moderate travel speeds and moderate to high volumes) was assigned to 6th Parkway based on matching the characteristics of the CDOT roadways. The Non-Rural Arterial Category NR-C (low to moderate travel speeds and moderate volumes) was assigned to Gun Club Road based on matching the characteristics of the CDOT roadways.

According to the State Highway Access Code for category NR-B and NR-C roadways with speed limits greater than 40 miles per hour, a left turn deceleration lane and taper is required for any access with a projected peak hour left ingress turning volume greater than 10 vehicles per hour (vph). A right turn deceleration lane and taper is required for any access with a projected peak hour right ingress turning volume greater than 25 vph.

Southbound left turn lane has been evaluated in the revised traffic study.

Based on the 2024 traffic volume projections, turn lane requirements for the project access intersections along 6th Parkway and Gun Club Road are as follows:

6th Avenue and Gun Club Road

SB Left was mentioned in previous sections, but it is not listed here. Please include.

- A northbound left turn lane **is** warranted for the intersection based on projected 2024 background plus project traffic volumes being 17 northbound left turns during the peak hour and the threshold being 10 vph. It is recommended that this lane be constructed to 275 feet with a 160-foot taper.
- A southbound right turn lane **is not** warranted for the Gun Club Road and 6th Avenue intersection based on projected 2024 background plus project traffic volumes being 16 southbound right turns during the peak hour and the threshold being 25 vph.

5th Avenue and Gun Club Road

this may change if trip distribution changes

- A northbound left turn lane **is** warranted for the Gun Club Road and 5th Avenue intersection based on projected 2024 background plus project traffic volumes being 92 northbound left turns during the peak hour and the threshold being 10 vph.

This section has been updated with the revised trip distribution.

Subdivision development will provide a northbound left turn lane with the buildout of their project in 2022.

- A southbound right turn lane **is not** warranted for the Gun Club Road and 5th Avenue intersection based on projected 2024 background plus project traffic volumes being 18 southbound right turns during the peak hour and the threshold being 25 vph.

this may change if trip distribution changes

5.4 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersections. The queuing analysis was performed using Synchro presenting the results of the analysis in terms of queue lengths. Results are shown in the following **Table 6** with calculations provided in the service operational sheets of **Appendix D** for unsignalized intersections and **Appendix E** for signalized intersections.

This section has been updated with the revised trip distribution.

Table 6 – Turn Lane Queuing Analysis Results

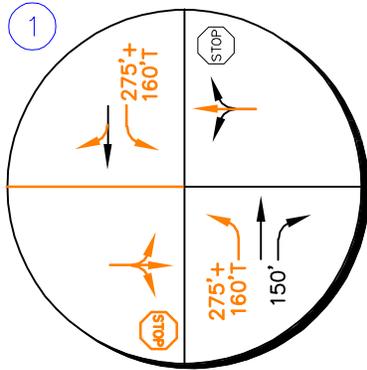
Intersection Turn Lane	Existing Turn Lane Length (feet)	2024 Calculated Queue (feet)	2024 Recommended Length (feet)	2045 Calculated Queue (feet)	2045 Recommended Length (feet)
6th Ave & Gun Club Rd					
Northbound Left	DNE	25'	275'+160'T (CDOT)	25'	275'+160'T (CDOT)
Southbound Left	DNE	25'	275'+160'T (CDOT)	25'	275'+160'T (CDOT)
5th Ave & Gun Club Rd					
Eastbound Left	DNE	40'	150'	40'	150'
Westbound Left	DNE	48'	150'	55'	150'
Northbound Left	DNE	31'	275'+160'T (CDOT)	33'	275'+160'T (CDOT)
Southbound Left	150'	26'	150'	32'	150'
6th Pkwy & Gun Club Rd					
Eastbound Left	125'	250'	250'	281'	300'
Westbound Left	200'	82'	200'	156'	200' DL
Westbound Right	C	26'	C	-	-
Northbound Left	150'	87'	150'	212'	225' DL
Northbound Right	250'	25'	250'	-	-
Southbound Left	150'	108'	150'	131'	150'
Southbound Right	DNE	25'	150'	-	150'

DL = Dual Left Turn Lanes; DNE = Does Not Exist; C = CDOT SHAC

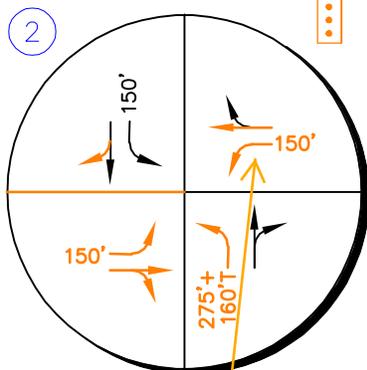
As shown in the queuing table, all vehicle queue lengths are contained within the existing turn lanes in 2024 with the exception of the eastbound left turn lane at the 6th Parkway and Gun Club Road intersection. The eastbound left turn lane at the 6th Parkway and Gun Club Road intersection is 125 feet of length. The eastbound left turn lane at the 6th Parkway and Gun Club Road intersection is extended from 125 feet to 250 feet of length.

The turn lane length recommendations in the Aurora Crossroads TIS have been checked for consistency purposes and appropriate discussion has been included in the revised traffic study.

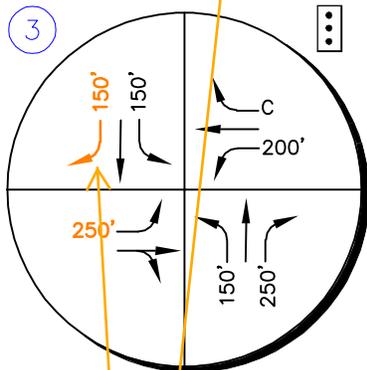
check that these are consistent with the lengths in Aurora Crossroads for the same intersection.



6TH AVENUE & GUN CLUB ROAD



5TH AVENUE & GUN CLUB ROAD



6TH PKWY & GUN CLUB ROAD



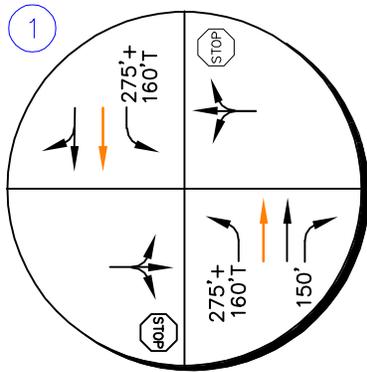
Additional discussion and clarification has been provided for these turn lanes in the revised traffic study.

Add discussion to the report on why this is warranted. These have not been mentioned previously like the other auxiliary lanes.

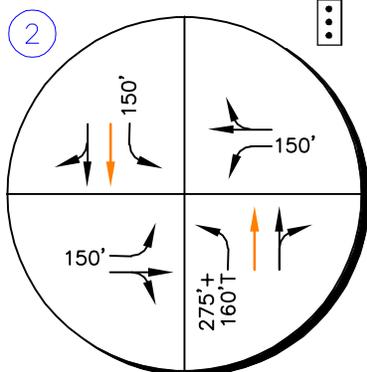
LEGEND

- (X) Study Area Key Intersection
- STOP Stop Controlled Approach
- ⋮ Signalized Intersection
- C Continuous Turn Lane
- 100' Turn Lane Length (feet)
- Improvements
- Major Arterial
- Minor Arterial
- Collector Street
- Local Street

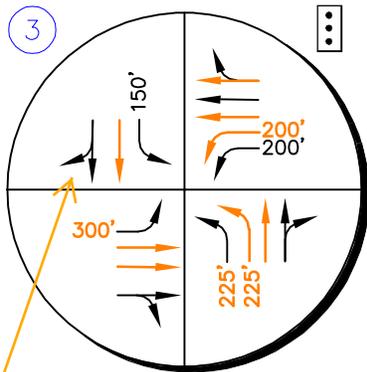
FIGURE 10



6TH AVENUE & GUN CLUB ROAD



5TH AVENUE & GUN CLUB ROAD



6TH PKWY & GUN CLUB ROAD



LEGEND

- (X) Study Area Key Intersection
- STOP Stop Controlled Approach
- ⋮ Signalized Intersection
- C Continuous Turn Lane
- 100' Turn Lane Length (feet)
- ↔ Improvements
- Red Line Major Arterial
- Blue Line Minor Arterial
- Green Line Collector Street
- Magenta Line Local Street

Volumes warrant a right-turn to continue into the future.

Revised.

VISTA CREEK MULTI-FAMILY
 AURORA, COLORADO
 2045 RECOMMENDED GEOMETRY

FIGURE 11

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Vista Creek Multi-Family will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2024 Recommendations

- With the buildout of the project, the west leg and a northbound left turn lane will be provided at the intersection of 6th Avenue and Gun Club Road. The west leg of this intersection will provide access to the project. It is recommended that a R1-1 “STOP” sign be provided on the eastbound approach of the 6th Avenue and Gun Club Road intersection. To meet Aurora turn lane length requirements, the northbound left turn lane is recommended to be 275 feet of storage with a 160-foot taper. Of note, the existing southbound left turn lane volumes warrant a turn lane, and it is recommended a southbound left turn lane is also provided at this intersection. It should be noted that project traffic does not contribute to the southbound left turn movement at the 6th Avenue and Gun Club Road intersection.
- It is anticipated that the proposed adjacent development to the south, Lamar Landing Subdivision, will be built out prior to the project and will construct the west leg and a northbound left turn lane at the 5th Avenue and Gun Club Road intersection. The intersection of 5th Avenue and Gun Club Road is anticipated to meet four-hour vehicular volume warrants in 2024; therefore, signalization is anticipated to be the appropriate control at this intersection by 2024. If signalized, the eastbound and westbound approaches of this intersection should provide designated left turn lanes and a shared through/right turn lane.
- It is recommended that the eastbound left turn lane at the 6th Parkway and Gun Club Road intersection be extended from 125 feet to 250 feet.

Widening for a NB left-turn will include widening the SB approach for aligned travel lanes. It is understood that this is not a project warranted improvement.

Acknowledged.

2045 Recommendations

- By 2045, the City of Aurora six-lane cross section is expected to be provided along 6th Parkway within the project limits. Further, Gun Club Road is expected to be constructed to the ultimate street section of two through lanes in each direction.

- Northbound and westbound dual left turn lanes may be needed at the 6th Parkway and Gun Club Road intersection by 2045 and should be studied further as traffic volumes materialize in the future.

General Recommendations:

- Any on-site and off-site roadway, signing, striping, and signal improvements should be incorporated into the Civil Drawings, and conform to City of Aurora standards as well as the Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD).



A multi-modal section has been added in the revised traffic study.