



## GREEN INTERNATIONAL AFFILIATES, INC.

239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886

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July 16, 2020

John Lee  
Chairman, Zoning Board of Appeals  
Walpole Town Hall  
135 School Street  
Walpole, MA 02081

**Subject: Diamond Hill Estates, Dupee Street  
Supplemental Traffic Information**

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Dear Mr. Lee

As part of the application for the Diamond Hill Estates 40B project and on behalf of the Applicant, Green International Affiliates, Inc. (Green) provided a limited traffic assessment summary in accordance with the current regulations and practices of the Board of Appeals for small residential projects (i.e. under 20 units). The initial memorandum was completed on February 3, 2019 and was updated (dated June 2, 2020) to reflect the site design changes such as the hammerhead turnaround design. While the comments on sight distances and fire apparatus movement were addressed in the June memorandum, additional information was requested by the town engineer and the deputy fire chief. In addition, several comments were made by the deputy police chief as well. On behalf of the applicant for the Diamond Hill Estates, we have compiled this additional information including:

- Provision of a sight line triangle plan for the intersection of Dupee Street with High Plain Street that can be incorporated into the overall site plans to indicate areas to keep clear of any obstructions to sight distances, and
- Provision of plans that illustrate fire apparatus movement for both the access intersection and the internal turnaround that was modified to a 'hammerhead' type design from the original cul-de-sac.

Again, our previous analyses described in memo reports<sup>1 2</sup> to the Board responded in general to the traffic related comments received from Town officials. The previous memoranda documented that adequate sight distances will exist and Walpole's fire truck apparatus will be accommodated with the current design, however, plans and diagrams had not been provided. That said, comments received from Deputy Chief Barry (dated June 5, 2020), Deputy Chief Kelleher (March 17, 2020) and the Carl Balduff, P.E. Town Engineer (May 5, 2020) that pertain to traffic have been further addressed in the following paragraphs and the attachments.

### **Sight Distances**

Visibility in relation to the site access is an important consideration for any development. The minimum criteria for establishing adequate stopping and intersection sight distances are defined by the American Association of State Highway and Transportation Officials (AASHTO)<sup>3</sup>. The limited traffic assessment

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<sup>1</sup> Green International Affiliates, Memorandum to Wall Street Development, dated February 3, 2020

<sup>2</sup> Green International Affiliates, Memorandum to Wall Street Development, dated June 22, 2020

<sup>3</sup> American Association of State Highway Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets (Green Book), Washington, D.C., 2018.

completed for this project used the posted speed of 35 mph on High Plain Street in the vicinity of Dupee Street as recent travel speed data in that area is not readily available. Stopping sight distance (SSD) represents the distance required for a driver traveling at that speed to come to a complete stop in a safe manner and therefore, relates specifically to safety of access and egress. Intersection sight distance (ISD) relates to an exiting driver’s view of approaching traffic and represents the distance an approaching vehicle travels during a specified time gap. As indicated by AASHTO, if the available ISD meets or exceeds the minimum SSD criteria, then there is adequate safe sight distance available for motorists to safely avoid collisions.

The Town Engineer requested information on the calculations of sight distances as well as commented that 35 mph may not adequately represent the 85<sup>th</sup> percentile speeds in the project area. It should be noted that posted speeds are regulated by MassDOT and are typically based on speed studies and the 85<sup>th</sup> percentile. That said, actual field measurements of available sight distances have shown that sight distances that currently exist will meet the criteria for approximately 45 mph to the west and more than 50 mph to the east that in our opinion, are not typical speeds for that section and would likely exceed the 85<sup>th</sup> percentile.

For 35 mph speeds, the minimum stopping and intersection sight distance criterion would be 250 feet. Using the following equation from AASHTO that accounts for reaction time and braking distance the stopping sight distance and with essentially level street conditions, the required stopping sight distance can be calculated:

$$SSD=1.47Vt + V^2/[30((a/32.2) +/- G/100)]$$

Where: V=speed; t=reaction time; a=deceleration rate and G=grade

Tables are already set up in AASHTO as well as reprinted in the MassDOT Design Guide that have already computed the values and taken into account potential grade effects on the distances. The stopping sight table from these sources is illustrated below:

**Exhibit 3-8**  
**Motor Vehicle Stopping Sight Distances**

Design Speed	Stopping Sight Distance (ft) by Percent Grade (%)						
	Downgrade				Upgrade		
	0	3	6	9	3	6	9
20	115	116	120	126	109	107	104
25	155	158	165	173	147	143	140
30	200	205	215	227	200	184	179
35	250	257	271	287	237	229	222
40	305	315	333	354	289	278	269
45	360	378	400	427	344	331	320
50	425	446	474	507	405	388	375
55	495	520	553	593	469	450	433
60	570	598	638	686	538	515	495
65	645	682	728	785	612	584	561
70	730	771	825	891	690	658	631
75	820	866	927	1003	772	736	704

Source: A Policy on Geometric Design of Streets and Highways, AASHTO, Washington DC, 2004. Chapter 3 Elements of Design

As can be seen in the table, for a level street such as High Plain Street in the project area and at 35 mph, the required minimum distance would be 250 feet.

Sight distances measured in relation to the Dupee Street were approximately 350 to 360 feet to and from the west and more than 800 feet to and from the east. This available distance significantly exceeds required minimums for the posted 35 mph and will provide an additional safety factor to approximately 45 mph

speeds in relation to the west while higher speeds to/from the east. The available sightlines are more than adequate to ensure safe traffic operations.

The Town Engineer also requested that a sight line triangle plan be prepared and this plan has been prepared and included in this transmittal. It can also become part of the overall site plan set as it defines the areas that should be kept clear of any substantive obstructions. We recognize that Dupee Street will be improved when this project advances and that will include improved turning radii at the intersection with High Plain Street, relocation of a utility pole, new ADA handicap ramps at the sidewalk and some general clearing within the sight line triangles within public rights of way.

#### **Fire Apparatus Movement**

The movement of fire apparatus was evaluated with respect to the project access and the current internal design that incorporates a 'hammerhead' turnaround. The current road design that will include a 20 foot wide paved cross-section, be straight and level will accommodate the truck turning. The Deputy Chief has acknowledged that the proposed condition will be a significant improvement over current conditions. He also requested that the turn movements be shown on a plan that is stamped by professional engineer. This plan set is attached to this response. As noted above, the Dupee Street intersection with High Plain Street will be improved with corner radii that can be accommodated within the public right of way. One utility pole will need to be relocated. With these actions as well as the 20 foot wide section and the hammerhead turnaround, the fire apparatus can be adequately, safely and efficiently accommodated.

#### **Pedestrian Movement**

The Deputy Police Chief raised several items related to pedestrian movement. One was the possibility of including a sidewalk along Dupee Street out to High Plain Street. This could potentially be an option along the side of the proposed homes, however, the narrow public layout and the current location of the street within the layout will not accommodate without easements or being able to shift the road layout. That said, the street is a dead end street, level, relatively short and with a small number of housing units on the street that will result in low volumes and low speeds. Consequently, walking on the street in this case would be safely accommodated. The sidewalk at High Plain Street will be reconstructed at the intersection of Dupee Street with ADA compliant ramps. A crosswalk will be installed across Dupee Street as requested by the Chief.

We believe this supplemental information with the attachments in combination with the previous memoranda have fully addressed the traffic questions and comments.

Very truly yours,  
**GREEN INTERNATIONAL AFFILIATES, INC.**

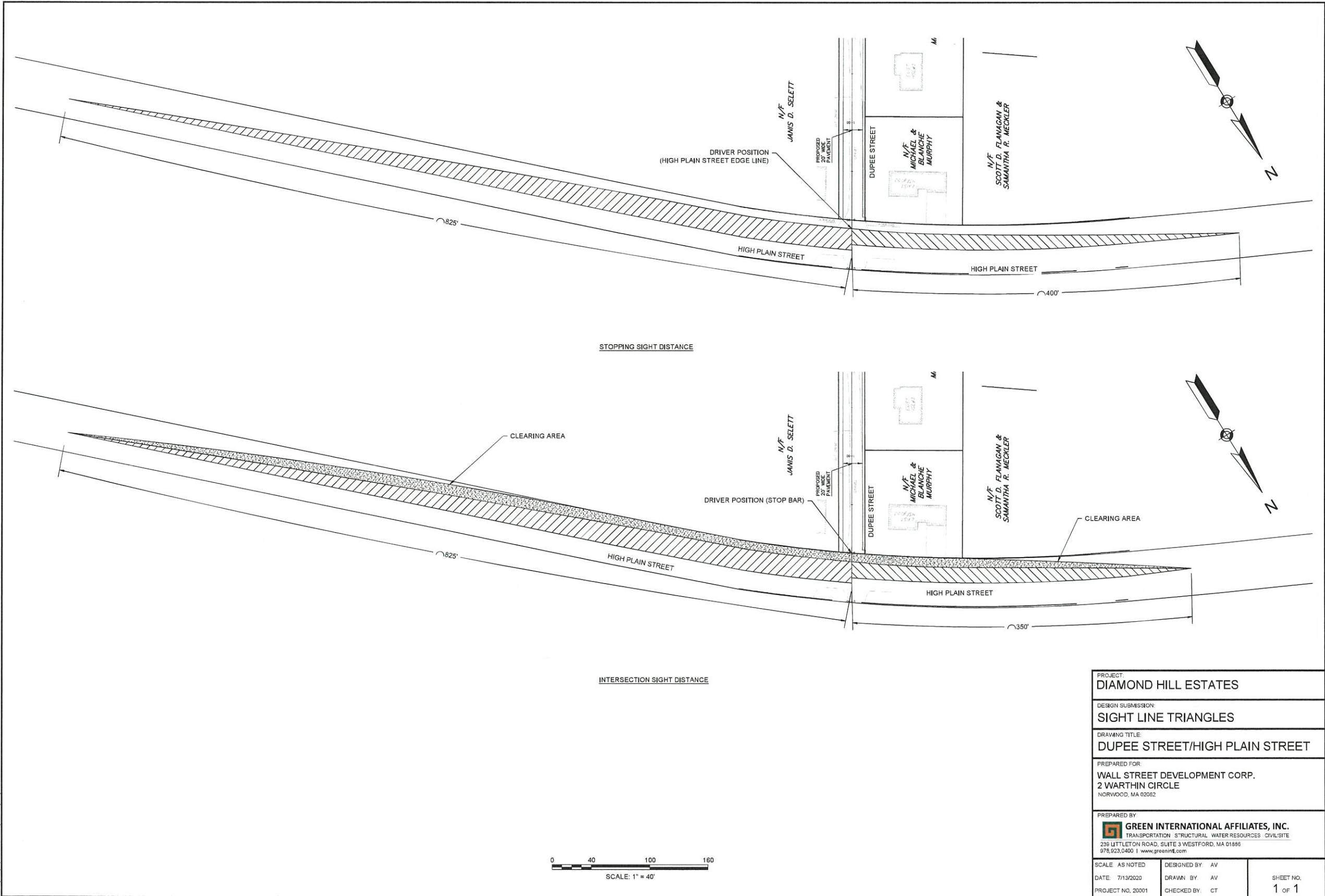
*William J Scully*

William J. Scully, P.E.  
Vice President

WJS/-

Attachments

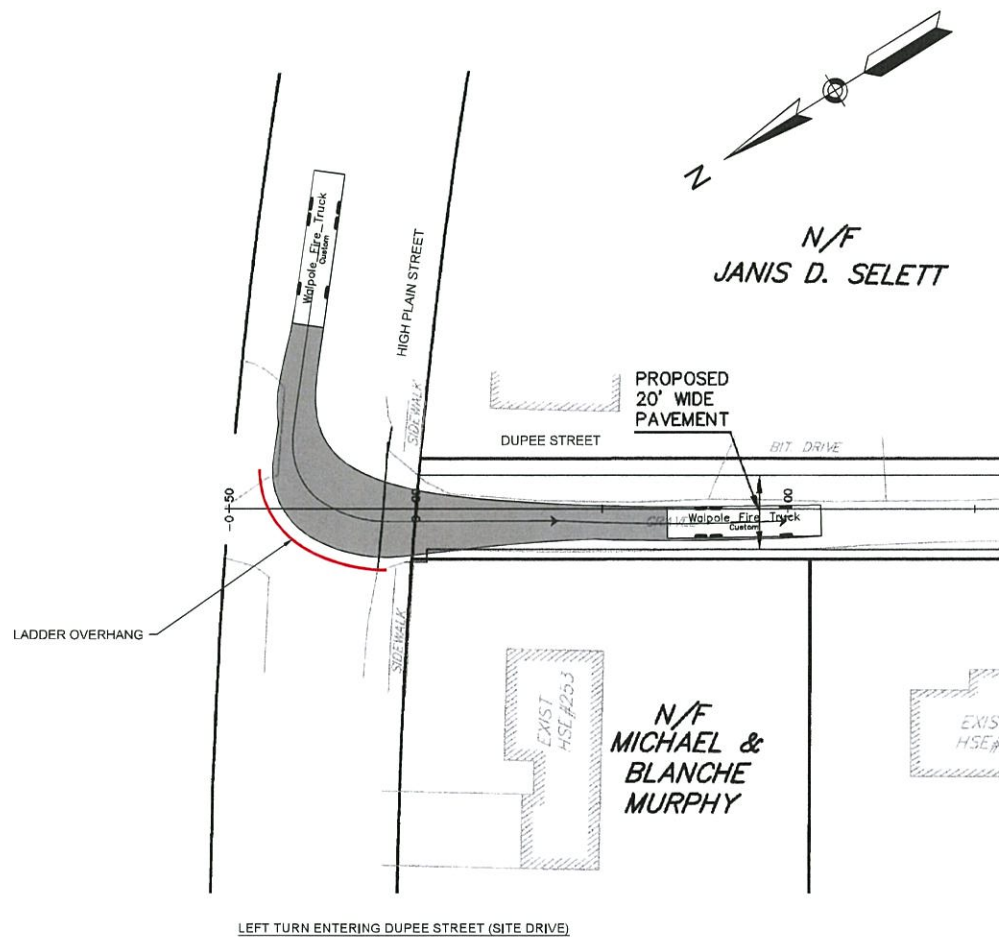
Cc L. Petrozzi



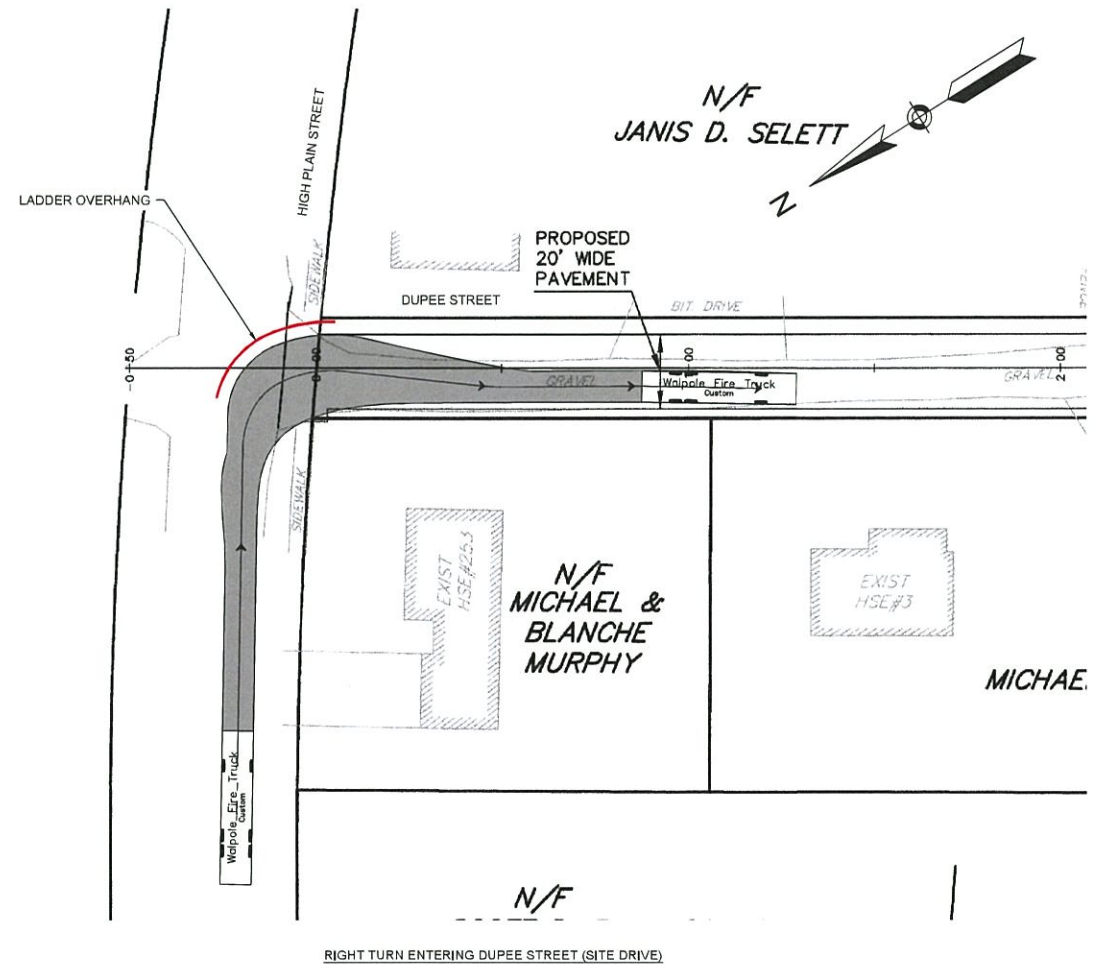
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DESIGN SUBMISSION: <b>SIGHT LINE TRIANGLES</b>		
DRAWING TITLE: <b>DUPEE STREET/HIGH PLAIN STREET</b>		
PREPARED FOR: <b>WALL STREET DEVELOPMENT CORP. 2 WARTHIN CIRCLE NORWOOD, MA 02062</b>		
PREPARED BY:  <b>GREEN INTERNATIONAL AFFILIATES, INC.</b> TRANSPORTATION STRUCTURAL WATER RESOURCES CIVIL/SITE 236 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886 978.623.0400   www.greenintl.com		
SCALE: AS NOTED	DESIGNED BY: AV	SHEET NO. <b>1 of 1</b>
DATE: 7/13/2020	DRAWN BY: AV	
PROJECT NO. 20001	CHECKED BY: CT	

11/11/2020 10:00:00 AM C:\Users\jgreen\OneDrive\Documents\2020\Diamond Hill Estates\11-13-2020\11-13-2020.dwg

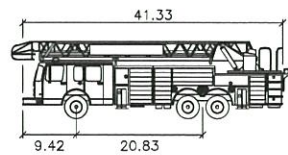




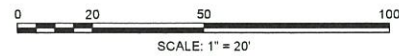
LEFT TURN ENTERING DUPEE STREET (SITE DRIVE)




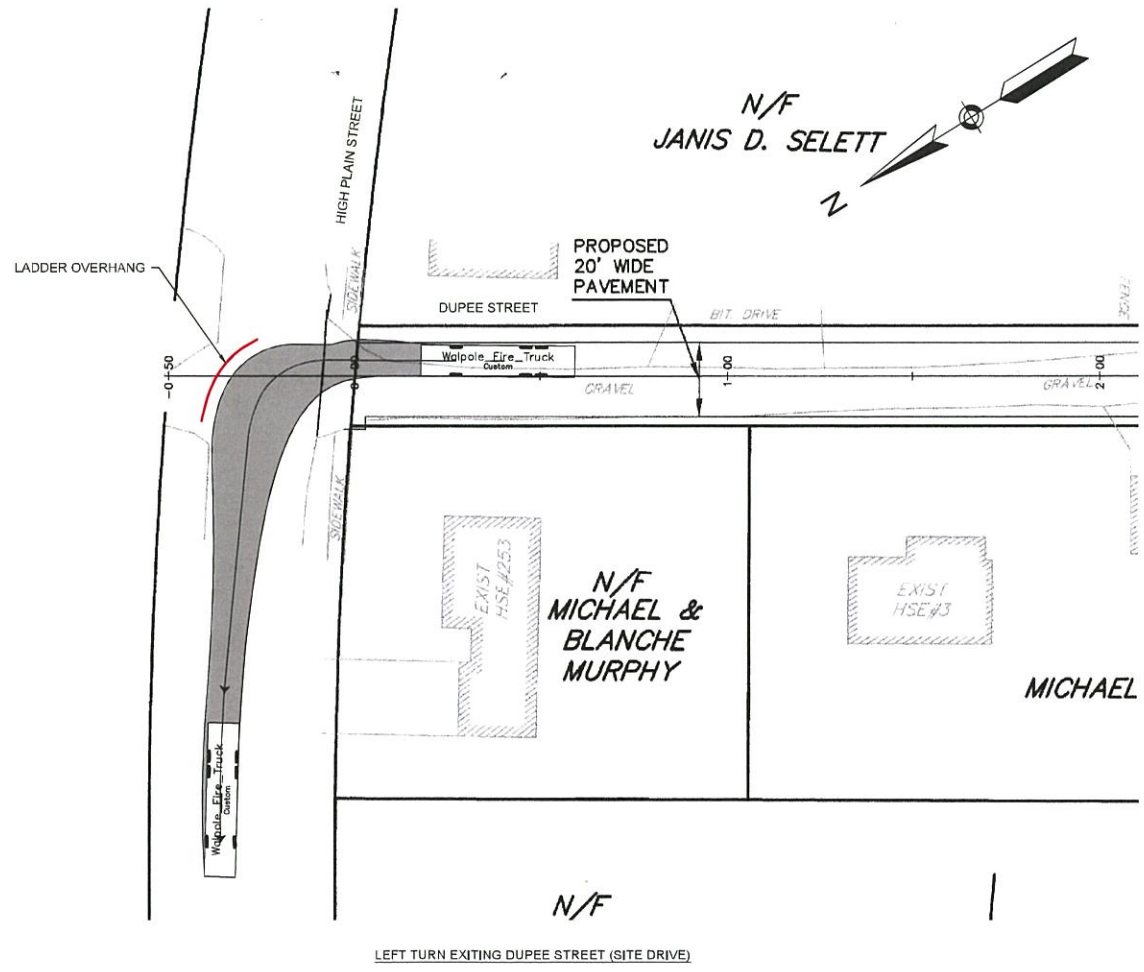
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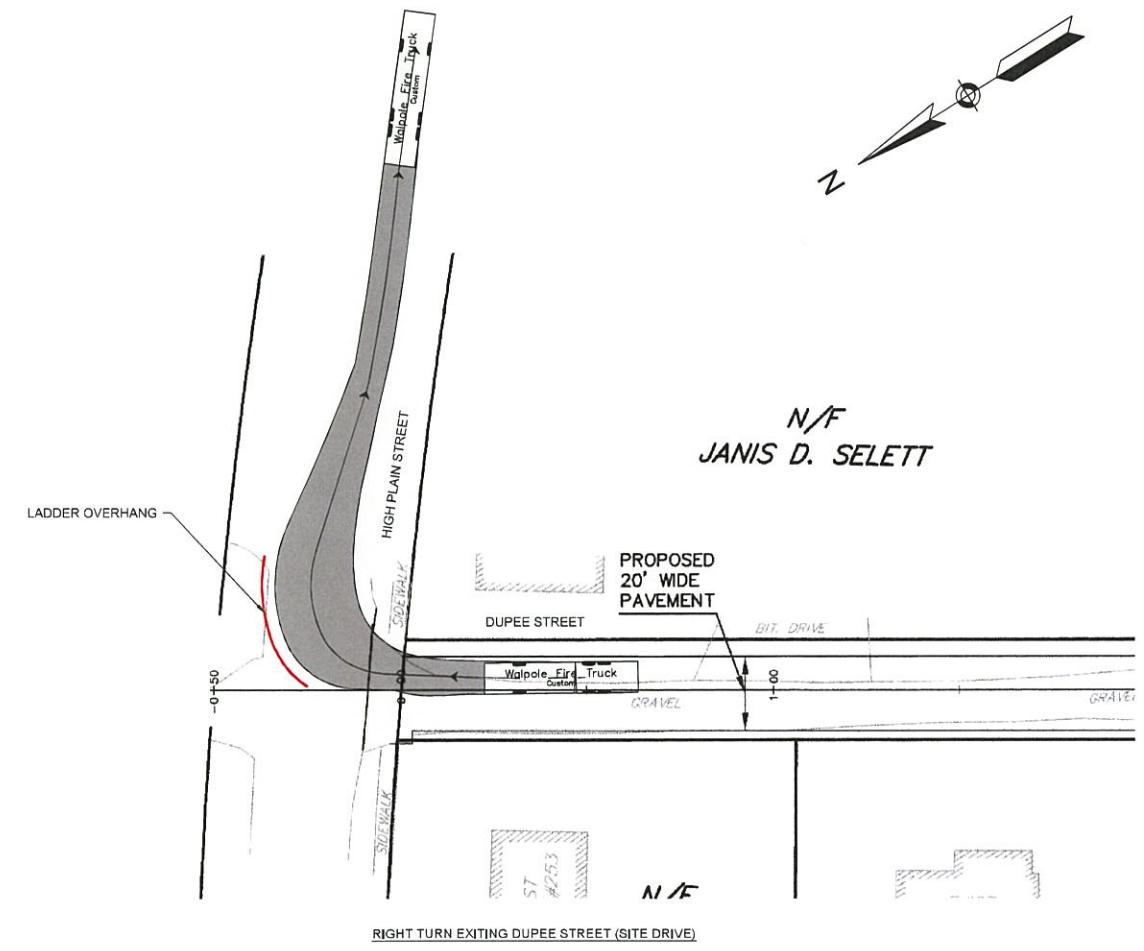
Walpole\_Fire\_Truck  
feet  
Width : 8.33  
Track : 8.33  
Lock to Lock Time : 6.0  
Steering Angle : 42.0



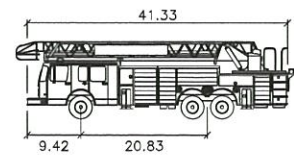
PROJECT: DIAMOND HILL ESTATES		
DESIGN SUBMISSION: TRUCK TURNING MOVEMENTS		
DRAWING TITLE: ENTERING TURNING MOVEMENTS		
PREPARED FOR: WALL STREET DEVELOPMENT CORP. 2 WARTHIN CIRCLE NORWOOD, MA 02062		
PREPARED BY:  GREEN INTERNATIONAL AFFILIATES, INC. TRANSPORTATION STRUCTURAL WATER RESOURCES CIVIL/SITE 239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886 978.923.0400   www.greenintl.com		
SCALE: AS NOTED	DESIGNED BY: AV	SHEET NO. 1 OF 3
DATE: 7/13/2020	DRAWN BY: AV	
PROJECT NO: 20001	CHECKED BY: CT	



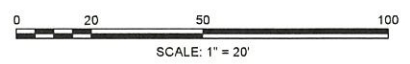
LEFT TURN EXITING DUPEE STREET (SITE DRIVE)



RIGHT TURN EXITING DUPEE STREET (SITE DRIVE)

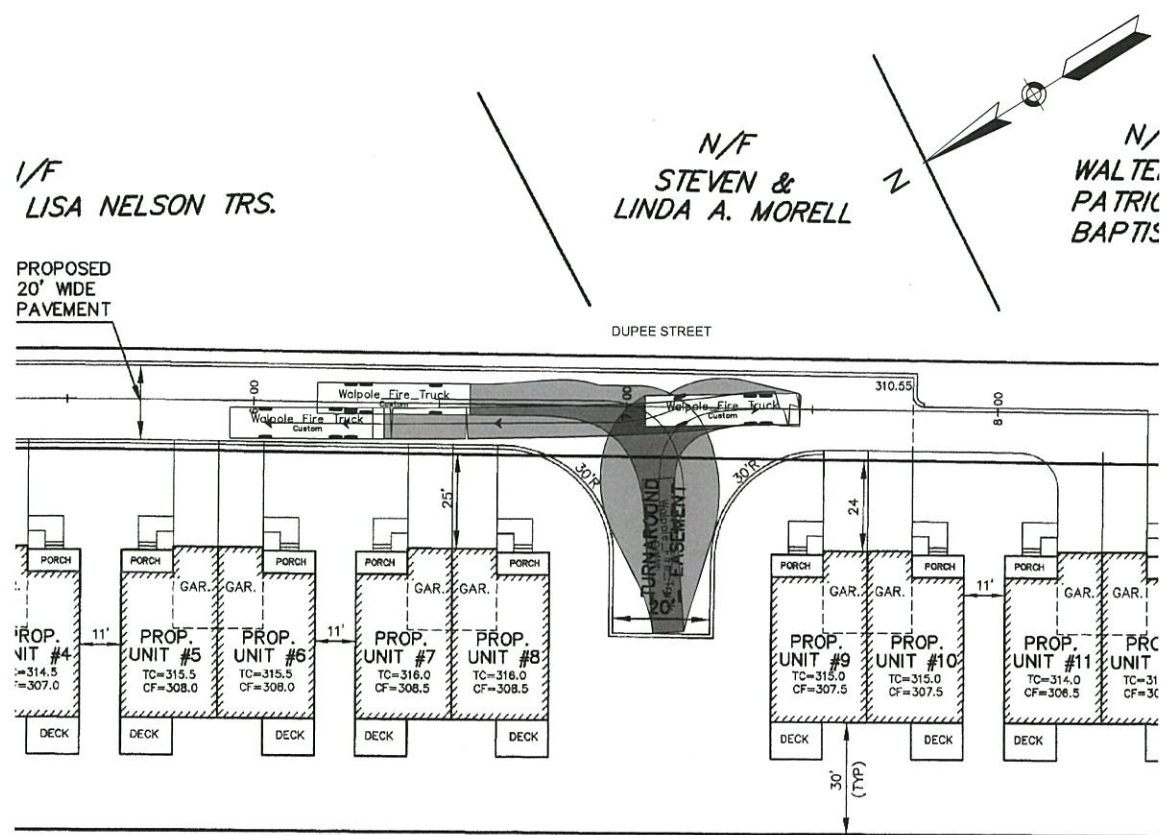


Walpole\_Fire\_Truck  
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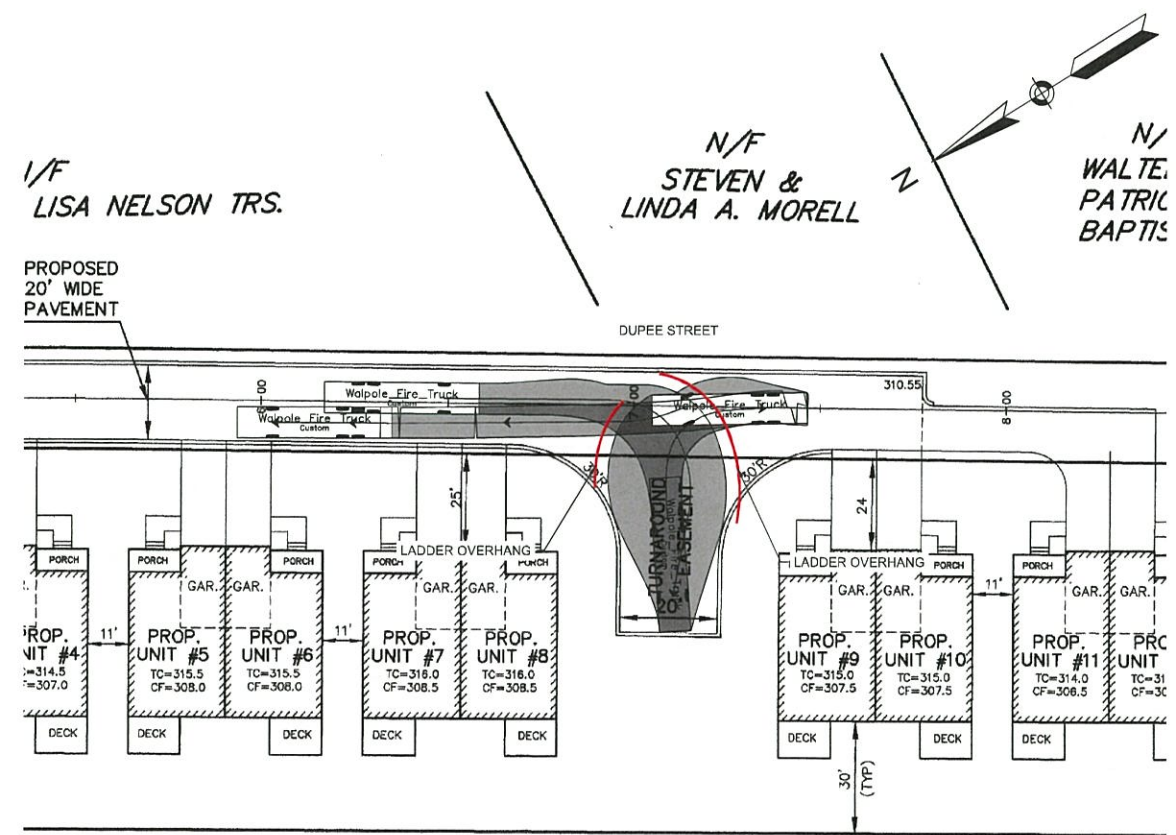


PROJECT: DIAMOND HILL ESTATES	
DESIGN SUBMISSION: TRUCK TURNING MOVEMENTS	
DRAWING TITLE: EXITING TURNING MOVEMENTS	
PREPARED FOR: WALL STREET DEVELOPMENT CORP. 2 WARTHIN CIRCLE NORWOOD, MA 02062	
PREPARED BY: <b>GREEN INTERNATIONAL AFFILIATES, INC.</b> TRANSPORTATION STRUCTURAL WATER RESOURCES CIVIL/SITE 239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886 978.923.0400   www.greenintl.com	
SCALE: AS NOTED	DESIGNED BY: AV
DATE: 7/13/2020	DRAWN BY: AV
PROJECT NO. 20001	CHECKED BY: CT
SHEET NO. 2 OF 3	

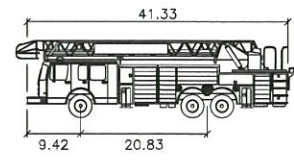




DUPEE STREET HAMMERHEAD TURNAROUND



DUPEE STREET HAMMERHEAD TURNAROUND WITH LADDER OVERHANG



Walpole\_Fire\_Truck

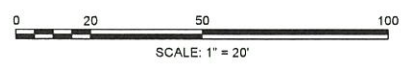
feet

Width : 8.33

Track : 8.33

Lock to Lock Time : 6.0

Steering Angle : 42.0



PROJECT:	DIAMOND HILL ESTATES
DESIGN SUBMISSION:	TRUCK TURNING MOVEMENTS
DRAWING TITLE:	HAMMERHEAD TURNAROUND
PREPARED FOR:	WALL STREET DEVELOPMENT CORP. 2 WARTHIN CIRCLE NORWOOD, MA 02062
PREPARED BY:	GREEN INTERNATIONAL AFFILIATES, INC. TRANSPORTATION STRUCTURAL WATER RESOURCES CIVIL/SITE 239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01885 978.923.0400   www.greenintl.com
SCALE:	AS NOTED
DESIGNED BY:	AV
DATE:	7/13/2020
DRAWN BY:	AV
PROJECT NO.:	20001
CHECKED BY:	CT
SHEET NO.:	3 OF 3