



January 25, 2016

**BY ELECTRONIC MAIL: msarcione@shrewsburyma.gov
AND BY HAND**

Shrewsbury Zoning Board of Appeals
Richard D. Carney Municipal Office Building
100 Maple Avenue
Shrewsbury, MA 01545-5398

Re: The Pointe at Hills Farm, Shrewsbury - Traffic Impacts

Dear Members of the Zoning Board:

As you may recall, this firm represents neighbors and abutters to the proposed 280-unit residential development located at 440 and 526 Route 20, Shrewsbury (the "Project" and the "Project Site"), which is the subject of a pending application for a comprehensive permit under General Laws Chapter 40B, Sections 20-23 proposed by Smart Growth Design, LLC (the "Developer").

We understand that the hearing this evening will focus on the Project's traffic-related impacts, and the adequacy of the Project to prevent traffic conflicts and threats to public safety. We have reviewed the Developer's Traffic Impact and Access Study, and have the following comments.¹

1. Sight Distances

The Developer's calculation of minimum sight distances does not appear to be consistent with the AASHTO standards that the Developer cites and relies upon in its report. "Intersection sight distance" or "corner sight distance" ("ISD") is the sight distance required for a driver of a car approaching an intersection to enter that intersection and safely make a turn onto the intersecting road. On Table 14 in its Traffic Study, the Developer states that the minimum AASHTO ISD for a left turn onto Stoney Hill Road (west) for a 32 mile-per-hour design speed is 233 feet, and that the "desirable" ISD for this design speed is 353 feet. According to the Developer, the 85th percentile speed of traffic on Stoney Hill Road in the vicinity of the Project's westerly driveway is 32 MPH. ISD is measured by applying a simple equation: $1.47 * (\text{design$

^{1/} As of Noon today, the peer review report from Conley Associates had not been made publicly available, and therefore we reserve our right to modify these comments, or make additional ones, based on the report.

speed) * (time gap for minor road vehicles to enter the major road). The equation from page 659 of the AASHTO manual is reproduced in Figure 1 below.

In this case, the design speed is 32 MPH, and the time gap assumption in the AASHTO manual is 7.5 seconds for passenger cars (the gap is longer for larger vehicles such as trucks). This 7.5 second factor is consistent with the calculations in the Developer's Appendix I. Applying this equation, the ISD should be 353 feet. This is consistent with the Developer's "desirable" figure, but the Developer's "minimum" figure is not based on any alternative equation we could find in the AASHTO manual.

FIGURE 1

Metric	US Customary
$ISD = 0.278 V_{major} t_g$	$ISD = 1.47 V_{major} t_g$ (9-1)
where:	where:
ISD = intersection sight distance (length of the leg of sight triangle along the major road) (m)	ISD = intersection sight distance (length of the leg of sight triangle along the major road) (ft)
V_{major} = design speed of major road (km/h)	V_{major} = design speed of major road (mph)
t_g = time gap for minor road vehicle to enter the major road (s)	t_g = time gap for minor road vehicle to enter the major road (s)

As noted on Table 14 of the Developer's traffic study, there is only 260 feet of available intersection sight distance, and therefore this intersection would be unsafe under the AASHTO standard, particularly for trucks. This intersection's "stopping sight distance" appears to have been calculated correctly. The Developer's Table 14 is reproduced below for your convenience.

Table 14 Phase I (west) Sight Distance Measurements (SSD and ISD)

Intersection	85 th Percentile Speed (mph)	Approx. Grade	AASHTO Desirable (feet)	AASHTO Minimum (feet)	Measured Distance (feet)	Meets AASHTO Desirable	Meets AASHTO Minimum
Route 20/Phase I Site Driveway (Rt. In/Rt. Out)							
<u>Stopping Distance</u>							
From the West	55	+5%	456	NA	+700	Yes	
<u>Intersection Sight Distance</u>							
To the West	55		588	456	+700	Yes	
Stoney Hill Road/Site Driveway							
<u>Stopping Distance</u>							
From the North	32	-5%	233	NA	241	Yes	
From the South	33	+4%	216	NA	266	Yes	
<u>Intersection Sight Distance</u>							
To the North	32		353	233	260	No	Yes
To the South	33		364	216	300	No	Yes

Critically missing from the Developer's sight distance analysis is any consideration of sight distances at the two intersections of Stoney Hill Road and Route 20. On Figure 4 of the Traffic Study, the Developer identified six "study area intersections," but provided sight distance analysis for only four intersections. One reason for this omission could be that those sight distances do not conform to AASHTO standards. Existing traffic speeds on Route 20 in this location are fast (55 MPH), and combined with the steep grade (5-6%), makes entering Route 20 from Stoney Hill Road dangerous, particularly in bad weather. Applying AASHTO's intersection sight distance equation, one would need at least 711 feet of ISD $(1.47 * 55 * 8) * 1.1$ (adjustment for steep grade of Route 20). The time gap is increased by .5 seconds because vehicles turning left onto Route 20 would need to cross an extra lane of traffic on Route 20 eastbound. See, Traffic Study, Appendix I.

Similarly, the minimum *stopping sight distance* for vehicles travelling westbound on Route 20 at the westerly intersection of Stoney Hill Road is 553 feet, assuming a 6% downgrade. See, AASHTO Exhibit 3-2, reproduced below as Figure 2.

FIGURE 2

Elements of Design

Metric							US Customary						
Design speed (km/h)	Stopping sight distance (m)						Design speed (mph)	Stopping sight distance (ft)					
	Downgrades			Upgrades				Downgrades			Upgrades		
	3%	6%	9%	3%	6%	9%		3%	6%	9%	3%	6%	9%
20	20	20	20	19	18	18	15	80	82	85	75	74	73
30	32	35	35	31	30	29	20	116	120	126	109	107	104
40	50	50	53	45	44	43	25	158	165	173	147	143	140
50	66	70	74	61	59	58	30	205	215	227	200	184	179
60	87	92	97	80	77	75	35	257	271	287	237	229	222
70	110	116	124	100	97	93	40	315	333	354	289	278	269
80	136	144	154	123	118	114	45	378	400	427	344	331	320
90	164	174	187	148	141	136	50	446	474	507	405	388	375
100	194	207	223	174	167	160	55	520	553	593	469	450	433
110	227	243	262	203	194	186	60	598	638	686	538	515	495
120	263	281	304	234	223	214	65	682	728	785	612	584	561
130	302	323	350	267	254	243	70	771	825	891	690	658	631
							75	866	927	1003	772	736	704
							80	965	1035	1121	859	817	782

Exhibit 3-2. Stopping Sight Distance on Grades

AASHTO recommends that the values expressed in Exhibit 3-2 for SSD be exceeded for truck traffic, for the reasons explained on page 114 of its manual, reproduced below:

There is one situation in which every effort should be made to provide stopping sight distances greater than the design values in Exhibit 3-1. Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades where truck speeds closely approach or exceed those of passenger cars, the greater height of eye of the truck driver is of little value, even when the horizontal sight obstruction is a cut slope. Although the average truck driver tends to be more experienced than the average passenger car driver and quicker to recognize potential risks, it is desirable under such conditions to provide stopping sight distance that exceeds the values in Exhibits 3-1 or 3-2.

Increasing SSD at this location is appropriate given that the Developer's own traffic consultants observed that trucks represent 14% of the existing traffic on Route 20 westbound in the morning. See, Traffic Study, p. 4. Notably, a trucking company is located across Route 20 from Stoney Hill Road's westerly intersection. We do not see any calculation of available ISD or SSD in the Developer's Traffic Study for either of the two Stoney Hill Road intersections with Route 20. The Board should ask the Developer to supplement its Traffic Study with this information.

2. Level of Service Analysis

The Developer concedes that the intersection of Stoney Hill Road (west) and Route 20 will operate at a “level of service” (LOS) rating of “F” after the Project is completed and occupied. Traffic Study, p. 16. LOS F represents a condition where minor street demand (here, Stoney Hill Road) exceeds capacity, resulting in extreme delays or “queuing.” The federal Highway Capacity Manual published by the Transportation Research Board (cited by the Traffic Study) defines a LOS F as average delays of 50 seconds or greater. Here, the Developer states that the delays at the intersection are already in excess of 120 seconds, and will be in excess of 120 seconds after the Project is built, but does not tell us how much *worse* the Project will make the delays for the existing residents of the Stoney Hill Road neighborhood.

Appendix G of the Traffic Study may contain this information, but it is difficult for a lay person to interpret. The Appendix seems to indicate that the existing delay at the intersection is 645 seconds (11 minutes) in the morning, well in excess of the 50 second threshold for LOS “F” intersections. The Appendix then appears to predict that by 2022, delays will be 6,691 seconds. This, of course, seem implausible, so we would request that the Developer clarify, with specificity, what the projected delays are under current and future build conditions. The Developer should provide this information so that the Board can thoroughly evaluate the traffic impacts from this Project.

We further note that the Developer conducted a “study” of queuing at the Stoney Hill Road (west) intersection at Route 20. Data was apparently collected on just one day, raising questions as to whether this could constitute an adequate sample size. Moreover, data was collected on February 24, 2015, which as Shrewsbury residents will not soon forget was during one of the worst extreme winter weather months in history. In our experience, commuting congestion was materially lower last February as a result of the storms, and the aftereffect of people choosing to work from home or to flee south for a vacation during that time. We believe that a queuing study would be helpful for the Board to evaluate traffic impacts, but suggest that the Board require the Developer to take additional observations and data collection, on more than one day of the week, during normal weather conditions.

The Developer seems to have taken a position that a traffic signal at the Stoney Hill West intersection with Route 20 is not “warranted,” and would not be approved by the state Department of Transportation. In our experience, a “warrant analysis” is not dispositive on this issue, and that municipal concerns can also weigh in the state’s decisionmaking. If a comprehensive permit is approved for this Project, it should be conditioned at least on the installation of a traffic signal, whether MassDOT approves it or not. We refer to the comments and slides from Steve Danielson, a Stoney Hill Road neighbor, on this issue.

3. Trip Generation

The Traffic Study measured 102 existing outbound daily trips from the Stoney Hill neighborhood during the morning peak hour (both legs). The study predicts that the Project will

generate 116 outbound trips, an increase of more than 100%. Similarly, the Project will generate 123 inbound trips in the afternoon, compared to 84 trips into the neighborhood under current conditions. The Study assumes that 7% of the people commuting to work from the Project will carpool, bike, walk, or take public transit. However, as the Developer has acknowledged, there is no public transit within walking distance, there are no bike lanes on Route 20, and there are very few employers within walking distance. The carpool assumption is pure speculation and not substantiated by any hard data. We think that discounting the trip generation projections for these assumptions is inappropriate given the isolated location of the Project Site, which is the antithesis of "smart growth" notwithstanding the Developer's trade name.

We also request that the Board ask the planning department to review the Developer's assumptions with respect to future projects that are likely to increase traffic on Route 20. We note that the Developer stated in one section that it was applying a "growth" factor of 1% per year, but in another section that factor was stated to be .5%. The Board should seek clarification on this.

We further note that the Study stated that its trip counts were taken on two days in April, 2014, and one day in November, 2014. The Developer stated that that it used a traffic monitoring station on Route 9 to determine whether a seasonal adjustment should be applied to the counts taken in November (determining that no adjustment was necessary), but it did not state whether it considered a seasonal adjustment for the April trip counts. We request clarification on this issue as well.

* * *

Thank you for this opportunity to comment on the Developer's Traffic Study, and for the Board's diligence in reviewing this application.

Very truly yours,


Daniel C. Hill

Enc.
cc: Peter Freeman, Esq.
Shrewsbury Board of Selectmen
Client