



LSC TRANSPORTATION CONSULTANTS, INC.
2504 East Pikes Peak Avenue, Suite 304
Colorado Springs, CO 80909
(719) 633-2868
FAX (719) 633-5430
E-mail: lsc@lsctrans.com
Website: <http://www.lsctrans.com>

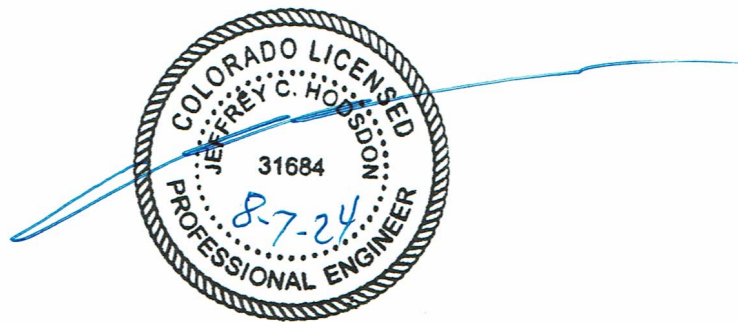
LSC Responses to TIS
Redline comments -
Preliminary Plan 1

Monument Ridge East Traffic Impact Study

EPC PCD File Nos. SP 241, P245, P246
(LSC #S234450)
August 7, 2024

Traffic Engineer's Statement

This 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.



Developer's Statement

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

Date

LSC Responses to TIS Comments (Preliminary Plan)

Page: 1

Number: 1 Author: jchodsdon Subject: Text Box Date: 10/4/2024 18:51:40
LSC Responses to TIS Redline comments - Preliminary Plan

Approximately 342 total dwelling units are planned for the site, including 36 single-family lots on the east side of the planned extension of Misty Acres Boulevard and duplex, tri-plex, and four-plex dwelling units on the west side of the planned extension of Misty Acres Boulevard. Figure 2 shows the site plan.

Access and Circulation

Figure 2 also shows the proposed roadways, roadway realignments, and access points.

Figure 3 highlights the details of the proposed extension of Misty Acres Boulevard north to County Line Road, the realignment of the north portion of Monument Hill Road to the south to tie into the proposed extension of Misty Acres Boulevard, and the segments of existing roadway to be removed.

Access points are proposed at the following locations.

- Unbroken Drive – 395 feet south of the future County Line Road/Misty Acres Boulevard intersection (centerline spacing).
- Plowman Drive – 725 feet south of the future County Line Road/Misty Acres Boulevard intersection.
- Nees Drive – 280 feet west of the future Misty Acres Boulevard/Monument Hill Road intersection.
- New west leg at the existing Misty Acres Boulevard/Old Antlers Way T-intersection

SIGHT DISTANCE

Include sight distance exhibits ¹
for remaining intersections

Intersection sight distance at all proposed public road/site-access intersection locations on Misty Acres Boulevard and Monument Hill Road must meet intersection sight-distance requirements in *ECM* Table 2-21. Sight distance lines of sight for all public road intersections/access points will need to be kept clear of any sight-distance obstructions, including landscaping, signage, structures, fencing, parking areas, etc.


Only horizontal sight distance has been analyzed, as grading for the proposed roadways has not been completed. Thus, vertical sight distance cannot be measured yet and will need to be verified with the plan-and-profile drawings and construction drawings. Please refer to Exhibit 1 for more details.

Entering Sight Distance

With a proposed design speed of 40 mph (35-mph posted speed limit) on Misty Acres Boulevard, the sight distance to the south at the proposed Unbroken Drive site-access location would be 665 feet. This exceeds the required 445-foot requirement for entering sight distance per *ECM* Table 2-21. Sight distance looking to the north from Unbroken Drive would have a sight distance of 345 feet. Although the general *ECM* standard by classification for a 40-mph design speed is 445 feet, basically all approaching southbound vehicles on Misty Acres Boulevard would be

Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 13:45:19

[Include sight distance exhibits for remaining intersections](#)

 Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:47:17

LSC Response:

Additional sight distance figures have been added for the missing intersections. Only horizontal sight distance requirements are shown on the exhibits. Vertical to be verified with plan-and-profile design at a later design stage.

Existing Traffic Volumes

Vehicular turning-movement counts were conducted for the following dates and times at the following intersections, as shown in Figure 4. Raw count data is attached:

- I-25 southbound ramps/County Line Road
 - Thursday, January 18, 2024 from 6:30 – 8:30 a.m.
 - Wednesday, January 17, 2024 from 4:00 – 6:00 p.m.
- I-25 southbound ramps/County Line Road
 - Thursday, January 18, 2024 from 6:30 – 8:30 a.m.
 - Wednesday, January 17, 2024 from 4:00 – 6:00 p.m.
- County Line Road/Monument Hill Road
 - Wednesday, January 10, 2024 from 6:30 – 8:30 a.m.
 - Tuesday, January 9, 2024 from 4:00 – 6:00 p.m.
- Monument Hill Road/Misty Acres Boulevard (north)
 - Tuesday, December 12, 2023 from 6:30 – 8:30 a.m.
 - Tuesday, December 12, 2023 from 3:45 – 5:45 p.m.
- Monument Hill Road/Misty Acres Boulevard (south)
 - Wednesday, January 10, 2024 from 6:30 – 8:30 a.m.
 - Tuesday, January 9, 2024 from 4:00 – 6:00 p.m.
- County Line Road/Doewood Drive
 - Tuesday, June 18, 2024 from 6:30 – 8:30 a.m.
 - Tuesday, June 18, 2024 from 4:00 – 6:00 p.m.
- Misty Acres Boulevard/Old Antlers Way (from the WSB TIS report)
 - Wednesday, April 27, 2022 from 6:30 – 8:30 a.m.
 - Wednesday, April 27, 2022 from 4:00 – 6:00 p.m.

SHORT TERM (2024) BASELINE TRAFFIC VOLUMES


Unresolved: Counts are too old per B.3.1.A, please include updated values ¹

Figure 5 shows the estimated short-term baseline volumes. These volumes account for projected shifts in **existing** traffic volumes following the extension of Misty Acres Boulevard to the north, realignment of Monument Hill Road, and associated closure of some segments of roadway (as depicted in Figure 3). The intent was to show shift/adjustment to existing and projected future background traffic volumes assuming the roadway changes.

Additional background traffic growth from currently-vacant parcels located southwest of I-25 and County Line Road has been estimated and included in the short and long-term background traffic volumes. The land uses assumed for the background traffic include 82,000 square feet of retail space, 12.5 acres of warehouse uses, and other area growth to the west -.

Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 09:51:34

Unresolved: Counts are too old per B.3.1.A, please include updated values

 Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:47:38

LSC Response

New counts were conducted on September 25, 2024 and have been added to the report/analysis

TRIP DISTRIBUTION AND ASSIGNMENT

Trip Directional Distribution

The directional-distribution estimate of site-generated vehicle trips to the study-area roads and intersections is a necessary component in determining the site's traffic impacts. Figure 6 shows the percentages of the site-generated vehicle trips projected to be oriented to and from the site's major approaches. Estimates have been based on the following factors: LCS's previous traffic impact studies in the vicinity, the proposed new land uses, the area roadway system serving the site, and the site's geographic location relative to the overall greater El Paso County/Colorado Springs area and the Denver metro area. Figure 6 shows the estimated distribution splits.

Site-Generated Traffic

Site-generated volumes have been calculated by applying the directional-distribution percentages estimated by LSC (from Figure 6) to the trip-generation estimates (from Table 1). Figure 7 shows the projected site-generated traffic volumes for the weekday morning and afternoon peak hours.

Short-Term (2024) Total Traffic Volumes

Figure 8 shows the projected short-term total traffic, which is the sum of the short-term baseline (adjusted existing) traffic volumes (from Figure 5) and site-generated traffic volumes (from Figure 7). Laneage and traffic control at the study-area intersections are shown in Figure 8.

Note: as indicated in the "Short-Term Baseline Traffic Volumes" section and as shown in Figure 5, short-term baseline traffic volumes assume that existing traffic patterns would change following the realignment of Monument Hill Boulevard and extension of Misty Acres Boulevard (as depicted in Figure 3).

Please include a statement to verify that development west of I-25 was added to the short term traffic

2044 Background Traffic Volumes

Figure 9 shows estimated long-term background volumes. Projected 20-year background traffic volumes do **not** include projected traffic to be generated by the proposed site. Long-term background traffic volumes are estimates by LSC, which generally assume a two-percent annual growth rate on County Line Road. However, some additional specific growth was added for parcels southwest of Interstate 25 and County Line Road. With site-generated traffic, the total growth rate is about 3.3 percent west of Misty Acres Boulevard and about 2.3 percent east of Misty Acres Boulevard (growth over the short-term baseline/adjusted existing volume).

Additionally, long-term background traffic volumes assume that existing traffic patterns would change following the realignment of Monument Hill Boulevard and extension of Misty Acres Boulevard.

Please give your basis for this 2 percent growth rate

☰ Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 13:49:03

Please include a statement to verify that development west of I-25 was added to the short term traffic

↩ Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:47:57

LSC Response

The following sentence has been to this section for clarification:

"Traffic from currently-vacant developments west of I-25 has been included in the short-term total traffic volumes, as well."

☰ Number: 2 Author: Bret Subject: Engineer Date: 9/19/2024 13:57:40

Please give your basis for this 2 percent growth rate

↩ Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:48:12

LSC Response

This has been revised and basis has been added.

The design speed at the Monument Hill Road study-area intersections are noted for each one below.

Auxiliary Turn-Lane Needs Analysis

Please refer to Figure 11 and Figure 12 for preliminary recommendations for auxiliary turn lanes at the study-area intersections.

County Line Road/Misty Acres Boulevard

The following auxiliary turn lanes would be required at the future County Line Road/Misty Acres Boulevard intersection. The turn lanes on County Line Road are based on County Line Road grades of between 5-7 percent. Per *ECM* Table 2-5, a deceleration-lane grade-adjustment factor of 0.80 is applied on upgrades of 5-7 percent, while a factor of 1.35 is applied to the required turn-lane length on downgrades of 5-7 percent. Please refer to the site plan, which depicts the following laneage at this intersection. LSC provided the laneage recommendations for inclusion on the site plan.

- Northbound Right Turn Deceleration Lane
 - 175 feet of full-width lane (including storage) + 80-foot bay taper = 255 feet total
- Westbound-Left Turn Deceleration Lane
 - 176 feet of full-width lane + 50 feet of storage + 162-foot taper = 388 feet total
- Eastbound-Right-Turn Deceleration Lane
 - 140 feet of full-width lane + 75-foot taper = 215 feet total
 - Will require a design waiver from CDOT, as based on SHAC criteria, a 356-foot lane plus 144-foot taper is prescribed for a total of 500 feet. This waiver would be requested due to the challenging topography to the west of the intersection. The plans show a larger corner radius on the southwest corner as mitigation for the shorter lane which would allow for right turns at a higher speed, thus reducing the speed differential between eastbound through traffic and right-turning traffic.

Regarding the *ECM* threshold for a northbound left turn lane, the laneage plan shows a separate northbound right-turn lane and the No. 1 northbound (TH/LT) lane will be a “defacto left” with a very low straight through volume. The CDOT Access Code provision allowing a left-turn lane to be dropped when opposing through traffic is low would apply.

An eastbound-left-turn deceleration lane would not be required based on projected volumes and the threshold requirement for a turn lane. However, in the site plan, LSC recommends a short eastbound-left-turn bay for vehicle storage. The space will be striped this lane between the eastbound and westbound through lanes on the west leg of this intersection.

- Eastbound-left-Turn-Storage-Bay
 - 75 feet of full-width lane for vehicle storage + 120-foot taper = 195 feet total
 - Not required based on projected volumes but recommended by LSC

Please include the section of the Access Code here; Could the right turn lane include the through volume instead?

Unresolved: Please add a bullet point for explanation of why the turn lane is being recommended

Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 10:18:05

Please include the section of the Access Code here; Could the right turn lane include the through volume instead?

Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:48:28

LSC Response

Added "per Section 3.5(5) of the *State Highway Access Code*" note in the report.

Our recommendation is for the laneage shown. There are implications to any potential widening/modification on the north side of County Line Road. Moreover, volumes to and from the north side are very light.

Number: 2 Author: Bret Subject: Engineer Date: 9/16/2024 14:19:28

Unresolved: Please add a bullet point for explanation of why the turn lane is being recommended

Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:49:05

LSC Response: Added as requested.

Misty Acres Boulevard/Unbroken Drive

Based on projected total volumes, auxiliary turn lanes would **not** be required on any approach at the intersection of Monument Hill Road/Unbroken Drive.

Although the projected left-turn volume does not exceed the *ECM* threshold requiring a northbound-left-turn lane on Misty Acres Boulevard, the proposed major collector cross section of Misty Acres Boulevard includes a striped median for left-turning movements at intersections/access points.

Update to Maga Drive per Prelim plan drawings throughout the document

Misty Acres Boulevard/Plowman Drive

Based on projected total volumes, auxiliary turn lanes would **not** be required on any approach at the intersection of Misty Acres Boulevard/Plowman Drive.

Although the projected left-turn volume does not exceed the *ECM* threshold requiring a northbound-left-turn lane on Misty Acres Boulevard, the proposed major collector cross section of Misty Acres Boulevard includes a striped median for left-turning movements at intersections/access points.

Misty Acres Boulevard/Old Antlers Way/South Site Access

Based on projected total volumes, auxiliary turn lanes would **not** be required on any approach at the intersection of Misty Acres Boulevard/Old Antlers Way.

Unresolved: Please include discussion of southbound here as well

Although the projected left-turn volume does not exceed the *ECM* threshold requiring a northbound-left-turn lane on Misty Acres Boulevard, the proposed major collector cross section of Misty Acres Boulevard includes a striped median for left-turning movements at intersections/access points.

Monument Hill Road (Realigned)/Misty Acres Boulevard (New Proposed Intersection)

A 315-foot southbound-right-turn lane would be required on Misty Acres Boulevard approaching Monument Hill Road. This 315-foot turn lane would consist of 155 feet of deceleration length plus a 160-foot taper. Based on projected total volumes, other auxiliary turn lanes would **not** be required at the intersection of Misty Acres Boulevard/Monument Hill Road. The width that would otherwise be six-foot paved shoulder in the southbound direction (as part of the overall Misty Acres Boulevard cross section) could be utilized as part of the 12-foot right-turn lane width.

Although the projected left-turn volume does not exceed the *ECM* threshold requiring a northbound-left-turn lane on Misty Acres Boulevard, the proposed major collector cross section of Misty Acres Boulevard includes a striped median for left-turning movements at intersections/access points.

☰ Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 09:59:28

[Update to Maga Drive per Prelim plan drawings throughout the document](#)

↶ Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:49:13

LSC Response: Street names have been revised and updated in the TIS.

📄 Number: 2 Author: Bret Subject: Engineer Date: 9/19/2024 09:58:13

Plowman Drive

☰ Number: 3 Author: Bret Subject: Engineer Date: 9/19/2024 09:54:37

[Unresolved: Please include discussion of southbound here as well](#)

↶ Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:49:39

LSC Response: Added as requested.

David Whitehead
Monument Ridge East

Unresolved: Address impacts to:
Monument Hill Rd / Deer Creek
Monument Hill Rd / Woodmoor Drive
Woodmoor Dr / Hwy 105
(or how project impacts (~600 trips?) are insignificant at these locations)

Page 15

August 7, 2024

Traffic Impact Study, Roundabout Report

Regarding the *ECM* threshold for an eastbound left-turn lane, the laneage plan shows a shared approach lane. Given the low straight through and right-turn volumes, the CDOT Access Code provision allowing a left-turn lane to be dropped when opposing through traffic is low, would apply.

Please include the section of the Access Code here

Monument Hill Road/Nees Drive

Based on projected total volumes, auxiliary turn lanes would **not** be required on any approach at the intersection of Monument Hill Road/Nees Drive. Based on the recommended classification of this new segment/new north terminus of Monument Hill Road (Urban Local), the design speed will be 25 mph.

Monument Hill Road/Misty Acres Boulevard (South/Existing Intersection)

No modifications would be required by the applicant at the intersection of Monument Hill Road/Misty Acres Boulevard despite additional site-generated traffic from this development.

Intersection Configuration and Traffic Control

County Line Road/Misty Acres Boulevard Proposed Intersection Location

All proposed site-access points would be two-way, stop-sign-controlled intersections.

Regarding the intersection of County Line Road and Misty Acres Boulevard, the project team has determined that a roundabout option for traffic control would not be feasible. The following are a list of pros and cons comparing a modern roundabout intersection to a conventional intersection with two-way, stop-sign control and the potential for future signalization once MUTCD warrant(s) are met.

Roundabout Intersection

Cons:

- Grades would not meet the established guidelines for grades. The following is criteria from the *Wisconsin DOT Roundabout Design Manual* (used by El Paso County, Colorado):
 - Entry grade profiles (approximately 2 car lengths from the ICD) are not to exceed 4%, with 2% being the typical maximum.
 - Roundabouts typically should be constructed on relatively flat or rolling terrain with an approach grade that is typically less than 3%, but not greater than 5%. Grades approaching 4% and steeper terrain may require greater transitions to provide an appropriate grade through the intersection. The profile grades along the central island should generally not exceed 4%, (typically 3% or less).

☰ Number: 1 Author: Bret Subject: Text Box Date: 9/16/2024 14:48:20

[Unresolved: Address impacts to: Monument Hill Rd / Deer Creek Monument Hill Rd / Woodmoor Drive Woodmoor Dr / Hwy 105 \(or how project impacts \(~600 trips?\) are insignificant at these locations\)](#)

👉 Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:49:52

LSC Response: Appendix A has been added to the TIS report to address the relative impacts at these intersections and study area per ECM Appendix B criteria.

☰ Number: 2 Author: Bret Subject: Engineer Date: 9/19/2024 14:34:54

[Please include the section of the Access Code here](#)

👉 Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:50:11

LSC Response

Added "per Section 3.5(5) of the *State Highway Access Code*" note in the report

- A roundabout centered on the existing County Line Road would force realignment of the existing north leg [at the current County Line Road/Monument Hill Road intersection] into conservation easement on the north side of County Line Road, which is prohibited.
- If a roundabout circle were shifted south to avoid the conservation easement, then the grading for the roundabout footprint would encroach into the wetlands located southeast of the intersection, which would also not be feasible.
- Projected volumes are higher on County Line Road than Misty Acres approach. Balanced volumes are ideal for roundabouts.

Pros:

- Generally, roundabouts are self-regulating and offer safety advantages over conventional intersections.
- The LOS would potentially be better than the conventional intersection for the northbound approach before a signal warrant is met, and potentially after signalization as well.

Conventional Intersection

Pros:

- The intersection would be similar to the existing intersection, will little modification needed on the north leg.
- A signal would not likely need to be installed in the short term – could remain TWSC.
- The LOS is shown to be D or better, based on the short-term scenario.
- There are likely more precedent cases for signal installation at intersections with grades over 4 percent than with roundabout grades over 4 percent.

Cons:

- Installation of a signal at an intersection with approach grades over 4 percent is not ideal, and would require a deviation (county intersection maximum intersection grade is 4 percent)
- Generally, El Paso County staff has indicated that an intersection cannot be signalized until warrants are met. The LOS would potentially be worse with the conventional intersection for the northbound approach before a signal warrant is met. The short term shows LOS D for the northbound approach.
- The conventional intersection would require auxiliary turn lanes on the intersection legs as shown on Figure 11,

The intersection of Misty Acres Boulevard/County Line Road will likely need to be signalized in the future. Based on projected volumes the volumes for the AM and PM peak hours would meet the Warrant No. 2 (Four-Hour Volume) threshold. The volume threshold would need to be met for two other hours of the day, such as the afternoon “school” peak hour and two hours during the late afternoon/evening peak hour.

Please indicate whether
crash warrants would be met ¹

☰ Number: 1 Author: Bret Subject: Engineer Date: 9/19/2024 14:35:56

Please indicate whether crash warrants would be met

↩ Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:50:31

LSC Response

Added to the report: "Fewer than five crashes were reported during any one-year period between 2021-2023, so MUTCD Warrant 7, Crash Experience would not be satisfied."

County Line Road/Misty Acres Boulevard **Alternate** Intersection Location – Per CDOT Comments

The CDOT comments and follow-up meeting identified the need to consider shifting the intersection of Misty Acres Boulevard about 575 feet to the east and the Misty Acres Boulevard shown on the Preliminary Plan would be modified to an alignment more to the east to connect to this alternate intersection location. Lastly this alternate intersection would be constructed as a modern roundabout. Please refer to **Deviation No. 3** included with this submittal, which describes this alternative, includes the reasons this alternative is not viable - as summarized below, request for deviations to intersection spacing and intersection grade *ECM* criteria to allow the proposed intersection location as presented in this TIS report.

- The floodplain would present significant issues to this alignment.
- An alignment of Misty Acres more to the east to connect to this alternate intersection would be significantly closer to the existing homes west of Doewood. This alignment would have significant negative implications to the Preliminary Plan.
- A roundabout intersection would not likely fit without encroaching in the conservation easement and/or the Woodmoor Water & Sanitation property.
- The alternate alignment would need to have sharper reverse curves in order to connect to the alternate intersection location.
- The Doewood Drive/County Line Road intersection would likely need to be closed as this intersection would be only 250 feet from this alternate intersection location. The Doewood connection to County Line Road would need to be rerouted through an east-west connection to Misty Acres Boulevard.
- The Misty Acres/County Line intersection, as proposed, would meet the minimum CDOT 550-foot distance from end of the radius at the I-25 off-ramp intersection.

Other Recommendations


LSC recommends MUTCD horizontal curve warning signage be installed on Monument Hill Road for traffic on the northbound approach to the proposed curve to the east adjacent to the site. The specific signs and sign placement can be included for review as part of the construction plans.

please show
location on a plan

1

Number: 1 Author: Bret Subject: Callout Date: 9/19/2024 09:56:12

[please show location on a plan](#)

 Author: jchodsdon Subject: Sticky Note Date: 10/4/2024 18:50:46
LSC Response: The updated report contains a new Figure 14 to address this comment.



Approximate Scale
1" = 500'

860' 825'

Existing Monument Hill Rd Alignment (to be removed)

County Line Rd

Unbroken Dr

Lowman Dr

Doewood Dr

Monument Hill Rd

Nees Dr

Old Antlers Way

Misty Acres Blvd

Interstate 25

Monument Hill Rd

Note: Please refer to Figure 3 for an exhibit showing road realignments and changes.



Figure 2
Site Plan

Monument Ridge East (LSC# S234450)

