

To: Varsity Wireless, LLC

Cc: Cape Cod Commission

From: ProTerra Design Group, LLC

Date: October 22, 2014

RE: Driveway Sight Distance Analysis along US Route 6

Applicant: Varsity Wireless, LLC

Site Name: WELLFLEET 6

Site Number: VW-MA-0057

**Address: 724 US Route 6
Wellfleet, MA 02667**

Varsity Wireless, LLC proposes to construct a 150-foot tall monopole tower within a 57-foot by 57-foot fenced compound. In order to provide maintenance vehicle access to the tower compound, a 15-foot wide access easement will follow the existing gravel driveway from US Route 6 (public right-of-way) to the compound in the southeast corner of the property. This letter is intended to provide a sight distance analysis at the existing driveway along the east side of US Route 6 as shown on the attached Figure #1 prepared by ProTerra Design Group, LLC.

Background Information

The proposed tower and compound will be located within the property whose address is 724 US Route 6, Wellfleet, MA 02667. Currently, an existing gravel driveway provides access to the property containing the commercial business, Cape Cod Disposal Co., an office, and a small apartment. The existing driveway is approximately 800-feet south of Lieutenant Island Road and approximately 1,350-feet north of Richards Way. It is assumed that the occupying landowner has obtained the proper cub cut permit for the existing driveway, and the existing use will remain commercial.

An existing asphalt driveway apron extends into the property for approximately 25-feet at an approximately flat grade. The driveway intersection does not contain marked turning lanes or a traffic control device (i.e. stop sign, etc.). For the purposes of this analysis, the intersection will be treated as a stop controlled minor roadway intersecting an uncontrolled major roadway. Refer to Photo #1.



Photo #1 – Existing Driveway Apron

US Route 6 has a posted speed of 45 MPH with slopes ranging approximately from 1-3% in both directions from the driveway. Refer to Photos #2 and #3.



Photo #2 – Looking South from Driveway along US Route 6



Photo #3 – Looking North from Driveway along US Route 6 towards Lieutenant Island Road

Once the tower facility becomes fully operational, normal and routine maintenance by tower owner's and carrier's technicians will be performed. Each carrier plus the tower owner on average may visit the tower once per month for normal maintenance resulting in less than one trip per day (low use). The estimated vehicular traffic generated by these visits is predicted to be less than the typical traffic generated by a single-family dwelling (4-22 trips per day).

Intersection Sight Distance Analysis

The AASHTO manual, *A Policy on Geometric Design of Highways and Streets, 2001 Fourth Edition* (Green Book), was used to provide evaluation of sight distance at the driveway intersection. Two separate cases were analyzed. Case B1 assumes a left turn movement from the driveway into the southbound lane of US Route 6. Case B2 assumes a right turn movement from the driveway into the northbound lane of US Route 6. In both scenarios, the decision point was assumed to be 14.5-feet behind the white shoulder stripe along the east side of US Route 6.

The following equation for intersection sight distance was used:

$$ISD = 1.47 * V_{major} * t_g$$

ISD = intersection sight distance (length of leg of sight triangle along the major road) (FT)

V_{major} = posted speed of major road (MPH)

t_g = time gap for minor road vehicle to enter the major road (S)

Time gap becomes the variable when analyzing the different turning movement situations. Acceptable time gap values provide in the Green Book were utilized for both Case B1 and Case B2. Tables 1 and 2 show the sight distance requirements for Case B1 and Case B2, respectively.

Table 1: Case B1 – Left Turn Movement from Minor Roadway

Design Vehicle	Time Gap t_g (Seconds)	V_{major} (MPH)	ISD Calculated (FT)	ISD Design (FT)
Passenger Car	7.5	45	496.1	500
Single-Unit Truck	9.5	45	628.4	630
Combination Truck	11.5	45	760.7	765

Table 2: Case B2 – Right Turn Movement from Minor Roadway

Design Vehicle	Time Gap t_g (Seconds)	V_{major} (MPH)	ISD Calculated (FT)	ISD Design (FT)
Passenger Car	6.5	45	430.0	430
Single-Unit Truck	8.5	45	562.3	565
Combination Truck	10.5	45	694.6	695

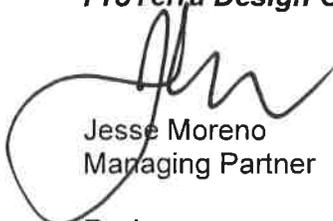
Intersection sight triangles depicting both Case B1 and Case B2 for each design vehicle are shown on Figures #2-#4, respectively.

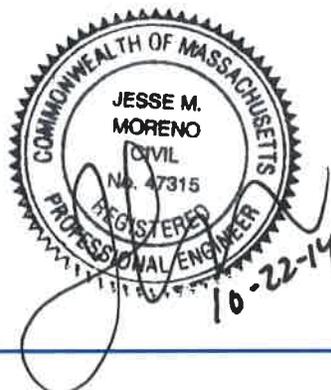
Summary and Conclusions

Based on existing roadway geometry and posted speed limits, in our opinion, the existing driveway has adequate intersection sight distance for the proposed tower compound maintenance vehicle traffic. Proposed traffic generated by the tower facility after construction is a low trip generation and is predicted to be less than the typical traffic generated by a single-family dwelling.

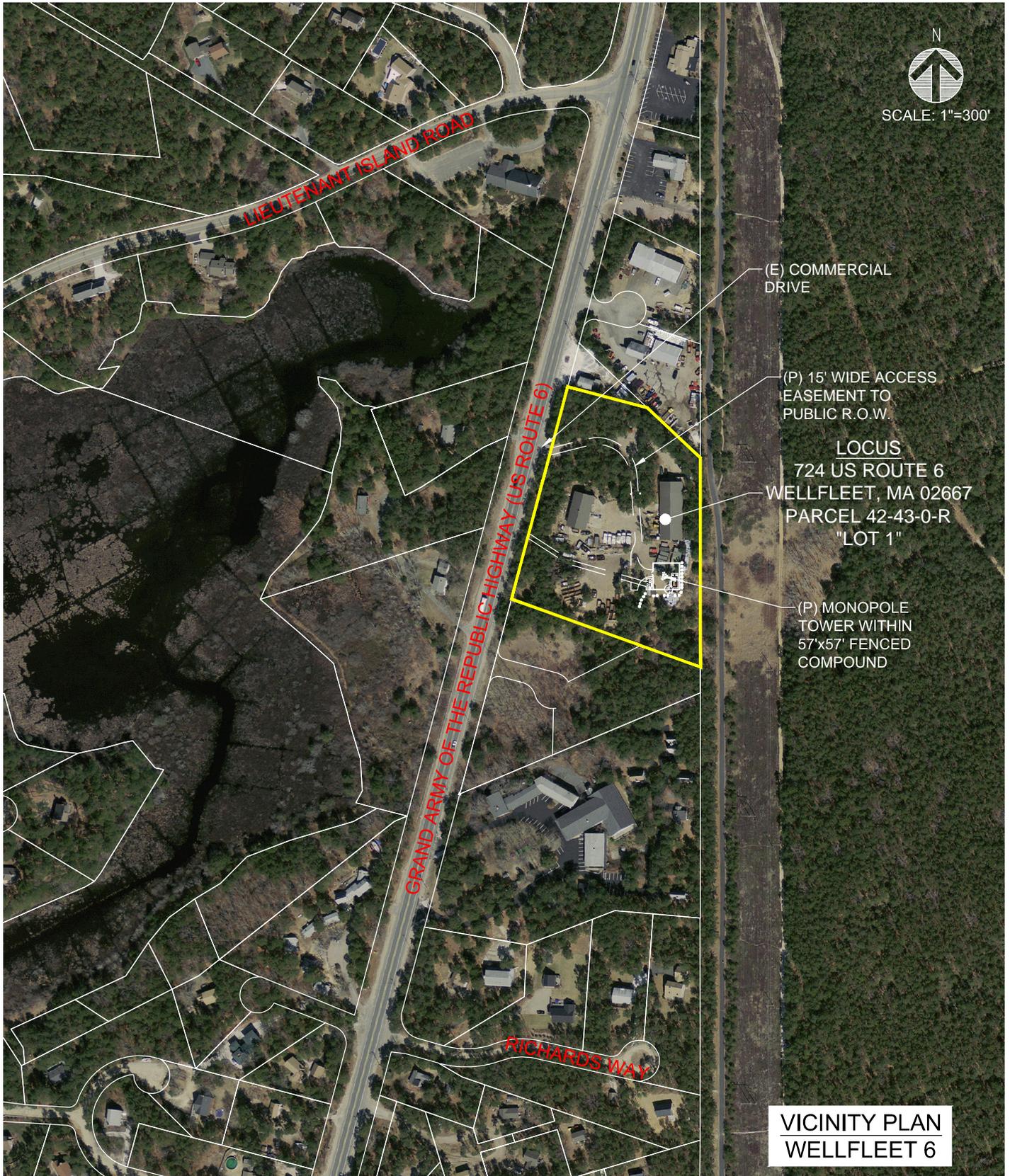
If you have any questions or need further information, please do not hesitate to call.

Sincerely,
ProTerra Design Group, LLC


 Jesse Moreno
 Managing Partner



Enclosures



VICINITY PLAN
WELLFLEET 6

ProTerra
DESIGN GROUP, LLC

4 Bay Road, Bldg A,
Suite 200
Hadley, MA 01035

Ph: (413)320-4918
Fax: (413)320-4917

SIGHT DISTANCE EXHIBIT

SITE NUMBER: VW MA 0057
 SITE NAME: WELLFLEET 6
 ADDRESS: 724 US ROUTE 6
 WELLFLEET, MA 02667



varsity wireless

JOB NO.: 14-009

REVISION: 0

DATE: 10/22/14

FIGURE: #1



ProTerra

DESIGN GROUP, LLC

4 Bay Road, Bldg A,
Suite 200
Hadley, MA 01035

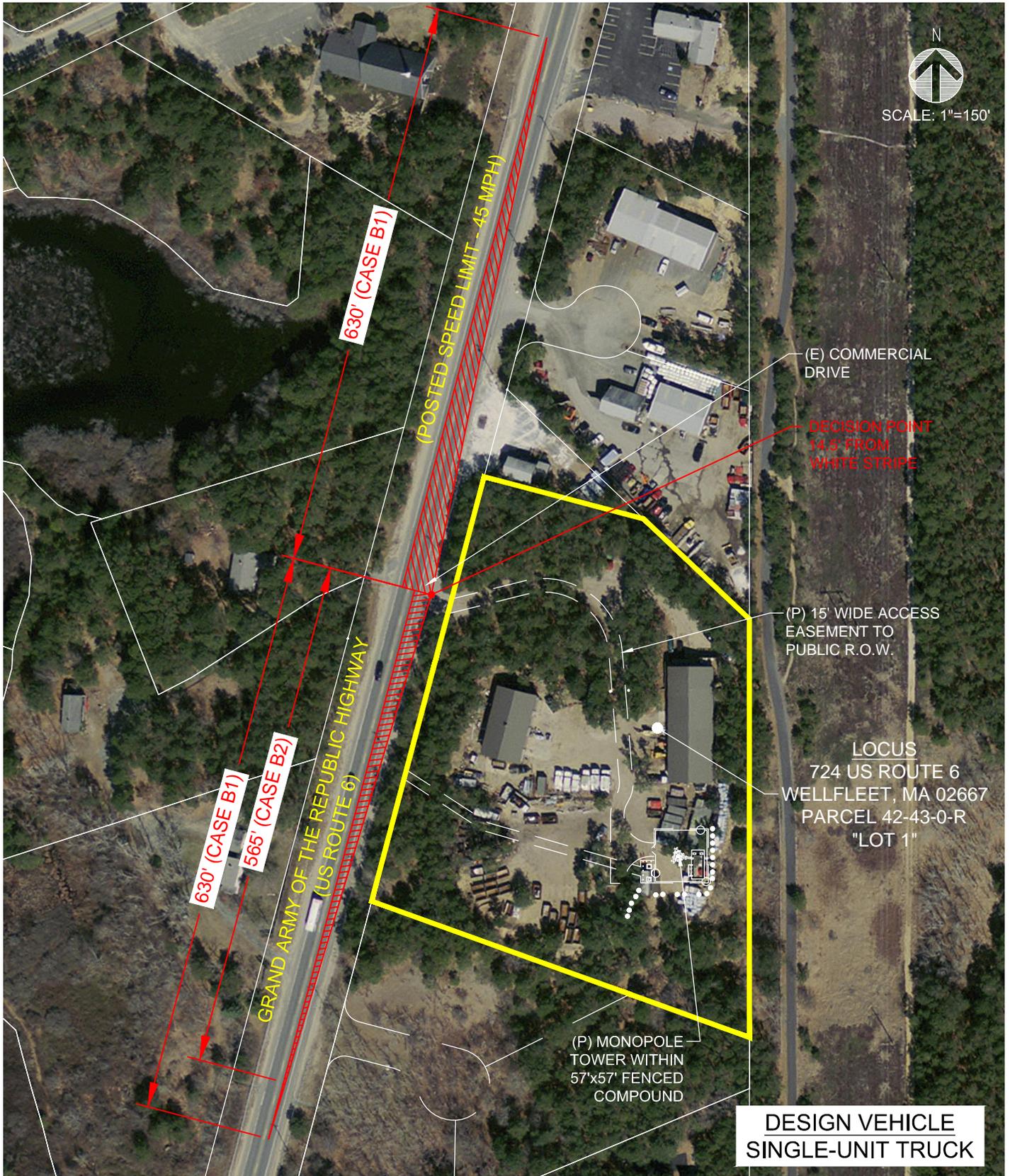
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JOB NO.: 14-009	REVISION: 0	DATE: 10/22/14	FIGURE: #2
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SCALE: 1"=150'

**DESIGN VEHICLE
SINGLE-UNIT TRUCK**

ProTerra
DESIGN GROUP, LLC

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Suite 200
Hadley, MA 01035

Ph: (413)320-4918
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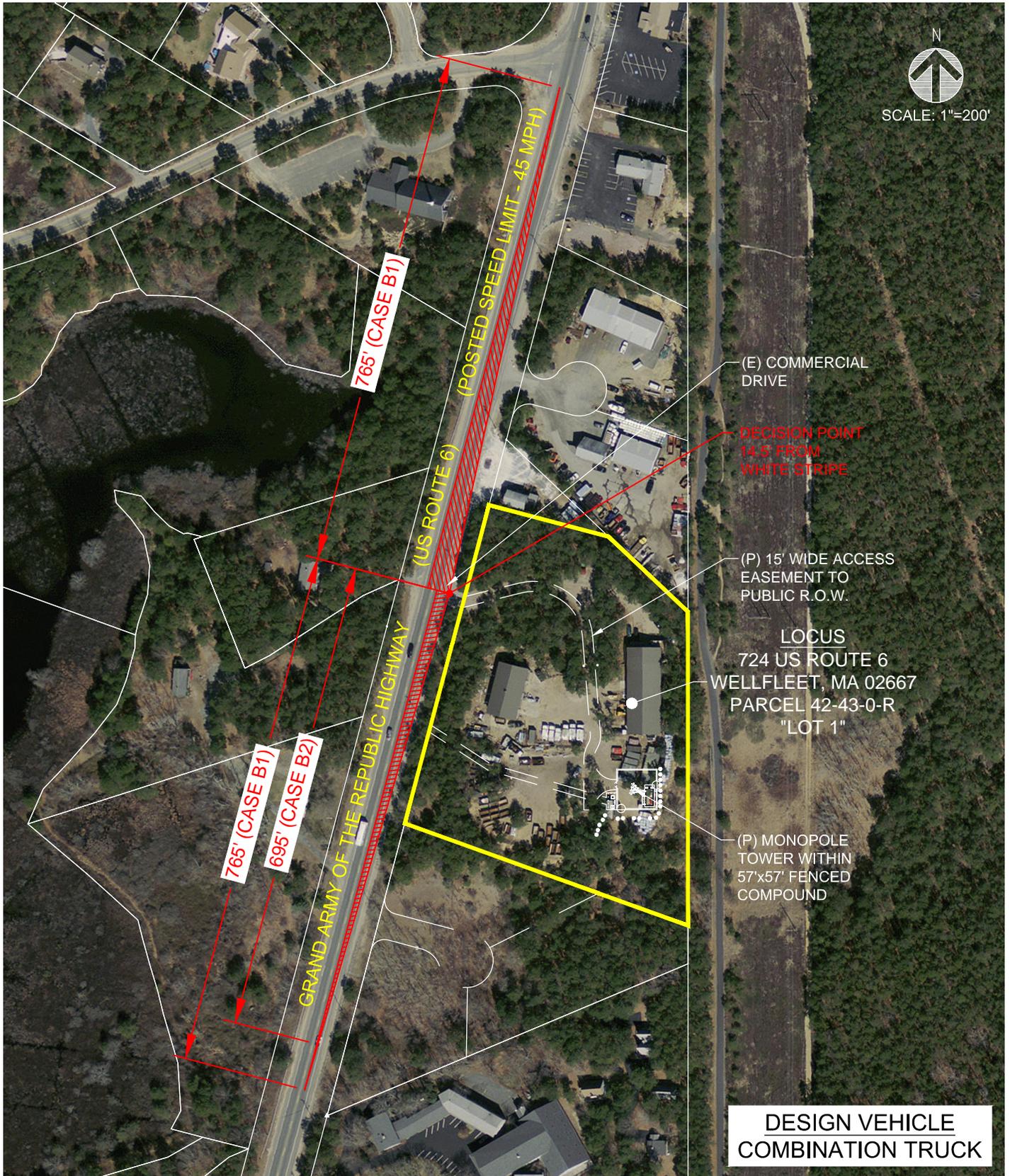


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FIGURE: #3



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FIGURE: #4