

STATE OF NEW HAMPSHIRE
INTRA-DEPARTMENT COMMUNICATION

JDB

FROM: John D. Butler, P.E.
Geometrics Engineer

DATE: December 12, 2019
AT (OFFICE): Bureau of Highway Design

SUBJECT: MISC. ENG DISTRICT 6
1832-J
Northwood, US3 & Bow Lake Road
Aroma Joe's

TO: James A. Hewitt, P.E.
NHDOT District 6

MEMORANDUM

The Bureau of Highway Design has reviewed the following materials relative to the proposed Aroma Joe's at the intersection of US Route 4 and Bow Lake Road in Northwood:

- Traffic Impact Assessment (TIA) prepared by Stephen G. Pernaw & Company, dated October 2019
- Proposed site plan (sheet 4 of 16) prepared by NH Land Consultants, dated June 3, 2019

The proposed development consists of:

- 866 sf drive-thru-only coffee shop
- 203 sf office space
- Existing small greenhouse
- Existing single-family residence

Access is proposed via one full access driveway on the east side of Bow Lake Road, approximately 250 feet from the US 4/Bow Lake Road intersection.

We have the following comments:

1. The proposed development is expected to add approximately 39 vehicles in the AM peak hour and 15 vehicles in the PM peak hour to the traffic exiting from Bow Lake Road onto US 4, a 27% and 14% increase volume in the design year (2030). Although this will result in increased queuing on Bow Lake Road, it appears that the proposed driveway is located beyond the worst-case queue length, reported to be 9 vehicles (225') in Table 3 of the TIA. Therefore, we find the drive location to be acceptable. Bow Lake Road is a Town road, so we defer to the town regarding the acceptability of the increase in queues and delays. We would note:

- The TIA notes that field measurement of existing delay is considerably less than the estimated delay calculated by Synchro and reported in Table 3 of the TIA.
 - In the Synchro model, it appears that the Bow Lake Road approach is coded as a two lane approach, but it does not code the very short length of the lane separation. In reality, the left turn queue will eventually block access to the right turn lane, resulting in queues and delays that are longer than those reported in Table 3 of the TIA. This issue may be offset by the issue noted in the bullet above.
 - There appears to be very little room within the Bow Lake Road right-of-way to extend the lane separation.
 - The TIA suggests that some vehicles making a left turn out of Bow Lake Road will do so as a two-stage maneuver, using the center median area as a refuge, thereby reducing the queues and delays. We don't know if this actually happens today, but it seems unlikely given the relatively high speed and volume of traffic on US 4.
2. The TIA does not address the need for a westbound right turn lane on US 4 at the Bow Lake Road intersection. Per NCHRP 457 guidance, a right turn lane is warranted in both the AM and PM peak hours for the existing (No Build) traffic volumes; however, the proposed development exacerbates the need for a right turn lane by adding 22 and 7 vehicles to the right turn movement in the AM and PM peak hours respectively, a 20% and 10% increase in the design year (2030). Widening US 4 for a right turn lane would be a significant undertaking, including utility relocations; therefore, we recommend that the developer donate a 10 foot wide strip of frontage for the potential of future widening by others.

Per record plans from the Northwood 11143C2 project (attached), the existing US 4 right-of-way line is 5 feet behind the back of sidewalk; however, the site plan depicts the right-of-way line approximately 10 feet behind the back of sidewalk. This discrepancy should be resolved by the developer's surveyor.

3. The site plan is missing several items from the Northwood 11143C2 plans:
- Existing bounds on US 4. This would help identify the correct right-of-way location.
 - Existing slope and drainage easements along US 4 and Bow Lake Road.
 - Existing drainage along US 4 and Bow Lake Road.

cc: W. Oldenburg
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