

**STOPPING SIGHT DISTANCE**  
**CAPE COD RAIL TRAIL BIKE CROSSING**  
**@ QUEEN ANNE ROAD**

Stopping sight distance is the distance a vehicle travels from the perception of an obstruction in the road to the vehicle coming to a full stop. It includes reaction time of a typical driver to apply the brakes and the mechanical braking distance.

Attached is a diagram illustrating the stopping sight distance for specific design speeds. It assumes wet pavement and a relatively flat grade.

Speed limits on Queen Anne Road range from 40 mph to 30 mph. Assuming the higher 40 mph speed approaching the bike crossing on Queen Anne Road, the required safe sight distance is 305'.

**Vehicles approaching the bike crossing from the east**

The vertical grade is relatively flat, so there are no vertical curve restrictions to sight. The horizontal curve starts restricting sight of the crossing approximately 320' from the crossing. The sight distance should be adequate for vehicles traveling west on Queen Anne Road. This assumes a travel speed of no more than 40 mph, and an attentive driver.

**Vehicles approaching the bike crossing from the west**

For vehicles traveling east, the controlling factor is the vertical curve. The elevation at the crossing is approximately 56'. The elevation of the road rises to 59' at a distance of 90' from the intersection, and lowers to 54' at a distance of 156' from the intersection. A vehicle traveling east on Queen Anne Road would not notice a biker in the road at the crossing until it is approximately 135' from the crossing. This is much less than the required 305' stopping site distance should a vehicle be required to stop before the crossing. Even without the vertical curve restriction, the horizontal curve allows a sight distance of only approximately 250' which is still inadequate.

**Bike Crossing Safety Beacons**

An early warning safety beacon is definitely required to the west of the bike crossing on Queen Anne Road. Although an early warning beacon installed to the east of the crossing would add to the safety of the crossing, this study indicates that it may not be necessary.

## Costs

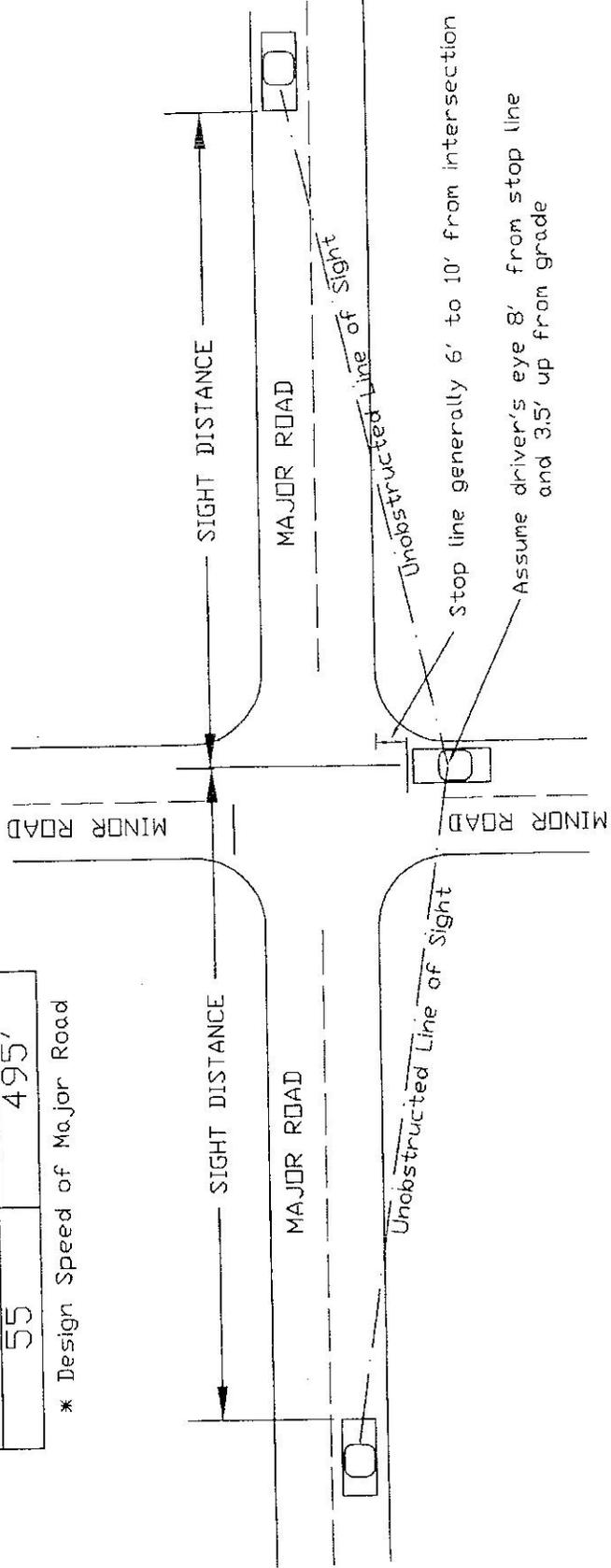
I estimate the cost for each solar powered crossing beacon similar to the ones currently in use by the Town to be approximately \$6,750 each. Two are required for the crossing facing in each direction. One is required as an early warning beacon to the west of the bike path intersection. This results in a cost of \$20,250 for three beacons. At 10% contingency, this is increased to \$22,275.

If it were decided to add an extra beacon to the east of the intersection for added safety, this cost with the 10% contingency would increase to \$29,700.

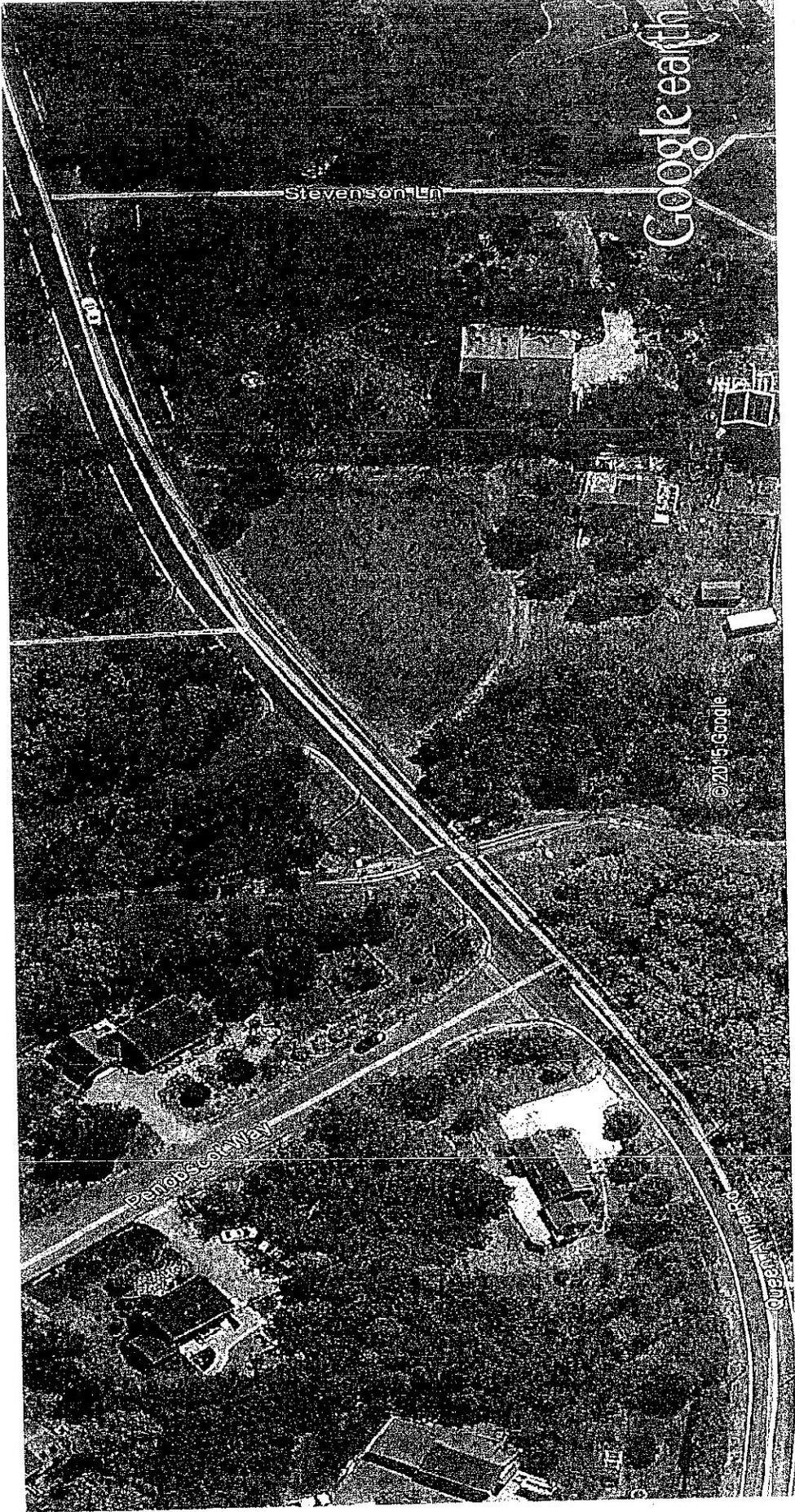
# MINIMUM REQUIRED SIGHT DISTANCE

DESIGN * SPEED	SIGHT DISTANCE
25	155'
30	200'
35	250'
40	305'
45	360'
50	425'
55	495'

Distances Reflect Stopping Sight Distance From:  
 Mass Highway Project Development & Design Guide (2006)  
 and  
 AASHTO Geometric Design of Highways and Streets (2004)



\* Design Speed of Major Road



500

100

feet  
meters

Google earth

R13



# TOWN OF HARWICH

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### MEMORANDUM

**TO:** Fran Salewski, Bike Committee Chairman

**FROM:** Lincoln Hooper, Traffic Safety Clerk *lh*

**DATE:** October 14, 2015

**RE:** Recommendations for Bike Crossing Warning System Installation

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At a meeting of the Traffic Safety Committee on October 7, 2015, the Committee unanimously voted a priority list of bike crossings in Harwich as follows:

1. Cape Cod Rail Trail Queen Anne Road crossing
2. Cape Cod Rail Trail Route 124 Pleasant Lake General Store crossing
3. Cape Cod Rail Trail Depot Street North Harwich crossing

It was the Committees understanding that the Bike Committee intends on pursuing purchasing and installing one bike crossing warning system per year and we fully support that goal.

Please contact me if we can be of further assistance. Thank you for attending our meeting.