



# NORTHLAND

— RESIDENTIAL —  
CORPORATION

June 2, 2020

Patrice Garvin  
Town Administrator

Jeffrey Wheeler  
Town Planner

Glenn Clancy  
Director of Community Development

Steve Pinkerton  
Chair, Planning Board

Town of Belmont  
455 Concord Avenue  
Belmont, MA 02478

## **RE: The Residences at Bell Mont – Revised Development Program and TMMA Compliance**

Patrice, Jeffrey, Glenn and Steve,

You have asked that I provide the transportation engineering methodology and associated data supporting the vehicle trip analysis provided by my Traffic Engineering Consultant, Vanasse & Associates, and secondly that I propose, an acceptable to me, revised TMMA compliant development program for Zone 3 of the McLean District. This revised proposal is compliant with Exhibit I of the MOA – the Traffic Mitigation and Monitoring Agreement, dated 11/22/99, (the “TMMA”) and **will not** require changes to the terms and conditions of such agreement.

In the first instance, find attached Exhibit 1, Section 4.3 from the 3<sup>rd</sup> Edition of the Institute of Transportation Engineers Trip Generation Handbook, dated September 2017. This Section describes the technical approach employed by the traffic engineers to model prospective vehicle trips to/from a site based on a specified land use. It should be understood that traffic engineering analysis is based on both technical analysis and the application of professional judgment in the derivation of vehicle trip data.

In the second instance, based on recent discussions with the Select and Planning Boards we will not seek to amend the TMMA. Instead, with the input of the Boards, Town Staff and interested residents, we have crafted a development program for Zone 3 that complies with the TMMA, without amendment, and meets the varying interests of the Community.

Specifically, we propose a revised development program which increases the number of senior housing units by age-restricting one of the two multifamily rental buildings. The specifics of this proposed adjustment are as follows:

McLean Zone 3 Development Program/Project	Current Proposal	Revised Proposal
<b>Total Unit Count</b>	150 Units	150 Units
<b>For-Sale Condominium Townhouses:</b>	40	40
Age -Restricted	40	40
Inclusionary Housing Units	15% @ 80 % AMI 6 units	15% @ 80 % AMI 6 units
<b>Multi-Family Rental Units:</b>	110 2 four story buildings over parking	110 2 four story buildings over parking
Age-Restricted Units	0	53
Non – Age Restricted Units	110	57
Inclusionary Housing Units	25% 20% @ 80% & 5% @ 50% 28 units	25% 20% @ 80% & 5% @ 50% 28 units
<b>Chapel Building Renovation</b>	2 units	2 units

#### TMMA Compliance Analysis:

In consultation with Giles Ham of Vanasse & Associates (Vanasse) Tables 1 & 2 below were prepared to compare prospective vehicle trips to/from Zone 3 for the *current* and *revised* programs against the requirements of the TMMA. Table 2 vehicle trip projections assume the use of public transit at 5% for the Age Restricted/Senior Housing unit population and 10% for the non age-restricted unit population. Exhibit 2 and Appendix 1 provide the detailed calculations and U.S. Census Data supporting these projections. In order for the Town to fully assess our projections we recommend that the Town ask its traffic consultant, BSC, to ratify our analysis, assumptions and projections.

**TABLE 1 – CURRENT PROPOSAL/PROGRAM w/out TRANSIT USE ADJUSTMENT**

**150 Units - 40 AR Townhouse Units and 110 NAR Multi-Family Units**

Table 1 compares the am, pm and daily trip counts for 40 Senior Adult Age-Restricted Housing units (ITE Land Use Code 252) and 110 Multifamily Non-Age Restricted Housing units (ITE Land Use Code 221) based on the 10<sup>th</sup> Edition ITE manual with the permitted TMMA trip limits. The analysis reflects that the proposed Zone 3 development program generates less than the allowed Daily and PM trips and nominally exceeds the allowed AM trips by 12 (trips).

Time Period/Direction	ITE Senior housing (40 units) <sup>a</sup>	Multifamily Housing (110 units) <sup>b</sup>	Total	Traffic Monitoring and Mitigation Agreement (TMMA)	Above (Below)
Average Weekday	148	598	746	1,148	(402)
<i>Weekday Morning Peak Hour</i>					
Entering	3	10	13	36	12
Exiting	5	30	35		
Total	8	40	48		
<i>Weekday Evening Peak Hour</i>					
Entering	6	29	35	92	(34)
Exiting	4	19	23		
Total	10	48	58		

<sup>a</sup>Based on ITE LUC 252, Senior Adult Housing – Attached – 40 units.

<sup>b</sup>Based on ITE LUC 221, Multifamily Housing (MidRise) – 110 units

*Trip Generation*, 10<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2017



**TABLE 2 – REVISED PROPOSAL with BLENDED TRANSIT USE ADJUSTMENT****150 Units - 40 AR Townhouse Units, 53 AR Rental Units and 57 NAR Multi-Family Units**

Table 2 compares the am, pm and daily trip counts for a revised development program of 93 Senior Adult Age-Restricted Housing units (ITE Land Use Code 252) and 57 Multifamily Non-Age Restricted Housing units (ITE Land Use Code 221) with the application of a blended Transit Use Adjustment Factor. The analysis is based on 2013 - 2017 Census Data, which indicates a 15.9% public transportation utilization rate for the resident population of Belmont. VAI's has conservatively projected trip counts to/from site, *assuming* a utilization rate of 5% for senior housing units and 10% for non senior housing units. These assessments assume that due to the site's proximity to public transportation that public transit use will be utilized by the Zone 3 resident population. *As shown in Table 2 below, the revised unit mix combined with the application of a blended transit adjustment complies with the imposed TMMA limits.*

Time Period/Direction	ITE Senior housing	Transit Reduction		ITE Multifamily Housing	Transit Reduction		BLENDED TOTAL	TMMA LIMIT	Above (Below)
	(93 units)	5%	Total	(57 units)	10%	Total			
<i>Average Weekday</i>	348.49	17.42	331.07	308.90	30.89	278.01	609.08	1,148	(538.92)
<i>Weekday Morning Peak Hour</i>									
Entering	6.45	0.32	6.13	5.34	0.53	4.81	10.94		
Exiting	<u>11.97</u>	<u>0.60</u>	<u>11.37</u>	<u>15.18</u>	<u>1.52</u>	<u>13.66</u>	<u>25.03</u>		
Total	18.42	0.92	17.50	20.52	2.05	18.47	35.97	36	(0.03)
<i>Weekday Evening Peak Hour</i>									
Entering	13.27	0.66	12.61	15.3	1.53	13.77	26.38		
Exiting	<u>11.31</u>	<u>0.57</u>	<u>10.74</u>	<u>9.78</u>	<u>0.98</u>	<u>8.80</u>	<u>19.54</u>		
Total	24.58	1.23	23.35	25.08	2.51	22.57	45.92	92	(46.08)

<sup>a</sup>Based on ITE LUC 252, Senior Adult Housing

<sup>b</sup>Based on ITE LUC 221, Multifamily Housing (MidRise)

I believe that the above is responsive to your request. Should you have a question please contact me.

Best Regards,

A handwritten signature in blue ink, appearing to read "J. Dawley".

John C. Dawley  
President & CEO  
Northland Residential Corporation

Cc: Michele Gougeon, Steve Kidder





# Trip Generation Handbook 3rd Edition

SEPTEMBER 2017

INSTITUTE OF TRANSPORTATION ENGINEERS



### 4.3 Basis for Recommended Process

The recommended approach for using information from *Trip Generation Manual* data pages to estimate trip generation for a study site is based on the following statements:

- The value of the independent variable for the study site must be within the range of data included to use the data plot;
- When the data plot has at least 20 data points and a fitted curve equation are provided, the fitted curve equation should be used;
- A fitted curve equation with an  $R^2$  of at least 0.75 is appropriate to use because it indicates the recommended acceptable level of correlation between trips generated by a site and the value measured for an independent variable;
- A weighted average rate is appropriate to use when the weighted standard deviation is less than or equal to 55 percent of the weighted average rate;
- The use of supplemental local data is suggested when the data plot has fewer than six data points; and
- The number of trips determined by either the rate or the equation should be within the cluster of data points (that is, the range of trip values) found at the study site's independent variable value. Otherwise, collecting and using additional local data is suggested.

A detailed step-by-step approach for using *Trip Generation Manual* data is presented in Section 4.4 of this chapter.

### 4.4 Process for Selecting Average Rate or Equation in *Trip Generation Manual* Data

A step-by-step procedure is described below for determining how best to estimate trip generation using data contained in *Trip Generation Manual*. These guidelines are merely tools to help the analyst estimate trip generation. These tools are by design straightforward and uncomplicated. They do not include all considerations that could be relevant to a particular situation. Thus, professional judgment must be applied at all stages in this analysis process. The procedure is also outlined with simplified text in the flow chart in Figure 4.2.

**4.4.1—Step 1:** Determine if the study site is consistent with the description of a land use code in *Trip Generation Manual* and with the described or presumed characteristics of development sites for which data points are provided.

- If the answer is **yes**, proceed to Step 2.
- If the answer is **no**, collect local data for the land use being analyzed and establish a local or consolidated rate. Refer to Chapter 9 for guidance.

**4.4.2—Step 2:** Determine if the size of the study site (in terms of the unit of measurement of the independent variable) is within the range of the data shown in the data plot.

- If the answer is **yes**, proceed to Step 3.
- If the answer is **no**, either (1) consider the use of a different independent variable and its associated data pages, or (2) collect local data and establish a local or consolidated rate. Refer to Chapter 9 for guidance.



Exhibit # 2 - 6 - 2 - 20

TRIP GENERATION

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**SITE TRIP GENERATION**

Time Period/Direction	ITE Senior housing (93 units) <sup>a</sup>	Transit Reduction Trips 5%	Total	ITE Multifamily Housing (57 units) <sup>b</sup>	Transit Reduction Trips 10%	Total	TOTAL	TMMMA
<i>Average Weekday</i>	348.49	17.42	331.07	308.90	30.89	278.01	609.08	1,148
<i>Weekday Morning Peak Hour</i>								
Entering	6.45	0.32	6.13	5.34	0.53	4.81	10.94	
Exiting	<u>11.97</u>	<u>0.60</u>	<u>11.37</u>	<u>15.18</u>	<u>1.52</u>	<u>13.66</u>	<u>25.03</u>	
Total	18.42	0.92	17.50	20.52	2.05	18.47	35.97	36
<i>Weekday Evening Peak Hour</i>								
Entering	13.27	0.66	12.61	15.3	1.53	13.77	26.38	
Exiting	<u>11.31</u>	<u>0.57</u>	<u>10.74</u>	<u>9.78</u>	<u>0.98</u>	<u>8.80</u>	<u>19.54</u>	
Total	24.58	1.23	23.35	25.08	2.51	22.57	45.92	92

<sup>a</sup>Based on ITE LUUC 252, Senior Adult Housing  
<sup>b</sup>Based on ITE LUUC 221, Multifamily Housing (MidRise)

**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 10th Edition**  
**Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise)**

Vehicle Trips Ends vs: Dwelling Units

Ident Variable (X): 57

**R<sup>2</sup>**      **Equation**  
0.77      **AVERAGE WEEKDAY DAILY**  

$$T = 5.45 * (X) - 1.75$$

$$T = 5.45 * 57 - (1.75)$$

$$T = 308.90$$

$$T = 308 \text{ vehicle trips}$$

with 50% ( 154.45 vpd) entering and 50% ( 154.45 vpd) exiting.

**Rate**  
0.67      **WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**  

$$T = 0.36 * (X)$$

$$T = 0.36 * 57$$

$$T = 20.52$$

$$T = 21 \text{ vehicle trips}$$

with 26% ( 5.34 vph) entering and 74% ( 15.18 vph) exiting.

**Rate**  
0.72      **WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**  

$$T = 0.44 * (X)$$

$$T = 0.44 * 57$$

$$T = 25.08$$

$$T = 25 \text{ vehicle trips}$$

with 61% ( 15.30 vph) entering and 39% ( 9.78 vph) exiting.



**Institute of Transportation Engineers (ITE)**

**Trip Generation, 10th Edition**

**Land Use Code (LUC) 252 - Senior Adult Housing - Attached**

Average Vehicle Trips Ends vs: Dwelling Units

Independent Variable (X): 93

<b>R<sup>2</sup></b>	<b><u>Equation</u></b>
<b>0.99</b>	<b>AVERAGE WEEKDAY DAILY</b> $T = 4.02 * (X) - 25.37$ $T = 4.02 * 93 - 25.370$ $T = 348.49$ $T = 348$ vehicle trips with 50% ( 174 vph) entering and 50% ( 174 vph) exiting.
<b>0.98</b>	<b><u>Equation</u></b> <b>WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC</b> $T = 0.20 * (X) - 0.18$ $T = 0.20 * 93 - 0.18$ $T = 18.42$ $T = 18$ vehicle trips with 35% ( 6.45 vph) entering and 65% ( 11.97 vph) exiting.
<b>0.96</b>	<b><u>Equation</u></b> <b>WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC</b> $T = 0.24 * (X) + 2.26$ $T = 0.24 * 93 + 2.26$ $T = 24.58$ $T = 25$ vehicle trips with 54% ( 13.27 vph) entering and 46% ( 11.31 vph) exiting.

June 1, 2020

APPENDIX 1  
US CENSUS  
TRIP GENERATION

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S0801

COMMUTING CHARACTERISTICS BY SEX

2013-2017 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

\*=Assumed 10% Trip Reduction

Subject	Belmont town, Middlesex County, Massachusetts				
	Total		Male		Female
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate
Workers 16 years and over	13,048	+/-380	6,658	+/-316	6,390
MEANS OF TRANSPORTATION TO WORK					
Car, truck, or van	69.3%	+/-2.4	67.9%	+/-3.0	70.8%
Drove alone	61.9%	+/-2.6	60.0%	+/-3.2	63.9%
Carpooled	7.4%	+/-1.2	7.9%	+/-1.7	6.9%
In 2-person carpool	6.7%	+/-1.2	6.6%	+/-1.5	6.7%
In 3-person carpool	0.3%	+/-0.3	0.4%	+/-0.4	0.2%
In 4-or-more person carpool	0.5%	+/-0.4	0.9%	+/-0.8	0.0%
Workers per car, truck, or van	1.06	+/-0.01	1.07	+/-0.02	1.05
Public transportation (excluding taxicab)	15.9%*	+/-1.8	16.1%	+/-2.4	15.6%
Walked	2.4%	+/-0.8	2.4%	+/-1.2	2.4%
Bicycle	1.9%	+/-0.6	2.9%	+/-0.9	0.9%
Taxicab, motorcycle, or other means	1.2%	+/-0.5	1.3%	+/-0.7	1.1%
Worked at home	9.2%	+/-1.4	9.4%	+/-2.0	9.1%
PLACE OF WORK					
Worked in state of residence	99.3%	+/-0.3	99.2%	+/-0.5	99.4%
Worked in county of residence	66.8%	+/-2.5	65.0%	+/-3.0	68.6%
Worked outside county of residence	32.5%	+/-2.5	34.2%	+/-3.1	30.7%
Worked outside state of residence	0.7%	+/-0.3	0.8%	+/-0.5	0.6%
Living in a place	100.0%	+/-0.3	100.0%	+/-0.5	100.0%
Worked in place of residence	18.6%	+/-1.9	17.1%	+/-2.6	20.2%
Worked outside place of residence	81.4%	+/-1.9	82.9%	+/-2.6	79.8%
Not living in a place	0.0%	+/-0.3	0.0%	+/-0.5	0.0%
Living in 12 selected states	100.0%	+/-0.3	100.0%	+/-0.5	100.0%
Worked in minor civil division of residence	18.6%	+/-1.9	17.1%	+/-2.6	20.2%
Worked outside minor civil division of residence	81.4%	+/-1.9	82.9%	+/-2.6	79.8%
Not living in 12 selected states	0.0%	+/-0.3	0.0%	+/-0.5	0.0%
Workers 16 years and over who did not work at home	11,844	+/-376	6,033	+/-341	5,811
TIME LEAVING HOME TO GO TO WORK					