

Memorandum

To: Jeffrey Eastburn, Franklin Township, Chester County

From: Mark Hood, P.E., LTAP

Date: July 20, 2021

Subject: Gypsy Hill Road Traffic Calming

BACKGROUND

In response to a technical assistance request from Franklin Township, I met with Jeffrey Eastburn and John Auerbach on July 14, 2021, to review traffic calming possibilities along Gypsy Hill Road. The Township has received speeding concerns along this roadway, particularly along the ~0.20-mile segment from the Presbyterian Church driveway to the start of the significant vertical curvature and grades on the road.

We drove and walked the area and evaluated existing conditions. See Figure 1.

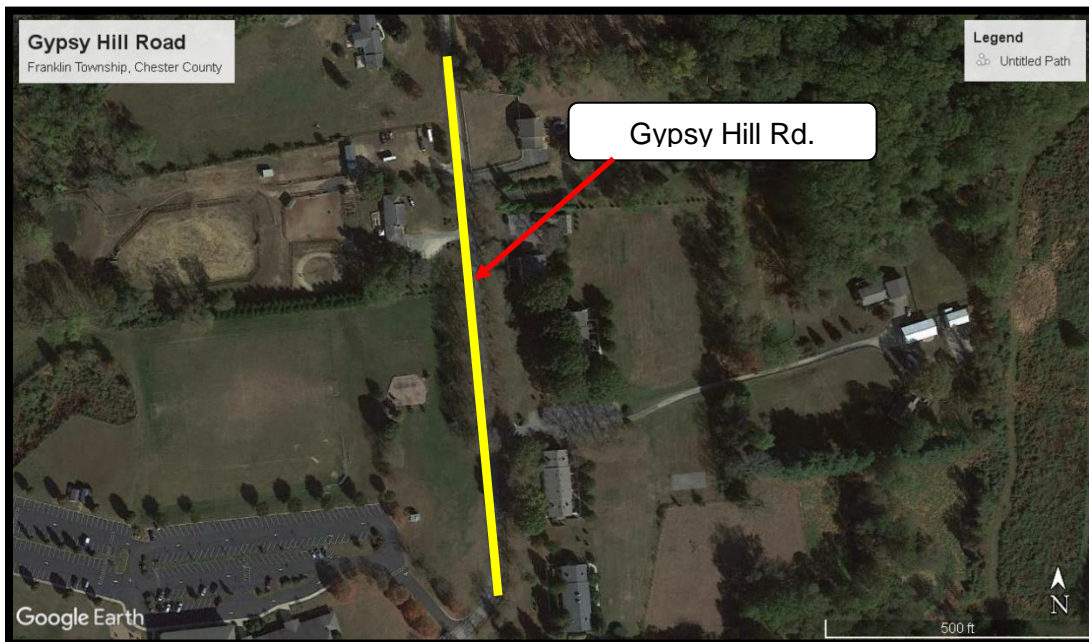


Figure 1: Gypsy Hill Road, Franklin Township, Chester County

Before discussing traffic calming concepts for this road, note that field observations, discussions with municipal personnel, and traffic engineering experience are largely responsible for the content and findings of this memo. In addition, specific references that were consulted include:

- 2009 Current Edition of the Manual on Uniform Traffic Control Devices (MUTCD)
- PennDOT Publications 46, 111, 212, 236, and 383
- ITE Traffic Calming State of the Practice
- PA Vehicle Code, Title 75
- FHWA Speed Management and Traffic Calming websites
- For more information on traffic calming:
 - <https://www.youtube.com/watch?v=bkz026kKpRU>
 - <http://www.seattle.gov/transportation/trafficcircles.htm>
 - <http://www.philadelphiastreet.com/traffic-and-lighting/traffic-calming-policy-information/>
 - https://safety.fhwa.dot.gov/speedmgt/traffic_calm.cfm

Pennsylvania LTAP is willing to clarify and provide additional information relating to any of the potential solutions listed.

GYPSY HILL ROAD

Gypsy Hill Road is a paved two-lane, two-way township roadway in a rural residential setting with a posted 35 MPH speed limit. It is about 18' to 20' in width with double yellow centerline pavement markings. The portion of Gypsy Hill Road that we focused on was about a 1,000-foot segment from the Presbyterian Church driveway to the start of the significant vertical curvature and grades on the road. The road has no curbs or sidewalks on either side of the road and has a relatively flat grade. See Figure 2.



Figure 2: Gypsy Hill Road, Franklin Township, Chester County

Traffic volumes were collected by the Township from June 28 to July 10, 2021. Average Daily Traffic (ADT) over that timeframe was 606 vehicles per day (vpd). A second set of traffic volumes were collected by the Township from July 13 to July 19, 2021. ADT over that timeframe was 558 vpd. Note that the counts for the partial days of July 13 and July 19 were combined and treated as a single day.

Speed data was also obtained from July 13 to July 19, 2021. This data indicates that the 85th percentile speed is 44.2 MPH.

Crash data for a five-year period starting from January 1, 2016, through December 31, 2020, was obtained from PennDOT's online Pennsylvania Crash Information Tool (PCIT). This data indicates that there were nine (9) reportable crashes during this timeframe on Gypsy Hill Road: Seven (7) were midblock crashes, one (1) occurred at the intersection with SR 896, and one (1) occurred at the intersection with SR 841. All of the midblock crashes were Hit-Fixed-Object (HFO) crashes, and five (5) of them involved speeding or driving too fast for conditions.

TRAFFIC CALMING

PennDOT Publication 383, *Pennsylvania's Traffic Calming Handbook*, identifies specific traffic calming measures that are approved for use in PA and contains background information, definitions, standards, and other information on traffic calming. Pub 383 defines traffic calming as:

Traffic Calming	The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users.
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Traffic calming offers additional ideas to municipalities beyond traditional traffic engineering and enforcement resources to improve the livability and safety of the street. Pub 383 states that traffic calming is an option for consideration to alleviate certain traffic problems including speeding and cut-through traffic. There are no laws or PennDOT regulations that require the application of traffic calming. Thus, the Township is under no obligation to install traffic calming but can consider it in certain selected situations. For a discussion on the Township's authority to install traffic calming devices, refer to Pub 383 Chapter 3, Legal Issues, Page 9.

If the Township chooses to implement traffic calming, they are required to conform to Pub 383; this is per Title 67, Chapter 212, Section 212.9, Traffic Calming.

Traffic Calming Policy

Before traffic calming implementation is considered, the Township should have a traffic calming policy in place. Pub 383 identifies a process for developing the policy, as well as samples of traffic calming policies from other municipalities. Part of the process is an

educational/outreach effort to inform residents about traffic calming, the benefits and costs, the negatives effects, and a rationale for prioritizing which streets are candidates for traffic calming. The process described in Pub 383 is likely overly comprehensive for Franklin Township. The Township will need to streamline the process to make it more manageable given the size and population of the Township.

For the purpose of the issues on Gypsy Hill Road, LTAP will present an approach and discussion of what traffic calming features may be appropriate if Franklin Township decides to pursue traffic calming. **This memo is not intended to take place of a traffic calming policy or the engineering and traffic studies required for traffic calming, but to provide an example discussion of the approach to traffic calming.** The steps for this approach should include:

- Clearly defining the problem
- Identifying appropriate traffic calming features to address the problem
- Identifying design issues related to implementation
- Identifying positive and negative impacts
- Estimating costs
- Selecting traffic calming features to implement

Another important step in the process, once a policy has been established, will be acquiring residents' approval for the implementation. Typical policies require from 70% to 80% approval (the Township can set its own threshold in its traffic calming policy). Pub 383 provides additional information on the recommended approach to traffic calming.

Defining the Problem

There are several typical issues that traffic calming can address such as speeding, inappropriate volumes of traffic, and cut-through traffic on streets. The reduction of speeds and volumes can be a direct result of traffic calming which typically creates a safer, more livable street environment.

Pub 383 defines a speeding problem as the 85th percentile speeds are more than 10 MPH over the posted speed limit. Based on past experience, this threshold is a bit high - 6-8 MPH is more

common. However, the Township can set a more appropriate threshold in its traffic calming policy and determine whether Gypsy Hill would have a defined

speeding issue. Note that the 10 MPH threshold also represents the speed at which local police can cite a driver per Title 75, Section 3368, Speed Timing Devices.

- *Speeding:* When speeding is the primary concern, the 85th percentile speed should exceed 10 mph over the posted speed limit before traffic calming is considered.
 - 85th percentile speed. (The 85th percentile speed is the speed at or below which 85 percent of the motorists on a street are traveling. This speed is often used as a measure of the upper limit of reasonable speeds for prevailing conditions.)

Pub 383 defines a traffic volume problem for a residential street at 1,000 vehicles per day. Gypsy Hill Road ADT is less than this threshold, but the Township can set its own level in its traffic calming policy.

Pub 383 also has a sample project ranking chart that the Township can use to prioritize problem areas, and if there are problems on multiple roads, which roads should be a higher priority. The Project Ranking System is included in Chapter 4 of Publication 383 and shown below in Figure 3.

**FIGURE 1
PROJECT RANKING SYSTEM**

Criteria	Points	Basis for Point Assignment
Speed	0 to 30	Extent by which 85 percentile speeds exceed posted speed limit; 2 points assigned for every 1 mph.
Volume	0 to 25	Average daily traffic volumes (1 point assigned for every 120 vehicles).
Crashes	0 to 10	1 point for every crash reported within past 3 years.
Elementary or Middle Schools	0 to 10	5 points assigned for each school crossing on the project street.
Pedestrian Generators	0 to 15	5 points assigned for each public facility (such as parks, community centers, and high schools) or commercial use that generates a significant number of pedestrians.
Pedestrian Facility	0 to 10	5 points assigned if there is no continuous sidewalk on one side of the street; 10 points if missing on both sides.
Total Points Possible	100	

Figure 3: Sample Project Ranking System from Publication 383

Once a traffic calming policy is in place, a more detailed traffic calming study can be completed to determine whether the speeds and volumes on Gypsy Hill Road affect safety and/or affects the character/quality of life on the streets.

Traffic Calming Options

Figure 4 below lists commonly used traffic calming measures that are approved for use in Pennsylvania in Pub 383. Studies show that each of these traffic calming measures have benefits—such as reducing the speed of traffic. Conversely, each traffic calming device will also have some negative effects. Pub 383 identifies the advantages and disadvantages for each of the treatments.

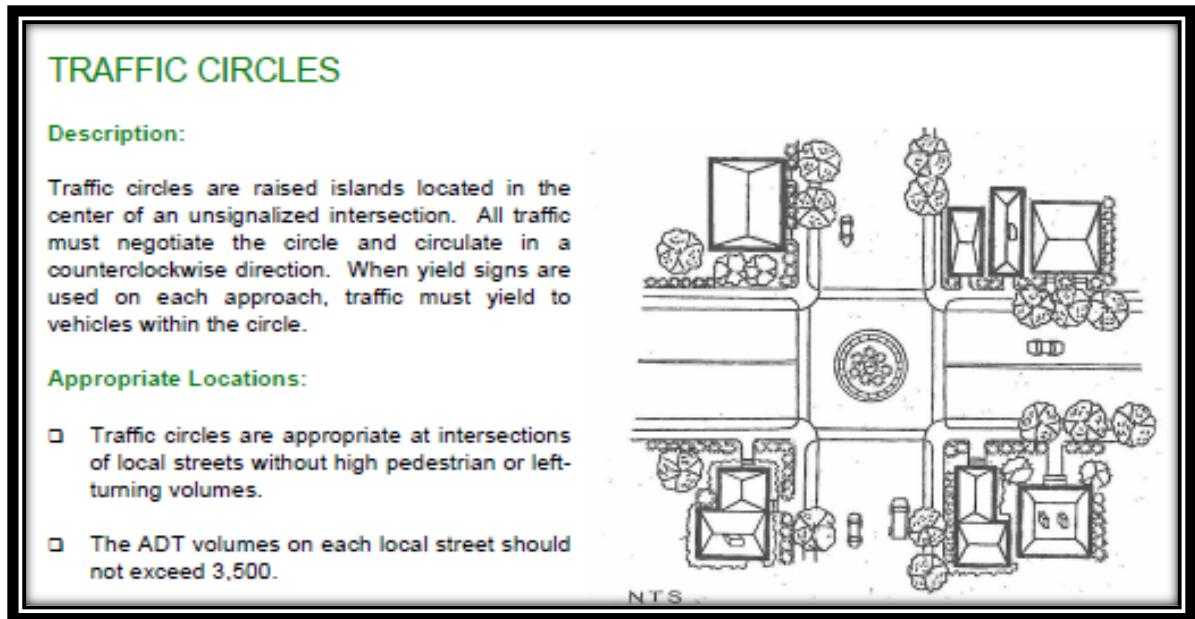
COMMONLY USED TRAFFIC CALMING MEASURES	
Horizontal Deflection	
Curb extension / bulb-out	Areas of expanded curbing that extend across a parking lane and may narrow a travel lane.
Chicane	Series of 3 bulb-outs, staggered at mid-block locations on alternating sides of the street.
Gateway	Entrance treatment, typically using physical and textural changes, that provides identity to an area.
On-street parking	Provision of on-street parking that reduces roadway width.
Raised median island / pedestrian refuge	Narrow islands, at mid-block or intersections, between travel lanes with breaks in landscaping and curbing for pedestrians.
Traffic circle	Raised island in the center of an intersection that requires vehicles to travel counterclockwise around the circle.
Vertical Deflection	
Speed hump	Raised humps in the roadway, typically 3 inches high with a 12 or 22-foot travel length.
Speed Cushion	Series of three to four cushions spaced across the roadway width that permits wide axle emergency vehicles to pass without slowing down.
Raised crosswalk	Marked pedestrian crossings elevated 3 to 6 inches above street grade at intersections or mid-block.
Raised intersection	Intersections, including crosswalks, raised 3 to 6 inches above street grade.
Physical Obstruction	
Semi-diverter	Directional closure created by physically blocking half the street.
Diagonal diverter	Physical barrier placed diagonally across a four-way intersection to create two unconnected intersections.
Right-in / right-out island	The use of raised islands to prevent left turns and through movements, to and from side streets, at intersections with major streets.
Raised median through intersection	Median barrier through an intersection that discourages through traffic in a residential area by restricting movements.
Street closure	The use of a cul-de-sac to close a roadway by extending a physical barrier across the entire width, obstructing all traffic movements.

Figure 4: Publication 383 Commonly Used Traffic Calming Measures

Several options that are appropriate to address a speeding issue include:

- On-Street Parking
- Sidewalks
- Traffic Circles
- Speed Humps
- Speed Cushions
- Raised Intersections

Each of these options have identified benefits, costs, and associated impacts, which are identified in Pub 383. An example of the benefits, costs, and impacts for a traffic circle is shown in Figure 5.



Advantages:	Disadvantages:
<ul style="list-style-type: none"> <input type="checkbox"/> Reduce speeds. <input type="checkbox"/> Can significantly reduce motor vehicle collisions, particularly right-angle conflicts. <input type="checkbox"/> Reduces the number of potential conflict points at an intersection. <input type="checkbox"/> Enhances neighborhood appearance when properly landscaped. <input type="checkbox"/> The Insurance Corporation of British Columbia, summarizing 43 international studies, reported that circles reduce collisions by 82 percent. 	<ul style="list-style-type: none"> <input type="checkbox"/> May make it difficult for emergency vehicles, buses, and trucks to turn left. <input type="checkbox"/> May be inappropriate on major emergency response routes. Emergency service vehicles are delayed from 1 to 11 seconds per circle, with most delays falling around 5 to 8 seconds. <input type="checkbox"/> May require removal of some on-street parking. The prohibition of parking for 30 feet from the intersection is recommended.

Figure 5: Traffic Circle Information from Pub 383

Implementation Considerations

Traffic calming features have many benefits, but also have design considerations and impacts that should be considered by the Township. Design issues and impacts could include:

- the constructability of the traffic calming feature,
- the impact to residents traversing the traffic calming features,
- the impact on roadway drainage, cross slopes, and pavement,
- the impact on services such as snow removal, trash collection, transit, school buses, and street sweeping,
- the diversion of traffic and what streets the issue may shift to,
- the effect on emergency vehicle response time, and
- the construction cost/maintenance costs.

For a full discussion of these impacts, including costs of different devices, refer to Pub 383.

One method to reduce the unknowns associated with the implementation of traffic calming is to use temporary installations. There are a variety of approved temporary traffic calming devices, including speed humps. Other traffic calming features can be implemented in a temporary manner using paint and traffic control devices such as delineators. Figure 6 shows a temporary speed hump that was installed in East Bradford Township, Chester County.



Figure 6: Example of a Temporary Speed Hump

SUGGESTIONS FOR GYPSY HILL ROAD

Traditional Solutions

Before attempting traffic calming measures, the Township could try traditional, lower cost solutions. These solutions would include public outreach/ education, enforcement, and the use of appropriate signs/ pavement markings. The Township should discuss increased targeted enforcement options with the State police. The Township should also continue to deploy a radar speed alert sign or portable speed trailer that displays the speed of vehicles as they pass by. An example of a portable speed trailer is in Figure 7.



Figure 7: Example of a Portable Speed Trailer

Another consideration would be the installation of edge lines along the length of Gypsy Hill Road. These can narrow lane widths and create the psycho-perceptual advantage of using narrow lanes to slow speeds.

Traffic Calming Suggestions

As indicated in previous sections, the Township should develop a traffic calming policy before implementing any traffic calming concepts. Further, the Township should follow the policy and conduct appropriate studies per Publication 383 before installing any traffic calming devices. The policy and the studies are critical to understand the various benefits and impacts of traffic calming as well as minimizing the Township's liability. As noted above, many traffic calming concepts can be implemented on a temporary, trial basis. This will allow the Township, residents, and emergency services all to determine the actual benefits and impacts of the traffic calming.

The other benefit of a traffic calming policy is to not overuse traffic calming devices where they are not appropriate or not warranted. Unwarranted traffic calming devices, just like unwarranted traffic control devices, tend to create more issues than solve them.

Speed Tables

Depending on how your policy is constructed and thresholds are established, some devices that could work on Gypsy Hill Road are vertical measures like speed tables or speed cushions. For a full description of each device, refer to Pub 383. I would consider speed tables rather than speed humps considering the existing 85th percentile speed of 44.2 MPH.

Per Pub 383, speed humps/tables should be used in series, from 250 to 600 feet apart. Figure 8 shows a series of speed tables about 250 feet apart with the first located 250 feet from the church driveway. Driveways, drainage, and other factors should be considered in the final design and placement of the speed tables. As with the other concepts, there are temporary speed tables that can be tried on a trial basis. Keep in mind, these are only concepts – you will need to evaluate conditions based on your policy and develop final layout options. Vertical measures would not be appropriate further north on Gypsy Hill Road because of the steep grades and vertical curves.

While speed tables can control speeds, one complaint that may arise is that residents that live on Gypsy Hill Road must travel over them every day and hear other vehicles travel over them every day. There are also maintenance considerations as well as impacts on emergency vehicle response times.



Figure 8: Gypsy Hill Road Speed Hump Concept

Optical Speed Bars

Optical speed bars, also known as speed reduction pavement markings, may be an option to consider. These are transverse markings that are placed on the roadway within a lane (along both edges of the lane) in a pattern of progressively reduced spacing to give drivers the impression that their speed is increasing. While these markings are typically placed in advance of an unexpectedly severe horizontal or vertical curve or other roadway feature where drivers need to decelerate prior to reaching the feature, they might be tested as a traffic calming measure. Additional information is included in Section 3B.22 of the MUTCD. See Figure 9.



Figure 9: Optical Speed Bars Example

Rumble Strips

While the results of the optical bars on reducing speed is muted, the positive impact of edge line and/or center line rumble strips is well documented in Pennsylvania. If the Township is considering edge line and/or center line rumble strips, they should work with an engineer to review PennDOT criteria/guidelines for their potential use on Gypsy Hill Road.

As an alternative to milled-in center line or edge line rumble strips, the Township could also try Thermoplastic Transverse Rumble Strip Pavement Markings. These are double thick thermoplastic transverse pavement markings that could bring attention to and slow traffic. Refer to page 63 of Publication 383 for additional information. Transverse pavement markings can be implemented quickly and effectively and are not as costly or noisy as milled rumble strips. The thermoplastic strips will also likely need to be re-installed each year because of winter maintenance activities. Refer to Figure 10.



Figure 10: Thermoplastic Transverse Rumble Strip Pavement Markings

SUMMARY AND NEXT STEPS

Based on a field view of the roadways, a review of crash data, and a review of the applicable standards/guidelines, Gypsy Hill Road may be a candidate for traffic calming depending on what the Township would like to establish as a policy. Here are a few summarized considerations for the Township:

1. Consider installation of edge lines along the length of the roadway.
2. Consider additional targeted enforcement options with the state police.
3. Continue deploying a radar speed alert sign/portable speed trailer that displays the speed of vehicles as they pass by.
4. Consider some education and outreach efforts to slow traffic.
5. If the Township is interested in traffic calming devices, start the process to develop a traffic calming policy.
6. Consider optical speed bars or thermoplastic transverse rumble strips.