

March 17, 2017

Mitchell Stern
Chief of Police
Verona Police Department
Verona, NJ 07044

Subject: Speed Evaluation of Oakridge Road from Fells Road to Hillside Road
Township of Verona, Essex County, New Jersey

Dear Chief Stern:

As requested, NV5 Inc. has evaluated speeding issues on Oakridge Road. we have utilized the following information as part of our evaluation:

- Speed and volume data gathered by the Verona Police Department using an All Traffic Solutions Shield Radar Speed Display unit (with the display off), gathered from March 5-19, 2017.
- Field investigations and measurements conducted in March, 2017.

Existing Conditions

Oakridge Road is a residential local roadway under the jurisdiction of the Township of Verona. The roadway is posted for 25 mile per hour operation, and has a width of 28 feet. Parking is permitted on the east side of the road only. The roadway is approximately 0.5 miles in length, and contains just under 50 single family homes. The intersection of Oakridge Road and Beechwood Road and Fells Road, which is at the northern end of Oakridge Road, is under 3 way stop sign control, with the Fells Road southbound approach being uncontrolled. The intersection of Oakridge Road and Stocker Road, which is approximately at the mid-point of Oakridge Road, is under all-way stop control. The intersection of Oakridge Road and Hillside Avenue, which is at the southern end of Oakridge Road, has stop sign control on the southbound Oakridge Road approach only. The northern-most block of Oakridge Road (between Chestnut Road and Beechwood Road) has grades of 8-10%, with southbound being the upgrade direction. This grade may contribute to speeding in the northbound direction. There are three (3) speed limit signs in the northbound direction and one (1) speed limit sign in the southbound direction, with none between Chestnut Road and Beechwood Road. All but one of these signs are faded and smaller than typical, as shown in the photos below (the left image is faded and smaller, while the one on the right image is in appropriate condition).



Speed and volume data was collected at two locations on the section of Oakridge Road between Stocker Road and Chestnut Road.

According to the data collected by the Verona Police Department, Oakridge Road has a traffic volume of 600-750 vehicles per day on weekdays. Peak hour traffic ranges from 60-85 vehicles per hour. Given the number of homes in the neighborhood, it appears that most of the traffic is local. However, it appears that 10-15% of peak period traffic may be cut-through traffic.

The median speed (the speed at which half the traffic travels above, and half below) was found to be 29-31 miles per hour. The 85th percentile speed (the speed at which 85% of traffic travels at or below) was found to be 32-34 miles per hour.

According to guidance provided in the Manual on Uniform Traffic Control Devices, speed limits should ideally be set within 5 miles per hour of the 85th percentile speed. This guidance needs to be balanced against the fact that 25 miles per hour is the statutory speed limit in residential areas of New Jersey within Title 39 of NJ Statutes. Consequently, it can be inferred that 25 mile per hour operation of traffic affords adequate safety for a neighborhood. With this in mind, the goal would be to reduce speeds on Oakridge Road by 3-5 miles per hour (so that the 85th percentile speed is within 5 miles per hour of 25 miles per hour). That translates into a speed reduction target of 10-15%.

Traffic Calming Alternatives

Enforcement

Strict enforcement of speed limits can be extremely effective at reducing speeds. Studies have indicated that an aggressive program of police enforcement of speed limits can reduce average travel speeds by 28 percent on the average. However, these speed reductions tend not to last very long once the enforcement push is off. Enforcement is manpower intensive, and few police forces have sufficient resources to conduct widespread enforcement. In order to offset this, trailers with radar speed displays are used. Occasionally, decoys placed in parked police cars are also used to discourage speeding.

Shoulder Stripes and Signage

Although they have not been found to have a significant effect on reducing travel speed, simply striping shoulders on wide roads can provide several safety benefits. By better defining the traveled way, shoulder stripes can reduce pedestrian crossing distance, and enhance motor vehicle safety by reducing the frequency of vehicles passing on another. Further, the shoulder area can provide an area for bicyclists and pedestrians that is relatively secure from conflicts with vehicles. Studies have found that pavement markings to narrow the traveled way have reduced travel speeds by 7 percent, on the average.

Adding speed limit signs has also been found to have some impact on reducing travel speeds. Studies have found that speed limit signs have reduced travel speeds by 6-7 percent, on the average. Speed limit signs can be enhanced using messages such as “Strictly Enforced” or “Radar Enforced” in order to increase effectiveness. In Oceanside, California, a series of signs placed on private property that read “Keep Kids Alive, Drive 25” was found to result in a 16% reduction in the average travel speed.

Other Pavement Treatments

Recently, a substantial number of pavement treatments designed to calm traffic have begun to be utilized in



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New Jersey and other states. These treatments include rumble strips, color-set pavement markings, and street-print (which can emulate red brick pavers). Red brick paver crosswalks have also been utilized widely. Rumble strips are occasionally used in advance of speed humps as well. The use of rumble strips has been found to cause considerable noise for adjacent properties. So far, there is very little evidence regarding the effectiveness of these treatments.

Speed Humps, Speed Tables, and Raised Intersections

Horizontal deflections are the most effective form of traffic calming. Speed humps have been used extensively throughout the United States and other countries. However, several emergency services and road maintenance departments have taken issue with speed humps, due to their negative impact on response time and snow removal activities. Therefore, several jurisdictions have begun implementing speed tables (which are similar to speed humps, but a minimum length of 22 feet, versus 12-14 feet for speed humps) as an alternative traffic calming measure. Before and after studies have indicated the following facts about the effectiveness of traffic humps and speed tables:

- Multiple studies have found that speed humps can reduce the 85th Percentile Speeds (i.e. the speed at which 85 percent of traffic travels at or less than) by 7-8 miles per hour (22 percent).
- Before and after studies have found that speed tables can reduce speed by 3-6 miles per hour (9-18 percent).
- Before and after studies have found that raised intersections and crosswalks can reduce speed by 19 percent, on the average.
- On the average, 85th Percentile Speeds were reduced to 26 miles per hour for speed humps and 30 miles per hour for speed tables.
- The effectiveness of speed humps and tables at speed reduction has been found to be a function of the average spacing used. The shorter the spacing, the slower the mid-block 85th percentile speed. The effectiveness of these traffic calming devices appears to diminish when the average spacing is greater than 600 feet.
- Fire vehicles and ambulances were delayed by 0-9 seconds per speed table, and 1-9 seconds per speed hump in Portland, OR.

Multi-way Stops

Having a series of all-way stops along a collector road can reduce the speed of traffic by not giving traffic a chance to build up speed. In this way, multi-way stops function in the same manner as speed humps and traffic circles, without the negative impacts to emergency services and roadway maintenance. Multi-way stops have the added advantage of reducing the delay to vehicles on side streets. Studies have found that where introduced, multi-way stops have reduced average travel speed by an average of 19 percent. Multi-way stops are frequently used in other states. However, in New Jersey, for a long time all multi-way stops were required to be approved by the New Jersey Department of Transportation, who in turn insisted on strict adherence to the warrants contained in the Manual on Uniform Traffic Control Devices (MUTCD). This prevented the use of multi-way stops for the most part in New Jersey. However, new editions of the MUTCD made several modifications to the warrants for multi-way stop signs that made them more viable. The required average major road traffic volume was reduced from 500 vehicles per hour to 300 vehicles per hour, and the required average side street volume of 200 vehicles per hour was modified to include pedestrians and bicyclists in addition to vehicles. As well, optional criteria for issues such as lack of sight distance and the intersection of two residential roads of similar character were added, giving more flexibility for the use of multi-way stops. For certain situations, the use of multi-way stops can be an effective traffic calming technique. However, care

must be taken to ensure that multi-way stops are applied at locations where they are not likely to be ignored, such as at intersections greatly imbalanced traffic volumes.

Neighborhood Traffic Circles

Cities such as Seattle, Portland, and Toronto extensively use traffic circles. Traffic circles are most effective when several of them are used on a given road. The intent is to force persons to steer around the circles in intersections, and this tends to reduce the speed of through traffic. Before and after studies have indicated the following facts about the effectiveness of traffic circles:

- 85th Percentile Speeds (i.e. the speed at which 85 percent of traffic travels at or less than) were reduced from 35 miles per hour (mph) to 33 mph in Toronto when two circles were used on a road.
- 85th Percentile speeds were reduced from 36 mph to 28 mph in Portland, Oregon when several traffic circles were installed.
- Median Speeds (the speed at which half the traffic travels above and half the traffic travels below) were reduced from 32 mph to 25 mph.
- Other studies have indicated that traffic circles have been able to reduce speeds by 34%.
- Intersection accidents were drastically reduced after traffic circles were installed in both Toronto and Portland (minimum reduction was 50%).
- Fire vehicles were delayed by 1.3-10.7 seconds per traffic circle in Portland, OR.
- Traffic circles can restrict access for trucks and longer school buses.
- Snow removal efforts were increased in Toronto due to traffic circles, although not significantly (An additional \$8,000 per year was found to be needed for a neighborhood with 4 traffic circles).

Pinch-Points, Curb Extensions, Chicanes, and Bulb-outs

Another method of slowing down traffic is through narrowing the roadway for vehicles. Horizontal treatments are often preferable to vertical treatments such as speed humps because they do not have the same potential for damages if vehicles do maintain speed over them. Bulb-outs can be used to create a protected parking lane. They also have a significant safety benefit for pedestrians. First of all, the crossing distance is reduced (in some instances cut in half). Second of all, having pedestrians standing on bulb-outs increases the chance of vehicles to see the pedestrians and be confident that pedestrians intend to cross the street. Intersection bulb-outs are already in use in South Orange, as well as Summit, Plainfield, Maplewood and several other communities in New Jersey. Before and after studies have indicated that pinch-points, curb extensions, chicanes, and bulb-outs can reduce average travel speeds by approximately 22% on the average.

Center Island Narrowing

Another traffic calming measure frequently utilized is a center island and lane narrowing. According to the Highway Capacity Manual, narrowing travel lanes to 10 feet and providing obstructions next to the road can effectively lower free flow traffic speeds by up to 10 miles per hour. Center islands tend to slow traffic down, as well as provide a refuge for pedestrians. They also reduce the crossing distance for pedestrians. Center islands also have the advantage of significantly reducing the potential for traffic accidents by segregating different directions of traffic. However, center islands can restrict access to driveways, and can have the potential to be blockaded by parked or disabled vehicles.



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Analysis and Recommendations

Given the objective of reducing speeds by 3-5 miles per hour, an incremental approach to traffic calming would be appropriate. The appropriate approaches would be as follows, with a check of speeds after each step (to determine if the objective had been achieved):

Step 1 – enhance speed limit signage – Replacing existing speed limit signs and adding additional speed limit signs may be effective at reducing speeds. In particular, adding speed limit signs between Chestnut Road and Beechwood Road is a high priority. Replacing the existing “Stop Ahead” signs and adding a new one between Chestnut Road and Beechwood Road would be helpful as well.

Step 2 – Add multi-way stop to Oakridge Road and Chestnut Road intersection – Installing a multi-way stops at Chestnut Road may help reduce speeding, and would be consistent with other intersections in the area. It is noted that a multi-way stop warrant report would have to be conducted at this location before the treatment could be implemented.

Step 3 – Striping a shoulder on the roadway – Striping a shoulder for the parking lane would visually narrow the road for motorists that could reduce speeds.

Step 4 – Install curb extensions at intersections to protect the parking lane – Physical narrowing of the roadway can be expected to reduce speeds and reduce pedestrian crossing distances. However, snow removal and roadway maintenance issues can result. It is therefore recommended that temporary curbing be utilized initially, with permanent measures being installed once everyone is comfortable with the change and it has been proven to be effective.

Speed humps or tables are specifically not recommended, due to the steep grades of the roadway and driveway frequency, combined with the fact that other treatments have been found to be equally effective or superior.

If you have any questions, please feel free to contact me at 973-946-5670.

Sincerely,
NV5



Gordon Meth, PE, PP, PTOE
Director, Traffic Engineering