

MEMORANDUM

Ref: 2000A

To: Michael J. Sievert, P.E.
MJS Engineering, P.C.

From: Stephen G. Pernaw, P.E., PTOE

Subject: Proposed Residential Development
Durham, New Hampshire

Date: February 21, 2020 (Updated 11/2/20)

As requested, Pernaw & Company, Inc. has conducted a trip generation analysis for the proposed residential development located off of Ambler Way in Durham, New Hampshire. The purpose of this updated memorandum is to summarize the results of our trip generation analyses for the revised layout as well as our trip distribution analysis. To summarize:

Proposed Development – According to the plan entitled “*Overall Site Plan*,” prepared by MJS Engineering, P.C. for Michael & Martha Mulhern (see Attachment 1), the proposed residential development will consist of fifteen age-restricted (55+) dwelling units constructed along a loop roadway. It is our understanding that at least 80% of the units are required to be age-restricted; meaning that up to three units could be unrestricted in terms of age.

The site is located on the east side of Ambler Way at its intersection with Gerrish Drive. Access to the proposed development will be provided via a two-way site access road that will extend easterly from the Ambler Way/Gerrish Drive intersection.

Trip Generation - To estimate the quantity of vehicle-trips that will be produced by the proposed residential development, Pernaw & Company, Inc. considered standard trip generation rates published by the Institute of Transportation Engineers¹ (ITE). Land Use Code 251 (Senior Adult Housing–Detached) and Land Use Code 210 (Single-Family Detached Housing) are the most applicable categories for the subject site and the number of dwelling units was utilized as the independent variable. The average “trip rate” method was utilized given the relatively small size of the development.

The following table summarizes the results of the trip generation analyses for two occupancy scenarios (100% and 80% age-restricted units). The computations pertaining to the trip generation analyses are attached (see Attachments 2 & 3).

¹ Institute of Transportation Engineers, *Trip Generation*, 10th Edition (Washington, D.C., 2017)

Table 1 **Trip Generation Summary / Comparison**

	CASE A		CASE B		Total
	100% Age-Restricted ¹ (15 Dwelling Units)	80% Age-Restricted ¹ (12 Dwelling Units)	Conventional ² (3 Dwelling Units)		
Weekday Total					
Entering	32 veh	26 veh	14 veh		40 veh
Exiting	<u>32 veh</u>	<u>26 veh</u>	<u>14 veh</u>		<u>40 veh</u>
Total	64 trips	52 trips	28 trips		80 trips
Weekday AM Peak Hour					
Entering	1 veh	1 veh	1 veh		2 veh
Exiting	<u>3 veh</u>	<u>2 veh</u>	<u>1 veh</u>		<u>3 veh</u>
Total	4 trips	3 trips	2 trips		5 trips
Weekday PM Peak Hour					
Entering	3 veh	2 veh	2 veh		4 veh
Exiting	<u>2 veh</u>	<u>2 veh</u>	<u>1 veh</u>		<u>3 veh</u>
Total	5 trips	4 trips	3 trips		7 trips
Saturday Total					
Entering	21 veh	17 veh	15 veh		32 veh
Exiting	<u>21 veh</u>	<u>17 veh</u>	<u>15 veh</u>		<u>32 veh</u>
Total	42 trips	34 trips	30 trips		64 trips
Saturday Peak Hour					
Entering	1 veh	1 veh	2 veh		3 veh
Exiting	<u>2 veh</u>	<u>2 veh</u>	<u>1 veh</u>		<u>3 veh</u>
Total	3 trips	3 trips	3 trips		6 trips

¹ITE Land Use Code 251- Senior Adult Housing - Detached (Trip Rate Method due to Independent Variable Size)

²ITE Land Use Code 210 - Single-Family Detached Housing (Trip Rate Method due to Independent Variable Size)

This table shows that the proposed residences are estimated to generate approximately 5 vehicle-trips (2 arrival, 3 departures) during the weekday AM peak hour, and 7 vehicle-trips (4 arrivals, 3 departures) during the weekday PM peak hour. It should be noted that site traffic will be immediately dispersed at the site entrance as one group will utilize Gerrish Drive for access and the remainder will utilize Ambler Way, depending upon the driver's origin or destination. Figure 1 shows the anticipated travel patterns in the immediate study area for the higher of the two cases. The trip distribution analysis is summarized on Attachment 4.

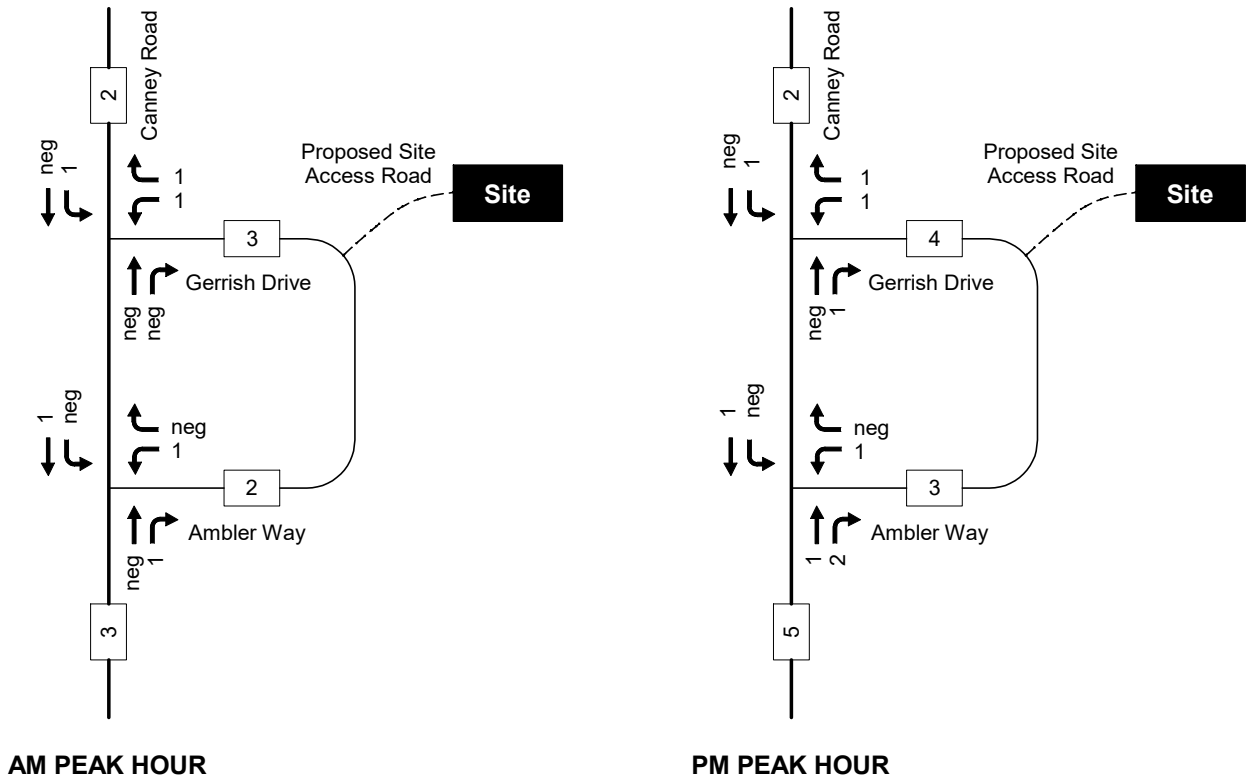


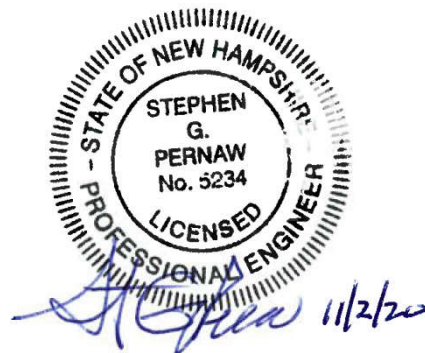
Figure 1

Site Generated Traffic Volumes
Traffic Evaluation, Proposed Residential Development, Durham, New Hampshire

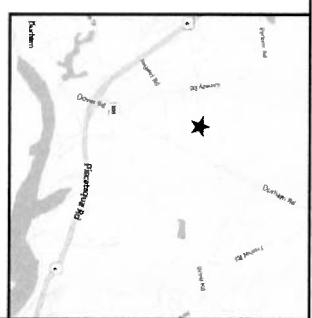
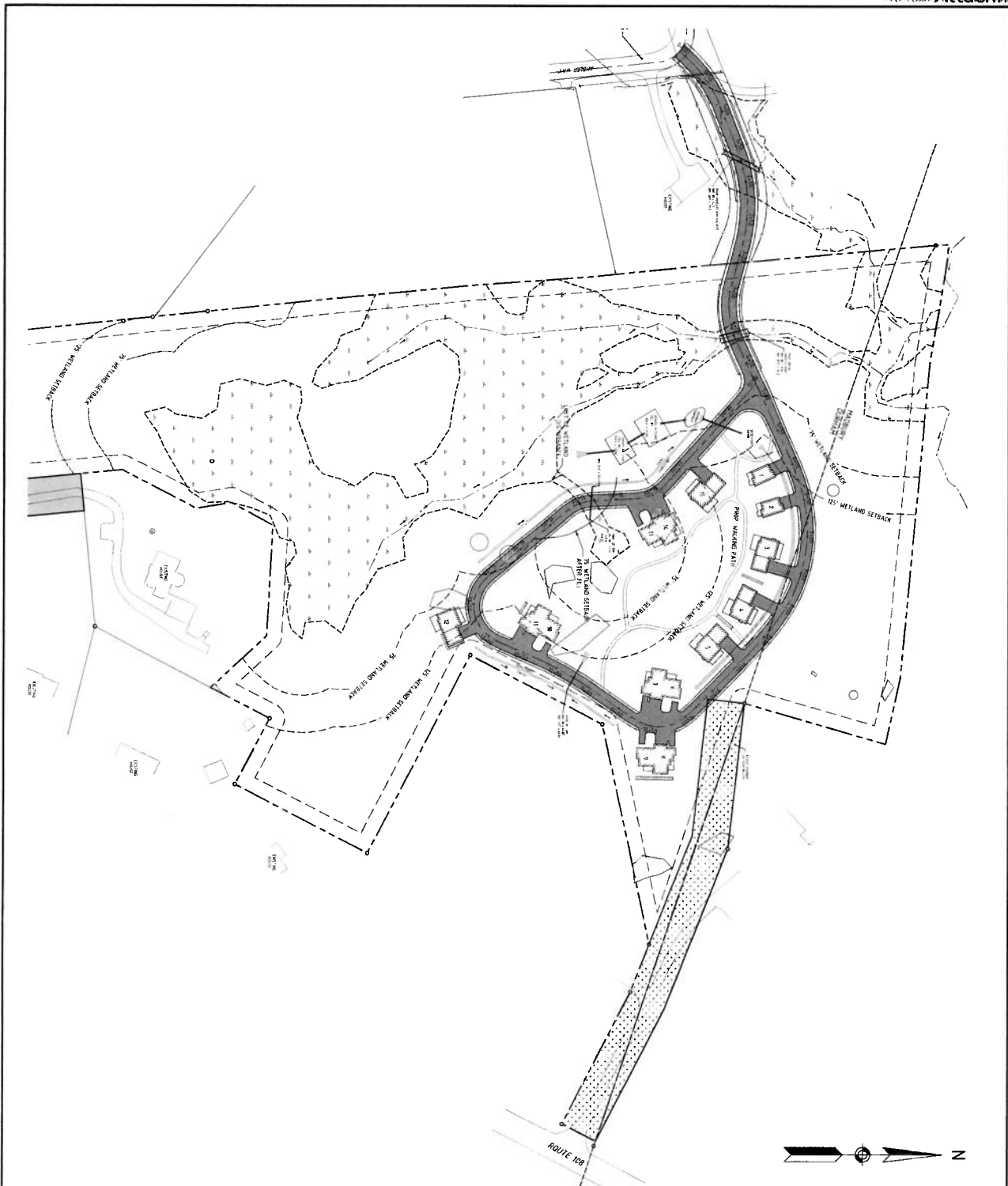
Findings & Conclusions

1. Access to the proposed development is proposed via a two-way site access loop road that will extend from the Gerrish Drive/Ambler Way intersection.
2. The trip generation analysis indicates that the proposed development will generate approximately 5 (AM) and 7 (PM) during the worst-case peak hour periods.
3. Site traffic is expected to be split between Gerrish Drive and Ambler Way. This means each roadway will accommodate approximately +4 vehicles over a one-hour period (PM peak hour). This translates into one additional vehicle every 15 minutes, on average.
4. Traffic increases of this order of magnitude will not significantly impact traffic operations at nearby intersections.
5. Development sites that generate fewer than 500 vehicles per day are generally considered to be “low-volume” traffic generators. Clearly, the proposed development is not a major traffic generator.
6. The proposed site access road approach to Gerrish Drive/Ambler Way should operate under STOP sign control (MUTCD R1-1), and include the installation of an 18-inch white stop line. As an option, the access road could be delineated with a four-inch double-yellow centerline to separate ingress and egress vehicles.

Attachments

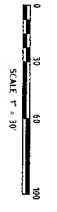


ATTACHMENTS



- GENERAL NOTES:**
1. ZONE: RESIDENTIAL, TRI-CENTRAL DISTRICT 2, WITH CONCEPTUAL SUBDIVISION
 2. THE INTENT OF THIS PLAN IS TO SHOW THE LAYOUT OF THE PROPOSED BUILDING FOOTPRINTS, PARKING LOTS, DRIVEWAYS, AND WETLAND SETBACKS.
 3. WETLANDS WERE Delineated BY PROVAL MAPING OF INDIAN SOIL SERVICES.
 4. SURVEY FIELD WORK WAS COMPLETED BY PROVAL AND NEWMAN PLANNING ASSOCIATES.

PROVAL APPROVED BY DURHAM PLANNING BOARD
 CERTIFIED BY MICHAEL BERTRAND, TOWN PLANNER
 DATE _____



	OVERALL SITE PLAN prepared for MULHERN TAX MAP 10, LOT 8-6 93 BAGGAD ROAD, DURHAM, NH 03824		DATE ISSUED: 10/28/20 SCALE: 1"=30' DESIGNED BY: MJS DRAWN BY: MJS APPROVED BY: MJS DWG FILE: 2023102801.dwg	SEAL _____ _____ _____	<table border="1"> <thead> <tr> <th>NO.</th> <th>REVISIONS</th> <th>DATE</th> <th>INT.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>INITIAL SUBMISSION TO THE DURHAM PLANNING BOARD</td> <td>10/28/20</td> <td>MJS</td> </tr> </tbody> </table>	NO.	REVISIONS	DATE	INT.	1	INITIAL SUBMISSION TO THE DURHAM PLANNING BOARD	10/28/20	MJS
	NO.	REVISIONS	DATE	INT.									
1	INITIAL SUBMISSION TO THE DURHAM PLANNING BOARD	10/28/20	MJS										
JOB: 19-063 C101													

Trip Generation Summary

Alternative: Alternative 1

Phase:

Project: 2000A

Open Date: 11/2/2020

Analysis Date: 11/2/2020

ITE	Land Use	Weekday Average Daily Trips			Weekday AM Peak Hour of Adjacent Street Traffic			Weekday PM Peak Hour of Adjacent Street Traffic		
		* Enter	Exit	Total	* Enter	Exit	Total	* Enter	Exit	Total
210	SFHOUSE 1	14	14	28	1	1	2	2	1	3
3	Dwelling Units									
251	SENIORDETACHED 2	26	25 26	54 52	1	2	3	2	2	4
12	Dwelling Units									
251	SENIORDETACHED 1	32	32	64	1	3	4	3	2	5
15	Dwelling Units									
<hr/>										
	Unadjusted Volume	72	71	143	3	6	9	7	5	12
	Internal Capture Trips	0	0	0	0	0	0	0	0	0
	Pass-By Trips	0	0	0	0	0	0	0	0	0
	Volume Added to Adjacent Streets	72	71	143	3	6	9	7	5	12

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Trip Generation Summary

Alternative: Alternative 1

Phase:

Open Date: 11/2/2020

Project: 2000A

Analysis Date: 11/2/2020

ITE	Land Use	Saturday Average Daily Trips			Saturday Peak Hour of Generator				
		*	Enter	Exit	Total	*	Enter	Exit	Total
210	SFHOUSE 1 3 Dwelling Units		15	14 15	29 30		2	1	3
251	SENIORDETACHED 2 12 Dwelling Units		17	16 17	33 34		1	2	3
251	SENIORDETACHED 1 15 Dwelling Units		21	20 21	41 42		1	2	3
Unadjusted Volume			53	50	103		4	5	9
Internal Capture Trips			0	0	0		0	0	0
Pass-By Trips			0	0	0		0	0	0
Volume Added to Adjacent Streets			53	50	103		4	5	9

Total Saturday Average Daily Trips Internal Capture = 0 Percent

Total Saturday Peak Hour of Generator Internal Capture = 0 Percent

* - Custom rate used for selected time period.

TRIP DISTRIBUTION ANALYSIS

A. Work Destination Report - Where Workers are Employed Who Live in the Selection Area - by County Subdivisions

To/From	Count	Gateway %				Gateway Allocation			
		North		South		North		South	
		Canney Rd	Canney Rd	Canney Rd	Canney Rd	Canney Rd	Canney Rd	Canney Rd	Canney Rd
Durham town (Strafford, NH)	628	0.40	0.60	0.40	0.60	251	377	628	628
Portsmouth city (Rockingham, NH)	416	0.40	1.00	0	416	0	416	416	416
Dover city (Strafford, NH)	309	0.90	0.60	124	185	172	19	309	309
Manchester city (Hillsborough, NH)	191	0.90	0.10	172	19	132	15	191	191
Nashua city (Hillsborough, NH)	147	0.20	1.00	0	143	24	97	143	143
Exeter town (Rockingham, NH)	121	1.00	0.80	87	0	87	0	87	87
Salem town (Rockingham, NH)	87	0.10	0.90	9	77	0	77	86	86
Concord city (Merrimack, NH)	85		1.00	0	77	0	77	77	77
Rochester city (Strafford, NH)	77								
Boston city (Suffolk, MA)	2204								
						799	1406	2205	2205
						36.2%	63.8%	100%	100%
						35	65	100	100