MEMORANDUM

DATE: December 24, 2020

TO: Chris Claussen
Quarry North LLC
379 Concord Road
Sudbury, MA 01776

FROM: Robert J. Michaud, P.E. – Managing Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Cold Brook Crossing – Concord Parcel (By Others)**
North Road, Sudbury, MA

MDM Transportation Consultants, Inc. (MDM) has prepared this memorandum to clarify the buildout of the Concord Parcel (by others) adjacent to the proposed Cold Brook Crossing project on North Road in Sudbury, Massachusetts. The location of the Site relative to adjacent roadways is shown in **Figure 1**. The traffic analysis to date has assumed that the remaining developable land which is within the Town of Concord was intended to consist of 6 additional townhome units; however, the remaining developable land can potentially include no more than 6 single family homes. Present subdivision plan proposes a single lot in Concord pending a final determination of what use, if any, will be made of the land in Concord. This memorandum provides a trip generation comparison (see **Table 1**) between the Cold Crook Crossing project as summarized in the February 2020 Traffic Impact and Access Study (TIAS)[1] and the permitted plan broken down by unit type including the 6 single family homes (by others) on the Concord parcel.

As shown in **Table 1**, when broken down by unit type to include townhomes, apartments, age - restricted units and the maximum of 6 single family homes, the combined property within Sudbury and Concord will result in *lower* trip activity than the highly conservative estimates presented in the February 2020 TIAS. Therefore, the findings of the February TIAS remain valid and no further analysis is required.

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[1]*TIAS, Cold Brook Crossing, North Road, Sudbury, MA,* prepared by MDM, dated February 2020.

TABLE 1
TRIP-GENERATION COMPARISON[1]

Peak Hour/Direction	February 2020 TIAS (274 Units)[2]	Cold Brook Crossing			Concord Parcel	Total	Difference (Δ)
		Townhomes (92 Units)[3]	Apartments (101 Units)[4]	Age Restricted (81 Units)[5]	Single Family (6 Units)[6]		
Weekday Morning Peak Hour:							
Entering	27	10	9	6	1	26	-1
Exiting	84	32	27	10	3	72	-12
Total	111	42	36	16	4	98	-13
Weekday Evening Peak Hour:							
Entering	83	15	27	12	4	58	-25
Exiting	52	37	17	9	2	65	+13
Total	135	52	44	21	6	123	-12
Weekday Daily (24 hours)	1,722	674	550	300	58	1,582	-140

[1]Source: ITE *Trip Generation*, Tenth Edition; 2017.

[2]ITE LUC 220 – Multifamily Housing (Low-Rise) applied to 123 units and ITE LUC 221 – Multifamily Housing (Mid-Rise) applied to 151 units.

[3]ITE LUC 220 – Multifamily Housing (Low-Rise) applied to 92 units.

[4]ITE LUC 221 – Multifamily Housing (Mid-Rise) applied to 101 units.

[5]ITE LUC 252 – Senior Adult Housing – Attached applied to 81 units.

[6]Concord Parcel (By Others): ITE LUC 210 – Single-Family Detached Housing applied to 6 units.

MDM

ATTACHMENTS

☐ Trip Generation

Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 220 - Multifamily Housing (Low-Rise)

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X):   123

AVERAGE WEEKDAY DAILY

T = 7.32 * X
T = 7.32 *   123
T = 900.36
T = 900   vehicle trips
   with 50% (**450** vpd) entering and 50% (**450** vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.46 * X
T = 0.46 *   123
T = 56.58
T = 57   vehicle trips
   with 23% (**13** vph) entering and 77% (**44** vph) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

T = 0.56 * X
T = 0.56 *   0
T = 68.88
T = 69   vehicle trips
   with 28% (**19** vph) entering and 72% (**50** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.56 * X
T = 0.56 *   123
T = 68.88
T = 69   vehicle trips
   with 63% (**43** vph) entering and 37% (**26** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF GENERATOR

T = 0.67 * X
T = 0.67 *   0
T = 82.41
T = 82   vehicle trips
   with 59% (**48** vph) entering and 41% (**34** vph) exiting.

SATURDAY DAILY

T = 8.14 * X
T = 8.14 *   123
T = 1001.22
T = 1,002   vehicle trips
   with 50% (**501** vpd) entering and 50% (**501** vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.70 * X
T = 0.70 *   123
T = 86.10
T = 86   vehicle trips
   with 49% (**42** vph) entering and 51% (**44** vph) exiting.

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

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X):   151

AVERAGE WEEKDAY DAILY

  T = 5.44 * X
  T = 5.44 *   151
  T = 821.44
  T = 822   vehicle trips
     with 50% (**411** vpd) entering and 50% (**411** vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

  T = 0.36 * X
  T = 0.36 *   151
  T = 54.36
  T = 54   vehicle trips
     with 26% (**14** vph) entering and 74% (**40** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

  T = 0.44 * X
  T = 0.44 *   151
  T = 66.44
  T = 66   vehicle trips
     with 61% (**40** vph) entering and 39% (**26** vph) exiting.

SATURDAY DAILY

  T = 4.91 * X
  T = 4.91 *   151
  T = 741.41
  T = 742   vehicle trips
     with 50% (**371** vpd) entering and 50% (**371** vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

  T = 0.44 * X
  T = 0.44 *   151
  T = 66.44
  T = 66   vehicle trips
     with 49% (**32** vph) entering and 51% (**34** vph) exiting.

Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 220 - Multifamily Housing (Low-Rise)

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X):   92

AVERAGE WEEKDAY DAILY

T = 7.32 * X
T = 7.32 *   92
T = 673.44
T = 674   vehicle trips
   with 50% (**337** vpd) entering and 50% (**337** vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.46 * X
T = 0.46 *   92
T = 42.32
T = 42   vehicle trips
   with 23% (**10** vph) entering and 77% (**32** vph) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

T = 0.56 * X
T = 0.56 *   0
T = 51.52
T = 52   vehicle trips
   with 28% (**15** vph) entering and 72% (**37** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.56 * X
T = 0.56 *   92
T = 51.52
T = 52   vehicle trips
   with 63% (**33** vph) entering and 37% (**19** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF GENERATOR

T = 0.67 * X
T = 0.67 *   0
T = 61.64
T = 62   vehicle trips
   with 59% (**37** vph) entering and 41% (**25** vph) exiting.

SATURDAY DAILY

T = 8.14 * X
T = 8.14 *   92
T = 748.88
T = 748   vehicle trips
   with 50% (**374** vpd) entering and 50% (**374** vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.70 * X
T = 0.70 *   92
T = 64.40
T = 64   vehicle trips
   with 49% (**31** vph) entering and 51% (**33** vph) exiting.

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

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X):   101

AVERAGE WEEKDAY DAILY

T = 5.44 * X
T = 5.44 *   101
T = 549.44
T = 550   vehicle trips
   with 50% (**275** vpd) entering and 50% (**275** vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.36 * X
T = 0.36 *   101
T = 36.36
T = 36   vehicle trips
   with 26% (**9**   vph) entering and 74% (**27** vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.44 * X
T = 0.44 *   101
T = 44.44
T = 44   vehicle trips
   with 61% (**27** vph) entering and 39% (**17** vph) exiting.

SATURDAY DAILY

T = 4.91 * X
T = 4.91 *   101
T = 495.91
T = 496   vehicle trips
   with 50% (**248** vpd) entering and 50% (**248** vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.44 * X
T = 0.44 *   101
T = 44.44
T = 44   vehicle trips
   with 49% (**22**   vph) entering and 51% (**22** vph) exiting.

Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 252 - Senior Adult Housing - Attached

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X):   81

AVERAGE WEEKDAY DAILY

T =   3.70*(X)   (Small Sample Size - Use with Caution)
T =   3.70*   81
T =   299.70   vehicle trips
T=   300
       with 50% (150 vpd) entering and 50% (150 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T =   0.2*(X)
T =   0.20*   81
T =   16.00   vehicle trips
T =   16
       with 35% (6   vph) entering and 65%(10   vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T =   0.26*(X)
T =   0.26*   81
T =   21.00
T =   21
       with 55% (12   vph) entering and 45%(9   vph) exiting.

SATURDAY DAILY

   T = 3.23 * (X)   (Small Sample Size - Use with Caution)
   T = 3.23 *   81
   T = 261.63
   T = 262   vehicle trips
      with 50% (131 vpd) entering and 50% (131 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

   T = 0.33 * (X)
   T = 0.33 *   81
   T = 26.73
   T = 27   vehicle trips
      with 62% (17   vph) entering and 38%(10   vph) exiting.

Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 210 - Single-Family Detached Housing

Average Vehicle Trips Ends vs: Dwelling Units

Independent Variable (X):   6

AVERAGE WEEKDAY DAILY

$T = 9.5* (X)$

$T = 9.5*$ 6

$T = 57.00$

$T = 58$ vehicle trips

   with 50% (29 vpd) entering and 50% (29 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.74* (X)$

$T = 0.74 *$ 6

$T = 4.44$

$T = 4$ vehicle trips

   with 25% (1 vph) entering and 75% (3 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.99* (X)$

$T = 0.99*$ 6

$T = 5.94$

$T = 6$ vehicle trips

   with 63% (4 vph) entering and 37% (2 vph) exiting.

SATURDAY DAILY

$T = 9.54* (X)$

$T = 9.54*$ 6

$T = 57.24$

$T = 58$ vehicle trips

   with 50% (29 vph) entering and 50% (29 vph) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$T = 0.93* (X)$

$T = 0.93*$ 6

$T = 5.58$

$T = 6$ vehicle trips

   with 54% (3 vph) entering and 46% (3 vph) exiting.