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Grandview Reserve
Master Traffic Impact Analysis
PCD No.: SKP-20-001
(LSC #184840)
July 10, 2020

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.

COLORADO LICENSED
JEFFREY C. HODSDON
31684
7-10-20
PROFESSIONAL ENGINEER

Developer's Statement

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

1

_____ _____
Date

LSC Responses to TIS redlines 8-5-20.pdf

Page: 1

Number: 1 Author: dsdrice Date: 8/5/2020 10:01:43

PREVIOUS TRAFFIC REPORTS COMPLETED IN THE AREA

A list of other traffic studies in the area of study completed within the past five years (that LSC is aware of) is attached for reference. This study accounts for the land use, trip generation and the roadway network included in these studies. The previous area studies generally assumed Rex Road would not extend from Eastonville Road to US Hwy 24 in the 20-year horizon as is now planned. The previous studies also assumed fewer dwelling units on this site.

LAND USE AND ACCESS

Site Plan

Figure 2 shows the proposed Grandview Reserve sketch plan. Phase 1 of the development is planned to include up to 1,585 lots for single-family homes in Parcels I, J, K, and L. Buildout of Phase 1 is anticipated to be completed in five to seven years. At buildout, the site is planned to be developed with up to 3,260 residential dwelling units, 17 acres of commercial uses, an elementary school, and a church. This report assumes full buildout of the site by 2040.

1

2

Trip Gen sections mentions a Private K - 8 school (elementary-middle school).

Site Access

Two full-movement access points are proposed to Eastonville Road and seven full-movement access points are proposed to an extension of Rex Road through the site. Figure 2 shows the proposed spacing of the access points. The sketch plan also shows a future street connection to planned Phase 3 of the Waterbury development.

The site access points to Rex Road and Eastonville Road will need to meet County standards for intersection and stopping sight distance. Based on the criteria contained in the El Paso County *Engineering Criteria Manual* (ECM), the required intersection spacing for an Urban Minor Arterial is ¼ mile (1,320 feet). Additional access may be permitted, if entering sight distance requirements are met. Both proposed site access points to Eastonville Road meet the intersection spacing criteria. The spacing of the proposed residential collector between Eastonville Road and US Hwy 24 meets the ¼ mile spacing criteria. However, the intermediary access points are all less than ¼ mile apart. Intersection and stopping sight distance should be evaluated at the PUD, Preliminary Plan, and/or subdivision level, as applicable. The roads and access points shown in the Sketch Plan are conceptual and may change during the subdivision process.

Pedestrian and Bicycle Accommodations

There are two existing school sites located within two miles of the site, Falcon High School and Meridian Ranch Elementary. A future K-8 school is planned just north of Falcon High School. These schools are located north of Londonderry Drive and west of Eastonville Road. There is also a regional park located just west of the site.

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Number: 1 Author: Paul Brown Subject: Cloud Date: 8/5/2020 09:26:02

Number: 2 Author: Paul Brown Subject: Callout Date: 8/5/2020 09:26:39

Trip Gen sections mentions a Private K - 8 school (elementary-middle school).

Author: Kirstin Subject: Sticky Note Date: 8/14/2020 14:00:00

The future use of the school site is unknown. The text has been revised to identify the parcel as a "school site"

LSC has developed small area traffic models for Meridian Ranch, Waterbury, and the Trails as part of previous work completed in the area. The results of these modeling efforts have been combined to estimate the background traffic volumes. These background traffic volumes have been based on the existing traffic volumes (from Figure 3a) plus increases in traffic due to regional growth, including buildout of existing and currently proposed subdivisions within the Waterbury development located northeast of:

area around Grandview Reserve(?) 2

Are all these developments northeast of Eastonville/Stapleton? 3

- The intersection of Eastonville/Stapleton;
- Meridian Ranch Filings 1-3 and Filings 6-8;
- Estates Filings 2-3;
- Meridian Ranch Filing 11;
- Stonebridge Filings 1, 2, and 3;
- Meridian Ranch Filing 9;
- The Vistas at Meridian Ranch Filing 1;
- WindingWalk at Meridian Ranch Filing 1;
- The Enclave at Stonebridge at Meridian Ranch;
- The Estates at Rolling Hills Ranch Filing No. 1; and
- The Rolling Hills Ranch at Meridian Ranch PUD.

Increases in through traffic on US Hwy 24 were estimated based a yearly growth rate of 2 percent per year. This growth rate was calculated from the CDOT 20-year growth factor for US Hwy 24 adjacent to the site. The short-term background traffic volumes assume Rex Road has been extended from its existing terminus to the Rolling Hills Ranch at Meridian Ranch PUD access, but **not** further east to Eastonville Road. The background traffic scenarios also hypothetically assume Rex Road has been constructed from Eastonville Road through the site to US Hwy 24, but the background traffic scenarios include only the non-site traffic.

Figure 3b shows the lane geometry, traffic control, and level of service at the key area intersections, based on the short-term background volumes.

2040 BACKGROUND TRAFFIC

Please state resulting PEL growth factor/rate for US 24 used in the study. 4

Figure 5a shows the projected 20-year background traffic volumes for the year 2040. The 2040 background/baseline traffic volumes are based on the *Colorado Department of Transportation US Hwy 24 Planning and Environmental Linkages Study Final Corridor Conditions Report* dated December 2016 and on previous work completed by LSC in the area, including work done for the Meridian Ranch and Waterbury developments. The background traffic scenarios hypothetically assume Rex Road through the site, but the background traffic scenarios include only the non-site traffic. In general, through traffic volumes and volumes to and from Curtis Road were based on the PEL report and all other background volumes were based on previous work completed by LSC. The 2040 background traffic volumes do not include traffic from Grandview Reserve.

Figure 5b shows the lane geometry, traffic control, and level of service at the key area intersections, based on the 2040 background volumes.

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Number: 1 Author: Paul Brown Subject: Cloud Date: 8/5/2020 09:26:02

Number: 2 Author: dsdrice Subject: Cloud+ Date: 8/5/2020 07:48:57

area around Grandview Reserve(?)

Number: 3 Author: Paul Brown Subject: Text Box Date: 8/5/2020 09:26:39

Are all these developments northeast of Eastonville/Stapleton?

Author: Kirstin Subject: Sticky Note Date: 8/14/2020 14:01:12

This section of the text has been updated to include the existing currently proposed Waterbury subdivisions in the bulleted

Number: 4 Author: Paul Brown Subject: Text Box Date: 8/5/2020 09:26:39

Please state resulting PEL growth factor/rate for US 24 used in the study.

Author: Kirstin Subject: Sticky Note Date: 8/17/2020 14:50:59

The report has been updated to address this comment. The 2040 traffic volumes shown in the PEL were based on the PPACG traffic demand model. The projected volume on US 24 adjacent to the site was shown to increase from 9,500 vehicles per day to 23,000 vehicles per day. This represents a 20 year growth rate of about 4.5 percent per year.

1

Type of school is changed from Public to Private in this update. ITE Trip Gen rates should be preferred but since MSTA rates are higher (AM), they are ok to use.

TRIP GENERATION

The site-generated vehicle trips were estimated using the nationally published trip generation rates from *Trip Generation, 10th Edition, 2017* by the Institute of Transportation Engineers (ITE). Table 2 shows the trip generation estimates. It is currently unknown if the school site will be developed as a neighborhood school, a charter school, or some other type of educational use. To be conservative (at the request of County staff), the trip generation estimate for the school site was based on the ITE trip generation rates for a private K-8 school for the daily traffic volumes and the afternoon peak hour. The morning trip generation estimate was calculated using the Municipal and School Transportation School Traffic Calculator provided by the Traffic Management Unit, Transportation Mobility and Safety Division of Highway, North Carolina Department of Transportation.

The total number of vehicle trips generated by the land uses has been reduced to account for the internal vehicle trips made within the site between land uses, without use of the external streets surrounding the site. Table 2 shows the number of internal trips assumed for each land use. The internal trip reduction for the commercial parcels is an estimate by LSC, based on National Highway Cooperative Highway Research Program (NCHRP) Report 684 *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. The results of the spreadsheet model are attached. An additional 10 percent of the school trips were also assumed to be internal to the site. The internal trip reduction assumes the school site is developed as a charter school with a small percentage of the students coming from the Grandview Reserve neighborhood.

The total number of vehicle trips generated has also been reduced to take into account the "pass-by" phenomena. A pass-by trip is made by a motorist who would already be on the adjacent roadways regardless of the proposed development, but who stops in at the site while passing by. The motorist would then continue on his or her way to a final destination in the original direction. The pass-by percentages shown in Table 2 are from the *Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition*, 2017 by ITE.

Phase 1 is planned to include buildout of up to 1,585 residential dwelling units in Parcels I, J K, and L. This phase is estimated to be completed in five to seven years. The short-term horizon year of 2028 was selected to occur one year after buildout. Following Phase 1, Grandview Reserve is expected to generate about 13,212 vehicle trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 283 vehicles would enter and 848 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 908 vehicles would enter and 533 vehicles would exit the site.

At buildout, Grandview Reserve is expected to generate about 32,240 new external vehicle trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour, about 970 vehicles would enter and 2,033 vehicles would

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Number: 1 Author: Paul Brown Subject: Callout Date: 8/5/2020 09:26:39

Type of school is changed from Public to Private in this update. ITE Trip Gen rates should be preferred but since MSTA rates are higher (AM), they are ok to use.

Author: Kirstin Subject: Sticky Note Date: 8/17/2020 14:52:01

The trip generation assumptions were requested by and approved by County staff (Jeff Rice) prior to updating the TIA

PROJECTED LEVELS OF SERVICE

The key area intersections and site access points have been analyzed to determine the projected future levels of service based on the unsignalized method of analysis procedures from the *Highway Capacity Manual, 6th Edition* by the Transportation Research Board and Synchro signalized intersection procedures. Based on the criteria contained in the ECM, a peak hour factor of 0.85 was used for the short-term (Year 2028) analysis except for those intersections whose existing peak hour factor calculated from traffic counts conducted by LSC was higher than 0.85. In those cases, the existing peak hour factor was used. A peak hour factor of .095 was used for the long-term (Year 2040) analysis, except for the southbound through traffic on US Hwy 24 during the morning peak hour and the northbound through traffic on US Hwy 24 in the afternoon peak hour. Based on the existing peak hour factor and high traffic volumes projected for these movements, a future peak hour factor of 0.98 was used. Five percent heavy vehicles were assumed for the through movements on US Hwy 24 based on data provided by the Colorado Department of Transportation. Two percent heavy vehicles were assumed for all other movements. The results of the analysis are contained in Figures 4b, 5b, 9b-9d, and 10b-10e. The level of service reports are attached.

1 0.95 2 3 4

Synchro reports use 2% for US 24 under all scenarios in the Appendix

Rex/Eastonville

In the short term, it was assumed that a new section of Rex Road would be constructed from Eastonville Road through the Grandview Reserve sketch plan area to US Hwy 24. It was assumed that the section of Rex Road just west of Eastonville Road through the Meridian Ranch development was not yet constructed. The intersection of Rex/Eastonville is projected to operate at LOS B or better for all movements during the peak hours as a stop sign-controlled "T" intersection, based on the projected short-term total traffic volumes.

By 2040, it was assumed that Rex Road would be completed between Meridian Road and US Hwy 24. Based on the projected 2040 total traffic volumes, the intersection of Rex/Meridian is projected to operate at LOS F for some of the minor approach volumes, if it is stop sign-controlled. If this intersection is constructed as a one-lane modern roundabout or if it is traffic-signal-controlled, all movements are projected to operate at LOS D or better during the peak hours.

Rex Road Site Access Points

The site access points to Rex Road were analyzed as two-way, stop-controlled intersections and one-lane modern roundabouts. The intersection of the proposed residential collector and the access point for the commercial parcels were also analyzed as assuming traffic-signal control. The first three intersections east of Eastonville Road (intersections 2, 3, and 4) are projected to operate at a satisfactory level of service as two-way, stop sign-controlled intersections. The remaining access points will likely need alternate traffic control to achieve an acceptable level of service.

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Number: 1 Author: Paul Brown Subject: Cloud Date: 8/5/2020 09:26:46

Number: 2 Author: Paul Brown Subject: Text Box Date: 8/5/2020 09:26:39

0.95

Number: 3 Author: Paul Brown Subject: Cloud Date: 8/5/2020 09:26:02

Number: 4 Author: Paul Brown Subject: Callout Date: 8/5/2020 09:26:39

Synchro reports use 2% for US 24 under all scenarios in the Appendix

Author: Kirstin Subject: Sticky Note Date: 8/17/2020 14:53:24

This section has been struck from the updated report. As discussed in the response to comments with the prior submittal:
"The CDOT heavy-vehicle data is
based on the daily traffic volumes. The percentage of heavy vehicles during the peak hour is likely lower than during the off-peak times and will likely to continue to decrease
as the large number of residential uses currently planned in the region are developed. LSC used the Synchro default of 2 percent trucks for all movements."

Stapleton/US Hwy 24

The intersection of US Hwy 24/Stapleton is currently stop sign-controlled. The northbound and southbound left-turn movements and the northbound through movements are currently operating at LOS F during the peak hours. This intersection is planned to be signalized in the future. Once signalized, all movements are projected to operate at LOS D or better during the peak hours, based on the projected short-term total traffic volumes. By 2040, some movements at this intersection are projected to operate at LOS E or F during the peak hours. To maintain an overall LOS D or better as a "conventional" four-leg signalized intersection, it would be necessary to provide three through lanes in all directions. Alternate traffic-control options were presented in the US Hwy 24 PEL Study. Alternatives to a "conventional" four-leg signalized intersection may include a jug handle intersection, a continuous flow intersection (or partial/half CFI), or a junior interchange. An alternate intersection design may be needed long-term to maintain an acceptable level of service.

Judge Orr/Meridian Ranch/Eastonville

The intersection of Judge Orr/Meridian Ranch/Eastonville is currently all-way, stop sign-controlled. The level of service for several of the approach lanes are projected to degrade to LOS E or LOS F during the peak hours, based on the projected 2028 background traffic volumes. If this intersection were to be converted to traffic-signal control, all movements are projected to operate at LOS D or better during peak hours, based on the projected 2028 and 2040 total traffic volumes

McLaughlin/Eastonville

The intersection of McLaughlin/Eastonville is currently two-way, stop-sign controlled. Based on the projected 2028 background afternoon peak-hour traffic volumes, the northbound left-turn movement is projected to operate at LOS F and the northbound through and right-turn lane and the southbound approach are projected to operate at LOS E. If this intersection were to be converted to traffic-signal control, all movements are projected to operate at LOS D or better during peak hours based on the projected 2028 and 2040 total traffic volumes.

QUEUING ANALYSIS

A queuing analysis was performed using Synchro/SimTraffic for the intersection of Rex/US Hwy 24. The 2040 total afternoon peak-hour traffic volumes were entered into the Synchro model. The simulation was run five times and the results were averaged. The queuing reports are attached.

The projected maximum northeast-bound left-turn queue on US Hwy 24 approaching Rex Road is 492 feet. 1

Queuing analysis should look at both AM and PM peaks.
Analyze queuing at main site related intersections.
At a minimum, recommend intersections #1, 6, 8 and 9.

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Number: 1 Author: Paul Brown Subject: Callout Date: 8/5/2020 09:27:03

Queuing analysis should look at both AM and PM peaks. Analyze queuing at main site related intersections.At a minimum, recommend intersections #1, 6, 8 and 9.

Author: Kirstin Subject: Sticky Note Date: 8/14/2020 14:14:42

The requested additional queuing analysis has been included in the updated report