



January 11, 2021

Mr. Mike Lovick
Cherry Creek School District
4850 S. Yosemite Street
Greenwood Village, CO 80111

Dear Mr. Lovick:

In response to your request, LSC impact analysis for the proposed Figure 1, the site is located south Aurora, Colorado.

REPORT CONTENTS

The report contains the following: the site including the lane geomet weekday site-generated traffic volu traffic volumes to the area roadway traffic volumes on the area roadway traffic and the impact of the propo

LAND USE AND ACCESS

The site is proposed as a 650-stude is expected to have about 300 stu buildout, the school is expected to future Butterfield developments. F to S. Blackstone Parkway and a bus conceptual site plan.

The January, 2003 *High Plains Co* overall Blackstone development an

ROADWAY AND TRAFFIC CONDITIONS

Area Roadways

The major roadways in the site's vicinity are shown on Figure 1 and are described below.

Comments: 02/10/2021

By: Kyle Morris (BHI)

Checked by: Brianna Medema

1. Provide additional analysis and discussion regarding how the double-stop movement effects the operation of the school full access. The report narrative was updated to detail the benefit provided by the two-stage left-turn movement.
2. Provide auxiliary turn lane analysis in conformance with the CDOT SHAC. The report narrative has been updated.
3. A pandemic adjustment is noted, but the adjustment nor the methods for devolving it are clearly defined. Please provide more detail. Typically we expect a comparison with a traffic count that took place prior to the pandemic that is grown to the study year. Additional detail has been provided in the report narrative.
4. Provide the rate used to grow existing traffic counts. Growth rates were not used because the area around the school has reached buildout - the only growth will be from future school trips.
5. Provide queuing summary table for all study intersections. A queuing analysis has been provided.
6. Provide internal queuing analysis and discussion on how it was used to develop the recommended turn lane storage. Additionally there is concern that Left-out movement delay will cause interruption with the right turn movements and spill back into drop-off area. Please discuss. This is included in the **POTENTIAL IMPACT OF QUEUING** section of the report narrative.
7. Provide recommendations for how the school will restrict left turn out of the main access. Consider recommending a permanent restriction of EB Left turns at this location. The school is expected to open with only partial enrollment. It is recommended the left-turn movement exiting the site only be restricted if problematic queues are observed over time.
 - As there are two outbound lanes, how would this impact the right out-lane? It would create a zipper effect with two outbound lanes feeding one exiting right-turn lane.
8. Auxiliary turn lanes and thru lanes shall have a minimum width of 12'. If existing thru lane width is modified, appropriate shift taper striping will be required. Comment noted.
9. Provide additional discussion on the need for crossing guards. The existing median is very wide and may require crossing guards for each direction of travel. This is included in the **PEDESTRIAN ACCOMMODATIONS** section of the report narrative.
10. Provide circulation plan in the appendix. Comment noted.
11. See comments throughout report. Comment noted.

- **S. Blackstone Parkway/S. Valleyhead Way/E. Links Place:** All movements at this stop-sign controlled intersection are expected to operate at LOS “B” or better during all three peak-hours through 2041.
- **S. Blackstone Parkway/E. Long Place/Site Access:** All movements at this stop-sign controlled intersection are expected to operate at LOS “D” or better during all three peak-hours through 2041.

INTERNAL SIGNING AND STRIPING DETAILS

The internal signing and striping details are included in the detailed site plan separate from the traffic study.

PEDESTRIAN ACCOMMODATIONS

A significant number of students are expected to walk to school from the east side of S. Blackstone Parkway. An east-west marked crosswalk with a pedestrian-activated rectangular rapid flashing beacon (RRFB) is recommended on the north leg of the S. Blackstone Parkway/Valleyhead Way/E. Links Place intersection. The school should provide an experienced crossing guard at the location to assist students with crossing S. Blackstone Parkway. The width of the raised median will require two separate RRFB installations and two crossing guards (one for each RRFB).

POTENTIAL IMPACTS OF QUEUING

Vehicles Entering the Site

The school will manage drop-off/pick-up operations to reduce the likelihood of backups onto S. Blackstone Parkway. The raised median on S. Blackstone Parkway combined with the existing 16-foot wide travel lanes will result in any backups out of the site blocking through traffic on S. Blackstone Parkway. Auxiliary turn lanes are

They are the maximum lengths that could be provided while minimizing off-site impacts to existing infrastructure.

How will they restrict movements? Will it be monitored by staff or resource officer? May need to consider physical restrictions and signage for permanent restrictions.

How were these storage lengths developed. Please provide internal queuing analysis.

proposed to have separate left/through and right-turn lanes. The school may need to require exiting traffic to only turn right onto S. Blackstone Parkway to increase the release rate from the site.

LEFT TURN LANES ON S. BLACKSTONE PARKWAY

A northbound left-turn lane is recommended on S. Blackstone Parkway to reduce the likelihood of queue spillback out of the site which would block northbound through traffic. The recommended length is 150 feet plus a 75-foot transition taper. The existing northbound lane is about 16 feet wide so only about 8 feet of widening into the median should be needed to provide separate 12-foot northbound left and northbound through/right lanes.

There is no initial restriction recommended. If queues become an issue, the restriction would be implemented only during peak school times because the restriction is not needed off-peak.

A southbound right-turn lane is recommended on S. Blackstone Parkway to reduce the likelihood of queue spillback out of the site which would block southbound through traffic. The re-

commended length is 225 feet plus a 75-foot transition taper. The existing southbound lane is about 16 feet wide so only about 8 feet of widening into the median should be needed to provide separate 12-foot southbound left/through and southbound right lanes.

CONCLUSIONS AND RECOMMENDATIONS

Trip Generation

1. In Phase 1 (2022) with 300 students, the site is projected to generate about 567 vehicle-trips on the average weekday, with about half entering and half exiting during a 24-hour period. During the morning peak-hour, about 109 vehicles would enter and about 92 vehicles would exit the site. During the afternoon school peak-hour, about 46 vehicles would enter and about 56 vehicles would exit the site. During the afternoon peak-hour, about 24 vehicles would enter and about 27 vehicles would exit the site.
2. At full capacity with 650 students, the site is projected to generate about 1,210 vehicle-trips on the average weekday, with about half entering and half exiting during a 24-hour period. During the morning peak-hour, about 232 vehicles would enter and about 197 vehicles would exit the site. During the afternoon school peak-hour, about 98 vehicles would enter and about 120 vehicles would exit the site. During the afternoon peak-hour, about 52 vehicles would enter and about 57 vehicles would exit the site.

Projected Levels of Service

3. All movements at the intersections analyzed are expected to operate at LOS "B" or better through 2041 with the following exception: The eastbound left/through movement at the S. Blackstone Parkway/E. Long Place/Site Access intersection is expected to operate at LOS "D" in the 2041 morning peak-hour once the site reaches capacity. It may be appropriate to force drivers to turn right onto S. Blackstone Parkway to reduce backups into the site.

Conclusions

4. The impact of the proposed Cherry Creek Elementary School No. 45 can be accommodated by the existing and planned roadway network with the following recommendations.

Recommendations

5. The main access approach to S. Blackstone Parkway should have separate left/through and right-turn lanes as shown in Figure 2.
6. A northbound left-turn lane is recommended on S. Blackstone Parkway to reduce the likelihood of queue spillback out of the site which would block northbound through traffic. The recommended length is 150 feet plus a 75-foot transition taper. The existing northbound lane is about 16 feet wide so only about 8 feet of widening into the median should be needed to provide separate 12-foot northbound left and northbound through/right lanes. Coordination will be needed with the HOA because the HOA owns the median within S. Blackstone Parkway.

If this is recommended, shift taper will required based on posted speed. Please call out this required taper length.

An appropriate redirect taper for a posted speed limit of 25 mph is 15:1.

7. A southbound right-turn lane is recommended on S. Blackstone Parkway to reduce the likelihood of queue spillback out of the site which would block southbound through traffic. The recommended length is 225 feet plus a 75-foot transition taper. The existing southbound lane is about 16 feet wide so only about 8 feet of widening into the median should be needed to provide separate 12-foot southbound left/through and southbound right lanes.
8. A significant number of students are expected to walk to school from the east side of S. Blackstone Parkway. An east-west marked crosswalk with a pedestrian-activated rectangular rapid flashing beacon (RRFB) is recommended on the north leg of the S. Blackstone Parkway/Valleyhead Way/E. Links Place intersection. The school should provide an experienced crossing guard at the location to assist students with crossing S. Blackstone Parkway. The width of the raised median will require two separate RRFB installations and two crossing guards (one for each RRFB).

* * * * *

We trust our findings will assist you in gaining approval for elementary School No. 45 development. Please contact me if you need assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By

Christopher S. McGranahan, PE, PTOE
Principal

CSM/wc

1-11-21

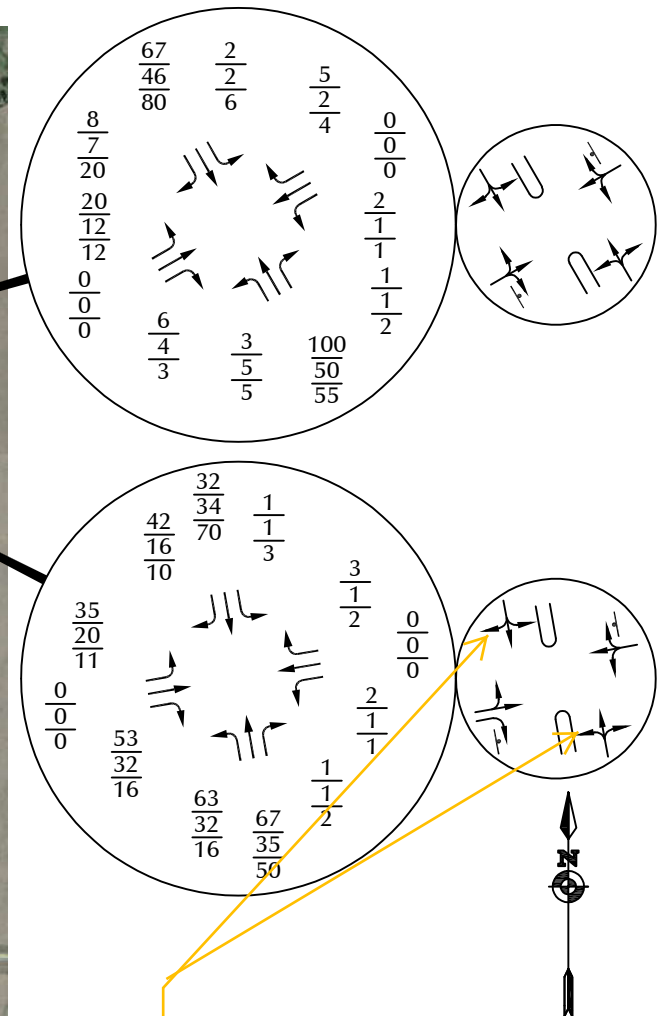
Will the crossing utilize the median as a refuge? The median is very wide and may require two crossing guards. One for NB, and one for SB traffic.

This is included in the PEDESTRIAN ACCOMMODATIONS section of the report narrative.

Add to recommendation section: The school can coordinate with the city if queuing or other traffic related issues arise.

This has been added to the report narrative.

Enclosures: Tables 1 and 2
Figures 1 - 8
Traffic Counts
Level of Service Definitions
Level of Service Reports



LEGEND:

⊥ = Stop Sign

$\frac{26}{35}$ = AM Peak Hour Traffic
PM School Peak Hour Traffic
 $\frac{28}{28}$ = PM Peak Hour Traffic

1,000 = Average Daily Traffic

Show auxiliary lane recommendations and lengths. Also show the double stop condition for all laneage figures.

Figure has been updated.

Year 2022 Total Traffic,
Lane Geometry and Traffic Control

Cherry Creek Elementary School No. 45 (LSC #200810)

Figure 7