

Traffic Impact Study

# Monument Hill

El Paso County, Colorado

Prepared for:


**The Garrett Companies**

**Kimley»Horn**

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

Traffic Engineer's Statement


The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.

  
\_\_\_\_\_  
Curtis D. Rowe, P.E., PTOE PE #36355

September 14, 2022  
\_\_\_\_\_  
Date

Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

  
\_\_\_\_\_  
Mr. Karl Stout  
The Garrett Companies, Inc.  
1051 Greenwood Springs Boulevard  
Suite 101  
Greenwood, Indiana 46143

September 20, 2022  
\_\_\_\_\_  
Date

**Monument Hill**

El Paso County, Colorado

**Prepared for**  
**The Garrett Companies**  
1051 Greenwood Springs Boulevard  
Suite 101  
Greenwood, Indiana

**Prepared by**  
**Kimley-Horn and Associates, Inc.**  
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Suite 300  
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September 2022



*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

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Monument Hill is proposed to be located at 18950 Base Camp Road in El Paso County, Colorado. The project is proposed to include approximately 264 multifamily dwelling units. It is expected that Monument Hill will be completed in the next several years. Therefore, analysis was conducted for the 2025 short-term buildout horizon as well as the 2045 long-term twenty-year planning horizon.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study per El Paso County and CDOT standards and requirements:

- Palmer Divide Road and Monument Hill Road (#1)
- Misty Acres Boulevard and Monument Hill Road (#2)
- Deer Creek Road and Monument Hill Road (#3)
- Deer Creek Road and Base Camp Road (#4)
- Deer Creek Road and Woodmoor Drive (#5)
- Monument Hill Road and Woodmoor Drive (#6)
- State Highway 105 (SH-105) and Woodmoor Drive (#7)
- Monument Hill Road Southern Right-In/Right-Out Movement Access (#8)
- Monument Hill Road Northern Full Movement Access (#9)

Regional access to Monument Hill will be provided by Interstate 25 (I-25) and SH-105. Primary access will be provided by Woodmoor Drive and Monument Hill Road. Direct access will be provided by a proposed northern full movement access located approximately 800 feet south of the Palmer Ridge High School bus loop access (measured right-of-way to center) and a southern right-in/right-out access located approximately 800 feet south of the full movement access (measured center to center). Likewise, access to the development will be available at the northern cul-de-sac terminus of Base Camp Road. Traffic using this access will arrive and depart Base Camp Road at the Deer Creek Road (#4) intersection.

Monument Hill is expected to generate approximately 1,768 weekday daily trips, with 106 of these trips occurring during the morning peak hour and 136 of these trips occurring during the afternoon

List any reports from other projects which may have been used/researched.

Timley-Horn and Associates, Inc.  
096481007 – Monument Hill

This was addressed in previous comments and is included in this paragraph on the next page. These include the North Bay at Woodmoor Traffic Study, Waterside Traffic Study, and Lewis Palmer Trail Safe Routes to School Plans.

peak hour. The trip generation calculation worksheets are included in **Appendix C**. These trips were added to the background traffic volumes in the 2025 and 2045 horizon analysis years to develop future total traffic volume projections. The background traffic volumes used in this study include traffic anticipated to be generated by the adjacent North Bay at Woodmoor and the Waterside developments which were analyzed in Traffic Impact Studies completed by LSC Transportation Consultants in May and June of 2022, respectively. Additionally, a summary of the Lewis Palmer Trail Safe Routes to School plans within and nearby the study area is included in this traffic study.

Based on the analysis presented in this report, Kimley-Horn believes Monument Hill 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 conclusions and recommendations:

Recommendations are shown at the end of the report. Please remove them from this location.

Updated to only be in the conclusion section.

### **2022 Recommendations**

- The Monument Hill Road and Woodmoor Drive (#6) intersection experiences a failing level of service today with existing traffic during the morning peak hour. As such, it is recommended this intersection be considered for control improvements to provide acceptable level of service. For purposes of this analysis, the intersection was evaluated with roundabout control. The existing eastbound right turn lane that operates with free conditions can remain unmodified. The eastbound approach to the roundabout should provide a shared left/through lane. The westbound approach should provide a shared left/through/right turn lane. The northbound approach should provide a left turn lane and a shared through/right turn lane. The southbound approach should provide a shared left/through lane and a right turn lane. Each approach to the roundabout should operate with yield conditions with posted R1-2 “YIELD” signs.
- At the SH-105 and Woodmoor Drive (#7) intersection, it is recommended that southbound dual right turn lanes be provided due to existing southbound queues extending beyond the Lake Woodmoor Drive intersection to the north. The existing chevron striping between the southbound right turn and left turn lanes should be modified to include a second southbound right turn lane. As such, it is recommended the southbound right turn phasing be modified from permissive-overlap to protected-overlap phasing with no right turn on red. It is anticipated

## 2.0 INTRODUCTION

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Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study for the Monument Hill residential project proposed to be located at 18950 Base Camp Road in El Paso County, Colorado. A vicinity map illustrating the Monument Hill development location is shown in **Figure 1**. For the purposes of this study, Monument Hill is anticipated to include approximately 264 multifamily dwelling units. A conceptual site plan is attached in **Appendix F**. It is expected that Monument Hill will be completed within the next several years; therefore, analysis was conducted for the 2025 short-term buildout horizon as well as the 2045 long-term twenty-year planning horizon.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were evaluated in this traffic study per El Paso County and CDOT standards and requirements:

- Palmer Divide Road and Monument Hill Road (#1)
- Misty Acres Boulevard and Monument Hill Road (#2)
- Deer Creek Road and Monument Hill Road (#3)
- Deer Creek Road and Base Camp Road (#4)
- Deer Creek Road and Woodmoor Drive (#5)
- Monument Hill Road and Woodmoor Drive (#6)
- State Highway 105 (SH-105) and Woodmoor Drive (#7)
- Monument Hill Road Southern Right-In/Right-Out Movement Access (#8)
- Monument Hill Road Northern Full Movement Access (#9)

Include Access at Base Camp Road

Base Camp Access is now included in this list.

Woodmoor Drive is a two-lane roadway with one through lane in the north/south direction. The posted speed limit is 30 miles per hour that reduces to 20 miles per hour near the Lewis Palmer Middle School during school arrival and departure times. This roadway is classified by El Paso County as a two-lane residential collector.

Although SH-105 is a north/south state highway, within the study area it extends east/west with two through lanes in each direction through the Woodmoor Drive study intersection. For purposes of this analysis, SH-105 will be referred to in the eastbound/westbound directions. The posted speed limit near the study intersection is 35 miles per hour. The Colorado Department of Transportation classifies this roadway as a Non-Rural Principal Highway (NR-A).

Include discussion on if any of the existing roads have any planned improvements per the Major Transportation Corridor Study (MTCP)

Discussion was added to reference plans shown in El Paso County's MTCP.

### 3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the study intersections Wednesday, September 7, 2022 during the morning and afternoon peak hours. Of note, the nearby schools of Palmer Ridge High School, Lewis-Palmer Middle School, and Lewis-Palmer Elementary School were all in session when these traffic counts were collected. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 2:30 PM to 6:00 PM on these count dates—of note, the counts conducted during these peak periods include the arrival and dismissal times of each of the previously mentioned schools in the study area. The existing intersection traffic volumes are shown in **Figure 3** with count sheets provided in **Appendix A**.

### 3.4 Unspecified Development Traffic Growth

According to information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along SH-105 in the vicinity of the site is 1.39. This 20-year growth factor equates to annual growth rate of 1.66 percent. Therefore, a 1.66 percent annual growth rate was used to estimate the short-term 2025 and long-term 2045 traffic volume projections along SH-105. Likewise, Palmer Divide Road is a corridor similar in nature to SH-105 for growth potential; therefore, a 1.66 percent annual growth was also used to estimate 2025 and 2045 traffic volumes. However, the area surrounding the intersections along Monument Hill Road, Deer Creek Road, Woodmoor Drive, and Misty Acres Boulevard are primarily built out. To provide a conservative analysis along these roadways, a 1.0 percent annual growth rate was applied at these intersections. Traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix B**.

In addition, the volume associated with the known nearby proposed developments of Waterside and North Bay at Woodmoor were included in the background traffic volumes. The applicable documents from the Waterside Traffic Impact Study and the North Bay at Woodmoor Traffic Impact Study prepared in May and June of 2022 are also included in **Appendix B**. Background traffic volumes for 2025 and 2045 are shown in **Figures 4** and **5**, respectively.

Indicate whether which years 2025 and/or 2045 is when Waterside and North Bay counts were included in volumes.

Statement was updated to clarify that these studies were added into both the 2025 and 2045 background traffic volumes.

## 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**.

## 4.3 Traffic Assignment

Monument Hill traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 7**.

## 4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2025 buildout horizon and long-term 2045 twenty-year planning horizon. These total traffic volumes for the study area are illustrated for the 2025 and 2045 horizon years in **Figures 8** and **9**, respectively.

Provide more description on how thru volumes at intersections 8 & 9 were determined on this figure.

Provide more description on how these volumes were all determined.

Additional description was provided to explain how the volumes were determined, including a description of how the through volumes at #8 and #9 were determined.



### Palmer Divide Road and Monument Hill Road (#1)

The unsignalized intersection of Palmer Divide Road and Monument Hill Road (#1) operates with stop control on the northbound and southbound approaches of Monument Hill Road. The movements operate acceptably at LOS C or better during both peak hours under existing conditions. With project traffic, the intersection movements are expected to continue operating with LOS D or better during both peak hours in the 2025 horizon.

However, by the 2045 horizon prior to construction of this project, this intersection may experience a failing level of service with its current lane configuration and control. As such, this intersection was analyzed as a single-lane roundabout in the 2045 horizon. With the recommended improvements to this intersection, the intersection movements are anticipated to operate acceptably in the 2045 horizon. **Table 3** provides the results of the LOS analysis for this intersection.

Alternate scenarios should be provided besides just a roundabout.

A signalized analysis including a signal warrant was conducted for this intersection. Based on anticipated 2045 background plus project traffic volumes, this intersection is not anticipated to warrant a signal. However, it was noted that the intersection will operate acceptably in 2045 with either a roundabout or a signal.

**Table 3 – Palmer Divide Road & Monument Hill Road LOS Results**

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
<b>2022 Existing</b>				
Northbound Approach	21.2	C	14.9	B
Eastbound Left	8.5	A	7.7	A
Westbound Left	7.8	A	8.1	A
Southbound Approach	17.1	C	9.5	A
<b>2025 Background</b>				
Northbound Approach	24.1	C	15.7	C
Eastbound Left	8.5	A	7.8	A
Westbound Left	7.9	A	8.1	A
Southbound Approach	17.9	C	9.6	A
<b>2025 Background Plus Project</b>				
Northbound Approach	26.8	D	16.2	C
Eastbound Left	8.5	A	7.8	A
Westbound Left	7.9	A	8.2	A
Southbound Approach	18.0	C	9.6	A
<b>2045 Background</b>				
Northbound Approach	70.2	F	22.6	C
Eastbound Left	9.2	A	8.0	A
Westbound Left	8.1	A	8.6	A
Southbound Approach	26.7	D	10.2	B
<b>2045 Background Plus Project #</b>	<b>10.4</b>	<b>B</b>	<b>6.4</b>	<b>A</b>
Northbound Approach	4.8	A	5.8	A
Eastbound Approach	5.7	A	6.8	A
Westbound Approach	13.5	B	5.8	A
Southbound Approach	7.5	A	4.2	A

# = Single-lane roundabout

### Misty Acres Boulevard and Monument Hill Road (#2)

The unsignalized 'T'-intersection of Misty Acres Boulevard and Monument Hill Road (#2) operates with stop control on the westbound approach of Misty Acres Boulevard. The movements operate with LOS D or better during both peak hours under existing conditions. The movements are expected to continue operating with LOS D or better during both peak hours through the 2025 horizon.

However, by the 2045 horizon prior to construction of this project, this intersection may experience a failing level of service in its current intersection configuration. As such, analysis was conducted with this intersection reconfigured as a single-lane three-leg roundabout. With the recommended improvements to the intersection, the intersection and approaches are anticipated to operate at an acceptable level of service with or without the project traffic in the 2045 horizon. **Table 4** provides the results of the LOS analysis conducted at this intersection.

Alternate scenarios should be provided besides just a roundabout.

**Table 4 – Misty Acres Boulevard & Monument Hill Road LOS Results**

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
<b>2022 Existing</b>				
Westbound Left	26.8	D	12.3	B
Westbound Right	8.8	A	8.8	A
Southbound Left	8.7	A	8.0	A
<b>2025 Background</b>				
Westbound Left	30.2	D	12.6	B
Westbound Right	8.9	A	8.9	A
Southbound Left	8.8	A	8.1	A
<b>2025 Background Plus Project</b>				
Westbound Left	31.5	D	12.9	B
Westbound Right	9.0	A	8.9	A
Southbound Left	8.9	A	9.1	A
<b>2045 Background</b>				
Westbound Left	92.3	F	14.7	B
Westbound Right	9.1	A	9.0	A
Southbound Left	9.4	A	8.3	A
<b>2045 Background Plus Project #</b>	<b>11.1</b>	<b>B</b>	<b>6.3</b>	<b>A</b>
Westbound Approach	8.9	A	6.7	A
Northbound Approach	11.4	B	6.0	A
Southbound Approach	13.8	B	5.7	A

A signalized analysis including a signal warrant was conducted for this intersection. Based on anticipated 2045 background plus project traffic volumes, this intersection is not anticipated to warrant a signal. However, it was noted that the intersection will operate acceptably in 2045 with either a roundabout or a signal.

# = Single-lane three-leg roundabout

### Deer Creek Road and Base Camp Road (#4)

The Deer Creek Road and Base Camp Road (#4) 'T'-intersection operates with stop control on the southbound approach of Base Camp Road. Currently, the movements at the intersection operate with LOS A during the morning and afternoon peak hours. The movements at the intersection are anticipated to continue operating with LOS B or better during both peak hours with the addition of project traffic through the long-term horizon. Therefore, no improvements or modifications are anticipated to be needed at the intersection. **Table 6** provides the results of the LOS analysis conducted at this intersection.

**Table 6 – Deer Creek Road and Base Camp Road LOS Results**

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
<b>2022 Existing</b>				
Eastbound Left	7.7	A	7.4	A
Southbound Approach	9.6	A	9.4	A
<b>2025 Background</b>				
Eastbound Left	7.8	A	7.5	A
Southbound Approach	9.8	A	9.5	A
<b>2025 Background Plus Project</b>				
Eastbound Left	7.8	A	7.5	A
Southbound Approach	10.7	B	9.8	A
<b>2045 Background</b>				
Eastbound Left	7.9	A	7.5	A
Southbound Approach	10.2	B	9.9	A
<b>2045 Background Plus Project</b>				
Eastbound Left	8.0	A	7.6	A
Southbound Approach	11.6	B	10.3	B

### Deer Creek Road and Woodmoor Drive (#5)

The unsignalized intersection of Deer Creek Road and Woodmoor Drive (#5) operates with stop control on the eastbound and westbound approach of Deer Creek Road. With existing geometry and control, the movements at the intersection operate with LOS C or better during both peak hours. It is known that a roundabout is being considered at this intersection in the future. As such, the 2025 and 2045 horizon years include analysis of this intersection reconfigured as a roundabout in addition to the horizon analysis completed with its existing configuration. With the addition of project traffic, the intersection movements are expected to continue operating with LOS D or better during both peak hours through the 2045 horizon in its existing configuration.

Keep the standard intersection analysis in as well and discuss. Roundabout is not a given, so both alternatives need to be provided along with a comparison between them.

As shown in Table 7, this intersection was still studied with the existing configuration, with the addition of the roundabout analysis conducted in the 2025 and 2045 horizons, as described in this paragraph. Additional clarification to this paragraph was provided.

With the modification of the intersection to become a single-lane roundabout, the intersection movements are anticipated to operate at LOS A during both peak hours through the 2045 horizon. **Table 7** provides the results of the LOS analysis conducted at this intersection.

**Table 7 – Deer Creek Road & Woodmoor Drive LOS Results**

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
<b>2022 Existing</b>				
Northbound Left	8.2	A	7.7	A
Eastbound Approach	12.1	B	11.3	B
Westbound Approach	16.5	C	13.6	B
Southbound Left	0.0	A	7.6	A
<b>2025 Background</b>				
Northbound Left	8.2	A	7.7	A
Eastbound Approach	12.5	B	11.7	B
Westbound Approach	18.4	C	14.4	B
Southbound Left	0.0	A	7.7	A
<b>2025 Background Plus Project</b>				
Northbound Left	8.3	A	7.7	A
Eastbound Approach	12.6	B	11.8	B
Westbound Approach	19.0	C	14.8	B
Southbound Left	0.0	A	7.7	A
<b>2025 Background Plus Project #</b>	<b>5.2</b>	<b>A</b>	<b>4.4</b>	<b>A</b>
Northbound Approach	3.8	A	4.7	A
Eastbound Approach	4.8	A	3.8	A
Westbound Approach	3.8	A	3.9	A
Southbound Approach	6.3	A	4.2	A
<b>2045 Background</b>				
Northbound Left	8.6	A	7.8	A
Eastbound Approach	14.5	B	13.0	B
Westbound Approach	25.1	D	16.7	C
Southbound Left	0.0	A	7.8	A
<b>2045 Background Plus Project</b>				
Northbound Left	8.6	A	7.8	A
Eastbound Approach	15.7	C	13.6	B
Westbound Approach	28.5	D	17.9	C
Southbound Left	0.0	A	7.8	A
<b>2045 Background Plus Project #</b>	<b>6.2</b>	<b>A</b>	<b>4.9</b>	<b>A</b>
Northbound Approach	4.2	A	5.3	A
Eastbound Approach	5.7	A	4.2	A
Westbound Approach	4.2	A	4.2	A
Southbound Approach	7.8	A	4.7	A

# = Single-lane roundabout

### Monument Hill Road and Woodmoor Drive (#6)

The Monument Hill Road and Woodmoor Drive (#6) unsignalized intersection operates with stop control on the eastbound and westbound approach of Monument Hill Road with the eastbound right turn operating with free movement. Based on the analysis conducted in this study, the eastbound left/through and westbound approaches to the intersection both operate at LOS F during the morning peak hour under existing conditions, while intersection movements currently operate at LOS D or better during the afternoon peak hour. As such, improvements are recommended to be considered at this intersection soon, with or without construction of this project. For purposes of this study, analysis was conducted with this intersection reconfigured as a roundabout in the 2025 and 2045 horizons. The existing eastbound right turn lane that operates with free conditions is recommended to remain unmodified. The eastbound approach to the roundabout should provide a shared left/through lane. The westbound approach should provide a shared left/through/right turn lane. The northbound approach should provide a left turn lane and a shared through/right turn lane. The southbound approach should provide a shared left/through lane and a right turn lane. With the addition of project traffic and the recommended improvements, the intersection is expected to operate with LOS C or better during both peak hours through the 2045 horizon. **Table 8** provides the results of the LOS analysis conducted at this intersection.

Alternate scenarios should be provided besides just a roundabout.

This intersection was updated to be analyzed in 2025 and 2045 in three ways:

- 1) restricting eastbound left/through and westbound left/through movements during either the school peak periods or permanently
- 2) Roundabout (as done previously)
- 3) Signalized intersection with existing intersection lane configuration.

A signal is not anticipated to be warranted based on projected 2045 background plus project traffic volumes.

All three scenarios are anticipated to operate well through the 2045 horizon with the following LOS results:

- 1) Movement restriction: LOS C or better through 2045
- 2) Roundabout: LOS C or better through 2045
- 3) Signal: LOS B or better through 2045.

### 5.3 CDOT Analysis

The threshold for requiring an access permit along Colorado Department of Transportation (CDOT) roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent or modifications are needed at the intersection. Based on traffic projections, the addition of project traffic on the north leg of Woodmoor Drive at SH-105 is not anticipated to increase existing access traffic volumes by more than 20 percent, with the maximum expected increase at 7.7 percent during the afternoon peak hour on the north leg (116 project / 1508 existing 2022 counts). In addition, improvements are not anticipated to be needed or recommended at the SH-105 and Woodmoor Drive intersection. Therefore, a CDOT access permit is not anticipated to be required in association with this project.

### 5.4 El Paso County Engineering Criteria Manual (ECM) was used to determine

The El Paso County Engineering Criteria Manual (ECM) was used to determine

The 116 and 1508 vehicle volumes are clarified further in the updated report. The 116 vehicles are based on project generated traffic on the north leg as shown in Figure 7 while the 1508 vehicles is based on 2022 existing traffic volumes as shown in Figure 3.

The 2022 existing traffic volumes are used per CDOT State Highway Access Code standards to provide a more conservative estimate of the impact the project will have on CDOT roadways; if the 2025 background traffic volumes were used, the percent increase in the volumes would be even lower and would thus not be in accordance with CDOT code nor be as conservative as the estimate provided in this analysis.

Monument Hill Road and Woodmoor Drive. El Paso County

Woodmoor Drive as Collector roadways. A While a second southbound right turn lane is recommended in this analysis, this does not affect the CDOT roadway as no acceleration or deceleration lanes or modification to SH-105 would be required based on this change. This statement was modified in the report to clarify this.

Materials and Lower Classifications, a left turn lane during the peak hour left turning volume of 25 vehicles per hour. A CDOT roadway as no acceleration or deceleration lanes or modification to SH-105 would be required based on this change. This statement was modified in the report to clarify this.

access with a projected peak hour right turn volume of 25 vehicles per hour. A CDOT roadway as no acceleration or deceleration lanes or modification to SH-105 would be required based on this change. This statement was modified in the report to clarify this.

right turn acceleration lane is generally not required. A CDOT roadway as no acceleration or deceleration lanes or modification to SH-105 would be required based on this change. This statement was modified in the report to clarify this.

providing a posted speed limit of 45 miles per hour to the south of Woodmoor Drive providing a speed limit of 30 miles per hour, the turn traffic contributes to are as follows:

#### Deer Creek Road & Monument Hill Road (#3):

- A northbound right turn lane exists and **is not** warranted at this intersection based on projected 2025 total traffic volumes being 47 northbound right turns during the peak hour and the threshold being 50 vehicles per hour. The existing northbound right turn provides a length of 225 feet.
- A southbound left turn lane exists and **is** warranted at this intersection based on projected 2025 total traffic volumes being 87 southbound left turns during the peak hour and the threshold being 25 vehicles per hour. The existing southbound left turn lane is 475 feet.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Monument Hill 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 conclusions and recommendations:

Note: If improvements are not being constructed for this intersection, funds may need to be set up to help pay for projects portion of improvements.

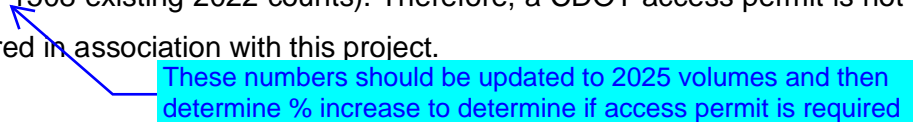
### 2022 Recommendations

- The Monument Hill Road and Woodmoor Drive (#6) intersection experiences a failing level of service today with existing traffic during the morning peak hour. As such, it is recommended that this intersection be considered for control improvements to provide acceptable level of service. For purposes of this analysis, the intersection was evaluated with roundabout conditions. The existing eastbound right turn lane that operates with free conditions can remain unmodified. The eastbound approach to the roundabout should provide a shared left/through lane. The westbound approach should provide a shared left/through/right turn lane. The northbound approach should provide a left turn lane and a shared through/right turn lane. The southbound approach should provide a shared left/through lane and a right turn lane. The eastbound approach to the roundabout should operate with yield conditions with posted R1-2 "YIELD" signs.
- At the SH-105 and Woodmoor Drive (#7) intersection, it is recommended that southbound dual right turn lanes be provided due to existing southbound queues extending beyond the Lake Woodmoor Drive intersection to the north. The existing chevron striping between the southbound right turn and left turn lanes should be modified to include a second southbound right turn lane. As such, it is recommended the southbound right turn phasing be modified from permissive-overlap to protected-overlap phasing with no right turn on red. It is anticipated this southbound right turn lane will be a continuous lane from the southbound through lane to the north of the Woodmoor Drive and Lake Woodmoor Drive intersection, while the inner southbound left turn lane also be a continuous lane. The existing southbound right and left turn lanes are recommended to provide 250 feet of storage length.

Noted. As mentioned in the report, this intersection is experiencing a failing level of service in the existing 2022 conditions. This project has included mention of appropriate road impact fees as shown in Table 12 for this proposed development. -done

These calculations are done based on the CDOT State Highway Access Code standards, which stipulates the permits be based on 2022 existing counts. Of note, updating to 2025 background traffic counts would lower the % shown here, so this is more conservative as it is. See previous note in CDOT Analysis section (5.3 in the report) for further clarification.

### **2025 Recommendations**

- The threshold for requiring an access permit along Colorado Department of Transportation (CDOT) roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent or modifications are needed at the intersection. Based on traffic projections, the addition of project traffic on the north leg of Woodmoor Drive at SH-105 is not anticipated to increase existing access traffic volumes by more than 20 percent, with the maximum expected increase at 7.7 percent during the afternoon peak hour on the north leg (116 project / 1508 existing 2022 counts). Therefore, a CDOT access permit is not anticipated to be required in association with this project.  

- With completion of the Monument Hill project, a northern full movement access is proposed to be located approximately 800 feet south of the Palmer Ridge High School bus loop access (measured right-of-way to center). The access is recommended to operate with stop control with installation of an R1-1 “STOP” sign on the westbound exiting approach.
- A southern right-in/right-out access is proposed to be located approximately 800 feet south of the full movement access (measured center to center), which would also place it approximately 775 feet north of the Deer Creek Road intersection. An R1-1 “STOP” sign is recommended to be installed on the exiting westbound approach. In addition, an R3-2 No Left Turn sign is recommended to be installed below the “STOP” sign to identify the restriction to right out only and on the southeast corner of the intersection visible to southbound drivers to identify the restriction to right in only.

### **2045 Recommendations**

- If projected 2045 volumes are realized, the Palmer Divide Road and Monument Hill Road (#1) intersection may need to be reconfigured with control improvements to operate acceptably. This intersection is anticipated to operate acceptably as a single-lane roundabout with a shared left/through/right turn lane at each approach. If constructed, each approach to the roundabout should operate with yield conditions with posted R1-2 “YIELD” signs. Of note, this intersection experiences a failing level of service in the 2045 horizon with or without construction of this project.



- The intersection of Misty Acres Boulevard and Monument Hill Road (#2) may experience a failing level of service in the 2045 horizon if projected volumes are realized. This intersection is also anticipated to operate acceptably as a single-lane roundabout with a shared northbound through/right turn lane, a shared southbound left/through lane, and a shared westbound left/right turn lane. The east leg of the intersection should still provide the existing configuration of two eastbound through lanes approaching the northern Palmer Ridge High School access, with the outside lane being an eastbound right turn lane into Palmer Ridge High School access and the inside lane continuing to the east. If constructed, each approach to the roundabout should operate with yield conditions with posted R1-2 “YIELD” signs. Of note, this intersection experiences a failing level of service in the 2045 horizon with or without construction of this project.

### **General Recommendations**

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of El Paso County and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

Summary table was added to the conclusion section of the report.

Provide summary table of recommended improvements & % impact project has at each of those intersections (% of how much traffic volume is being generated by proposed project)



## Text Box (11)

- Deer Creek Road and Woodmoor Drive (R5)
- Monument Hill Road and Woodmoor Drive (R5)
- State Highway 105 (SH-105) and Woodmoor Drive
- Monument Hill Road Southern Right-of-Way/Case 9
- Monument Hill Road Northern Full Movement Access

Include Access at Base Camp Road

**Subject:** Text Box

**Page Label:** 10

**Author:** CDurham

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Include Access at Base Camp Road

report. Kinley-Horn believes Monument Hill will be and future roadway network. Analysis of the existing component, and expected traffic volumes resulted in the

Recommendations are shown at the end of the report. Please remove them from this location.

or Drive (R5) intersection experiences a falling level of service during the morning peak hour. As such, it is recommended that improvements be provided to provide acceptable level of service. The intersection was evaluated with roundabout control.

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**Author:** CDurham

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Recommendations are shown at the end of the report. Please remove them from this location.

of the intersection prior to construction or implementation, the level of service with its current lane configuration and control is analyzed as a single-lane roundabout in the 2045 horizon. In this intersection, the intersection movements in the 2045 horizon. Table 3 provides the results of the analysis. Alternate scenarios should be provided besides just a roundabout.

Existing Round Approach	Delay (sec/mv)	LOS
	21.2	C

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Alternate scenarios should be provided besides just a roundabout.

to south, analysis was conducted. Roundabout. With the recommended lane configuration, the intersection is expected to operate at LOS in the 2045 horizon. Table 4

Alternate scenarios should be provided besides just a roundabout.

Time	LOS
PM Peak Hour	
...	...

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**Author:** CDurham

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Alternate scenarios should be provided besides just a roundabout.

the intersection movements are expected to continue through the 2045 horizon in its existing configuration.

Keep the standard intersection analysis in as well and discuss. Roundabout is not a given, so both alternatives need to be provided along with a comparison between them.

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**Author:** CDurham

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Keep the standard intersection analysis in as well and discuss. Roundabout is not a given, so both alternatives need to be provided along with a comparison between them.

a shared through-right turn lane. The south lane and a right turn lane. With this addition, the intersection is expected to operate at LOS in the 2045 horizon. Table 6 provides the results.

Alternate scenarios should be provided besides just a roundabout.

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**Author:** CDurham

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Alternate scenarios should be provided besides just a roundabout.

In addition, the volume associated with the known nearby and North Bay at Woodcreek were included in the final documents from the Waterside Traffic Impact Study and Impact Study prepared in May and June of 2022 are also traffic volumes for 2022 and 2045 are shown in Figure 4

Indicate whether which years 2025 and/or 2045 is when Waterside and North Bay counts were included in volumes.

Kimley-Horn and Associates, Inc.  
00461-027 - Attachment 102

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**Author:** CDurham  
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Indicate whether which years 2025 and/or 2045 is when Waterside and North Bay counts were included in volumes.

California version of Peak Camp Road Traffic at Camp Road at the Deer Creek Road (M) intersection

Manuscript 102 is expected to generate approximately 1000 trips occurring during the morning peak hour and 1300

List any reports from other projects which may have been used/researched.

Kimley-Horn and Associates, Inc.  
00461-027 - Attachment 102

**Subject:** Text Box  
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**Author:** CDurham  
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List any reports from other projects which may have been used/researched.

Although SR-108 is a north-south state highway, within the study it runs through lanes in each direction through the intersection. One side of this analysis, SR-108 will be analyzed in the eastbound direction and the other side will be analyzed in the westbound direction. Transportation conditions the roadway as a New State Principal High

Include discussion of if any of the existing roads have any planned improvements per the Major Transportation Corridor Study (MTCP)

Kimley-Horn and Associates, Inc.  
00461-027 - Attachment 102

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**Author:** CDurham  
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Include discussion on if any of the existing roads have any planned improvements per the Major Transportation Corridor Study (MTCP)

This section of the report provides the recommended improvements to be implemented at the intersection of Deer Creek Road and the Manuscript and 1000 Edition.

Provide summary table of recommended improvements & % impact project has at each of those intersections (% of how much traffic volume is being generated by proposed project)

Kimley-Horn and Associates, Inc.  
00461-027 - Attachment 102

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**Author:** CDurham  
**Date:** 10/18/2022 3:29:54 PM  
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Provide summary table of recommended improvements & % impact project has at each of those intersections (% of how much traffic volume is being generated by proposed project)

6.0 CONCLUSIONS AND RECOMMENDATIONS

As presented in this report, Kimley-Horn believes Manuscript 102 will be provided into the existing and future roadway network. Analysis of the existing and proposed project development, and selected right-of-way related to the site and its surroundings.

Note: Recommendations are for the morning peak hour. This intersection, including lanes to be set up to help pay for proposed improvements.

At the Road and Manuscript 102 (M) intersection, a turning lane is recommended for the morning peak hour. As such, it is recommended that the intersection be provided with a dedicated right-of-way for the morning peak hour. This intersection will be provided with a dedicated right-of-way for the morning peak hour. This intersection will be provided with a dedicated right-of-way for the morning peak hour. This intersection will be provided with a dedicated right-of-way for the morning peak hour.

Kimley-Horn and Associates, Inc.  
00461-027 - Attachment 102

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**Author:** CDurham  
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Note: If improvements are not being constructed for this intersection, funds may need to be set up to help pay for projects portion of improvements.