To: Members of the Carlisle Board of Appeals
From: NOAH
Date: May 5, 2010

Traffic Update

In response to the Peer Review Analysis from Nitsch Engineering dated April 7, 2010 of the 2004 Traffic Impact and Access Study, NOAH is providing additional traffic and site information and analysis for the project of Benfield Farms off South Street in Carlisle.

1. Traffic Volume Comparison

According to the Traffic Impact and Access Study conducted in 2004, the traffic volumes at South Street during morning peak (7:00-9:00AM) and evening peak (4:00-6:00PM) period are showed in Table 1.

Table 1: 2004 Traffic Count

Source: 2004 Traffic Study by MS Transportation Systems, Inc.

Date	Total	Number East Bound	Number West Bound
Morning Peak (7:00-9:00am)	136	69	67
Evening Peak (4:00-6:00pm)	168	58	110
Grand Total	**304**	**127**	177

To analyze the changes on traffic volume since 2004, NOAH collected the up-to-date traffic data on Tuesday, April 27, 2010. The new data consisted of morning and evening peak period at South Street and considered both the west and the east bound traffic numbers. The results are presented in Table 2.

A review of the data indicates that morning peak hour flows were 166 vehicles, and evening peak hour were 176 vehicles, resulting in a total traffic count of 342 vehicles. Compared with the data in 2004, the traffic volume during morning and evening peak hours climbs by 22% and 4.8%, respectively. The total traffic volume at South Street in 2010 is 12.5% higher than those collected in 2004.

Table 2: 2010 Traffic Count Conducted by John Luther, Building Commissioner

Date	Total	Number East Bound	Number West Bound
Morning Peak 4/27/10 (7:00-9:00am)	166	104	62
Evening Peak 4/27/10 (4:00-6:00pm)	176	88	88
Grand Total	**342**	**192**	**150**

However, the comparison between the data in 2010 and that in 2009 No-Build Projection in the Traffic Study (see Table 3) shows that the traffic volume in 2010 is consistent with that in the 2009 No-Build projection. The traffic flow to the east bound in 2010 is 32.4% higher than in 2009 No-Build projection, but the volume to the west bound is 24.2% lower. As a result, the total traffic numbers in 2010 is one less than in 2009 No-Build Projection. That suggests the real traffic volume increase since 2004 at South Street was anticipated in the Traffic Study.

Table 3: 2009 No-Build Traffic Projection Source: 2004 Traffic Study by MS Transportation Systems, Inc

Date	Total	Number East Bound	Number West Bound
Morning Peak (7:00-9:00am)	152	78	74
Evening Peak (4:00-6:00pm)	191	67	124
Grand Total	**343**	**145**	**198**

For the Build Traffic projection, the 2004 Traffic Study provided the number of traffic trips generated by the project based on the proposed use at the time of 26-units of 3 bedroom family housing rather than the current use of one and two bedroom senior rental housing. The 2004 estimate was 18 trips in the morning peak and 20 trips in the evening peak hours.

To estimate the accurate number of trips, NOAH relied on ITE Trip Generation Manual: Land Use 252, Senior Adult Housing – Attached which indicates Weekday peak hour am: 0.08 trips/unit and Weekday peak hour pm: 0.11 trips/unit. Using these ratios, we calculate that the new proposed project will generate 2 vehicle trips in the morning peak hours and 6 vehicle trips during evening peak hours. The total trips generated in weekday peak hours are

estimated to be eight, significantly less than the number generated by the family housing component proposed in 2004. As can be seen, senior housing component will generate negligible traffic increase during peak hours and is a more favorable option in terms of overall traffic impact.

2. Traffic Accident Data Comparison

In the 2004 Traffic Study, the analysis for traffic accidents was based on 2000-2002 data collected from Massachusetts Highway Department (MHD) Accident Record System (ARS). The results are presented in Table 4.

To track the changes of crash, NOAH collected the accident data in 2004, 2006, and 2008 separately from MHD ARS (see Table 5). Review of the new data indicates that during 2004, 2006, and 2008, two more reported accidents occurred at the South Street intersection with Concord Street, one more reported accident at the intersection with West Street, four more at the South Street, and one less at the intersection of South Street and Cross Street. Compared with the data from 2000-2002 period, there were a total of six more reported accidents along South Street and its intersections with the other streets. Within the six more reported accidents, two are cross movement or angle accidents, and four involved personal injury. Neither analysis has fatal injuries. In addition, Table 4 and 5 show that the percentage of accidents under wet and icy conditions are about the same level of 63% and 64% from 2000 to 2008, while the accidents during peak hours increased 29%. It thus can be concluded that the major factor causing traffic accidents on South Street is wet or icy road conditions, while peak-hour traffic is becoming a more important factor particularly at Concord Street which is quite far from the project site.

Table 4
SUMMARY OF ACCIDENT DATA (2000-2002)

	NUMBER OF ACCIDENTS			SEVERITY			ACCIDENT TYPE					PERCENT DURING	
Location	Total	Average per Year	Crash Rate	PD[a]	PI[b]	F[c]	CM[d]	RE[e]	HO[f]	FO[g]	Other	Peak Hours	Wet/Icy Conditions
South Street @ Concord Stree	1	0.33		0	1	0	0	0	1	0	0	0%	0%
South Street @ West Street	0	0.00		0	0	0	0	0	0	0	0	0%	0%
South Street (Whole Length)	5	1.67		5	0	0	2	0	0	2	1	0%	60%
South Street @ Cross Street	2	0.67		2	0	0	1	0	0	1	0	0%	100%
Total	**8**	**2.67**		**7**	**1**	**0**	**3**	**0**	**1**	**3**	**1**	**0%**	**63%**

[a] Property Damage Only
[b] Personal Injury
[c] Fatality
[d] Cross Movement (or Angle)
[e] Rear End
[f] Head On
[g] Fixed Object

Table 5
SUMMARY OF ACCIDENT DATA (2004, 2006, 2008)

	NUMBER OF ACCIDENTS			SEVERITY			ACCIDENT TYPE					PERCENT DURING	
Location	Total	Average per Year	Crash Rate	PD[a]	PI[b]	F[c]	CM[d]	RE[e]	HO[f]	FO[g]	Other	Peak Hours	Wet/Icy Conditions
South Street @ Concord Stree	3	1		2	1	0	3	0	0	0	0	67%	33%
South Street @ West Street	1	0.33		0	1	0	0	0	1	0	0	0%	0%
South Street (Whole Length)	9	3.00		6	3	0	3	1	0	4	1	22%	78%
South Street @ Cross Street	1	0.33		1	0	0	1	0	0	0	0	0%	100%
Total	**14**	**4.67**		**9**	**5**	**0**	**7**	**1**	**1**	**4**	**1**	**29%**	**64%**

[a] Property Damage Only
[b] Personal Injury
[c] Fatality
[d] Cross Movement (or Angle)
[e] Rear End
[f] Head On
[g] Fixed Object

3. Parking Space and Fire Access

The access into the site will be a looped driveway of 24 feet in width as requested by the Fire Department. The primary entry will be on the northeastern side of the building that will pass in front of the building and continue to the barn structure and lead to the second egress along the southwest edge of South Street. The two-way drive will provide for easier and safer access into and out of the site depending upon which direction along South Street traffic is traveling.

Parking spaces are provided on either side of the building with a larger lot on the eastern side and a smaller lot on the west side of the building. There are 41 hard spaces with at least one designated space for each unit, including 26 spaces in the east lot and 15 in the west. Two of the 41 spaces will be designated as handicapped spaces and will be located closer to west side of the building in the west lot. In addition, seven spaces of "soft parking" are designated in the southern part of the west lot to be used for trail parking. By using pavers or some material pervious for drainage, those spaces will also provide overflow parking as needed for special events.