



## **Skyline Aggregate Transportation Study Trip Generation and Signal Warrant Review**

**Dec 3, 2025. Headway Transportation**

**April 4, 2026. LSC Transportation Consultants, Bill Suen TE**

A peer review of the *Updated Transportation Technical Study for Skyline Aggregates* dated December 3, 2025 by GCW Engineers and Surveyors was conducted by LSC Transportation Consultants INC. The findings from the review are documented in this memo.

### **Summary**

- Trip generation using person trip analysis is reasonable, assuming 20 employees and 400 truck loads per day during a 6:00 AM to 6:00 PM operating day.
- Volumes used to evaluate signal warrants (found in Table 6) do not have a clear source. Summing up volumes from the turning movement volume diagram (Figure 7) do not yield Table 6 volumes. No count sheets are included.
- Three signal warrants are evaluated: eight-hour, four-hour, peak hour. Results are reasonable, however the eight-hour warrant does not use 24-hour volumes and only applies the four-hour period of collected data. This assumes that roadway volumes for the remaining 20 hours do not exceed the collected data. A 24-hour roadway count should be conducted to confirm.
- Crash Experience (Warrant 7) was not applied. Based on historical volume of crashes at the project site driveway location this warrant should be evaluated.
- Historical crash concentration at the site driveway location, due to the curve in the roadway, would warrant additional safety signs such as a curve ahead warning sign (W1-2), flashing beacon in conjunction with the sign, curve warning chevron signs (W1-8), and truck warning sign to be installed.
- Installation of an acceleration lane for westbound left turning vehicles exiting the project site is recommended.

## **Trip Generation**

As stated in the original report, the *Institute to Transportation Engineers Trip Generation Manual* does not include the specific project land use: an aggregate facility which reclaims mining material. As so, the study relies on a “person trip” analysis to calculate the number of daily and peak hours (AM and PM) trips generated. The report states the facility will have 20 employees on-site daily and 400 truck loads transported daily. The plant will operate from 6:00 AM to 6:00 PM daily. Assuming these statements are correct, the following can be derived based on Table 3: Trip Generation Estimates.

- 20 employees, each driving their own vehicle, will make 40 trips arriving and departing each day.
- 20 additional vehicle trips (10 round trips) will be made daily as employees travel to and from the site for various purposes/errands for a total of 60 daily employee trips.
- As the AM and PM peak hour of adjacent roadways typically occurs between 7:30-8:30 in the AM and 4:00-5:00 in the PM, the employee commute trips do not occur during the peak periods. However, six employee trips (3 in and 3 out) are assumed to take place during each of the peak periods.
- 400 truck loads each day will result in 800 daily truck trips. 80 truck trips are assumed to take place during each of the peak periods.
- Combining the employee and truck trips results in 860 total daily trips and 86 combined trips during the AM peak hour and 86 combined trips during the PM peak hour.

## **Singal Warrants**

The *California Manual on Uniform Traffic Control Devices* (CA MUTCD) lists nine different signal warrants.

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a (railroad) Grade Crossing

Of these nine, the traffic study performs three (Warrants 1-3). The remaining six do not apply to the site access intersection with the exception of Warrant 7: Crash Experience, which was not performed by the study.

The study collected traffic turning movement volumes for a total of four hours which are presented in Table 6: Four-Hour Future + Project Traffic Projections. The volumes presented in Table 6 are used in the signal warrant analysis for all three of the warrants analyzed. It is presumed that Table 6 is based on volumes displayed on Figure 7, it is unclear why summing up volumes from Figure 7 does not yield any of the Major Street Volumes found on Table 6. However, since the peak AM and PM volumes from Table 6 are greater than those of Figure 7, Table 6 is more conservative.

#### Warrant 1, Eight-Hour Vehicular Volume

Warrant 1 (eight-hour warrant) is based on Table 4C-1 found in the MUTCD and presented in the study.

The MUTCD states that for Warrant 1 *“The need for a traffic control signal should be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:*

- A. *The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major street and the more critical minor-street approach, respectively, to the intersection; or*
- B. *The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major California MUTCD 2026 Edition (FHWA’s MUTCD 2023 Edition, as amended for use in California) Page 1049 Chapter 4C – Traffic Control Signal Needs Studies January 18, 2026 Part 4 Highway Traffic Signals street and the more critical minor-street approach, respectively, to the intersection.*

*...If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.”*

Volumes for each hour of a 24-hour design day are typically evaluated to determine if conditions are met for any 8 of those hours. The study applies only the four peak hours assuming that the remaining 20 hours of the day do not exceed the four selected hours for which data was collected and adjusted for future conditions. A 24-hour roadway volume count could have been performed to confirm the assumption. Although the AM and PM commute periods typically account for the peak traffic, some roadways tend to peak midday.

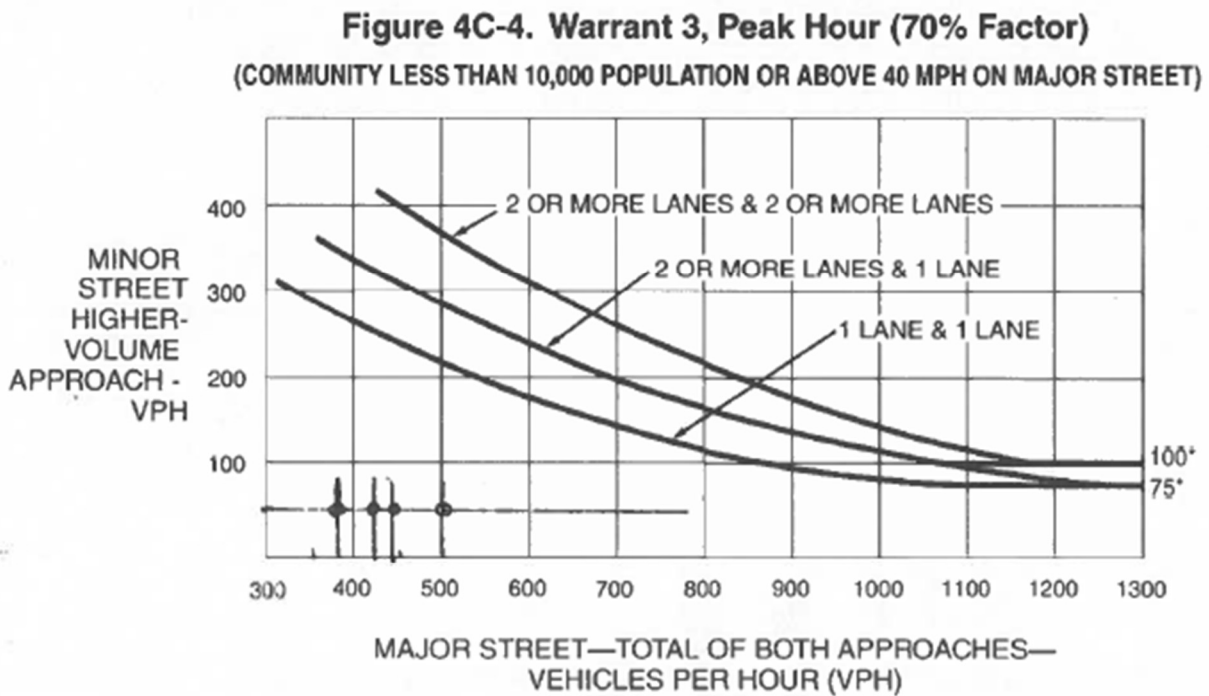
Based on the assumption that the four hours of data collected are the highest four hours of traffic volumes over the course of the day, and since neither of the threshold columns are exceeded, warrant 1 is not met. However, it is recommended to conduct a 24-hour roadway count to confirm this assumption.

Warrant 2, Four-Hour Vehicular Volume

Warrant 2 (four-hour warrant) is based on Figure 4C-2 (4-hour, 70%). Figure 4C-2 and the volume data points from Table 6 are plotted and presented in the study’s report. The plots indicated that the 4-hour warrant 2 is not met.

Warrant 3, Peak Hour

Warrant 3 (peak hour) is based on Figure 4C-4 (peak hour, 70%). Given that the peak hour warrant 3’s threshold criteria is more liberal than warrant 2’s, and that warrant 2 was not meet, the study simply states that the warrant is not met and did not include a plot in the report. Below is Figure 4C-4 with the data points plotted.



\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

## Warrant 7: Crash Experience

Warrant 7: Crash Experience was not evaluated by the study. The *Lassen County Local Road Safety Plan* (June 2, 2022), reviewed crash data from 2010-2019 within Lassen County. During this period, nine crashes occurred within approximately 1000 feet of the proposed site access. Eight of the crashes are single vehicle “run off road” type as the site access is located along a curve. One of the crashes was a result of an animal. The primary cause for four of the eight crashes were listed as excessive speed.

Warrant 7 (section 4C.08) states:

*02 The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:*

- A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and*
- B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and*
- C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.*

Based on the crash data set reviewed the site access location has an existing crash concentration. A review of the most recent crash data to satisfy section B would be prudent. Although a traffic signal by itself would likely not reduce the type of crashes experienced at this location, the presence of a signal would likely draw attention to the curve, since seven of the crashes occurred in dark or low light conditions. In addition, a signal ahead (W3-3) sign typically used in conjunction with a new signal could alert drivers to use caution reducing the run off road condition.

## Warning Signs

Historical crash data from 2010-2019 shows a concentration of crashes occurring at the project site location as a result of the roadway curvature. Additional safety counter measures such as a curve ahead warning sign (W1-2), flashing beacon in conjunction with the sign and/or curve warning chevron signs (W1-8) can be installed to reduce future crashes. The installation of a truck warning sign can also alert motorists of hazardous conditions ahead. The Ca MUTCD list a C44(CA) "Trucks Entering Existing" sign found in the temporary traffic control section appears in orange. In this application, as a permanent warning sign, the background color of yellow would be more appropriate. Since Skyline Road is not a Caltrans roadway a custom sign not found in the MUTCD that more accurately reflects the hazard can be applied.



## Acceleration Lane

The study recommends a southbound left turn/deceleration lane be placed on Skyline Road at the project site driveway intersection. An acceleration lane could be constructed opposite the southbound left turn lane for westbound left turning vehicles departing the facility. The acceleration lane would replace the taper portion opposite the left turn lane. Regardless of the need for acceleration, the additional width created by the acceleration lane allows vehicles to make a 2-stage left turn and provides a safety refuge for the westbound left turning vehicles against southbound through vehicles. As a taper opposite

the southbound left turn lane is already needed, the additional acceleration lane would only require modest additional length of roadway widening. As a northbound right turn lane is recommended by the study, roadway reconstruction will already be required.