

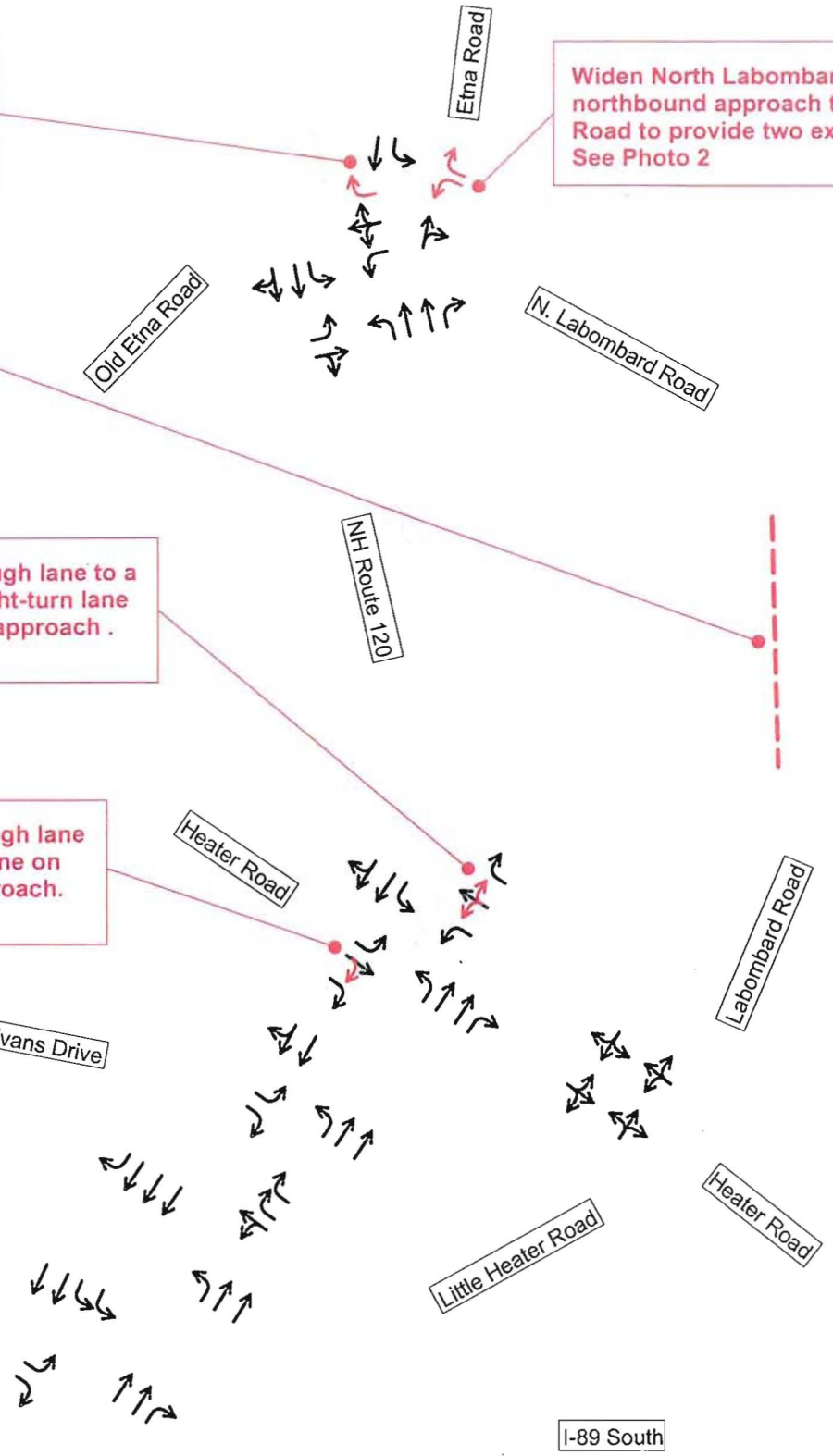
Widen Etna Road westbound approach to NH120 to provide an exclusive right-turn lane. See Photo 1

Widen North Labombard Road northbound approach to Etna Road to provide two exit lanes. See Photo 2

Connect Labombard Road to North Labombard Road to divert vehicles from NH120.

Convert existing exclusive through lane to a general purpose left/through/right-turn lane on the Heater Road westbound approach . See Photo 3

Convert existing exclusive through lane to a shared through/right-turn lane on the Heater Road eastbound approach. See Photo 4



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**Figure 13**

## STUDY FINDINGS AND RECOMMENDATIONS

Based on the existing conditions data collected at the study area intersections on NH120, Heater Road, and Etna Road, the anticipated traffic increases from the proposed hotel and conference center, and the analysis of future traffic levels in the study area, Pernaw & Company, Inc. concludes:

1. Traffic demand at the study area intersections on NH120 reached peak levels from 7:15 to 8:15 AM in the morning, and from 4:30 to 5:30 PM in the evening. The signalized intersection closest to the site to the south (NH120/Heater Road) accommodated 3,367 (AM) and 3,453 (PM) vehicles during the peak hour periods. The closest signalized intersection to the north (NH120/Etna Road/Old Etna Road) accommodated 2,881 (AM) and 2,799 (PM) vehicles during those respective peak periods.
2. The results of the trip generation analysis indicate that the proposed hotel and conference center will generate approximately 136 trips (99 arrivals, 37 departures) during the AM peak hour, and 139 trips (43 arrivals, 96 departures) during the PM peak period. All trips generated by the commercial development constitute new trips to the area.
3. Access to the hotel and conference center will be provided via Labombard Road and North Labombard Road; creating a connection between these two public streets. This connection will divert vehicles traveling between Etna Road and Heater Road, from NH120, past the subject site.
4. The greatest impact that site traffic will have on roadway volumes in the study area will occur along NH120, south of the Heater Road intersection. With the hotel and conference center fully operational, this section of roadway is expected to see increases of approximately +68 (AM) and +69 (PM) vehicles during the peak periods. This translates into increases of +2 percent during both the AM and PM peak periods. This is equivalent to approximately one additional vehicle-per minute during the worst-case peak hour periods. The greatest impact on intersection volumes will occur at the Heater Road/Labombard Road/Little Heater Road intersection. Intersection utilization is expected to increase by +9 percent (+93 vehicles) during the morning peak hour and +11 percent (+95 vehicles) during the evening peak hour.
5. The capacity analysis of the **NH120/Etna Road/Old Etna Road** intersection revealed that the overall intersection, and some lane groups, will be operating at or above capacity in the opening year (2012), both with and without the proposed development. This condition will worsen in the horizon year (2022). Favorably, the addition of site traffic will increase the volume-to-capacity ration at this intersection by only one or two percentage points in all cases. Mitigation at this intersection includes optimizing the traffic signal timing and constructing an exclusive right-turn lane on the Etna Road westbound approach to NH120. The optimization and additional turn lane on Etna Road has the potential to reduce vehicle delays and volume-to-capacity rations below the No-Build conditions.

6. The capacity analysis of the **NH120/Heater Road** intersection revealed that the overall intersection, and some lane groups, will be operating at or above capacity in the opening year (2012), both with and without the proposed development. This condition will worsen in the horizon year (2022). Mitigation at this intersection includes optimizing the traffic signal timing and re-stripping the exclusive eastbound through lane to a shared through/right-turn lane and re-stripping the exclusive westbound through lane to a shared left/through/right-turn lane. This mitigation, as in the previous analysis, will reduce overall volume-to-capacity ratios and vehicle delays in all cases.
7. The signalized intersection capacity analyses of the **NH120/I-89 Northbound Ramps** and **NH120/I-89 Southbound Ramps** intersections revealed that the overall intersection, and some lane groups, will operate at or above capacity in the opening year (2012) and continue through the horizon year (2022) regardless of the proposed development. This is prevalent at the I-89 NB ramps and, to a certain extent, at the I-89 SB ramps. The addition of site traffic through these two intersections will increase the volume-to-capacity ratios by only two percentage points or less in all cases. The proposed mitigation, which includes optimization of the traffic signal timings, will reduce vehicle delays at both intersections to below the No-Build cases; however the volume-to-capacity ratios will remain the same as the Build case (save for the PM peak hour case at the I-89 NB ramp intersection, where the volume-to-capacity ratio will increase).
8. The intersection capacity and Level of Service analyses pertaining to the **Etna Road/North Labombard Road** intersection confirmed that the southbound left-turn arrivals will operate well below capacity through the horizon year (2022) and beyond with the site fully occupied. The North Labombard Road approach should be widened to provide two departure lanes to reduce delays and maximize the egress capacity of North Labombard Road.
9. The intersection capacity and Level of Service analyses pertaining to the **Heater Road/Labombard Road/Little Heater Road** intersection confirmed that while the northbound and southbound movements from the minor approaches will operate with some delays, all movements at this intersection will operate below capacity through the horizon year (2022) and beyond with the proposed development fully operational.
10. Sight distances looking left and looking right from the Labombard Road and North Labombard Road approaches to Heater Road and Etna Road, respectively, are excellent due to the horizontal and vertical alignment features of each roadway.

11. Figure 13 summarizes the recommended intersection modifications that can be used to mitigate the impacts of site traffic. These intersection modifications will serve to increase the hourly capacity of the intersections, whereas the proposed extension of Labombard Road to North Labombard Road will serve to lessen the traffic demand on NH120 at the two nearly signalized intersections. The following improvements are recommended to mitigate the effects of site traffic, and are commensurate with the size and type of development that is proposed:

- Extend Labombard Road to North Labombard Road to divert vehicles off of NH120 that travel between points east on Heater Road and points north on Etna Road.
- Widen the Etna Road westbound approach to NH120 to provide a third approach lane. This westbound approach should be delineated with an exclusive left-turn lane, a shared left/through/right-turn lane, and an exclusive right-turn lane (see Photo 1, Appendix K).
- Widen the North Labombard Road approach to Etna Road to provide two exit lanes (see Photo 2, Appendix K).
- Modify the lane use on the Heater Road westbound approach to NH120 to include an exclusive left-turn lane, a shared left/through/right-turn, and an exclusive right-turn lane (see Photo 3, Appendix K).
- Modify the lane use on the Heater Road eastbound approach to NH120 to include an exclusive left-turn lane, a shared through/right-turn lane, and an exclusive right-turn lane (see Photo 4, Appendix K).

This section of NH Route 120 is under the jurisdiction of the NHDOT – District 2. Their review and approval is required through the Driveway Permit process to modify the Etna Road and Heater Road approaches to NH120. Optimization of the traffic signal timings for the coordinated traffic system along NH120 has the potential to reduce overall vehicle delays on the corridor and should be considered by the NHDOT, regardless of the proposed hotel and conference center project.