

**TIM
MILLER
ASSOCIATES, INC.**

10 North Street, Cold Spring, NY 10516

(845) 265-4400

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January 24, 2016

Ingrid Richards, Chair, and the Town of Ossining Planning Board
John Paul Rodrigues Operations Center
Town of Ossining Building and Planning Department
101 Route 9A - P.O. Box 1166
Ossining, NY 10562

RE: Parth Knolls, LLC Sight Distances

Dear Chair Richards:

This letter responds to Mr. Stolman's memorandum to you dated December 16, 2015 indicating the need to re-examine sight distances at the subject project.

Proposed Conditions

Site Design Consultants has revised the available sight distances shown on the plans for the project site. The intersection sight distance is not shown for the southern access as under the revised plans the southern access is ingress only. Stopping sight distances and intersection sight distances are tabulated and further explained below.

Table 1 Available Sight Distances		
	Sight Distances*	
	Northern Access	Southern Access
Stopping Sight Distance southbound	Greater than 500**	251***
Stopping Sight Distance northbound	Greater than 600**	Greater than 600**
Intersection Sight Distance to the north	Greater than 500**	---
Intersection Sight Distance to the south	Greater than 600**	---
*Site Design Consultants		
** Meets or exceeds actual 85th percentile speed criteria		
*** Meets 32 mph *		

Speeds

The speed limit on Hawkes Avenue is 30 miles per hour. A speed study was conducted to measure actual vehicle speeds and determine the 85th percentile speeds on Hawkes Avenue which were measured to be 46 miles per hour southbound and 44 miles per hour northbound (see Attachment A). The northbound speeds would be expected to be considerably slower just north of the NYS Route 9A ramp as 25 to 60 percent of traffic is entering Hawkes Avenue from the stop controlled NYS Route 9A ramp. Thus the many vehicles approaching the southern access from the south would be accelerating and not yet at 44 miles per hour in the decision zone.

Intersection Sight Distance

Intersection sight distance is based on an intersection with stop control on the minor road (Case B), although in this instance it is from a driveway and not a minor road. There are three sub cases:

- Case B1 Left turn from the driveway
- Case B2 right turn from the driveway
- Case B3 crossing maneuver to the opposite driveway.

Case B3 is not applicable to the northern access as there is no crossing maneuver. Case B3 should be a rare occurrence on the southern driveway as few vehicles would travel from Woods Brooke Terrace into the site.

Intersection sight distances are using 3.5 foot object height (driver eye height) to effectively evaluate the driver-sees-driver situation. Recognition can be earlier as 85 percent of vehicles equal or exceed 4.35 feet in height.

Since the typical design vehicle is a passenger car no adjustment is necessary for the grades of Hawkes Avenue. The northern driveway has a negative grade assisting vehicles in accelerating and thus no adjustment is necessary for the driveway grade.

ISD or intersection sight distance (length of the leg of the sight triangle along the Major Road) is computed in feet using the following equation

$$ISD = 1.47V_{\text{major}} t_g$$

V_{major} = design speed of major road (in miles per hour)

t_g = time gap for minor road vehicle to enter the major road which seconds for a passenger car is 7.5 (Table 9-5 Case B1) or 6.5 seconds (Table 9-7 Case B2 and B3).

Table 2 shows the design intersection sight distances which are slightly higher than calculated values.

Table 2 Design Intersection Sight Distances		
Design Speed	Design Sight Distances	
	Case B1	Case B2 and B3
30 mph	335 ft.	290 ft.
35 mph	390 ft.	335 ft.
40 mph	445 ft.	385 ft.
45 mph	500 ft.	430 ft.
*American Association of State Highway and Transportation Officials, <i>A Policy on the Geometric Design of Streets and Highways</i> , 6th edition, Wash. D.C., 2011.		

Stopping Sight Distance

Stopping sight distance on a grade is based on AASHTO 2011¹ equation 3-3:

$$SSD = 1.47Vt + V^2 / (30 * ((a/32.2) \pm G))$$

SSD is the stopping sight distance

V is the design speed, in mph

t is the brake reaction time in seconds, 2.5 seconds

a is the deceleration rate, in feet per second squared, 11.2 ft/s²

G is the grade, rise in elevation divided by the distance of the run and the percent of grade divided by 100, in feet per foot,

$V^2 / (30 * ((a/32.2) \pm G))$ is the braking distance which at grade is $1.075 * V^2 / a$

Roughly for 45 miles per hour with a nearly six percent downgrade a sight distance of 400 feet would be needed southbound at the southern ingress.

Mitigation

The southern ingress meets the stopping sight distance for 32 miles per hour or two miles per hour above the speed limit and 13 miles per hour below the actual travel 85th percentile speeds. This is an existing problem for Woods Brooke Terrace as well as potentially other developments.

The project includes several mitigations. The northern site access is proposed as the primary project access that has adequate sight lines. The development of the north access will require regrading and removal of trees. The existing access will become

¹ American Association of State Highway and Transportation Officials, *A Policy on the Geometric Design of Streets and Highways*, 6th edition, Wash. D.C., 2011.

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ingress only thereby removing the worst existing sight line (from exiting the driveway looking north). The increased use of Hawkes Avenue overtime should have a secondary effect of reducing speeds in the area due to additional slowing and turning vehicles.

Please contact me if there is a question concerning this information.

Sincerely,

A handwritten signature in cursive script that reads "James Garofalo".

James A. Garofalo, AICP CTP
Director, Transportation Division
TIM MILLER ASSOCIATES, INC.

ATTACHMENT A

Speed Data

American Traffic Information, Inc.

336 Pulaski Ave
Staten Island, NY, USA 10303
718-447-5161

Hawkes Ave 500' n/o Woods Brooke Terr

NB	Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	85th	95th	
		15	20	25	30	35	40	45	50	55	60	65	70	75	999		Percent	Percent	
	01/06/16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	10:00	0	0	0	4	3	9	13	1	0	0	0	0	0	0	30	43	45	
	11:00	0	2	1	8	4	16	7	1	0	0	0	0	0	0	39	41	44	
	12 PM	0	0	0	3	10	24	16	2	1	0	0	0	0	0	56	44	45	
	13:00	0	0	0	2	17	17	20	7	0	0	0	0	0	0	63	45	47	
	14:00	0	0	2	5	10	20	20	8	0	0	0	0	0	0	65	45	48	
	15:00	0	1	0	8	16	28	19	9	0	0	0	0	0	0	81	44	48	
	16:00	0	0	1	8	9	19	28	9	0	0	0	0	0	0	74	45	48	
	17:00	0	1	1	14	21	31	17	4	0	0	0	0	0	0	89	42	45	
	18:00	0	1	3	8	26	29	19	7	0	0	0	0	0	0	93	43	46	
	19:00	0	0	2	7	15	29	14	0	0	0	0	0	0	0	67	42	44	
	20:00	0	0	1	3	9	27	15	3	1	0	0	0	0	0	59	44	46	
	21:00	0	0	0	4	6	18	12	1	0	0	0	0	0	0	41	43	45	
	22:00	0	0	0	0	2	11	3	0	0	0	0	0	0	0	16	41	42	
	23:00	0	0	0	0	2	2	4	0	1	0	0	0	0	0	9	44	51	
	Total	0	5	11	74	150	280	207	52	3	0	0	0	0	0	782			
	Percent	0.0%	0.6%	1.4%	9.5%	19.2%	35.8%	26.5%	6.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%				
	AM Peak	11:00	11:00	11:00	11:00	11:00	11:00	10:00	10:00							11:00			
	Vol	2	1	1	8	4	16	13	1							39			
	PM Peak	15:00	18:00	18:00	17:00	18:00	17:00	16:00	15:00	12:00						18:00			
	Vol	1	1	3	14	26	31	28	9	1						93			

American Traffic Information, Inc.

336 Pulaski Ave
Staten Island, NY, USA 10303
718-447-5161

Hawkes Ave 500' n/o Woods Brooke Terr

NB	Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	85th	95th
		15	20	25	30	35	40	45	50	55	60	65	70	75	999		Percent	Percent
	01/08/16	0	0	1	1	1	1	1	1	0	0	0	0	0	0	6	45	46
	01:00	0	0	0	1	0	2	1	0	0	0	0	0	0	0	4	37	41
	02:00	0	0	0	1	1	0	2	0	0	0	0	0	0	0	4	41	42
	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	2	1	0	0	0	0	0	0	3	46	46
	05:00	0	0	0	1	2	0	1	0	0	0	0	0	0	0	5	32	41
	06:00	0	0	0	2	4	2	2	1	0	0	0	0	0	0	11	41	42
	07:00	1	0	0	0	9	11	4	3	2	0	0	0	0	0	30	44	48
	08:00	0	0	0	5	9	14	9	2	0	0	0	0	0	0	39	43	45
	09:00	0	1	1	3	12	9	11	5	1	0	0	0	0	0	43	45	49
	10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Total	1	1	3	14	38	39	33	13	3	0	0	0	0	0	145		
	Percent	0.7%	0.7%	2.1%	9.7%	26.2%	26.9%	22.8%	9.0%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
	AM Peak	07:00	09:00	00:00	08:00	09:00	08:00	09:00	09:00	07:00						09:00		
	Vol.	1	1	1	5	12	14	11	5	2						43		
	PM Peak																	
	Vol.																	
	Total	1	9	28	162	401	628	433	115	9	4	0	0	0	0	1790		
	Percent	0.1%	0.5%	1.6%	9.1%	22.4%	35.1%	24.2%	6.4%	0.5%	0.2%	0.0%	0.0%	0.0%	0.0%			

Stats
10 MPH Pace Speed : 36-45 MPH
Number in Pace : 1061
Percent in Pace : 59.3%
Number of Vehicles > 30 MPH : 1590
Percent of Vehicles > 30 MPH : 88.8%
Mean Speed(Average) : 38 MPH

American Traffic Information, Inc.

336 Pulaski Ave
Staten Island, NY, USA 10303
718-447-5161

Hawkes Ave 500' n/o Woods Brooke Terr

SB	Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	85th Percent	95th Percent
	01/07/16	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	42	42
	01:00	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	36	36
	02:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	36	36
	03:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	36	36
	04:00	0	0	0	0	0	3	0	1	0	0	0	0	0	0	4	38	46
	05:00	0	0	0	2	1	2	4	3	1	1	0	0	0	0	14	48	55
	06:00	0	0	2	9	12	23	9	9	1	0	0	0	0	0	65	45	49
	07:00	0	1	3	11	5	33	19	16	6	1	0	1	0	0	96	48	52
	08:00	0	1	4	9	3	27	36	12	4	5	0	1	0	0	102	48	56
	09:00	1	0	3	8	8	10	15	10	5	0	0	0	0	0	60	48	52
	10:00	0	1	0	7	3	5	11	8	2	0	0	0	0	0	37	47	50
	11:00	0	2	0	6	6	15	16	4	1	0	0	0	0	0	50	44	47
	12 PM	0	0	4	5	4	20	19	8	2	0	0	0	0	0	62	46	49
	13:00	0	2	3	5	5	17	16	5	4	0	0	0	0	0	55	46	51
	14:00	0	0	1	5	5	17	16	8	1	1	0	0	0	0	54	46	49
	15:00	0	0	2	5	7	20	16	4	0	1	0	0	0	0	55	44	47
	16:00	0	0	1	2	7	19	17	8	0	0	0	0	0	0	54	45	48
	17:00	0	0	5	3	11	29	15	2	3	0	0	0	0	0	68	44	50
	18:00	0	0	1	5	10	12	17	5	2	0	0	0	0	0	52	45	49
	19:00	0	0	2	2	5	7	9	5	1	0	0	0	0	0	31	46	49
	20:00	0	0	3	1	2	4	4	4	0	0	1	0	0	0	19	47	49
	21:00	0	0	1	0	3	5	4	0	1	0	0	0	0	0	14	43	44
	22:00	0	0	0	0	1	3	2	0	0	0	0	0	0	0	6	41	42
	23:00	0	0	0	1	1	0	1	0	0	0	0	0	0	0	3	41	41
	Total	1	7	35	86	98	274	248	112	34	9	1	2	0	0	907		
	Percent	0.1%	0.8%	3.9%	9.5%	10.8%	30.2%	27.3%	12.3%	3.7%	1.0%	0.1%	0.2%	0.0%	0.0%			
	AM Peak	09:00		08:00	07:00	06:00	07:00	08:00	07:00	07:00	08:00		07:00			08:00		
	Vol.	1	2	4	11	12	33	36	16	6	5		1			102		
	PM Peak		13:00	17:00	12:00	17:00	17:00	12:00	12:00	13:00	14:00	20:00				17:00		
	Vol.		2	5	5	11	29	19	8	4	1	1				68		

American Traffic Information, Inc.

336 Pulaski Ave
Staten Island, NY, USA 10303
718-447-5161

Hawkes Ave 500' n/o Woods Brooke Terr

SB	Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 99	Total	85th Percent	95th Percent
	01/08/16	0	0	0	0	1	1	0	2	0	0	0	0	0	0	4	46	47
	01:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	46	46
	02:00	0	0	0	0	1	1	1	0	0	0	0	0	0	0	3	41	41
	03:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2	36	36
	04:00	0	0	0	0	0	1	3	0	0	1	0	0	0	0	5	43	56
	05:00	0	0	2	2	3	3	6	2	1	0	0	0	0	0	19	45	47
	06:00	0	0	1	7	7	21	16	5	2	0	0	0	0	0	59	45	49
	07:00	0	1	3	10	8	17	37	15	8	2	0	0	0	0	101	49	53
	08:00	0	1	5	6	10	25	38	16	6	1	0	0	0	0	108	47	51
	09:00	0	0	3	3	7	13	25	7	3	0	0	0	0	0	61	46	50
	10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Total	0	2	14	29	38	83	126	48	20	4	0	0	0	0	364		
	Percent	0.0%	0.5%	3.8%	8.0%	10.4%	22.8%	34.6%	13.2%	5.5%	1.1%	0.0%	0.0%	0.0%	0.0%			
	AM Peak		07:00	08:00	07:00	08:00	08:00	08:00	08:00	07:00	07:00					08:00		
	Vol.		1	5	10	10	25	38	16	8	2					108		
	PM Peak																	
	Vol.																	
	Total	1	13	73	184	203	534	534	229	69	17	1	2	1	0	1861		
	Percent	0.1%	0.7%	3.9%	9.9%	10.9%	28.7%	28.7%	12.3%	3.7%	0.9%	0.1%	0.1%	0.1%	0.0%			

Stats
10 MPH Pace Speed : 36-45 MPH
Number in Pace : 1068
Percent in Pace : 57.4%
Number of Vehicles > 30 MPH : 1590
Percent of Vehicles > 30 MPH : 85.4%
Mean Speed(Average) : 39 MPH