



GREEN INTERNATIONAL AFFILIATES, INC.

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To: Lou Petrozzi, Wall Street Development Corp.
From: Corinne Tobias, PE, PTOE, Green International Affiliates, Inc. (Green)
CC: W. Scully, P.E., Green International Affiliates, Inc. (Green)
Date: February 21, 2020
Project Name: Proposed Diamond Hill Estates Residential Development, Walpole
Project Number: Green No. 20001
Subject: Traffic Assessment for Diamond Hill Estates Development

Green has prepared this traffic assessment for the proposed Diamond Hill Estates development located on Dupee Street (off High Plain Street) in Walpole, MA. The development consists of 6- duplex style buildings comprising of 12 townhouse residential units to be developed by Wall Street Development Corp. ("Wall Street"). Access to this proposed site will be provided directly along Dupee Street, which will be reconstructed under this proposed development as it intersects with High Plain Street to the north. This assessment is in conformance with the recent guidelines adopted by the Walpole Zoning Board of Appeals for projects with under twenty (20) units of housing.

The project location is shown in Figure 1 with respect to the surrounding area. This assessment includes:

- A summary of the existing characteristics of the abutting roadway network and site access
- Trip generation projections for the proposed residential development
- Sight distance analysis at the proposed site access driveway locations
- Truck turning movement analysis for the Walpole Fire Engine

Figure 1 - Overall Project Area



EXISTING ROADWAY NETWORK

The assessment focused on the roadway network in the immediate vicinity of the proposed project with an emphasis on the proposed site access from Dupee Street to the development site. As part of this assessment, a field reconnaissance was conducted to verify the physical and geometric layout of the study area roadways and to observe traffic operations in the study area. A description of the study roadways serving the project site is as follows:

High Plain Street

High Plain Street is functionally classified as a Principal Arterial that is owned and maintained by the Town of Walpole. It is generally oriented in the east-west direction. Throughout the study area, High Plain Street operates as a two-lane, two-way roadway accommodating eastbound and westbound vehicles. The total width of the roadway is approximately 24 feet next to the proposed access way of Dupee Street. There are shoulders on both sides of the roadway at approximately 1 foot wide. A sidewalk exists along the south side of the roadway for pedestrian accommodation. The surrounding land use(s) is primarily residential with some scattered wooded land. The posted speed limit for High Plain Street is 35 MPH.



High Plain Street at Proposed Site Driveway, looking from west

Dupee Street

Dupee Street is classified as a local road that is currently privately owned and serves as access for two (2) residential homes. It is oriented in the north-south direction. Dupee Street is currently a dead-end gravel road of approximately 300 feet that is maintained by the town of Walpole. The defined width of the existing roadway is approximately 12 feet. It currently operates as a one-lane roadway accommodating northbound and southbound vehicles. There are no shoulders or no pedestrian accommodations on this road under existing conditions. There is no posted speed limit for Dupee Street. The proposed development project includes the extension of the private way portion of Dupee Street and improve the entire right of way to a paved width of 20 feet its entirety.



Dupee Street looking south from High Plain Street

High Plain Street at Dupee Street

High Plain Street and Dupee Street form an unsignalized T-intersection. High Plain Street operates freely as the major east-west legs, while Dupee Street operates as the minor northbound approach. It operates as STOP controlled on the minor approach. The approaches of this intersection are perpendicular to each other and contain flat grades. Pedestrian accommodation is provided by the sidewalk along the south side of High Plain Street that includes a curb ramp at the Dupee Street intersection approach.

PROPOSED PROJECT SITE CHARACTERISTICS

The proposed development consists of 6 duplex style buildings with a total of 12 townhouse residential units. The development is set to be constructed along a repaved/widened Dupee Street, which provides access High Plain Street to form a T-intersection. Land use within the project area includes forest land surrounded by residential housing. The proposed site plan for the project is shown in the Appendix.

Travel Forecasting

In order to estimate the number of trips that could be generated by the proposed development, statistics published by the Institute of Transportation Engineers (ITE) in Trip Generation Manual for similar land uses were examined. While the project consists of duplex townhouses that are normally smaller in size and lower average occupancy than a typical 3 and 4 bedroom detached single family home, Land Use Code (LUC) 210 – Single Family Detached Housing was selected from the current ITE database as the most similar to the project. However, it will result in somewhat conservative estimates of trip making characteristics. Using LUC 210 trip models, the estimated vehicle trips generated by the project are presented in Table 2. Detailed trip generation calculations for the proposed development are included in the Appendix.

Table 1 – Summary of Project Trip Generation

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday Daily		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Residential Housing (8 units)	3	10	13	8	5	13	74	74	148

As indicated in Table 2, the proposed 12 unit project is estimated to result in a weekday total of approximately 148 net new vehicle trips over the course of a typical weekday with 74 entering trips and 74 exiting trips made in that time. During the weekday morning peak hour, the proposed project is expected to generate approximately 13 net new vehicle-trips with 3 entering trips and 10 exiting trips. During the weekday afternoon peak hour, the proposed project is expected to generate approximately 13 net new vehicle-trips with 8 entering trips and 5 exiting trips. Overall, the proposed project would be considered a low trip generator type project. Based on the estimated vehicle trips, the additional traffic is expected to create minimal impact to the traffic operations on the High Plain Street mainline.

SIGHT DISTANCE EVALUATION

Adequate sight distance is an important safety consideration at intersections and driveways. Stopping and Intersection Sight distances were reviewed at the proposed site drive location.

The minimum criteria are defined by the American Association of State and Highway and Transportation Officials (AASHTO)¹. SSD relates specifically to safety. 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 avoid collisions. A criterion for calculating minimum required sight distances can be established based on the posted speed limit. It is noted that the posted speed limit for High Plain Street is 35 MPH.

¹ American Association of State Highway and Transportation Officials (AASHTO), [A Policy on Geometric Design of Highways and Streets](#), (Green Book) Washington, D.C., 2011.

The SSD and ISD were measured in the field at the proposed Dupee Street/High Plain Street intersection and compared to minimum and desirable distances; Table 2 summarizes the results of the evaluation.

Table 2 – Summary of Sight Distance Analysis: High Plain Street

COUNTY STREET SITE DRIVEWAY	SIGHT DISTANCE		
	35 MPH		
	MEASURED (FT)	MINIMUM REQUIRED (FT)	DESIRABLE (FT)
High Plain Street Eastbound	825	250	-
High Plain Street Westbound	400	250	-
INTERSECTION SIGHT DISTANCE			
Dupee Street, looking east (High Plain Street WB traffic)	825	250	390
Dupee Street, looking west (High Plain Street EB traffic)	350	250	390

As shown in Table 2, minimum SSD was satisfied for 35 mph in both travel directions on High Plain Street approaching Dupee Street. While the ISD looking west from Dupee Street onto High Plain Street is limited to 350 feet by the roadway curvature, the minimum ISD criteria is easily satisfied from Dupee Street looking in both directions from the Dupee Street approach onto High Plain Street.

CONCLUSIONS AND RECOMMENDATIONS

As discussed above, Green conducted an assessment for the proposed residential development of 6 townhouse style duplex units on Dupee Street and this resulted in the following conclusions:

- The development of 6 duplex style buildings with twelve (12) residential townhouse units will be a low generator of traffic with an estimated peak hour generation of 13 total vehicle trips (enter plus exit) equating to approximately one vehicle every 5 minutes
- Proposed improvements to Dupee Street including providing a paved, 20 foot way for the total length of the roadway, along with a 90 foot diameter turnaround will afford safe access to vehicles.
- The proposed turnaround at the end of Dupee Street will provide safe turning access for large vehicle, including the Walpole Fire apparatus,
- Sight distance analysis completed at the existing intersection of High Plain Street with Dupee Street indicated that safe sight distance criteria will be adequately satisfied.

Consequently, it is expected that the development of Diamond Hill Estates on Dupee Street will have minimal impacts on the current traffic characteristics on the abutting street system. It is recommended, however, that when Dupee Street is improved, STOP sign control be installed at the intersection with High Plain Street, a crosswalk across Dupee Street be marked and any necessary repairs to the handicap ramps be made to ensure ADA compliance.

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Appendix

Trip Generation Calculations

Project Site Plan

Truck Turning Movement Analysis

TRIP GENERATION WORKSHEET

LAND USE: *Single Family Detached Housing*
 LAND USE CODE: 210 Independent Variable---Trips per DU
 SETTING/LOCATION: General Urban / Suburban

JOB: Proposed Diamond Hill Estates, Walpole, MA
 JOB NUMBER: 20001 Number of Units: 12

WEEKDAY

RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	9.44	4.81	19.39	50%	50%	159
AM PEAK	0.74	0.33	2.27	25%	75%	173
PM PEAK	0.99	0.44	2.98	63%	37%	190
PK GEN AM	0.76	0.36	2.27	26%	74%	157
PK GEN PM	1	0.49	2.98	64%	36%	165

	BY AVERAGE		
	Total	Enter	Exit
DAILY	113	57	57
AM PEAK	9	2	7
PM PEAK	12	8	4
PK GEN AM	9	2	7
PK GEN PM	12	8	4

	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	148	74	74	0.95
AM PEAK	13	3	10	0.89
PM PEAK	13	8	5	0.92
PK GEN AM	12	3	9	0.89
PK GEN PM	15	10	5	0.92

SATURDAY

RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	9.54	5.32	15.25	50%	50%	52
PEAK HR	0.93	0.64	1.75	54%	46%	31

	BY AVERAGE		
	Total	Enter	Exit
DAILY	114	57	57
PEAK HR	11	6	5

	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	134	67	67	0.91
PEAK HR	28	15	13	0.87

SUNDAY

RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	8.55	4.74	11.82	50%	50%	51
PEAK HR	0.85	0.6	1.45	53%	47%	31

	BY AVERAGE		
	Total	Enter	Exit
DAILY	103	52	52
PEAK HR	10	5	5

	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	41	21	21	0.94
PEAK HR	21	11	10	0.88

SOURCE: Trip Generation, 10th Edition, Institute of Transportation Engineers, 2017.

NO.	DATE	DESCRIPTION
1	8/30/19	CUL-DE-SAC LAYOUT

REVISIONS

PREPARED FOR
 WALL STREET DEVELOPMENT CORP.
 WESTWOOD, MA 02090

WALPOLE, MASSACHUSETTS

A COMPREHENSIVE PERMIT M.G.L.C. 40B
 "DIAMOND HILL ESTATES"
 SITE DEVELOPMENT PLAN

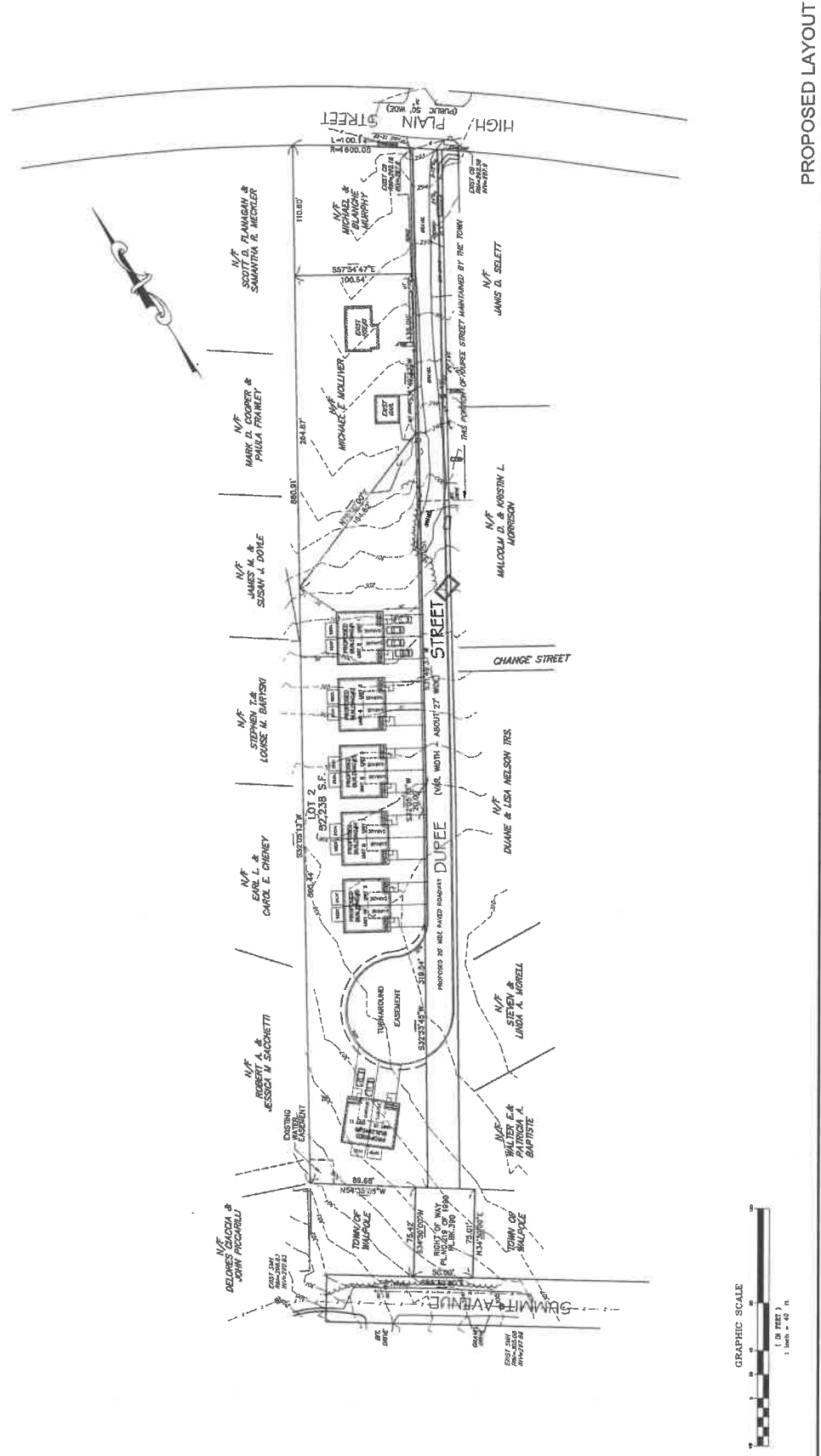
GLM Engineering, Inc.
 19 EXCHANGE STREET
 WILMINGTON, MASSACHUSETTS
 F. 508-429-1100
 F. 508-429-7180
 www.glmengineering.com

JOB NO. 1621B
 DATE: MAY 9, 2019
 SCALE: 1"=40'
 SHEET: 2 of 2
 PLAN #: 27.321

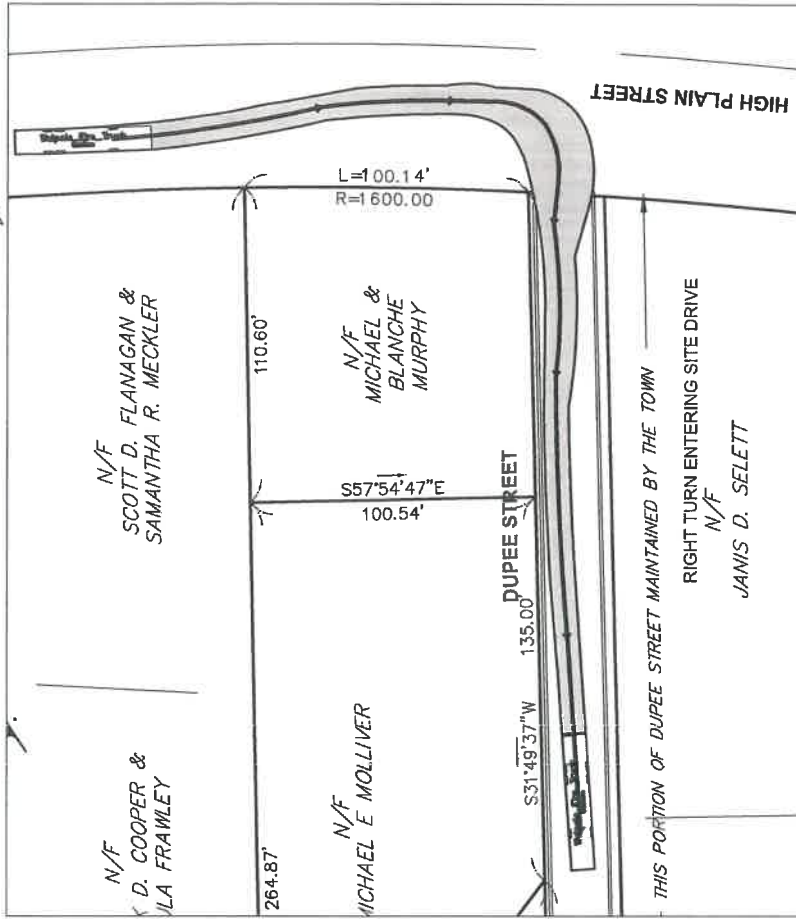
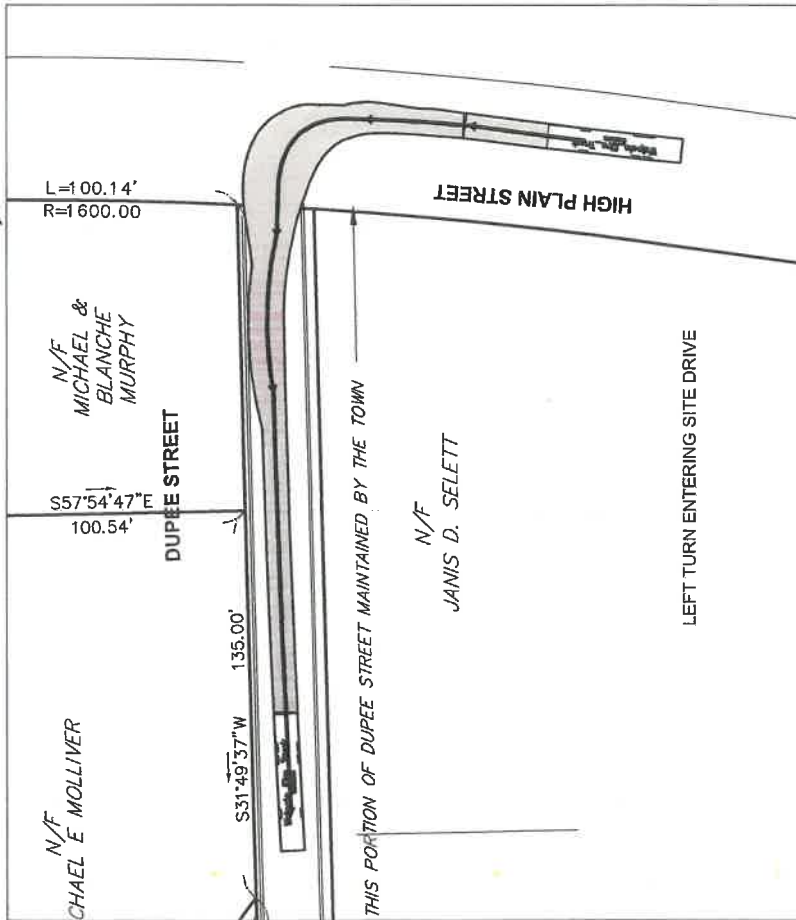
ZONING DATA
 RESIDENCE-B (RR)
 LOT AREA: 20,000 S.F.
 FRONT: 125 FT.
 DEPTH: 30 FT.
 REAR: 30 FT.
 MAXIMUM BUILDING HEIGHT: 35 FT.
 MAXIMUM STORES: 2.5

PERMITTED
 LOT COVERAGE: 25% (13,000 sq ft)
 TOTAL IMPERVIOUS (Buildings & Imp): 45.1K (23,500 sq ft)

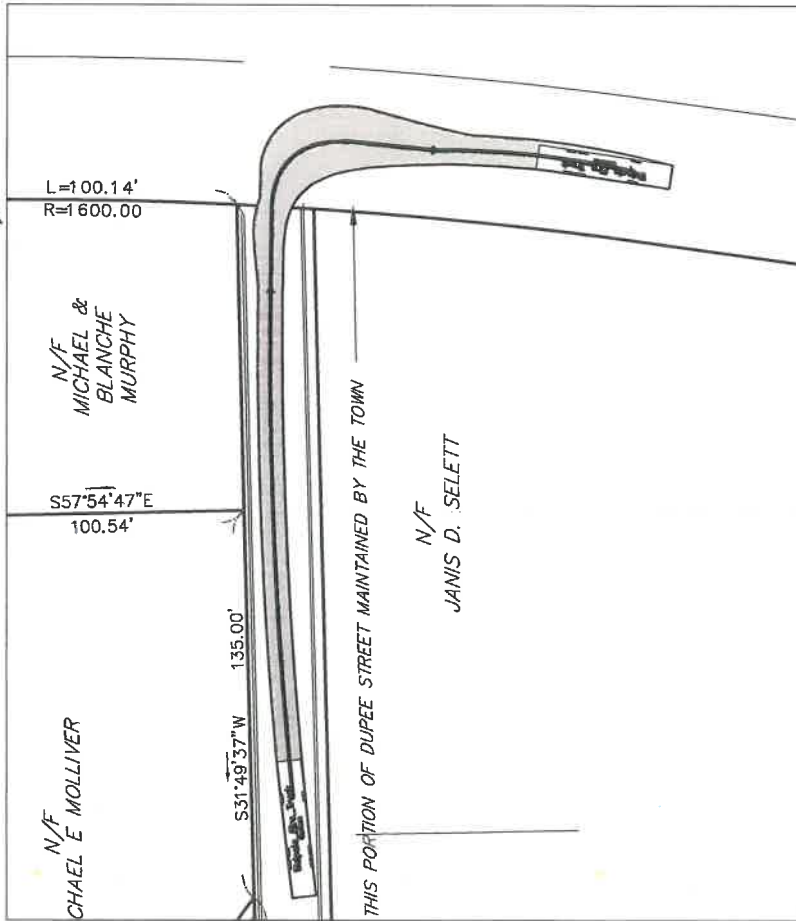
REFERENCES: REFERENCE MAP "SA, WALPOL, 2014"
 DEED REFERENCES: NEWBOLD COUNTY REGISTRY OF DEEDS, BL. 2077K, PG. 209
 NEWBOLD COUNTY REGISTRY OF DEEDS, FILE IN PLAN BOOK 77, PLAN 3721
 DEEDS OF RECORD: DEEDS BOOK REALTY TRUST, P.O. BOX 31, SA, WALPOL, MA
 ZONING CLASSIFICATION: RESIDENCE-B (RR)
 LOT AREA: 20,000 S.F.
 SETBACKS: 125 FT.
 FRONT: 30'
 REAR: 30'



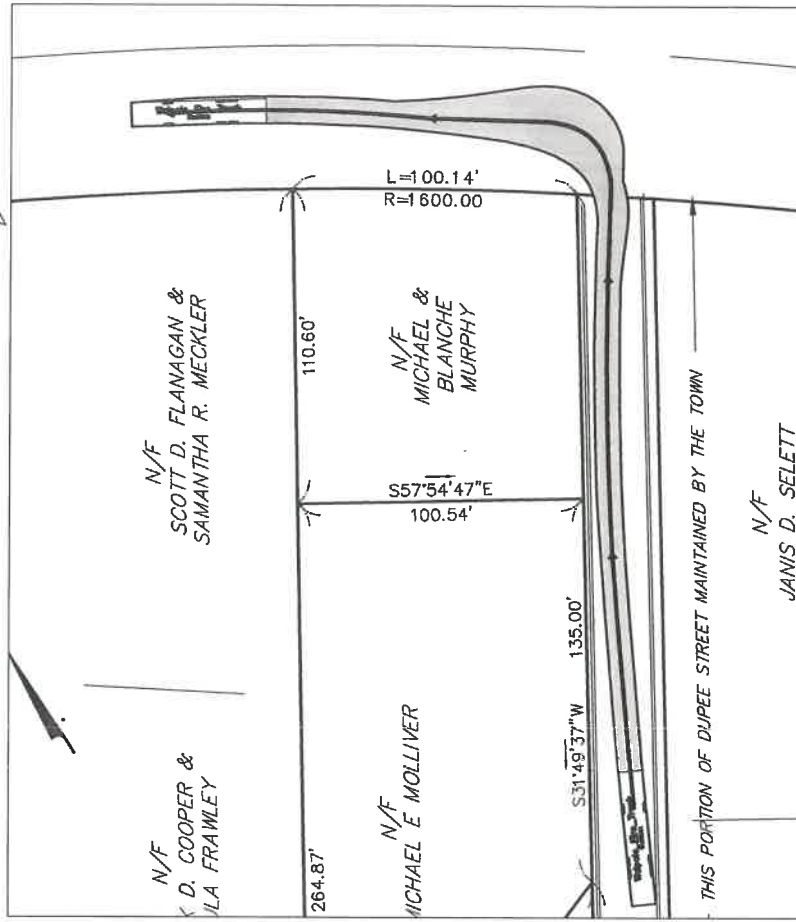
PROPOSED LAYOUT




PROJECT:	MOOSE HILL ROAD DEVELOPMENT
DESIGN SUBMISSION:	TURNING MOVEMENTS
DRAWING TITLE:	EXITING SITE DRIVE
PREPARED FOR:	RADKE, LLC
PREPARED BY:	GREEN INTERNATIONAL AFFILIATES, INC. Civil and Structural Engineers Professional Registration Greenland, Vermont
SCALE:	1" = 20'
DATE:	01/16/2020
PROJECT NO.:	1915091
DESIGNED BY:	DP
DRAWN BY:	DP
CHECKED BY:	CT
SHEET NO.:	01
OF SHEETS:	02



RIGHT TURN EXITING SITE DRIVE



LEFT TURN EXITING SITE DRIVE

PROJECT:	MOOSE HILL ROAD DEVELOPMENT
DESIGN SUBMISSION:	TURNING MOVEMENTS
DRAWING TITLE:	EXITING SITE DRIVE
PREPARED FOR:	RADKE, LLC
PREPARED BY:	GREEN INTERNATIONAL AFFILIATES, INC. Civil and Structural Engineers Worcester, Massachusetts 
SCALE:	1" = 20'
DATE:	01/15/2020
PROJECT NO.:	19113.00
DESIGNED BY/DP:	CP
DRAWN BY:	CP
CHECKED BY:	CT
SHEET NO.:	02
OF:	02