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# TOWN OF DEDHAM

*Commonwealth of Massachusetts*

55 RIVER STREET
DEDHAM, MA 02026-2935

(781) 751-9350
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www.dedham-ma.gov

DEPARTMENT OF INFRASTRUCTURE ENGINEERING

# INITIAL TRAFFIC EVALUATION

TO: Transportation Advisory Committee

FROM: Jason L. Mammone, P.E., Director of Engineering

DATE: October 3, 2014

SUBJECT: Traffic Calming Request #2013-003 – Highland Street

## Purpose

The Transportation Advisory Committee (TAC), at their 09/16/14 meeting, reviewed the traffic calming request form (#2013-003) submitted by Loretta DeBlasio of 390 Highland Street. Based upon the information provided in the form, Ms. DeBlasio's concerns were the speed at which vehicles travel on Highland Street, the volume of vehicles that utilize Highland Street, pedestrian and bicycle safety and sight distance issues for motorists. The TAC determined that this request warranted an initial evaluation to collect data relevant to the applicant's concerns on Highland Street and requested that the Engineering Department investigate this matter. This report summarizes the findings of the Engineering Department.

## Study Area

Highland Street is a north/south thickly settled residential through street with a pavement width ranging from approximately 21 to 23 feet from Court Street to Lowder Street and approximately 19 to 21 feet from Lowder Street to Washington Street. Highland Street is approximately 5,280 feet (1 mile) in length and extends from Court Street to Washington Street.

There is a 4 - 5 foot wide asphalt sidewalk along at least one side of the roadway for a majority of its length from Court Street to Federal Lane. There is no sidewalk from Federal Lane to Washington Street. The Department of Public Works has requested funds from the Town's Capital budget since 2011 to install a 5' wide asphalt sidewalk on the easterly side of Highland Street from Washington Street to Federal Lane and to also install sidewalks in the gaps where there is no sidewalk on at least one side of the road from Federal Lane to Sandy Valley Road. Several land taking would be required to properly install a sidewalk that complies with ADA and AAB regulations within these areas.

Highland Street is the only access to many of the neighborhood streets in this area of Town and is heavily utilized by Dedham Country Day School and Ursuline Academy for the pick-up and drop-off of their students. Both of these schools are almost exclusively commuter based with less than 1% of the entire student body walking to school.

The Police and Fire Departments utilize Highland Street frequently during emergency response situations not only for the residents of Highland Street, but for all of the neighborhood streets in the Highland Street area and the Dedham Country Day School.

Highland Street, from Richards Street to Washington Street was rehabilitated as part of the Town's Pavement Management Program in FY2013 and is in good condition. As part of the repaving of Highland Street, the Engineering Department redesigned the intersection of Lowder Street at Highland Street to improve the safety for motorists and pedestrians at the intersection. There were several accidents located at this intersection due to vehicles treating the stop on Lowder Street more like a yield. Lowder Street was narrowed and realigned at the intersection to mitigate the potential of vehicles treating the stop as a yield and at the same time reducing the distance that pedestrians had to walk to cross the street.

The prima facie speed limit on Highland Street is 30 mph. A prima facie speed limit is a default speed limit that applies when no other specific speed limit is posted. According to Massachusetts General Laws (MGL), Chapter 90, Section 17; unless posted otherwise, your speed would not be reasonable and proper if a motor vehicle is operated in excess of:

- 20 mph in a school zone
- 30 mph in a thickly settled or business district
- 40 mph outside a thickly settled or business district
- 50 mph on a highway outside a thickly settled or business district

## Observations

The Town of Dedham utilized a Jamar Radar Recorder to log the speed and volume of vehicles on Highland Street on three separate occasions. The first round of data was collected when school was not in session from August 19, 2014 through August 22, 2014. The second round was collected when school was back in session from September 8, 2014 through September 11, 2014. The counter for the first 2 rounds was located on a utility pole at station 44+03 which is located across the street from #354 Highland Street (See Attached Locus Plan). Due to the length of the roadway and to further classify how vehicles utilize Highland Street, a third round of data was collected from September 16, 2014 through September 19, 2014. The counter for the third round was located on a utility pole at station 9+80 which is located near #82 Highland Street (See Attached Locus Plan).

### *Highland Street*

The volume of traffic expressed as average daily traffic (ADT) and the speed data collected on Highland Street is shown below in the following tables:

Table 1 – Traffic Volumes Station 44+03

| *Direction* | *Average Daily Traffic 8/19 – 8/22* | *Average Daily Traffic 9/8 – 9/11* | *Peak Hour* |
|---|---|---|---|
| Highland Street | 1,680 | 2,198 | |
| Northbound | 563 (34%) | 850 (39%) | 7:00 – 8:00 AM |
| Southbound | 1,117 (66%) | 1,348 (61%) | 5:00 – 6:00 PM |

Table 2 – Traffic Volumes Station 9+80

| *Direction* | *Average Daily Traffic 9/16 – 9/19* | *Peak Hour* |
|---|---|---|
| Highland Street | 2,025 | |
| Northbound | 1,412 (70%) | 7:00 – 8:00 AM |
| Southbound | 613 (30%) | 4:00 – 5:00 PM |

Table 3 – Observed Speed

| *Data Collection Date* | *Recorder Location (Station)* | *Speed Limit* | *Average Speed (Combined)* | *85th Percentile Speed (Combined)* |
|---|---|---|---|---|
| 8/19 – 8/22 | 44+03 | 30 mph[a] | 28 mph | 33 mph |
| 9/8 – 9/11 | 44+03 | 30 mph[a] | 28 mph | 33 mph |
| 9/16 – 9/19 | 9+80 | 30 mph[a] | 29 mph | 33 mph |

[a] – Prima Facie Speed Limit

The combined average speed for both directions was found to be 28-29 mph at both radar recorder setup locations. The combined 85th percentile speed for both directions was found to be 33 mph for all three collection dates. The 85th percentile speed is the speed at or below which 85 percent of vehicles travel and is the national standard utilized to determine if the speed on a given roadway is in excess, at or below the speed limit. The 85th percentile speed indicates that the majority of the vehicles are travelling slightly above the prima facie speed limit of 30 mph.

The southerly half of Highland Street is narrow with moderate curves and hills throughout this section of roadway. One of the concerns from the applicant pertained to sight distance issues. As part of our evaluation, we studied the Stopping Sight Distance (SSD) of the 5 slight to moderate curves.

When designing roadways, the Stopping Sight Distance (SSD) should be calculated using the design speed or 85th percentile speed of the roadway (whichever is greater) for all vertical and horizontal curves to determine if there are or will be any visual obstructions (roadway, trees, buildings, etc.) within that distance preventing the motorist from safely recognizing a potential accident condition within the roadway and the ability to come to a complete stop. Table 4 below

indicates the approximate location of the horizontal/vertical curve, the actual SSD and the calculated SSDs at 33mph, 30 mph and 25 mph.

Table 4 – Stopping Sight Distance (SSD)

| *Approx. Location of Curve* | *Actual SSD (ft)* | *Calculated SSD @ 33mph (ft)* | *Calculated SSD @ 30 mph (ft)* | *Calculated SSD @ 25 mph (ft)* |
|---|---|---|---|---|
| #181 Highland St | 175 | 241 | ND | 161 |
| #226 Highland St | < 226 | 226 | ND | ND |
| #282 Highland St | 170 | 267 | ND | 152 |
| #314 Highland St | 185 | 226 | 197 | 152 |
| #365 Highland St | 200 | 232 | 197 | ND |

Based upon this data, 4 out of the 5 curves have a SSD issue at the observed 85$^{th}$ percentile speed of 33 mph. The table indicates that in order for a motorist to have an adequate SSD that their speeds should be at or below, depending on the curve, either 30 mph or 25 mph.

## Crash Data

The Engineering Department also analyzed crash data utilizing the most recent 2004-2011 data available from the Massachusetts Highway Department and the most recent 2006-2013 data available from the Dedham Police Department to determine if the subject area was experiencing a higher than normal rate of accidents. Upon review of the MassHighway and Town of Dedham data, it was determined that there were 11 accidents along Highland Street over a 10 year period yielding 1.1 crashes per year. Of those 11 accidents, 6 of them were related to inclement weather conditions (snow, ice, rain). The other crashes were in the vicinity of the curves described above, especially at #181, #282 and #314 Highland Street. No accidents were reported within the area of the curve at #365 Highland Street. There were also no accidents within the timeframe used for this study that involved a pedestrian or bicyclist.

## Conclusion

Traditional traffic calming measures are not recommended for Highland Street based upon the following:

- Highland Street does not meet the eligibility requirements for traditional traffic calming measures as a means to mitigate speeding since the measured 85$^{th}$ percentile speed of 33 mph does not meet the eligibility requirements, as stated in the Town's Traffic Calming Policy, that a residential street is required to exhibit an 85$^{th}$ percentile speed in excess of 5 mph over the speed limit to be considered for traditional traffic calming measures.

- Highland Street is currently classified as a residential street. However, due to an ADT over 2,000 vehicles per day and that it is the only access way to several neighborhood side streets and heavily utilized by two schools, it exhibits characteristics of a minor collector roadway and should be reclassified as such.

- Based upon the 10 years of crash data, there have been no accidents involving bicyclists and/or pedestrians and exhibits a 1.1 vehicles per year crash rate which is considered low. Based upon the types of motorist crashes, traditional traffic calming measures if in place would not have eliminated many of these crashes.

Although Highland Street is not recommended for traditional traffic calming measures, the Engineering Department is recommending that advanced warning signs consisting of advisory horizontal alignment signs and advisory speed plaques be installed on Highland Street for the 3 curves that have insufficient stopping sight distances to safely negotiate the curves near #181, #228 and #314 Highland Street as a means to mitigate potential future accidents. The placement and type of signs recommended to be installed are shown on the attached Proposed Advanced Warning Signs Plans. The recommended advanced warning signs are utilized to make motorists aware that their speeds should be lowered to safely negotiate the curve ahead.

Based upon our study, the advisory speed plaques should be for 20 mph since independent studies have indicated that motorists tend to drive about 5- 7 miles per hour above the posted advisory speed sign.

The Engineering Department is also recommending that “GO SLOW” wording be painted on the road surface adjacent to the advanced warning signs as another means to gather the motorists attention.

The Engineering Department also recommends the following low-cost traffic calming measures that could be utilized and/or taken on by the concerned residents and neighbors of the Highland Street area.

- Purchasing a Step2 Kid Alert Visual Warning System – These can be purchased at Toys R’ Us, Wal-Mart, Amazon.com and other similar retail and online stores for about $25 to $35. The Step2 Kid should be placed at the end of your driveway so it is visible to motorists. This should only be placed out during times when kids are actually outside playing in the yard. By having it out all the time, it will reduce its effectiveness. Studies have shown that when used properly, it usually aids in the reduction of vehicle speeds.

*Photo of Step 2 Kid Alert*

- Establish a neighborhood group that could create pamphlets or flyers that can be passed out in the neighborhood that discusses the concerns of speeding vehicles on Highland Street making people aware that they should drive cautiously. You or the group may even consider working with Dedham Country Day and Ursuline Academy to hand out flyers to the parents who drop off and pick up their children so they can become aware of the neighborhood’s concerns for fast traveling vehicles.

Cc: Board of Selectmen

Attachments: Highland Street Locus Map
Combined Speed Statistics Reports
Traffic Volume Reports
Horizontal Sight Line Maps
Proposed Advanced Warning Signs Plans

TOWN OF DEDHAM, MASSACHUSETTS

**HIGHLAND STREET**
**TCR #2013-003**
**LOCUS MAP**

**TOWN OF DEDHAM**
**Norfolk County**
**Massachusetts**


DEDHAM GIS

This document is intended for Town of Dedham planning and analysis purposes only.

Produced by:
The Town of Dedham
Engineering Department

**Town of Dedham**
**Engineering Department**
55 River Street
Dedham, MA 02026
**(781) 751-9350**



Site Code: 00000022
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

COMBINED

**Report for 8/19/2014 10:00:00 AM to 8/22/2014 12:39:04 PM**

## SPEED STATISTICS - 15 to 70+ by 5 MPH

| Speed in MPH | 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 - 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 87 | 314 | 733 | 2314 | 1553 | 255 | 25 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Percent | 1.6 | 5.9 | 13.9 | 43.8 | 29.4 | 4.8 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Over Speed | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 5195 | 4881 | 4148 | 1834 | 281 | 26 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent | 98.4 | 92.4 | 78.5 | 34.7 | 5.3 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Percentile | 5% | 10% | 15% | 45% | 50% | 55% | 85% | 90% | 95% |
|---|---|---|---|---|---|---|---|---|---|
| Speed | 19 | 22 | 24 | 28 | 29 | 30 | 33 | 34 | 36 |

Average (Mean) 28

Pace Speed 25-34
Number in Pace 3924
Percent in Pace 74.3

# Town of Dedham
# Engineering Department
55 River Street
Dedham, MA 02026
**(781) 751-9350**




Site Code: 00000022
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

COMBINED

| Speed | Volume |
|---|---|
| 7 | 1 |
| 8 | 2 |
| 9 | 1 |
| 10 | 8 |
| 11 | 14 |
| 12 | 14 |
| 13 | 8 |
| 14 | 14 |
| 15 | 25 |
| 16 | 43 |
| 17 | 47 |
| 18 | 64 |
| 19 | 73 |
| 20 | 87 |
| 21 | 74 |
| 22 | 102 |
| 23 | 152 |
| 24 | 188 |
| 25 | 217 |
| 26 | 327 |
| 27 | 439 |
| 28 | 481 |
| 29 | 511 |
| 30 | 556 |
| 31 | 460 |
| 32 | 381 |
| 33 | 331 |
| 34 | 221 |
| 35 | 160 |
| 36 | 120 |
| 37 | 63 |
| 38 | 34 |
| 39 | 23 |
| 40 | 15 |
| 41 | 10 |
| 42 | 8 |
| 43 | 6 |
| 44 | 1 |
| 45 | 0 |
| 46 | 0 |
| 47 | 0 |
| 48 | 0 |
| 49 | 0 |
| 50 | 0 |
| 51 | 0 |
| 52 | 1 |

**Town of Dedham**
**Engineering Department**
55 River Street
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**(781) 751-9350**



Site Code: 00000023
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

COMBINED

**Report for 9/8/2014 10:25:20 AM to 9/11/2014 10:34:58 AM**

## SPEED STATISTICS - 15 to 70+ by 5 MPH

| Speed in MPH | 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 - 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 130 | 361 | 1062 | 3063 | 1759 | 244 | 9 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent | 2.0 | 5.4 | 16.0 | 46.2 | 26.5 | 3.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Over Speed | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 6500 | 6139 | 5077 | 2014 | 255 | 11 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent | 98.0 | 92.6 | 76.6 | 30.4 | 3.8 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Percentile | 5% | 10% | 15% | 45% | 50% | 55% | 85% | 90% | 95% |
|---|---|---|---|---|---|---|---|---|---|
| Speed | 19 | 22 | 24 | 28 | 29 | 29 | 33 | 33 | 35 |

Average (Mean) 28

Pace Speed 24-33
Number in Pace 5011
Percent in Pace 75.6

**Town of Dedham**
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Dedham, MA 02026
**(781) 751-9350**



Site Code: 00000023
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

COMBINED

| Speed | Volume |
|---|---|
| 7 | 1 |
| 8 | 3 |
| 9 | 4 |
| 10 | 14 |
| 11 | 18 |
| 12 | 18 |
| 13 | 22 |
| 14 | 22 |
| 15 | 28 |
| 16 | 46 |
| 17 | 67 |
| 18 | 65 |
| 19 | 81 |
| 20 | 102 |
| 21 | 130 |
| 22 | 165 |
| 23 | 191 |
| 24 | 255 |
| 25 | 321 |
| 26 | 464 |
| 27 | 583 |
| 28 | 666 |
| 29 | 740 |
| 30 | 610 |
| 31 | 545 |
| 32 | 474 |
| 33 | 353 |
| 34 | 240 |
| 35 | 147 |
| 36 | 98 |
| 37 | 65 |
| 38 | 43 |
| 39 | 28 |
| 40 | 10 |
| 41 | 2 |
| 42 | 3 |
| 43 | 3 |
| 44 | 1 |
| 45 | 0 |
| 46 | 0 |
| 47 | 0 |
| 48 | 0 |
| 49 | 1 |
| 50 | 1 |

**Town of Dedham**
**Engineering Department**
55 River Street
Dedham, MA 02026
**(781) 751-9350**



Site Code: 00000024
Station ID: Sta. 9+80
On Utility Pole Near #82

Latitude: 0' 0.0000 Undefined

COMBINED

**Report for 9/16/2014 9:21:29 AM to 9/19/2014 9:56:21 AM**

## SPEED STATISTICS - 15 to 70+ by 5 MPH

| Speed in MPH | 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 - 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 17 | 92 | 859 | 3087 | 1712 | 290 | 33 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent | 0.3 | 1.5 | 14.1 | 50.7 | 28.1 | 4.8 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Over Speed | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Count | 6074 | 5982 | 5123 | 2036 | 324 | 34 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent | 99.7 | 98.2 | 84.1 | 33.4 | 5.3 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Percentile | 5% | 10% | 15% | 45% | 50% | 55% | 85% | 90% | 95% |
|---|---|---|---|---|---|---|---|---|---|
| Speed | 23 | 24 | 25 | 29 | 29 | 29 | 33 | 34 | 36 |

Average (Mean) 29

Pace Speed 25-34
Number in Pace 4994
Percent in Pace 82.0

# Town of Dedham
# Engineering Department
55 River Street
Dedham, MA 02026
**(781) 751-9350**




Site Code: 00000024
Station ID: Sta. 9+80
On Utility Pole Near #82

Latitude: 0' 0.0000 Undefined

COMBINED

| Speed | Volume |
|---|---|
| 9 | 1 |
| 10 | 0 |
| 11 | 1 |
| 12 | 2 |
| 13 | 5 |
| 14 | 4 |
| 15 | 4 |
| 16 | 17 |
| 17 | 7 |
| 18 | 16 |
| 19 | 22 |
| 20 | 30 |
| 21 | 58 |
| 22 | 88 |
| 23 | 140 |
| 24 | 232 |
| 25 | 341 |
| 26 | 463 |
| 27 | 615 |
| 28 | 691 |
| 29 | 650 |
| 30 | 668 |
| 31 | 511 |
| 32 | 457 |
| 33 | 351 |
| 34 | 247 |
| 35 | 146 |
| 36 | 128 |
| 37 | 71 |
| 38 | 42 |
| 39 | 32 |
| 40 | 17 |
| 41 | 12 |
| 42 | 7 |
| 43 | 7 |
| 44 | 1 |
| 45 | 6 |
| 46 | 1 |

# Town of Dedham
# Engineering Department

55 River Street
Dedham, MA 02026
(781) 751-9350

Site Code: 00000022
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

| Start | 18-Aug-14 | | Tue | | Wed | | Thu | | Fri | | Sat | | Sun | | Week Average | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | Southboun | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou |
| 12:00 AM | * | * | * | * | 2 | 1 | 0 | 3 | 0 | 1 | * | * | * | * | 1 | 2 |
| 01:00 | * | * | * | * | 1 | 4 | 1 | 1 | 0 | 4 | * | * | * | * | 1 | 3 |
| 02:00 | * | * | * | * | 2 | 3 | 0 | 3 | 1 | 0 | * | * | * | * | 1 | 2 |
| 03:00 | * | * | * | * | 0 | 0 | 0 | 1 | 0 | 0 | * | * | * | * | 0 | 0 |
| 04:00 | * | * | * | * | 1 | 1 | 2 | 1 | 1 | 0 | * | * | * | * | 1 | 1 |
| 05:00 | * | * | * | * | 6 | 5 | 2 | 3 | 3 | 3 | * | * | * | * | 4 | 4 |
| 06:00 | * | * | * | * | 14 | 24 | 15 | 25 | 11 | 20 | * | * | * | * | 13 | 23 |
| 07:00 | * | * | * | * | 39 | 70 | 43 | **88** | 41 | **67** | * | * | * | * | 41 | 75 |
| 08:00 | * | * | * | * | 34 | **100** | 60 | 80 | 44 | 57 | * | * | * | * | 46 | **79** |
| 09:00 | * | * | * | * | 58 | 36 | 83 | 46 | 83 | 27 | * | * | * | * | **75** | 36 |
| 10:00 | * | * | **51** | 26 | **59** | 20 | 53 | 16 | 43 | 25 | * | * | * | * | 52 | 22 |
| 11:00 | * | * | 42 | **31** | 45 | 27 | **103** | 40 | **106** | 43 | * | * | * | * | 74 | 35 |
| 12:00 PM | * | * | 50 | 25 | 60 | 19 | 75 | 32 | **27** | **14** | * | * | * | * | 53 | 22 |
| 01:00 | * | * | 47 | 24 | 44 | 30 | 38 | 36 | * | * | * | * | * | * | 43 | 30 |
| 02:00 | * | * | 43 | **43** | 55 | **39** | 101 | **42** | * | * | * | * | * | * | 66 | **41** |
| 03:00 | * | * | 104 | 27 | 109 | 36 | 122 | 38 | * | * | * | * | * | * | 112 | 34 |
| 04:00 | * | * | 124 | 23 | 120 | 24 | 180 | 30 | * | * | * | * | * | * | 141 | 26 |
| 05:00 | * | * | **168** | 21 | **168** | 26 | **191** | 23 | * | * | * | * | * | * | **176** | 23 |
| 06:00 | * | * | 81 | 27 | 108 | 28 | 81 | 37 | * | * | * | * | * | * | 90 | 31 |
| 07:00 | * | * | 46 | 26 | 36 | 24 | 43 | 25 | * | * | * | * | * | * | 42 | 25 |
| 08:00 | * | * | 31 | 24 | 25 | 22 | 60 | 27 | * | * | * | * | * | * | 39 | 24 |
| 09:00 | * | * | 25 | 12 | 31 | 17 | 37 | 17 | * | * | * | * | * | * | 31 | 15 |
| 10:00 | * | * | 8 | 5 | 11 | 6 | 16 | 6 | * | * | * | * | * | * | 12 | 6 |
| 11:00 | * | * | 6 | 4 | 5 | 9 | 1 | 2 | * | * | * | * | * | * | 4 | 5 |
| Lane | 0 | 0 | 826 | 318 | 1033 | 571 | 1307 | 622 | 360 | 261 | 0 | 0 | 0 | 0 | 1118 | 564 |
| Day | 0 | | 1144 | | 1604 | | 1929 | | 621 | | 0 | | 0 | | 1682 | |
| AM Peak | - | - | 10:00 | 11:00 | 10:00 | 08:00 | 11:00 | 07:00 | 11:00 | 07:00 | - | - | - | - | 09:00 | 08:00 |
| Vol. | - | - | 51 | 31 | 59 | 100 | 103 | 88 | 106 | 67 | - | - | - | - | 75 | 79 |
| PM Peak | - | - | 17:00 | 14:00 | 17:00 | 14:00 | 17:00 | 14:00 | 12:00 | 12:00 | - | - | - | - | 17:00 | 14:00 |
| Vol. | - | - | 168 | 43 | 168 | 39 | 191 | 42 | 27 | 14 | - | - | - | - | 176 | 41 |

| Comb. Total | 0 | 1144 | 1604 | 1929 | 621 | 0 | 0 | 1682 |
|---|---|---|---|---|---|---|---|---|

ADT ADT 1,680 AADT 1,680

# Town of Dedham
# Engineering Department

55 River Street
Dedham, MA 02026
(781) 751-9350

Site Code: 00000023
Station ID: Sta. 44+03
On Utility Pole Across From #354

Latitude: 0' 0.0000 Undefined

| Start | 08-Sep-14 | | Tue | | Wed | | Thu | | Fri | | Sat | | Sun | | Week Average | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | Southboun | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou |
| 12:00 AM | * | * | 2 | 1 | 1 | 2 | 1 | 2 | * | * | * | * | * | * | 1 | 2 |
| 01:00 | * | * | 0 | 2 | 1 | 3 | 1 | 1 | * | * | * | * | * | * | 1 | 2 |
| 02:00 | * | * | 0 | 1 | 0 | 1 | 0 | 2 | * | * | * | * | * | * | 0 | 1 |
| 03:00 | * | * | 1 | 0 | 1 | 0 | 1 | 0 | * | * | * | * | * | * | 1 | 0 |
| 04:00 | * | * | 1 | 0 | 0 | 0 | 0 | 2 | * | * | * | * | * | * | 0 | 1 |
| 05:00 | * | * | 3 | 5 | 4 | 6 | 5 | 2 | * | * | * | * | * | * | 4 | 4 |
| 06:00 | * | * | 18 | 42 | 24 | 41 | 19 | 44 | * | * | * | * | * | * | 20 | 42 |
| 07:00 | * | * | **144** | **204** | **159** | **228** | **130** | **213** | * | * | * | * | * | * | **144** | **215** |
| 08:00 | * | * | 68 | 124 | 78 | 135 | 91 | 174 | * | * | * | * | * | * | 79 | 144 |
| 09:00 | * | * | 84 | 38 | 35 | 37 | 47 | 67 | * | * | * | * | * | * | 55 | 47 |
| 10:00 | * | * | 35 | 16 | 43 | 25 | 19 | 5 | * | * | * | * | * | * | 32 | 15 |
| 11:00 | **41** | **29** | 49 | 30 | 58 | 36 | * | * | * | * | * | * | * | * | 49 | 32 |
| 12:00 PM | 47 | 29 | 43 | 22 | 50 | 28 | * | * | * | * | * | * | * | * | 47 | 26 |
| 01:00 | 50 | 23 | 43 | 28 | 39 | 25 | * | * | * | * | * | * | * | * | 44 | 25 |
| 02:00 | 109 | **77** | 110 | **62** | 115 | **64** | * | * | * | * | * | * | * | * | 111 | **68** |
| 03:00 | 143 | 35 | 148 | 59 | 151 | 39 | * | * | * | * | * | * | * | * | 147 | 44 |
| 04:00 | 193 | 51 | 202 | 47 | **195** | 54 | * | * | * | * | * | * | * | * | 197 | 51 |
| 05:00 | **210** | 29 | **230** | 43 | 188 | 36 | * | * | * | * | * | * | * | * | **209** | 36 |
| 06:00 | 78 | 21 | 95 | 40 | 104 | 28 | * | * | * | * | * | * | * | * | 92 | 30 |
| 07:00 | 53 | 29 | 52 | 20 | 46 | 18 | * | * | * | * | * | * | * | * | 50 | 22 |
| 08:00 | 26 | 18 | 65 | 25 | 18 | 18 | * | * | * | * | * | * | * | * | 36 | 20 |
| 09:00 | 20 | 16 | 12 | 11 | 20 | 8 | * | * | * | * | * | * | * | * | 17 | 12 |
| 10:00 | 9 | 5 | 7 | 4 | 4 | 5 | * | * | * | * | * | * | * | * | 7 | 5 |
| 11:00 | 4 | 1 | 5 | 5 | 1 | 6 | * | * | * | * | * | * | * | * | 3 | 4 |
| Lane | 983 | 363 | 1417 | 829 | 1335 | 843 | 314 | 512 | 0 | 0 | 0 | 0 | 0 | 0 | 1346 | 848 |
| Day | 1346 | | 2246 | | 2178 | | 826 | | 0 | | 0 | | 0 | | 2194 | |
| AM Peak | 11:00 | 11:00 | 07:00 | 07:00 | 07:00 | 07:00 | 07:00 | 07:00 | - | - | - | - | - | - | 07:00 | 07:00 |
| Vol. | 41 | 29 | 144 | 204 | 159 | 228 | 130 | 213 | - | - | - | - | - | - | 144 | 215 |
| PM Peak | 17:00 | 14:00 | 17:00 | 14:00 | 16:00 | 14:00 | - | - | - | - | - | - | - | - | 17:00 | 14:00 |
| Vol. | 210 | 77 | 230 | 62 | 195 | 64 | - | - | - | - | - | - | - | - | 209 | 68 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Comb. Total | 1346 | 2246 | 2178 | 826 | 0 | 0 | 0 | 2194 |

ADT ADT 2,198 AADT 2,198

# Town of Dedham
# Engineering Department

55 River Street
Dedham, MA 02026
(781) 751-9350

Site Code: 00000024
Station ID: Sta. 9+80
On Utility Pole Near #82

Latitude: 0' 0.0000 Undefined

| Start | 15-Sep-14 | | Tue | | Wed | | Thu | | Fri | | Sat | | Sun | | Week Average | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | Northboun | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo | Northbou | Southbo |
| 12:00 AM | * | * | * | * | 0 | 2 | 0 | 1 | 0 | 1 | * | * | * | * | 0 | 1 |
| 01:00 | * | * | * | * | 0 | 0 | 1 | 0 | 0 | 0 | * | * | * | * | 0 | 0 |
| 02:00 | * | * | * | * | 1 | 0 | 1 | 0 | 2 | 2 | * | * | * | * | 1 | 1 |
| 03:00 | * | * | * | * | 2 | 0 | 0 | 2 | 1 | 0 | * | * | * | * | 1 | 1 |
| 04:00 | * | * | * | * | 1 | 1 | 0 | 0 | 1 | 0 | * | * | * | * | 1 | 0 |
| 05:00 | * | * | * | * | 5 | 0 | 4 | 0 | 5 | 0 | * | * | * | * | 5 | 0 |
| 06:00 | * | * | * | * | 57 | 7 | 62 | 6 | 36 | 6 | * | * | * | * | 52 | 6 |
| 07:00 | * | * | * | * | **367** | **47** | **347** | **40** | **201** | **45** | * | * | * | * | **305** | **44** |
| 08:00 | * | * | * | * | 167 | 29 | 236 | 28 | 139 | 28 | * | * | * | * | 181 | 28 |
| 09:00 | * | * | * | * | 67 | 21 | 87 | 21 | 46 | 21 | * | * | * | * | 67 | 21 |
| 10:00 | * | * | 39 | 19 | 36 | 22 | 59 | 15 | * | * | * | * | * | * | 45 | 19 |
| 11:00 | * | * | **41** | **30** | 48 | 27 | 35 | 21 | * | * | * | * | * | * | 41 | 26 |
| 12:00 PM | * | * | 41 | 28 | 46 | 17 | 47 | 11 | * | * | * | * | * | * | 45 | 19 |
| 01:00 | * | * | 39 | 20 | 40 | 22 | 38 | 18 | * | * | * | * | * | * | 39 | 20 |
| 02:00 | * | * | 95 | 37 | 100 | 52 | 101 | 53 | * | * | * | * | * | * | 99 | 47 |
| 03:00 | * | * | **148** | 51 | **128** | 48 | 143 | 48 | * | * | * | * | * | * | **140** | 49 |
| 04:00 | * | * | 108 | **101** | 80 | 92 | 98 | **114** | * | * | * | * | * | * | 95 | **102** |
| 05:00 | * | * | 96 | 100 | 111 | **112** | 89 | 91 | * | * | * | * | * | * | 99 | 101 |
| 06:00 | * | * | 48 | 57 | 59 | 63 | 80 | 68 | * | * | * | * | * | * | 62 | 63 |
| 07:00 | * | * | 39 | 22 | 63 | 25 | 34 | 26 | * | * | * | * | * | * | 45 | 24 |
| 08:00 | * | * | 19 | 16 | 19 | 25 | **149** | 25 | * | * | * | * | * | * | 62 | 22 |
| 09:00 | * | * | 18 | 10 | 12 | 9 | 25 | 16 | * | * | * | * | * | * | 18 | 12 |
| 10:00 | * | * | 2 | 3 | 7 | 8 | 3 | 3 | * | * | * | * | * | * | 4 | 5 |
| 11:00 | * | * | 5 | 0 | 6 | 3 | 4 | 4 | * | * | * | * | * | * | 5 | 2 |
| Lane | 0 | 0 | 738 | 494 | 1422 | 632 | 1643 | 611 | 431 | 103 | 0 | 0 | 0 | 0 | 1412 | 613 |
| Day | 0 | | 1232 | | 2054 | | 2254 | | 534 | | 0 | | 0 | | 2025 | |
| AM Peak | - | - | 11:00 | 11:00 | 07:00 | 07:00 | 07:00 | 07:00 | 07:00 | 07:00 | - | - | - | - | 07:00 | 07:00 |
| Vol. | - | - | 41 | 30 | 367 | 47 | 347 | 40 | 201 | 45 | - | - | - | - | 305 | 44 |
| PM Peak | - | - | 15:00 | 16:00 | 15:00 | 17:00 | 20:00 | 16:00 | - | - | - | - | - | - | 15:00 | 16:00 |
| Vol. | - | - | 148 | 101 | 128 | 112 | 149 | 114 | - | - | - | - | - | - | 140 | 102 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Comb. Total | 0 | 1232 | 2054 | 2254 | 534 | 0 | 0 | 2025 |

ADT ADT 2,025 AADT 2,025


# HORIZONTAL SIGHT LINE @ 33 MPH
# #181 HIGHLAND STREET

1 inch = 50 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS


# HORIZONTAL SIGHT LINE @ 33 MPH
# #226 HIGHLAND STREET

1 inch = 50 feet

DEDHAM GIS

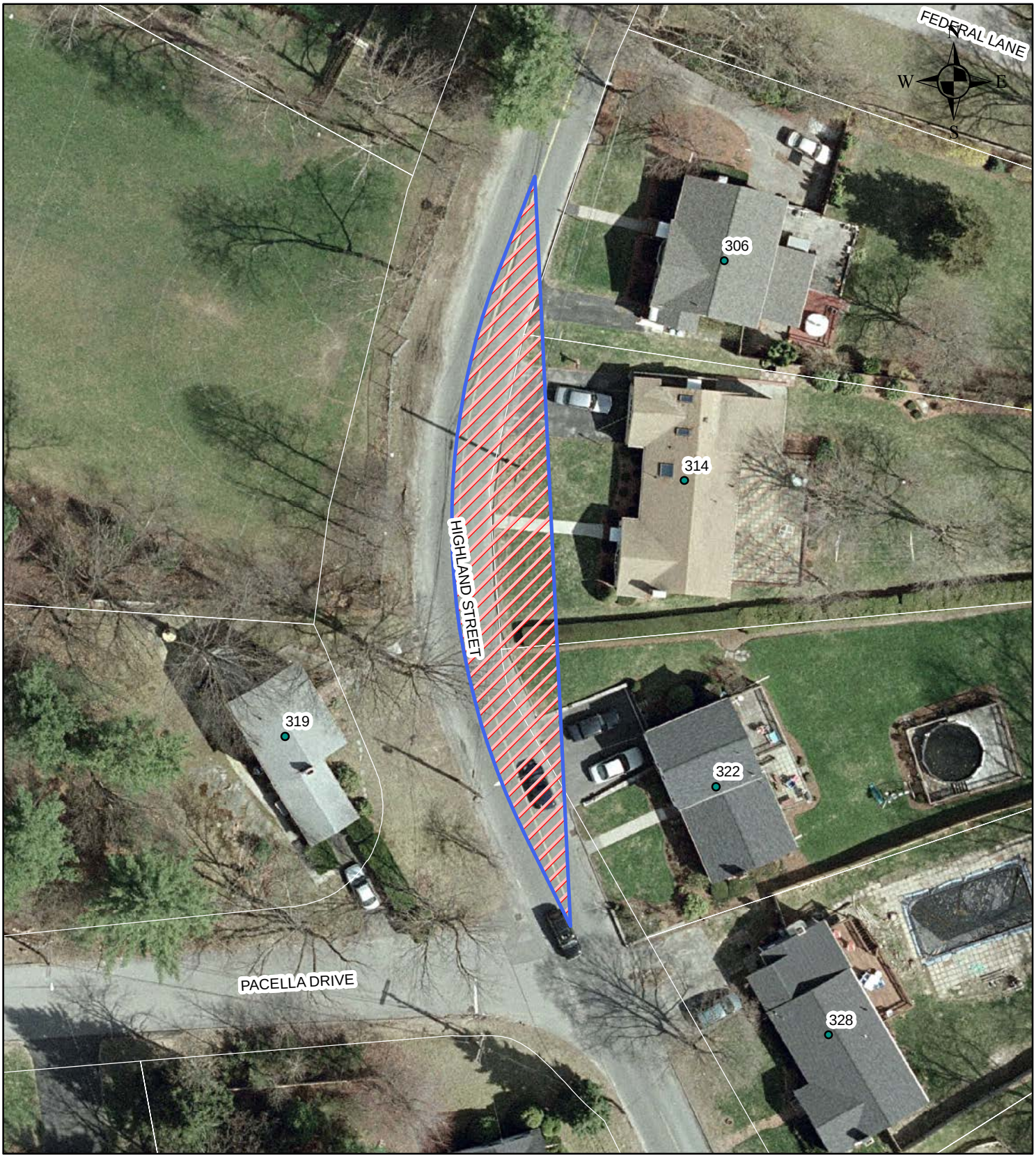
TOWN OF DEDHAM, MASSACHUSETTS


# HORIZONTAL SIGHT LINE @ 33 MPH
# #282 HIGHLAND STREET

1 inch = 50 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS

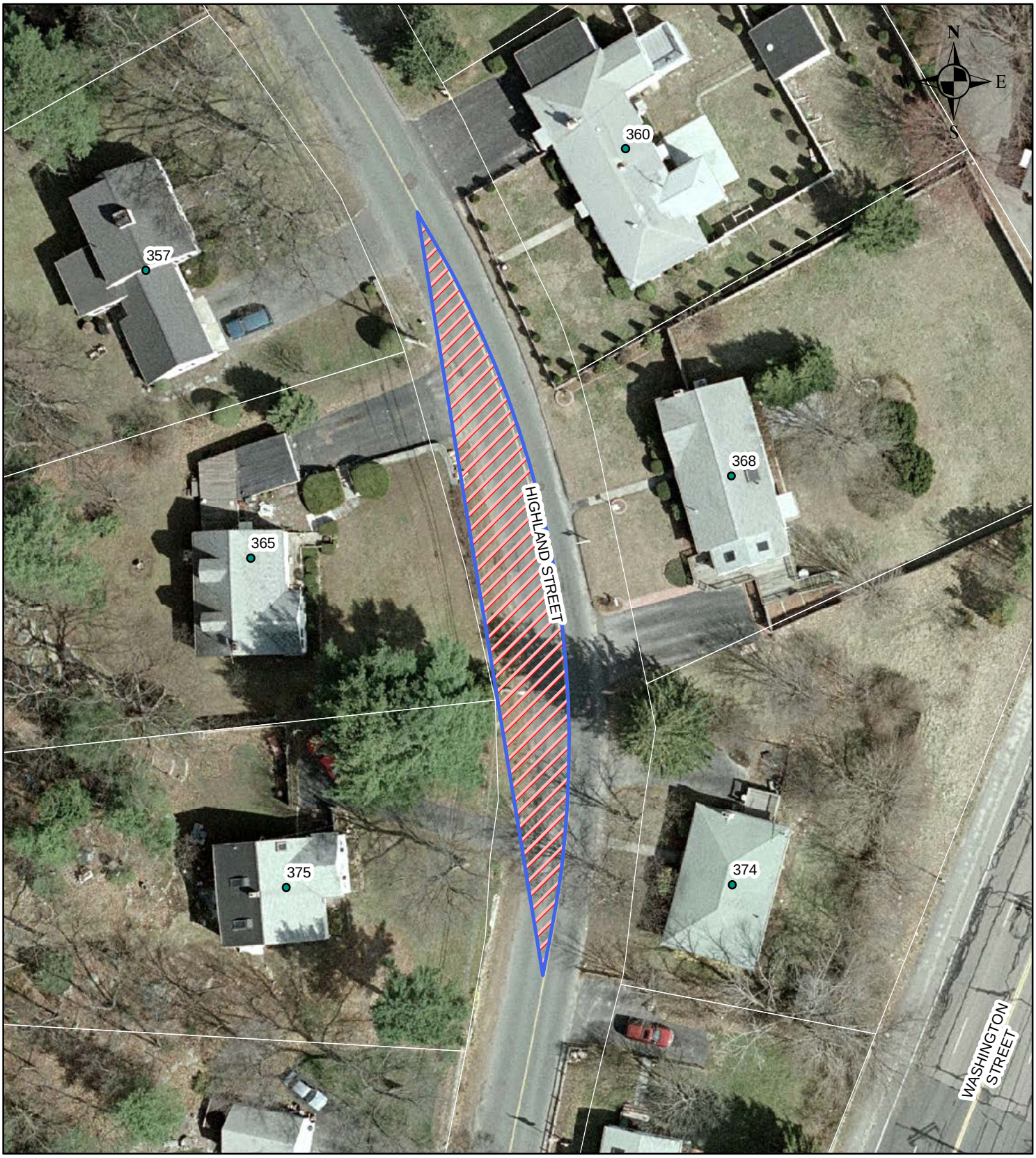



# HORIZONTAL SIGHT LINE @ 33 MPH
# #314 HIGHLAND STREET

1 inch = 40 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS

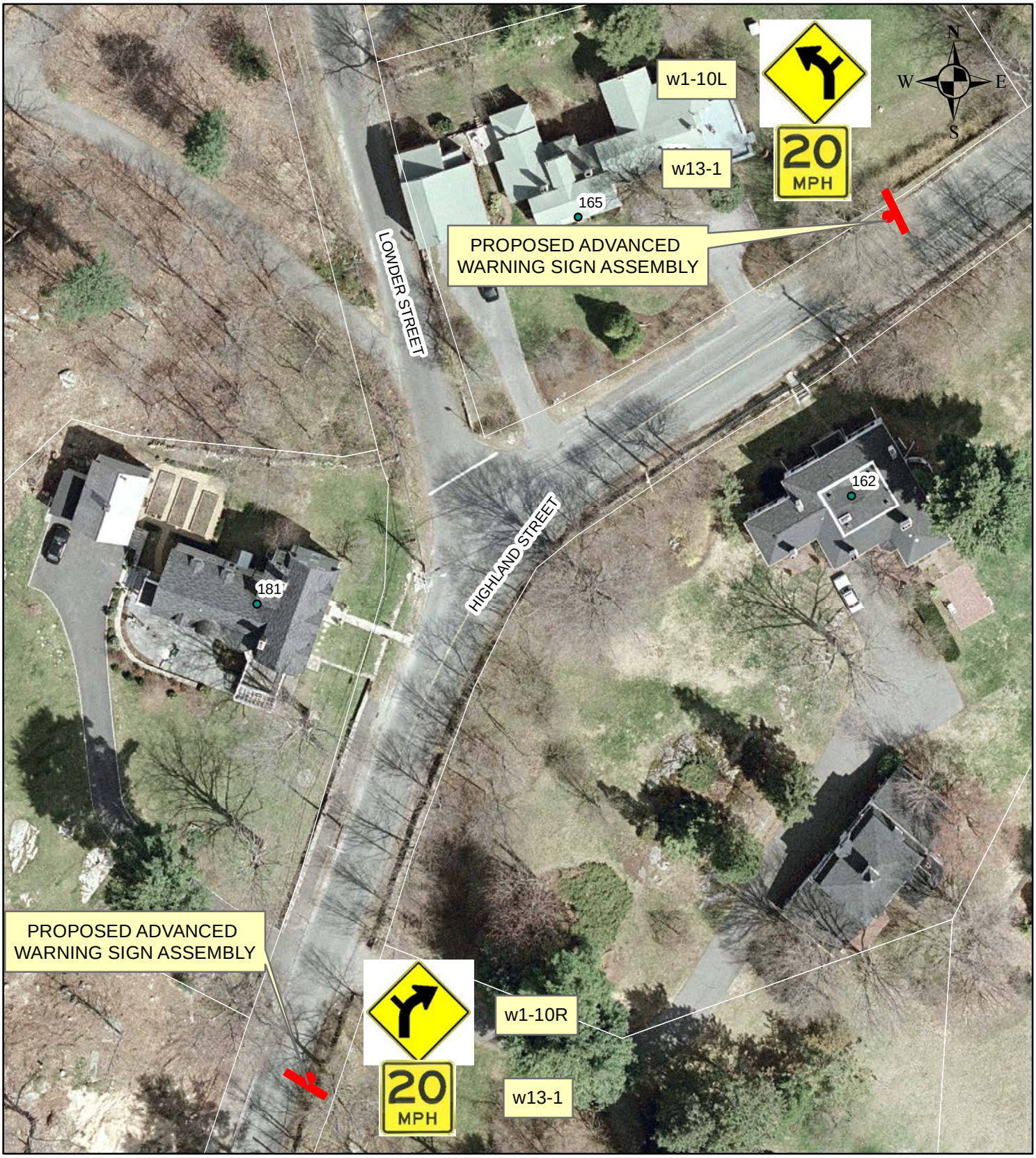



# HORIZONTAL SIGHT LINE @ 33 MPH
# #365 HIGHLAND STREET

1 inch = 40 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS

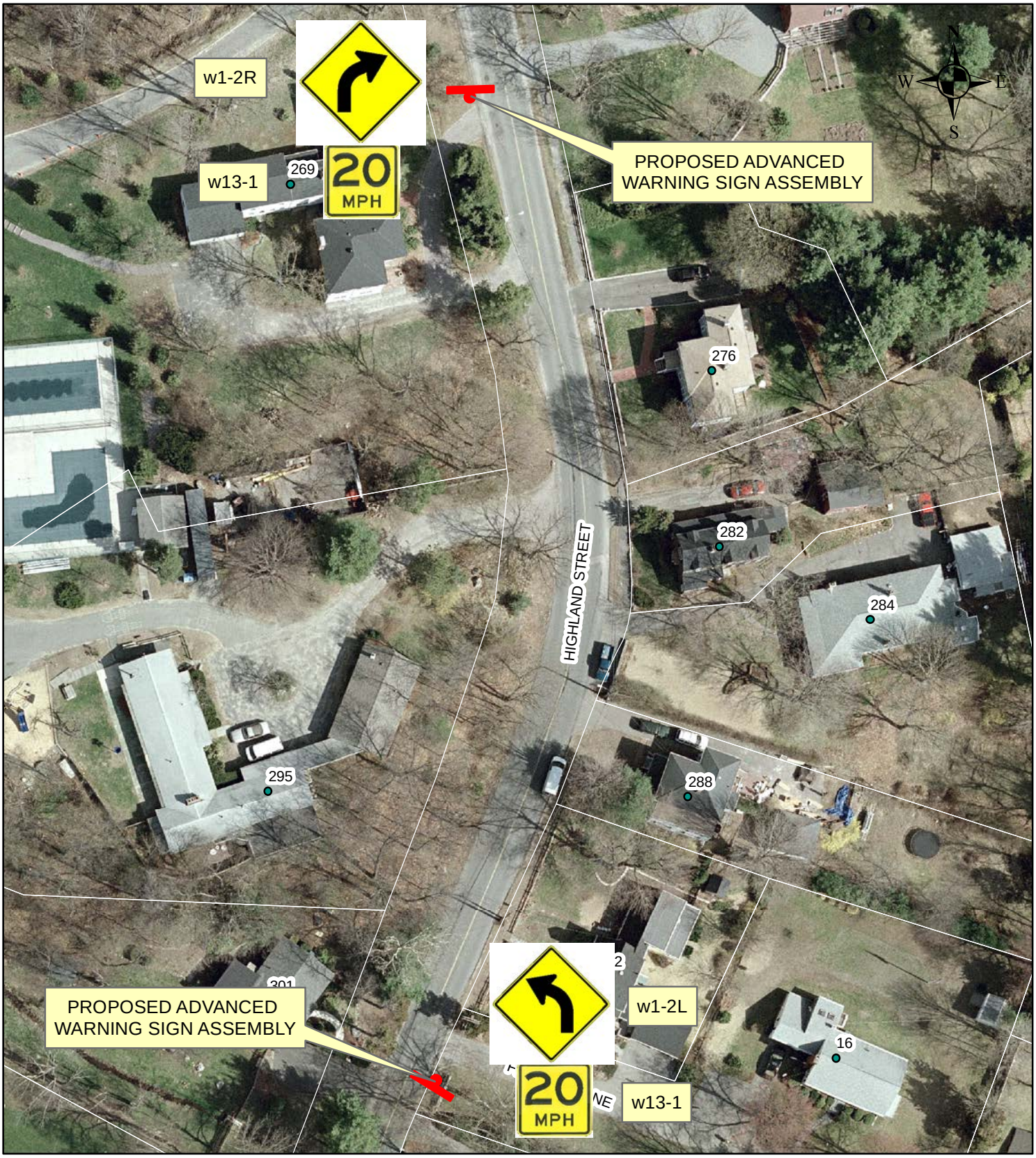



# PROPOSED ADVANCED WARBING SIGNS & MARKINGS #181 HIGHLAND STREET

1 inch = 50 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS

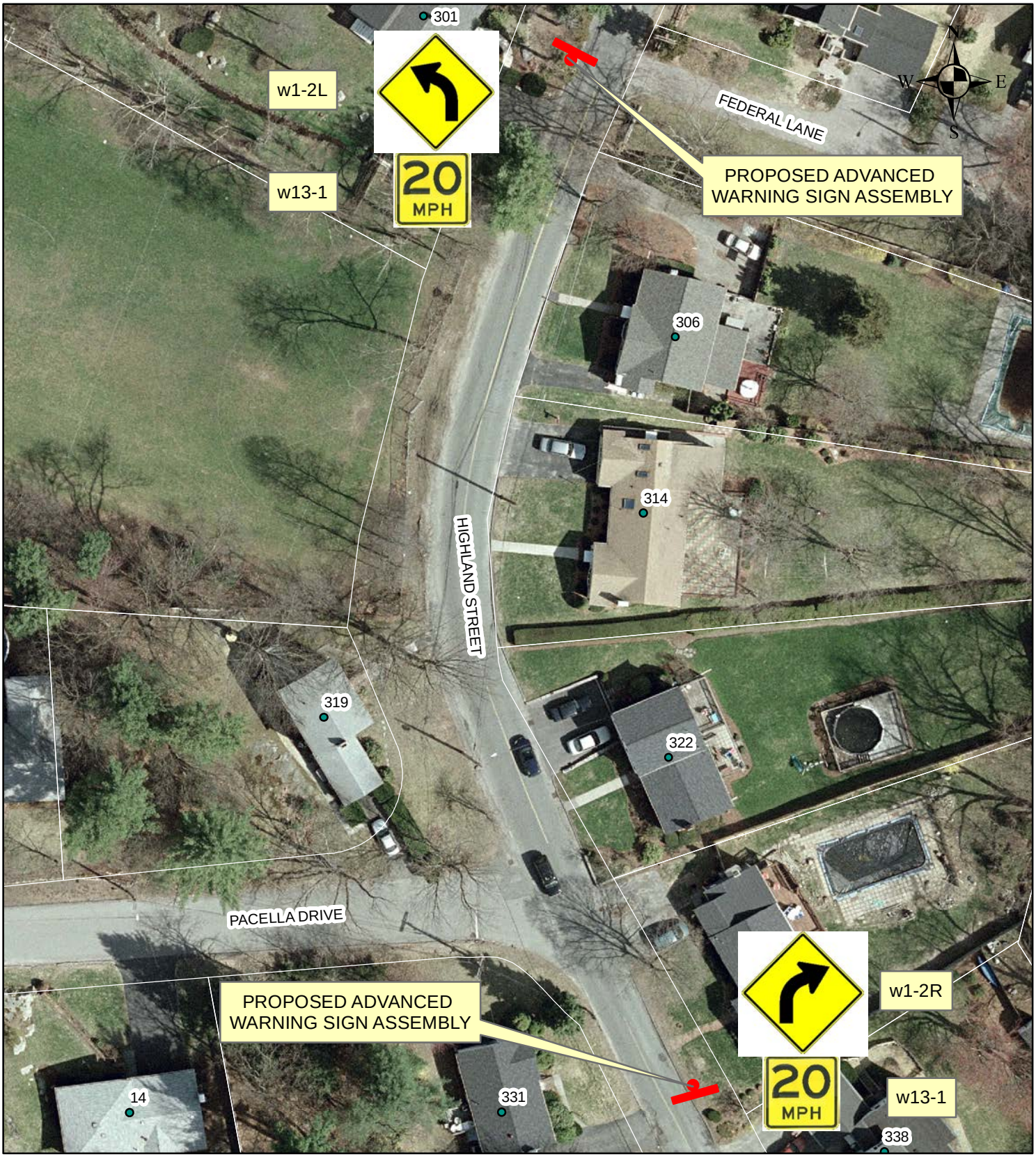



# PROPOSED ADVANCED WARNING SIGNS & MARKINGS #282 HIGHLAND STREET

1 inch = 60 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS




# PROPOSED ADVANCED WARNING SIGNS #314 HIGHLAND STREET

1 inch = 50 feet

DEDHAM GIS

TOWN OF DEDHAM, MASSACHUSETTS