

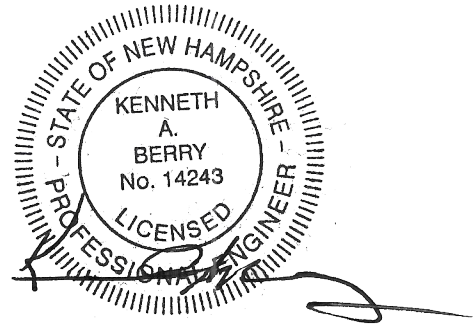
## BERRY SURVEYING & ENGINEERING

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Town of Nottingham Planning Office  
Attention: JoAnna Arendarczyk, Planning Secretary  
139 Stage Road  
P.O. Box 114  
Nottingham, NH 03290

April 9, 2020

RE: Traffic Impact Analysis & Distribution  
Robert L. DiBerto  
Mitchell Road  
Tax Map 242, Lot 1N  
Nottingham, NH 03290



Ms. Arendarczyk,

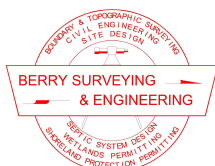
Pursuant to the Town of Nottingham Subdivision Regulations, Berry Surveying & Engineering (BS&E), on behalf of Robert L. DiBerto, has prepared a Standard Traffic Impact Analysis for the development of fourteen residential units on Tax Map 7, Lot 1N. The three points of analysis are the two intersections of Stone Grey Drive and Mitchell Road and a shared driveway and Mitchell Road.

The following conclusions were reached as a result Traffic Impact Analysis:

- A total of 4 vehicle trips (1 enter/3 exit) are predicted to occur at the AM peak hour and 6 vehicle trips (4 enter/2 exit) at the PM peak hour for Stone Grey Drive East.
- A total of 4 vehicle trips (1 enter/3 exit) are predicted to occur at the AM peak hour and 6 vehicle trips (4 enter/2 exit) at the PM peak hour for Stone Grey Drive West.
- A total of 2 vehicle trips (1 enter/1 exit) are predicted to occur at the AM peak hour and 2 vehicle trips (1 enter/1 exit) at the PM peak hour for the shared driveway.
- A total of 10 vehicle trips (3 enter/7 exit) are predicted to occur at the AM peak hour and 14 vehicle trips (9 enter/5 exit) at the PM peak hour for the entire project site.
- It is recommended that two gravel shoulder widenings with drainage swales are proposed to improve the cross section of Mitchell Road and will be able to handle the minimal projected increase in vehicle trips and peak hour and all other hours.

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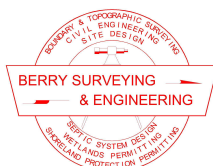
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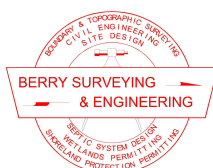
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## *Proposed Development & Introduction*

The proposal is to subdivide Tax Map 7, Lot 1N into fourteen single family lots. Tax Map 7, Lot 1N is proposed to contain the following: Stone Grey Drive, a 2,040 LF loop road from Mitchell Road for access to nine single family lots, Lipizzan Drive, a 664 LF cul-de-sac road accessed via Stone Grey Drive providing access to three single family lots, and a shared driveway on Mitchell Road, providing access to two single family lots. Stone Grey Drive intersections with Mitchell Road will be referred to as Stone Grey Drive East and Stone Grey Drive West. Stone Grey Drive and Lipizzan Drive are proposed to have 25-foot pavement entrance radii for emergency vehicle turning, 10-foot paved travel lanes (20 foot total paved width), and 2 foot gravel shoulders or sloped granite curbing on both sides of the roadway. Several grading and drainage improvements are proposed on Mitchell Road, including a widened gravel shoulder entrance to Stone Grey Drive East and improved roadside drainage swales between Stone Grey Drive West and the shared driveway. Off-street parking will consist of individual driveways, providing adequate parking for house lots. On street parking will be permitted in all locations except for the fire cistern apron on Stone Grey Drive and Lipizzan Drive cul-de-sac. The intersections of Stone Grey Drive and Mitchell Road and the shared driveway with Mitchell Road are the points of analysis. Stone Grey Drive East and West are located 900 feet apart. The shared driveway is located 475 feet to the west of the Stone Grey Drive West and are considered the points of analysis. The purpose of this analysis is to determine the maximum number of trips coming to and leaving Stone Grey Drive during certain peak periods of the day. This information is then used in determining the impact on safety as it relates to the existing roadway infrastructure. The following components of the analysis are typical for a project of this size pursuant to the Institute of Traffic Engineers (ITE) manual.

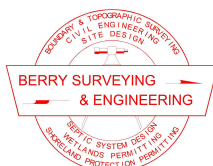
## *Existing Conditions*

### *Existing Site Description*

The existing site consists of Tax Map 7, Lot 1N containing 1,766,568 Sq. Ft. (40.55 Ac.) of land. Tax Map 7, Lot 1N is a vacant lot that is primarily wooded. Tax Map 7, Lot 1N is located in the Residential - Agricultural district. Sutton Street is located 250 feet from the eastern property corner and four residential driveway cuts exist across from the western portion of frontage on Mitchell Road.

### *Mitchell Road and Surrounding Roadway Descriptions*

Mitchell Road is a two-lane gravel local road. This road provides access to Smoke Street/U.S. Route 4/Nottingham to the west and N.H. 125/Lee to the east. It has an Average Annual Daily Traffic (AADT) of approximately 165 (2019) divided between east and west, as shown in the traffic counts performed by Accurate Counts.

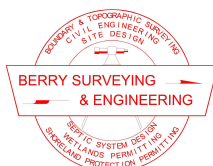


Mitchell Road in the area of the project is composed of a gravel variable width, sixteen to twenty-foot wide gravel surface with. There is no centerline delineation and fog / edge lines provided. The posted speed limit of the roadway is 25 miles per hour (MPH). The geometry of Mitchell Road in the area of Stone Grey Drive East is relatively flat to the west (1.75% +/-), steeper to the east (4.0% +/-) and straight. The geometry of Mitchell Road in the area of Stone Grey Drive West is relatively flat to the east (1.0% +/-), steeper to the west (4.0% +/-) and is located near the apex of a curve. There are no existing sidewalks, crosswalks, or other pedestrian amenities in the area of the project.

### **Smoke Street & Sutton Street.**

Approximately 0.2 miles to the east of the project site is the four-way, partial stop-controlled intersection of Smoke Street and Mitchell Road/Kennard Road. Kennard Road and Smoke Street are low volumes local roads. Kennard Road runs east-west and is a continuation of Mitchell Road to the West. Smoke Street runs north-south and intersects with U.S. Route 4, 0.2 miles to the north. According to traffic counts obtained from Accurate Counts, Smoke Street has an ADT 852 (2019). It is assumed that Kennard Road experiences an ADT equal to or less than Mitchell Road of 165 (2019). Due to the minimal trip generation of the proposed site and the distance from these intersections, there is no anticipated impact on the existing level of service at these intersections.

Approximately 250 feet to the east of the western front property corner of the project site is the three-way, partial stop controlled intersection of Mitchell Road and Sutton Street. Sutton Street is a local cul-de-sac that provides access to ten single family lots. There is no anticipated impact from this development on the intersection of Sutton and Mitchell Road.



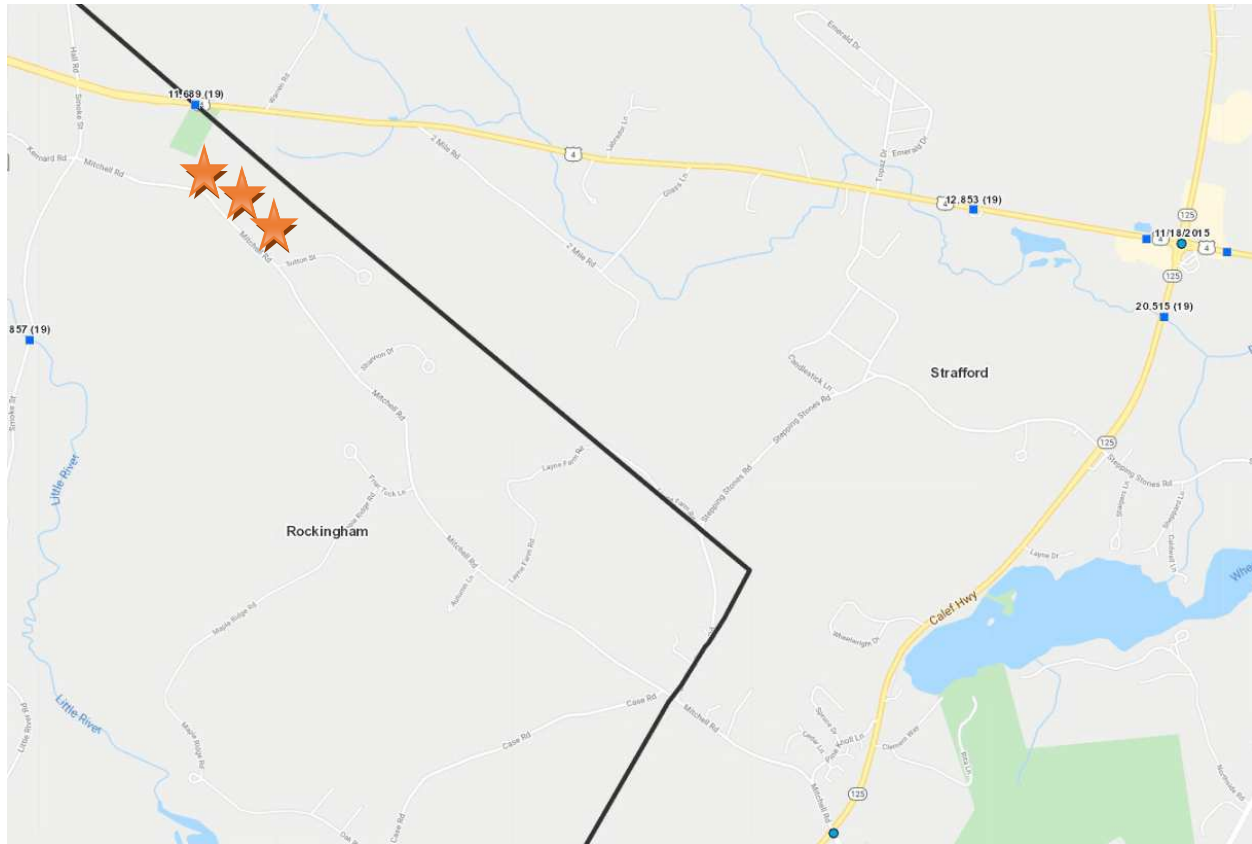
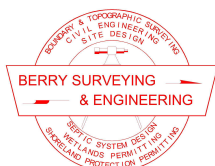


Figure 1: Mitchell Road with surrounding roadways (NHDOT)

### Existing Traffic Volumes

According to traffic counts recorded by Accurate Counts for December 12 - 14, 2020, Mitchell Road experienced weekday AM, PM, and Saturday two-way peaks of 23 trips, 25 trips, and 14 respectively. It was found that Mitchell Road has an AADT of 165 vehicles.

The highest weekday peak hour traffic volume on this section of Mitchell Road eastbound occurred from 8-9 AM with 9 vehicles and from 4-5 PM with 7 vehicles. Westbound highest weekday peak hour traffic volume occurred from 7-8 AM with 17 vehicles and from 4-5 PM with 19 vehicles. Table #1 shows the traffic direction breakdown of Mitchell Road and Figures #1-3 are graphical representations of the traffic variations occurring throughout the day. It can be seen from the directional percent distribution that the primary direction of travel during the AM and PM peak hour is westbound towards Smoke Street and U.S. Route 4. Traffic counts of Mitchell Road are provided in Appendix A as Figure 7.



Traffic Distribution Mitchell Road						
Date	Eastbound		Westbound		Two-Way	
Thursday 12/12/2019	AM Peak	9	AM Peak	17	AM Peak	23
	PM Peak	6	PM Peak	19	PM Peak	25
Friday 12/13/2019	AM Peak	6	AM Peak	16	AM Peak	22
	PM Peak	7	PM Peak	8	PM Peak	15
Average Peak Hour Traffic	AM Peak	7.5	AM Peak	16.5	AM Peak	22.5
	PM Peak	6.5	PM Peak	13.5	PM Peak	20.0
% Distribution	AM Peak	31.3	AM Peak	68.8		
	PM Peak	32.5	PM Peak	67.5		
Saturday 12/13/2019	Peak	6	Peak	8	Peak	14
% Distribution	Peak	42.9	Peak	57.1		

Table 1: Directional breakdown of trips occurring on Mitchell Road

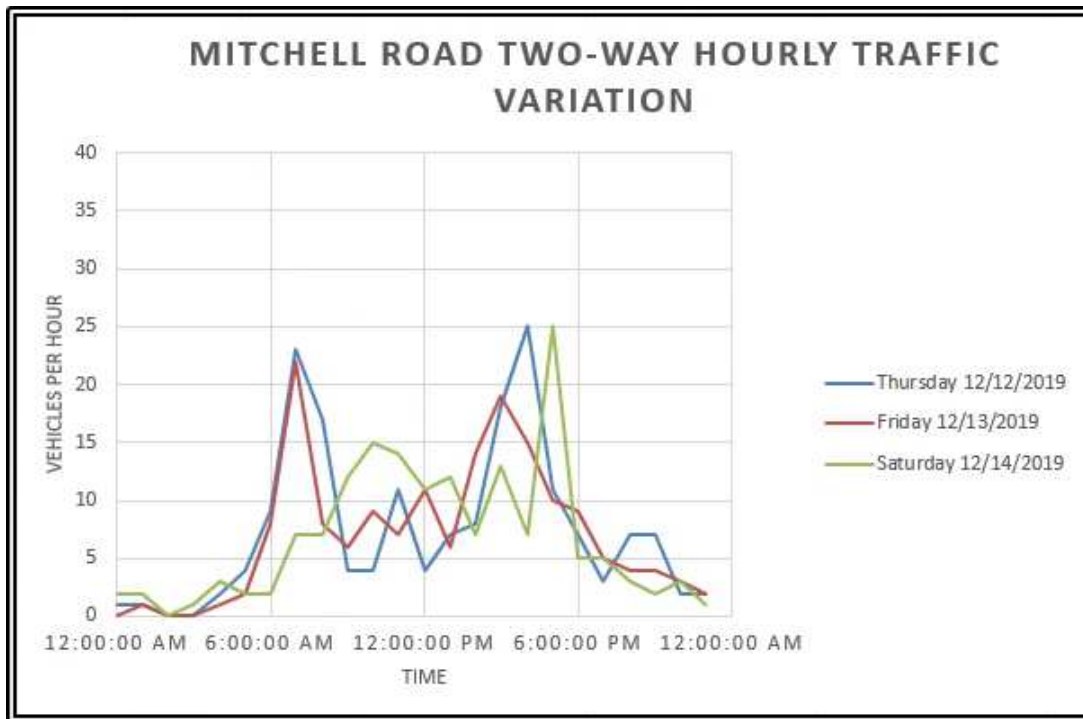
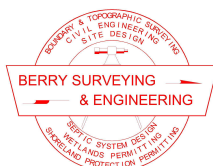


Figure 2: Graph of Mitchell Road two-way hourly traffic variation





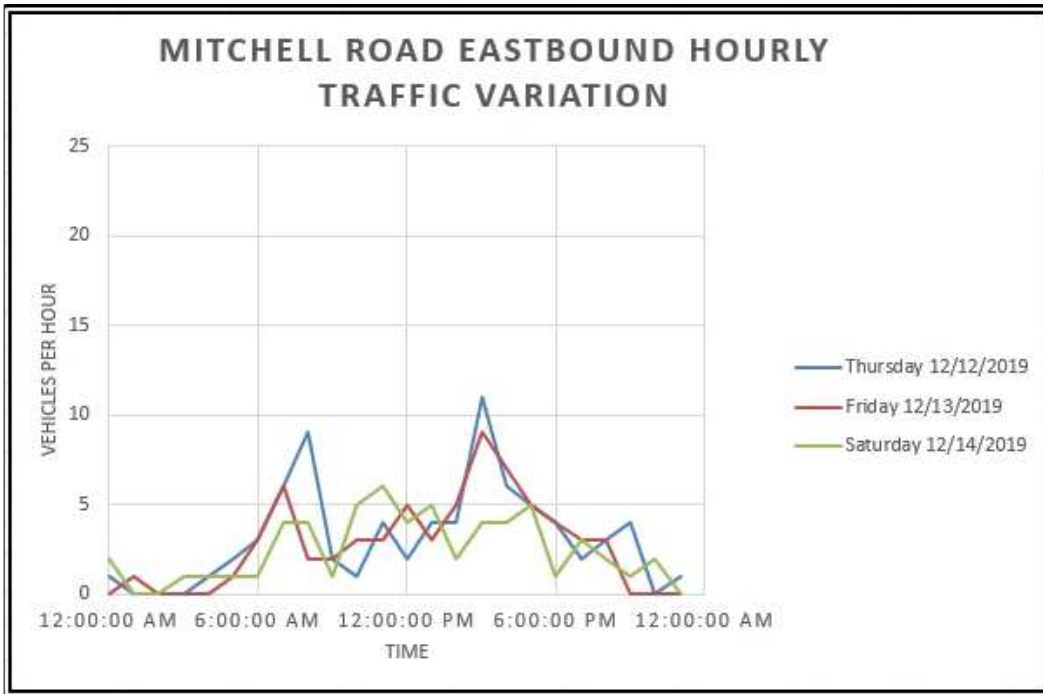


Figure 3: Graph of Mitchell Road eastbound hourly traffic variation

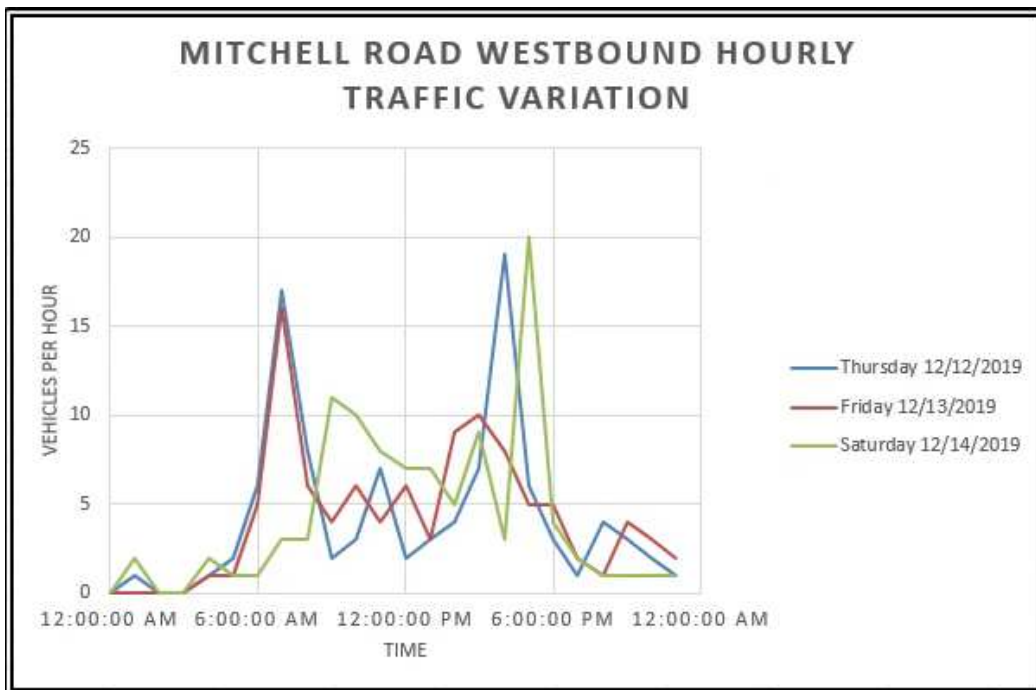
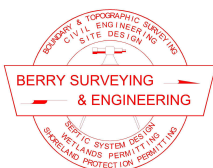


Figure 4: Graph of Mitchell Road westbound hourly traffic variation



### Existing Vehicle Speeds

As previously mentioned, the posted speed limit of Mitchell Road is 25 MPH. For the purposes of the safety analysis, the 85<sup>th</sup> percentile of speed is required. This section of Mitchell Road was measured by Accurate Counts to analyze the pass by traffic, reviewing speed. Excessive speeds were rare, and most operators obeyed the posted speed limits within a deviation of 4 MPH. The 85<sup>th</sup> percentile derived by measurement was found to be 26 MPH. Mitchell Road experienced 50<sup>th</sup> percentile speeds of 22 MPH 95<sup>th</sup> percentile speed of 29 MPH. Collected Mitchell Road vehicle speeds can be found in Appendix B as Figures #8-11.

### Proposed Trip Generation

The 10<sup>th</sup> Edition ITE Trip Generation Manual was used to determine the proposed volume of trips, as well as the percentage of entrance-to-exit traffic experienced at the AM & PM peak hours between 7 and 9 AM and 4 and 6 PM, and the weekday total volume. Single Family Detached Housing (210) was used in deriving the proposed trip generation for the Stone Grey Drive and the shared driveway. Tables 2-4 provide average trip rate, total trips generated, enter to exit ratio, and the enter to exit distribution for Stone Grey Drive East, Stone Grey Drive West, and the shared driveway. Table 5 shows the combined proposed trip generation. As the use of the site will be single family residences, the primary vehicle trips generated will be two axel cars and trucks. A single-family lot was assigned either Stone Grey Drive East or West based on proximity to intersection.

#### **Single Family Detached Housing Trip Generation Stone Grey Drive East:**

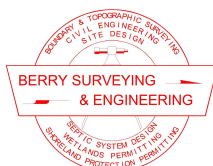
Time Method	Weekday Total (Page 2)			Time Method	AM Peak Adj. Street (Page 3)			Time Method	PM Peak Adj. Street (Page 4)		
	Dwelling Units				Dwelling Units				Dwelling Units		
# Units	6			# Units	6			# Units	6		
Avg. Rate	9.44			Avg. Rate	0.74			Avg. Rate	0.99		
Total Trips	56.6			Total Trips	4.4			Total Trips	5.9		
% Enter	50.0	Total Enter	28.3	% Enter	25.0	Total Enter	1.1	% Enter	63.0	Total Enter	3.7
% Exit	50.0	Total Exit	28.3	% Exit	75.0	Total Exit	3.3	% Exit	37.0	Total Exit	2.2

**Table 2: (Single Family Detached) Peak hour of adjacent street traffic weekdays AM, PM, Saturday & weekday total**

#### **Single Family Detached Housing Trip Generation Stone Grey Drive West:**

Time Method	Weekday Total (Page 2)			Time Method	AM Peak Adj. Street (Page 3)			Time Method	PM Peak Adj. Street (Page 4)		
	Dwelling Units				Dwelling Units				Dwelling Units		
# Units	6			# Units	6			# Units	6		
Avg. Rate	9.44			Avg. Rate	0.74			Avg. Rate	0.99		
Total Trips	56.6			Total Trips	4.4			Total Trips	5.9		
% Enter	50.0	Total Enter	28.3	% Enter	25.0	Total Enter	1.1	% Enter	63.0	Total Enter	3.7
% Exit	50.0	Total Exit	28.3	% Exit	75.0	Total Exit	3.3	% Exit	37.0	Total Exit	2.2

**Table 3: (Single Family Detached) Peak hour of adjacent street traffic weekdays AM, PM, Saturday & weekday total**



**Single Family Detached Housing Trip Generation Shared Driveway:**

Time Method	Weekday Total (Page 2) Dwelling Units			Time Method	AM Peak Adj. Street (Page 3) Dwelling Units			Time Method	PM Peak Adj. Street (Page 4) Dwelling Units		
# Units	2			# Units	2			# Units	2		
Avg. Rate	9.44			Avg. Rate	0.74			Avg. Rate	0.99		
Total Trips	18.9			Total Trips	1.5			Total Trips	2.0		
% Enter	50.0	Total Enter	9.4	% Enter	25.0	Total Enter	0.4	% Enter	63.0	Total Enter	1.2
% Exit	50.0	Total Exit	9.4	% Exit	75.0	Total Exit	1.1	% Exit	37.0	Total Exit	0.7

**Table 4: (Single Family Detached) Peak hour of adjacent street traffic weekdays AM, PM, Saturday & weekday total**

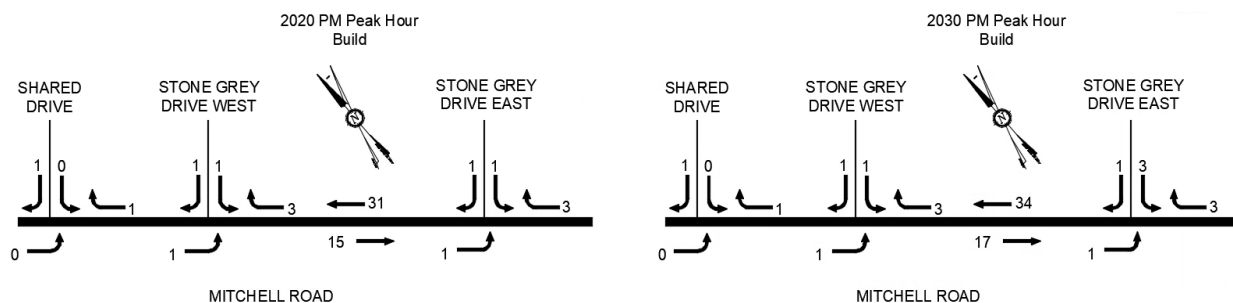
**Total Proposed Trip Generation Stone Grey Drive and Shared Driveway**

Time Method	Weekday Total (Page 2) Dwelling Units			Time Method	AM Peak Adj. Street (Page 3) Dwelling Units			Time Method	PM Peak Adj. Street (Page 4) Dwelling Units		
Total Trips	132.2			Total Trips	10.4			Total Trips	13.9		
% Enter	50.0	Total Enter	66.1	% Enter	25.0	Total Enter	2.6	% Enter	63.0	Total Enter	8.7
% Exit	50.0	Total Exit	66.1	% Exit	75.0	Total Exit	7.8	% Exit	37.0	Total Exit	5.1

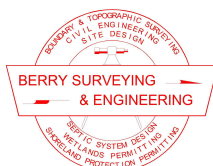
**Table 5: Total combined trip generation Stone Grey Drive and Shared Driveway**

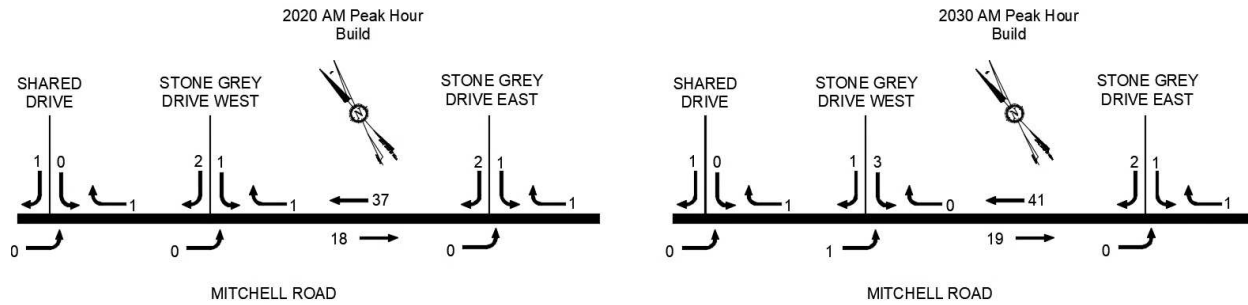
***Build Traffic Projections and Turning Analysis***

Traffic data obtained from Accurate Counts in December 2019 has been projected to 2020 and ten years further to 2030. This has been done using a December peak seasonal adjustment factor of 2.17 (AM & PM) and using an annual growth rate of 1%, compounded annually. The derivation of the peak seasonal adjustment factor comes from an average series of values from other scenic highways from across New Hampshire, which can be found as Table 14 in Appendix D. Figures 5 and 6 show the build turning movements to and from Stone Grey Drive East, Stone Grey Drive West and a shared driveway during AM and PM peak hours. This data is used to provide a visualization of trips project to occur to and from the project site.



**Figure 5: 2020 build projected traffic volumes and turning movements Stone Grey Drive and Shared DW**





**Figure 6: 2020 build projected traffic volumes and turning movements Stone Grey Drive and Shared DW**

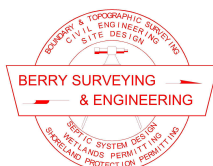
Tables 6-11 show in a tabular format the total trips that are calculated to occur to and from Stone Grey Drive East, Stone Grey Drive West, and the shared driveway are shown at AM and PM weekday peak hours in a build situation. These trips are further broken down into enter and exit to and from the site as well as percentage of left and right turns. Tables 12 and 13 show total directional breakdown of trips generated by the site.

Time	AM Peak Hour Stone Grey Drive East	# Trips	Turn Type	% Distribution
<b>Total Trips</b>	<b>4.4</b>			
Trips Enter from Mitchell Road Eastbound		0.3	Left	7.8
Trips Enter from Mitchell Road Westbound		0.8	Right	17.2
Trips Exit to Mitchell Road Eastbound		1.0	Left	23.4
Trips Exit to Mitchell Road Westbound		2.3	Right	51.6

**Table 6: Summary of AM build turning movements to and from Stone Grey Drive East**

Time	PM Peak Hour Stone Grey Drive East	# Trips	Turn Type	% Distribution
<b>Total Trips</b>	<b>5.9</b>			
Trips Enter from Mitchell Road Eastbound		1.2	Left	20.5
Trips Enter from Mitchell Road Westbound		2.5	Right	42.5
Trips Exit to Mitchell Road Eastbound		0.7	Left	12.0
Trips Exit to Mitchell Road Westbound		1.5	Right	25.0

**Table 7: Summary of PM build turning movements to and from Stone Grey Drive East**



Time	AM Peak Hour Stone Grey Drive West	# Trips	Turn Type	% Distribution
Total Trips	4.4			
	Trips Enter from Mitchell Road Eastbound	0.3	Left	7.8
	Trips Enter from Mitchell Road Westbound	0.8	Right	17.2
	Trips Exit to Mitchell Road Eastbound	1.0	Left	23.4
	Trips Exit to Mitchell Road Westbound	2.3	Right	51.6

Table 8: Summary of AM build turning movements to and from Stone Grey Drive West

Time	PM Peak Hour Stone Grey Drive West	# Trips	Turn Type	% Distribution
Total Trips	5.9			
	Trips Enter from Mitchell Road Eastbound	1.2	Left	20.5
	Trips Enter from Mitchell Road Westbound	2.5	Right	42.5
	Trips Exit to Mitchell Road Eastbound	0.7	Left	12.0
	Trips Exit to Mitchell Road Westbound	1.5	Right	25.0

Table 9: Summary of PM build turning movements to and from Stone Grey Drive West

Time	AM Peak Hour Shared DW	# Trips	Turn Type	% Distribution
Total Trips	1.5			
	Trips Enter from Mitchell Road Eastbound	0.1	Left	7.8
	Trips Enter from Mitchell Road Westbound	0.3	Right	17.2
	Trips Exit to Mitchell Road Eastbound	0.3	Left	23.4
	Trips Exit to Mitchell Road Westbound	0.8	Right	51.6

Table 10: Summary of AM build turning movements to and from shared driveway

Time	PM Peak Hour Shared DW	# Trips	Turn Type	% Distribution
Total Trips	2.0			
	Trips Enter from Mitchell Road Eastbound	0.4	Left	20.5
	Trips Enter from Mitchell Road Westbound	0.8	Right	42.5
	Trips Exit to Mitchell Road Eastbound	0.2	Left	12.0
	Trips Exit to Mitchell Road Westbound	0.5	Right	25.0

Table 11: Summary of PM build turning movements to and from shared driveway



Time	AM Peak Hour Total Generation	# Trips	Turn Type	% Distribution
Total Trips	10.4			
Trips Enter from Mitchell Road Eastbound		0.8	Left	7.8
Trips Enter from Mitchell Road Westbound		1.8	Right	17.2
Trips Exit to Mitchell Road Eastbound		2.4	Left	23.4
Trips Exit to Mitchell Road Westbound		5.3	Right	51.6

Table 12: Summary of total AM build turning movements

Time	PM Peak Hour Total Generation	# Trips	Turn Type	% Distribution
Total Trips	13.9			
Trips Enter from Mitchell Road Eastbound		2.8	Left	20.5
Trips Enter from Mitchell Road Westbound		5.9	Right	42.5
Trips Exit to Mitchell Road Eastbound		1.7	Left	12.0
Trips Exit to Mitchell Road Westbound		3.5	Right	25.0

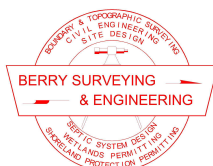
Table 13: Summary of total PM build turning movements

### *Sight Distance and Safety Analysis*

Sight distance on Stone Grey Drive East and Stone Grey Drive West to the east and west, as well as roadway alignment are the two determining factors of safety. For a conservative measurement of sight distance, an 85<sup>th</sup> percentile speed of 35 MPH will be used instead of the measured 85<sup>th</sup> percentile speed of 26 MPH for Mitchell Road. For Stone Grey Drive East, sight distance to the east un-obstructed for well over 250 feet (measured), while sight distance to the west is un-obstructed for well over 250 feet (measured). Using Exhibit 3-1 (Stopping Sight Distance) (Figure 14) in the Geometric Design Manual, and a 35 mph 85<sup>th</sup> percentile speed, requires a stopping sight distance of 250 feet for eastbound and westbound traffic. To the east of Stone Grey Drive, a six foot, widened gravel shoulder on the north side of Mitchell Road is proposed for right turns entering the site. The regrading associated with this gravel shoulder allow for adequate sight distance to the east.

For Stone Grey Drive West, sight distance to the east un-obstructed for well over 250 feet (measured), while sight distance to the west is un-obstructed for well over 250 feet (measured). Using Exhibit 3-1 (Stopping Sight Distance) (Figure 14) in the Geometric Design Manual, and a 35 mph 85<sup>th</sup> percentile speed, requires a stopping sight distance of 250 feet for eastbound and westbound traffic. There are no improvements required to obtain this sight distance.

With respect to general safety of Mitchell Road in relation to the peak hour trip generation and AADT, it is our assessment that the cross section of Mitchell Road and shoulder widths require two improvements. The first improvement is the previously mentioned, six foot widened gravel shoulder on the north side of Mitchell Road to the east of Stone Grey Drive. The second



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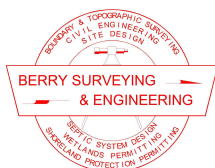
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Traffic Impact Analysis

April 9, 2020

improvement is an expanded two-foot gravel shoulder, on the north side of Mitchell Road to the west of Stone Grey Drive West. This gravel shoulder and associated drainage swale will improve the drainage conditions of Mitchell Road and help to reduce ponding water.

\*AASHTO Geometric Design of Highways and Streets 7<sup>th</sup> Edition (2018)



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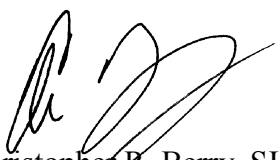
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## *Conclusions and Recommendations*

- 1.) A total of 4 vehicle trips (1 enter/3 exit) are predicted to occur at the AM peak hour and 6 vehicle trips (4 enter/2 exit) at the PM peak hour for Stone Grey Drive East.
- 2.) A total of 4 vehicle trips (1 enter/3 exit) are predicted to occur at the AM peak hour and 6 vehicle trips (4 enter/2 exit) at the PM peak hour for Stone Grey Drive West.
- 3.) A total of 2 vehicle trips (1 enter/1 exit) are predicted to occur at the AM peak hour and 2 vehicle trips (1 enter/1 exit) at the PM peak hour for the shared driveway.
- 4.) A total of 10 vehicle trips (3 enter/7 exit) are predicted to occur at the AM peak hour and 14 vehicle trips (9 enter/5 exit) at the PM peak hour for the entire project site.
- 5.) It is recommended that two gravel shoulder widenings with drainage swales are proposed to improve the cross section of Mitchell Road and will be able to handle the minimal projected increase in vehicle trips and peak hour and all other hours.

Respectfully Submitted,

**BERRY SURVEYING & ENGINEERING**

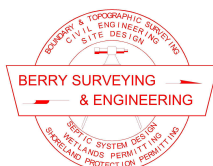


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CPSWQ, CPESC, CESSWI  
Principal, VP-Technical Operations



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# Appendix A

## Traffic Counts

Accurate Counts  
 978-664-2565

Page 1

Location : Mitchell Road  
 Location : East of Smoke Street  
 City/State: Nottingham, NH

1849VOLI

Start Time	12/9/2019		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	*	*	*	*	1	0	0	0	2	0	*	*	1	0
01:00	*	*	*	*	*	*	0	1	1	0	0	2	*	*	0	1
02:00	*	*	*	*	*	*	0	0	0	0	0	0	*	*	0	0
03:00	*	*	*	*	*	*	0	0	0	0	1	0	*	*	0	0
04:00	*	*	*	*	*	*	1	1	1	1	2	*	*	*	1	1
05:00	*	*	*	*	*	*	2	2	1	1	1	1	*	*	1	1
06:00	*	*	*	*	*	*	3	6	3	5	1	1	*	*	2	4
07:00	*	*	*	*	*	*	6	17	6	16	4	3	*	*	5	12
08:00	*	*	*	*	*	*	9	8	2	6	4	3	*	*	5	6
09:00	*	*	*	*	*	*	2	2	2	4	1	11	*	*	2	6
10:00	*	*	*	*	*	*	1	3	3	6	5	10	*	*	3	6
11:00	*	*	*	*	*	*	4	7	3	4	6	8	*	*	4	6
12:00 PM	*	*	*	*	*	*	2	2	5	6	4	7	*	*	4	5
01:00	*	*	*	*	*	*	4	3	3	3	5	7	*	*	4	4
02:00	*	*	*	*	*	*	4	4	5	9	2	5	*	*	4	6
03:00	*	*	*	*	*	*	11	7	9	10	4	9	*	*	8	9
04:00	*	*	*	*	*	*	6	19	7	8	4	3	*	*	6	10
05:00	*	*	*	*	*	*	5	6	5	5	5	10	*	*	5	7
06:00	*	*	*	*	*	*	4	3	4	5	1	4	*	*	3	4
07:00	*	*	*	*	*	*	2	1	3	2	3	2	*	*	3	2
08:00	*	*	*	*	*	*	3	4	3	1	2	1	*	*	3	2
09:00	*	*	*	*	*	*	4	3	0	4	1	1	*	*	2	3
10:00	*	*	*	*	*	*	0	2	0	3	2	1	*	*	1	2
11:00	*	*	*	*	*	*	1	1	0	2	0	1	*	*	0	1
Lane Day	0	0	0	0	0	0	75	102	65	101	59	92	0	0	67	98
AM Peak Vol.	-	-	-	-	-	-	9	17	6	16	6	11	-	-	5	12
PM Peak Vol.	-	-	-	-	-	-	15	18	15	15	13	17	-	-	15	16
Comb. Total	0	0	0	0	0	0	177	102	166	101	151	92	0	0	165	98
ADT	ADT 165		ADT 165													

Figure 7: Mitchell Road Traffic Count Summary



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Accurate Counts  
 978-664-2565

Page 1

Location : Smoke Street  
 Location : North of Mitchell Road  
 City/State: Nottingham, NH

1849VOL2

Start Time	12/9/2019		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
12:00 AM	*	*	*	*	*	*	2	1	1	3	5	8	*	*	3	4
01:00	*	*	*	*	*	*	2	2	3	1	0	2	*	*	2	2
02:00	*	*	*	*	*	*	0	1	0	0	0	3	*	*	0	1
03:00	*	*	*	*	*	*	3	3	4	1	2	1	*	*	3	2
04:00	*	*	*	*	*	*	5	3	4	3	1	4	*	*	3	3
05:00	*	*	*	*	*	*	14	8	11	7	2	3	*	*	9	6
06:00	*	*	*	*	*	*	20	25	19	20	2	5	*	*	14	17
07:00	*	*	*	*	*	*	29	57	30	56	6	10	*	*	22	41
08:00	*	*	*	*	*	*	32	33	25	39	16	21	*	*	24	31
09:00	*	*	*	*	*	*	24	14	17	17	16	28	*	*	19	20
10:00	*	*	*	*	*	*	15	26	23	26	26	28	*	*	21	27
11:00	*	*	*	*	*	*	24	28	24	26	29	34	*	*	26	29
12:00 PM	*	*	*	*	*	*	24	25	29	26	35	24	*	*	29	25
01:00	*	*	*	*	*	*	28	30	22	23	20	31	*	*	23	28
02:00	*	*	*	*	*	*	32	26	23	36	23	37	*	*	26	33
03:00	*	*	*	*	*	*	38	36	38	41	26	36	*	*	34	38
04:00	*	*	*	*	*	*	45	51	31	48	28	31	*	*	35	43
05:00	*	*	*	*	*	*	25	40	30	44	14	30	*	*	23	38
06:00	*	*	*	*	*	*	21	35	23	27	16	24	*	*	20	29
07:00	*	*	*	*	*	*	18	22	12	24	8	15	*	*	13	20
08:00	*	*	*	*	*	*	11	16	15	19	8	6	*	*	11	14
09:00	*	*	*	*	*	*	8	10	4	11	13	12	*	*	8	11
10:00	*	*	*	*	*	*	5	10	5	3	7	13	*	*	6	9
11:00	*	*	*	*	*	*	7	7	2	3	4	3	*	*	4	4
Lane Day	0	0	0	0	0	0	432	509	395	504	307	409	0	0	378	475
AM Peak Vol.	-	-	-	-	-	-	32	57	30	56	29	34	-	-	26	41
PM Peak Vol.	-	-	-	-	-	-	16:00	16:00	15:00	16:00	12:00	14:00	-	-	16:00	16:00
Vol.	-	-	-	-	-	-	45	51	38	48	35	37	-	-	35	43

Comb. Total	0	0	0	0	941	899	716	0	853
ADT	ADT 852	AADT 852							

Figure 8: Smoke Street Traffic Count Summary



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# Appendix B

## Vehicle Speeds

Accurate Counts  
978-664-2565

Page 7

Location : Mitchell Road  
 Location : East of Smoke Street  
 City/State: Nottingham, NH

1849SPD1

**EB, WB**

Start Time	1	4	7	10	13	16	19	22	25	28	31	34	37	40	Total
Time	3	6	9	12	15	18	21	24	27	30	33	36	39	999	
12/12/19	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2
05:00	0	0	0	0	0	0	1	0	1	2	0	0	0	0	4
06:00	0	0	0	0	0	3	1	3	2	0	0	0	0	0	9
07:00	0	0	0	0	3	2	3	4	10	1	0	0	0	0	23
08:00	0	0	0	1	1	0	4	5	4	1	0	0	0	1	17
09:00	0	0	0	0	0	0	0	0	1	3	0	0	0	0	4
10:00	0	0	0	0	1	0	0	1	1	0	1	0	0	0	4
11:00	0	0	0	0	0	1	2	3	3	1	1	0	0	0	11
12 PM	0	0	0	0	0	1	1	0	1	1	0	0	0	0	4
13:00	0	0	0	0	1	1	2	1	1	1	0	0	0	0	7
14:00	0	0	0	0	1	1	3	2	1	0	0	0	0	0	8
15:00	0	0	0	0	2	3	6	3	4	0	0	0	0	0	18
16:00	0	0	0	0	1	2	8	3	5	4	2	0	0	0	25
17:00	0	0	0	0	1	1	1	7	0	0	1	0	0	0	11
18:00	0	0	0	0	0	1	2	1	3	0	0	0	0	0	7
19:00	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3
20:00	0	0	0	0	0	0	1	1	4	1	0	0	0	0	7
21:00	0	0	0	0	0	0	1	3	3	0	0	0	0	0	7
22:00	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
23:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>12</b>	<b>18</b>	<b>39</b>	<b>40</b>	<b>45</b>	<b>15</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>177</b>

Daily	15th Percentile :	17 MPH
	50th Percentile :	22 MPH
	85th Percentile :	26 MPH
	95th Percentile :	29 MPH
	Mean Speed(Average) :	23 MPH
	10 MPH Pace Speed :	18-27 MPH
	Number in Pace :	130
	Percent in Pace :	73.4%
	Number of Vehicles > 25 MPH :	52
	Percent of Vehicles > 25 MPH :	29.4%

**Figure 9: Mitchell Road Vehicle Speed Summary Thursday December 12, 2019**



Accurate Counts  
 978-664-2565

Page 8

Location : Mitchell Road  
 Location : East of Smoke Street  
 City/State: Nottingham, NH

1849SPD1

Start Time	1	4	7	10	13	16	19	22	25	28	31	34	37	40	Total
12/13/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
05:00	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2
06:00	0	0	0	1	1	2	2	2	2	0	0	0	0	0	8
07:00	0	0	1	0	2	1	4	4	7	3	0	0	0	0	22
08:00	0	0	0	0	0	1	2	2	1	2	0	0	0	0	8
09:00	0	0	0	0	0	0	2	1	2	1	0	0	0	0	6
10:00	0	0	1	0	0	2	0	2	2	2	0	0	0	0	9
11:00	0	0	0	0	0	0	1	1	4	1	0	0	0	0	7
12 PM	0	0	0	1	0	0	2	5	2	1	0	0	0	0	11
13:00	0	0	1	1	0	0	3	1	0	0	0	0	0	0	6
14:00	0	0	0	0	0	0	4	4	6	0	0	0	0	0	14
15:00	0	0	0	0	1	2	6	5	2	2	0	0	0	1	19
16:00	0	0	0	0	1	1	1	8	2	1	1	0	0	0	15
17:00	0	0	0	0	0	0	2	2	2	3	0	0	1	0	10
18:00	0	0	0	0	0	0	2	3	2	2	0	0	0	0	9
19:00	0	0	0	0	0	2	1	2	0	0	0	0	0	0	5
20:00	0	0	0	0	0	2	1	1	0	0	0	0	0	0	4
21:00	0	0	0	0	1	3	0	0	0	0	0	0	0	0	4
22:00	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3
23:00	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	3	5	8	16	33	44	34	20	1	0	1	1	166

Daily  
 15th Percentile : 16 MPH  
 50th Percentile : 22 MPH  
 85th Percentile : 26 MPH  
 95th Percentile : 29 MPH  
 Mean Speed(Average) : 22 MPH  
 10 MPH Pace Speed : 19-28 MPH  
 Number in Pace : 118  
 Percent in Pace : 71.1%  
 Number of Vehicles > 25 MPH : 46  
 Percent of Vehicles > 25 MPH : 27.5%

Figure 10: Mitchell Road Vehicle Speed Summary Friday December 13, 2019



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Accurate Counts  
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Page 9

Location : Mitchell Road  
 Location : East of Smoke Street  
 City/State: Nottingham, NH

1849SPD1

EB, WB

Start Time	1	4	7	10	13	16	19	22	25	28	31	34	37	40	Total
12/14/19	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
01:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	0	1	1	0	0	0	0	0	1	0	0	3
05:00	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2
06:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
07:00	0	0	0	0	0	1	1	4	0	0	1	0	0	0	7
08:00	0	0	0	0	0	1	2	2	1	1	0	0	0	0	7
09:00	0	0	0	0	0	2	1	4	4	1	0	0	0	0	12
10:00	0	0	0	0	1	6	5	1	2	0	0	0	0	0	15
11:00	0	0	0	0	1	2	4	5	0	1	1	0	0	0	14
12 PM	0	0	0	0	0	0	3	4	3	0	1	0	0	0	11
13:00	0	0	0	1	0	3	3	3	2	0	0	0	0	0	12
14:00	0	0	0	0	0	0	0	2	4	1	0	0	0	0	7
15:00	0	0	0	0	0	1	1	5	4	2	0	0	0	0	13
16:00	0	0	0	0	1	1	1	2	2	0	0	0	0	0	7
17:00	0	0	0	0	1	3	4	3	4	0	0	0	0	0	15
18:00	0	0	0	0	0	0	2	2	1	0	0	0	0	0	5
19:00	0	0	0	0	0	3	1	1	0	0	0	0	0	0	5
20:00	0	0	0	0	0	0	1	1	0	0	1	0	0	0	3
21:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
22:00	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3
23:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>24</b>	<b>32</b>	<b>45</b>	<b>29</b>	<b>9</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>151</b>

Daily  
 15th Percentile : 16 MPH  
 50th Percentile : 21 MPH  
 85th Percentile : 26 MPH  
 95th Percentile : 29 MPH  
 Mean Speed(Average) : 22 MPH  
 10 MPH Pace Speed : 18-27 MPH  
 Number in Pace : 114  
 Percent in Pace : 75.5%  
 Number of Vehicles > 25 MPH : 33  
 Percent of Vehicles > 25 MPH : 22.1%

Grand Total	0	0	3	9	24	58	104	129	108	44	12	0	1	2	494
-------------	---	---	---	---	----	----	-----	-----	-----	----	----	---	---	---	-----

Overall  
 15th Percentile : 16 MPH  
 50th Percentile : 22 MPH  
 85th Percentile : 26 MPH  
 95th Percentile : 29 MPH  
 Mean Speed(Average) : 22 MPH  
 10 MPH Pace Speed : 18-27 MPH  
 Number in Pace : 360  
 Percent in Pace : 72.9%  
 Number of Vehicles > 25 MPH : 131  
 Percent of Vehicles > 25 MPH : 26.5%

Figure 11: Mitchell Road Vehicle Speed Summary Saturday December 14, 2019



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## Appendix C

### Trip Generation Derivation

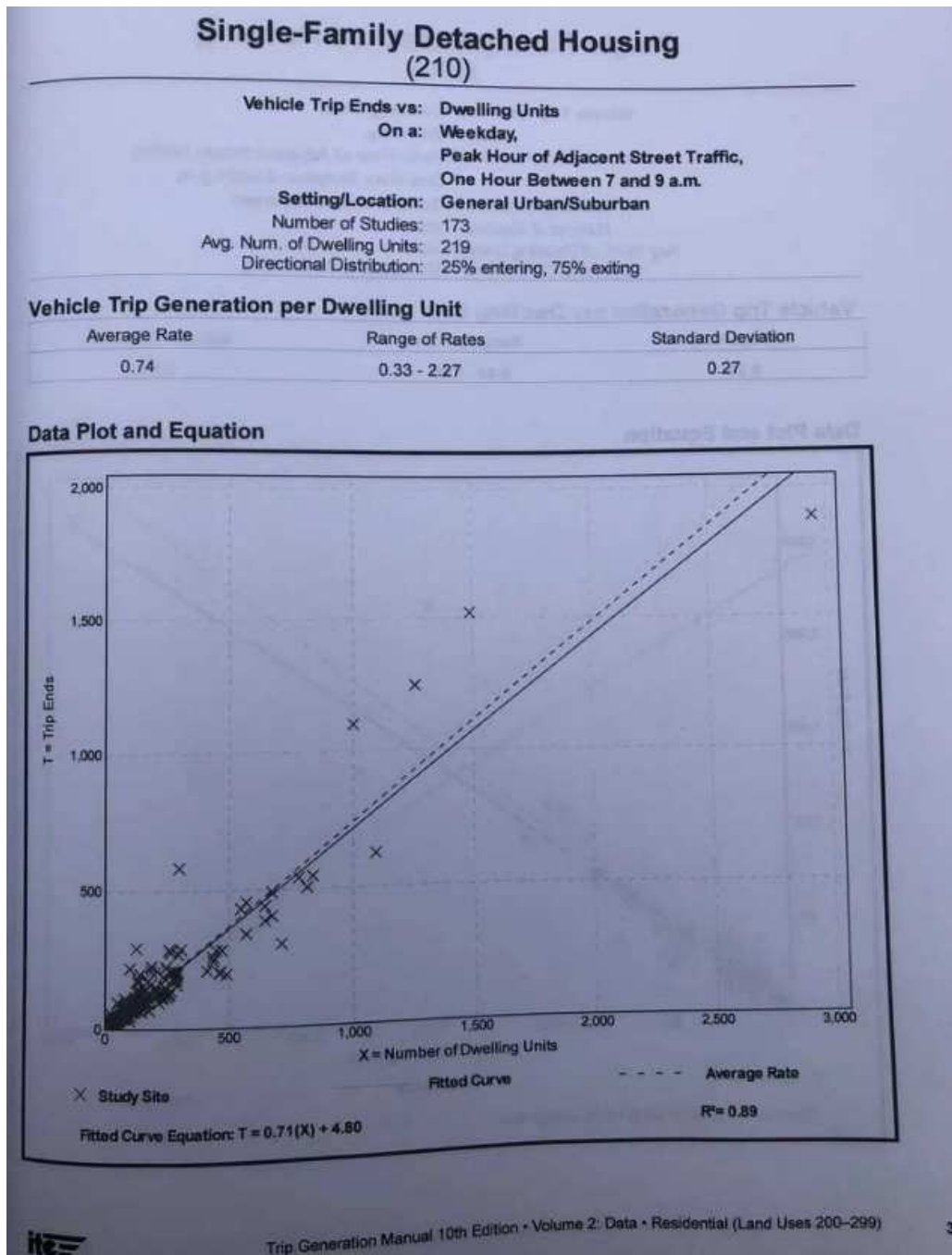
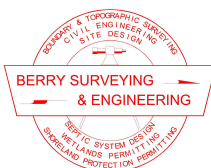


Figure 12: ITE Trip Generation, 10<sup>th</sup> Edition



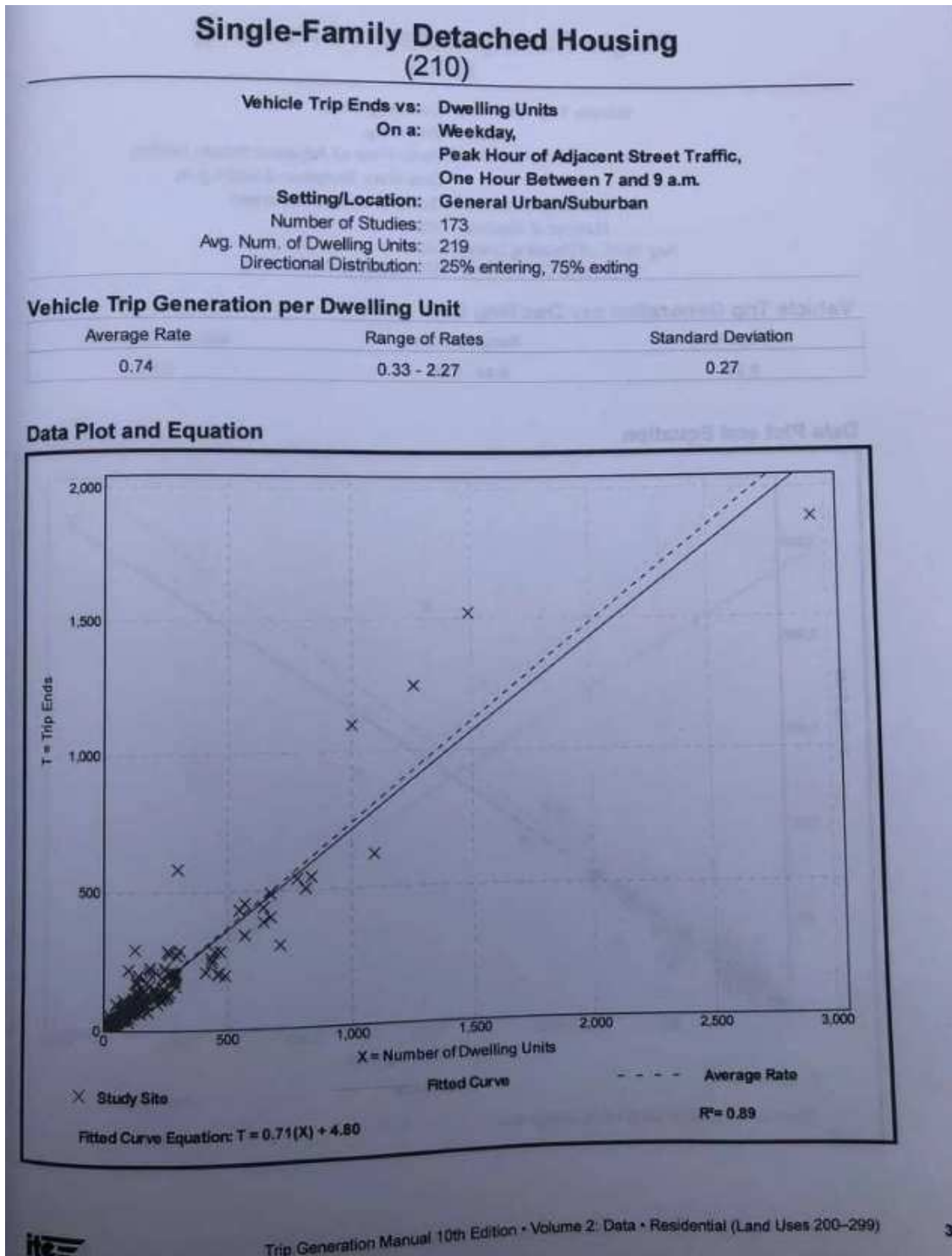
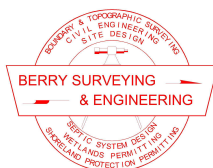


Figure 13: ITE Trip Generation, 10<sup>th</sup> Edition



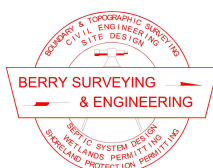
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## Appendix D

### Miscellaneous

Year 2018 Monthly Data			
Group 6 Averages:		Scenic Highways	
		Adjustment to	
Month	ADT	Average	Peak
January	3337	1.55	2.46
February	3961	1.30	2.07
March	4079	1.26	2.01
April	4230	1.22	1.94
May	5404	0.95	1.52
June	6851	0.75	1.20
July	8210	0.63	1.00
August	7831	0.66	1.05
September	5815	0.89	1.41
October	4944	1.04	1.66
November	3452	1.49	2.38
December	3787	1.36	2.17
Average ADT:	5158		
Peak ADT:	8210		

Table 14: Derivation of the seasonal peaking factor



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Table 3-1. Stopping Sight Distance on Level Roadways

U.S. Customary					Metric				
Design Speed (mph)	Brake Reaction Distance (ft)	Braking Distance on Level (ft)	Stopping Sight Distance		Design Speed (km/h)	Brake Reaction Distance (m)	Braking Distance on Level (m)	Stopping Sight Distance	
			Calculated (ft)	Design (ft)				Calculated (m)	Design (m)
15	55.1	21.6	76.7	80	20	13.9	4.6	18.5	20
20	73.5	38.4	111.9	115	30	20.9	10.3	31.2	35
25	91.9	60.0	151.9	155	40	27.8	18.4	46.2	50
30	110.3	86.4	196.7	200	50	34.8	28.7	63.5	65
35	128.6	117.6	246.2	250	60	41.7	41.3	83.0	85
40	147.0	153.6	300.6	305	70	48.7	56.2	104.9	105
45	165.4	194.4	359.8	360	80	55.6	73.4	129.0	130
50	183.8	240.0	423.8	425	90	62.6	92.9	155.5	160
55	202.1	290.3	492.4	495	100	69.5	114.7	184.2	185
60	220.5	345.5	566.0	570	110	76.5	138.8	215.3	220
65	238.9	405.5	644.4	645	120	83.4	165.2	248.6	250
70	257.3	470.3	727.6	730	130	90.4	193.8	284.2	285
75	275.6	539.9	815.5	820	140	97.3	224.8	322.1	325
80	294.0	614.3	908.3	910					
85	313.5	693.5	1007.0	1010					

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 11.2 ft/s<sup>2</sup> [3.4 m/s<sup>2</sup>] used to determine calculated sight distance.

Figure 14: Derivation of stopping sight distance requirements

