Traffic Calming in Bethlehem

January, 2020
Town of Bethlehem, NY

The Town of Bethlehem has 179 miles of town roads serving more than 11,000 homes and businesses, in addition to 17 miles of County and 53 miles of State roads (plus another 17 miles of the NYS Thruway). With such an extensive network, traffic, cyclist, and pedestrian conflicts invariably occur.

The Town uses the "3 E's" of best practices – education, enforcement, and engineering – to avoid and minimize these conflicts. This document lays out a range of engineering approaches the Town may consider to complement ongoing education and enforcement efforts to calm traffic on all of our roadways.

Defining Traffic Calming

Bethlehem follows the definition of traffic calming provided by the Institute of Traffic Engineers:

> "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."

This definition aligns well with the Federal Highway Administration's definition of traffic calming:

> "The primary purpose of traffic calming is to support the livability and vitality of residential and commercial areas through improvements in non-motorist safety, mobility, and comfort. These objectives are typically achieved by reducing vehicle speeds or volumes on a single street or a street network. Traffic calming measures consist of horizontal, vertical, lane narrowing, roadside, and other features that use self-enforcing physical or psycho-perception means to produce desired effects."

Considering Conflicts

The Town maintains a list of traffic, cyclist, and pedestrian safety concerns received from residents and our Police and Highway Departments. Each concern is reviewed monthly by an inter-departmental team with representatives from the Town Supervisor's Office, Engineering Division, Highway Department, Planning Department, and Police Department.

For concerns relating to traffic, our first step is to review available information on accidents, enforcement activity, and traffic citations in the area of concern. We then may deploy a covert traffic counter to gather data on vehicle speeds, traffic volume, and travel times. These counters are hidden from motorists and are typically deployed for 7-10 days to give us an objective picture of traffic patterns in areas of concern.

In most cases, we can address concerns through increased enforcement and temporary placement of mobile trailers that remind motorists of their current speeds. In some cases, however, additional engineering approaches are needed to address traffic concerns, particularly those involving speeding.

Appendix A of this report summarizes a variety of engineering approaches the Town may consider implementing when traffic problems cannot be addressed with enforcement and education. The focus of these engineering options is on traffic; solutions primarily aimed at pedestrian safety are being considered by the Town in collaboration with our Bicycle & Pedestrian Safety Committee.

One engineering approach that we have implemented over the last several years in areas with chronic speeding issues has been signs that flash a smile or frown depending on whether drivers are under or over the speed limit. These signs also capture data on traffic speeds, which helps us assess how effectively they are working.

Stop Signs Do Not Address Speeding Problems

A common misperception is that stop signs are an effective engineering approach to addressing speeding problems. They are not. Stop signs assign who has the right to go first at an intersection. Thus, they are a tool for reducing crash rates, not for slowing vehicles.

The Town conforms to the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* which sets clear standards for the placement of stop signs. These are important, because non-conforming stop signs may increase:

- the risk of rear end collisions;
- motorist speeds between signs to make up for lost time; and
- the likelihood of rolling stops at intersections, and as a result the risk of collisions.

Section 2B.05 from the Federal Highway Administration's *Manual on Uniform Traffic Control Devices*

STOP signs should be used if engineering judgment indicates that one or more of the following conditions exist:

A. Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;

B. Street entering a through highway or street;

C. Unsignalized intersection in a signalized area; and/or

D. High speeds, restricted view, or crash records indicate a need for control by the STOP sign.

Guidance:

- STOP signs should not be used for speed control.
- STOP signs should be installed in a manner that minimizes the numbers of vehicles having to stop. At intersections where a full stop is not necessary at all times, consideration should be given to using less restrictive measures such as YIELD signs (see Section 2B.08).
- Once the decision has been made to install two-way stop control, the decision regarding the appropriate street to stop should be based on engineering judgment. In most cases, the street carrying the lowest volume of traffic should be stopped.
- A STOP sign should not be installed on the major street unless justified by a traffic engineering study.

(https://mutcd.fhwa.dot.gov/HTM/2003r1/part2/part2b1.htm#section2B04)

Considerations for Traffic Calming

Appendix B shows three approaches that other municipalities have used for assessing when engineering solutions are necessary to calm traffic. Their primary foci are speeds, traffic volume, crash rates, and pedestrian issues.

At the time of this writing, the Town had not selected a scoring-based approach for deciding when to deploy engineering solutions. That said, the Town does consider the same issues of speed, volume, crashes, and pedestrian/cyclist safety when assessing areas of concern.

Like other municipalities, we look at speed in several ways using data from our counters. The primary measure is the "85th Percentile Speed." This is the speed at which 85% of the drivers on a road are at or below. We further consider the average speed on the road and the overall traffic volume.

The Federal Highway Administration classifies roads across a hierarchy, from local roads to interstates, based on the traffic flows they're designed to accommodate. The vast majority of Bethlehem's roads are local, but we also have collectors which feed local roads to larger arterials. The average daily traffic volume on these streets varies dramatically. Elsmere Ave, for example, typically has

Classification	Example
Principal Arterial	Delmar Bypass
Minor Arterial	Delaware Ave
Major Collector	Elsmere Ave
Minor Collector	South Albany Rd
Residential/Local	Hasgate Dr

about 7,500 vehicles daily while Mullens Road sees 50. Sections of Delaware Ave, a major arterial road, carries 18,000 vehicles daily.

In addition to considering *when* to apply engineering solutions, we also need to consider *which* device is most appropriate. Appendix A summarizes a wide variety of potential devices. The following considerations are important for determining on a case-by-case basis when engineering devices might be effective and which device will work best.

Considerations about When Engineering Necessary/Appropriate

1. Road Type
   - What type of road is it (residential, corridor, arterial)?
2. Speeds
   - What is the 85th percentile relative to the speed limit?
   - What is the average speed relative to the speed limit?
   - What are the highest speeds observed relative to the speed limit?
3. Traffic Volume
   - How many cars are using the road each day?
   - How many cars are using the road during peak travel hours?
4. Crashes
   - How many crashes have occurred due to speeding?
   - How many crashes have occurred for other reasons?
   - How many crashes have involved pedestrians or cyclists?
5. Cut Through Traffic
   - What percentage of drivers are just driving through the area of concern?
6. Pedestrian Safety
   - Are sidewalks available for pedestrians?
   - Are there facilities like parks and commercial centers nearby that are prime destinations for pedestrians and cyclists?
   - Are there facilities like schools and senior centers nearby that are prime destinations for younger or older pedestrians and cyclists?
7. Residential Density
   - How many homes (including apartments) are in the area of concern??

Considerations about Engineering Device Type & Installation

1. Effect on road users
   - Will emergency services be slowed or inconvenienced?
   - Will school and public transportation vehicles be slowed or inconvenienced?
   - Will passengers/patients be jarred and/or uncomfortable?
   - Will the device cause problems for pedestrians or cyclists?
2. Effect on snow removal process
   - Do vertical deflection devices hinder the snow plow effectiveness?
   - Will vertical deflection devices damage snow plow equipment?
3. Drainage
   - Will the calming device change the drainage pattern in the roadway?

4. ADA compliance
   - Especially when considering pedestrian safety and accessibility, the device must meet the requirements set forth in the Americans with Disabilities Act.
5. Initial costs
   - What is the cost of installing the calming device?
   - Are grants available to assist with funding?
6. Maintenance costs and other maintenance issues
   - What are the ongoing maintenance costs (repairs, labor, etc.)?
7. Aesthetics
   - How will the device affect the aesthetics of the street/neighborhood?
   - Are there sight distance requirements that must be met?
8. Enforcement
   - Will the device effectively lower speeds and thereby reducing the need for police enforcement?

Sources

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Appendix A. Summary of Traffic Calming Devices

Traffic Calming Device	Description	Reduction Measure	Type of Control	Application	Advantages	Disadvantages	Municipalities Using the Device
Edge striping	painted lines along sides of road	speeding	psychological	local, residential streets	visually narrows the roadway, can provide shoulder/lane for bicyclists, easy to implement	maintenance for striping, may require supplemental devices	
Transverse markings	thermoplastic pavement markings in clusters	speeding	psychological	school zones, hospitals, near severe curves	slows traffic in diverse areas	can be noisy for neighbors	
Street trees	featured along the roadway to visually narrow the "feel" of the road	speeding	psychological		visually constricts the roadway, adds to aesthetics of the roadway	maintenance cost for upkeep of landscaping, may require supplemental devices, may take time for trees to mature	
Gateways	special neighborhood entrance treatments using a combination of physical and textural changes	speeding & cut through	psychological	local roads, entrance to residential community	visual impression of narrow travel way, improved streetscapes	maintenance cost	
Painted speed humps	painted areas that resemble speed humps	speeding	psychological	local, residential streets	gives the illusion of a raised speed hump, no problems with snow removal, inexpensive to implement	unsure of effectiveness, tried in other countries but no data from the US	
Painted speed limit number	painted areas that show speed limit	speeding	psychological	local, residential streets	no problems with snow removal, inexpensive to implement	unsure of effectiveness	
On-street parking	parking on one or both sides of the roadway	speeding	psychological		visual impression of narrow travel way, parking maneuvers slows traffic, increase driver awareness	width of street	

Traffic Calming Device	Description	Reduction Measure	Type of Control	Application	Advantages	Disadvantages	Municipalities Using the Device
Speed humps	raised surface, typically 3-4 inches high and 12-20 feet long	speeding	physical	residential/midblock streets only, not grades >8%	effective for speed reduction, reduces volume and collision, inexpensive, easy bicycle crossing,	slows emergency vehicles and large trucks, discomfort for people with skeletal disabilities, difficult for snowplows, may be noisy, may impede drainage	
Speed bump/lump	similar to speed hump but adds 2 wheel cut outs	speeding	physical	residential/midblock streets only, not grades >8%	effective for speed reduction, reduces volume and collision, inexpensive, easy bicycle crossing, emergency vehicles and large trucks not affected	may be rough ride, discomfort for people with skeletal disabilities, may be noisy, may impede drainage	
Textured pavement	use of stamped pavement or alternate paving materials to create uneven surface	speeding	physical	intersections with high pedestrian activity, crosswalks	promotes pedestrian awareness, can reduce speed, includes colored pavement markings, rumble strips	expensive, shorter lifespan, can be difficult for wheel chairs or visually impaired, noisy	
Lateral shift	curb extensions that shift movement from one side and then back again	speeding	physical	straight streets	slows traffic to negotiate shift, no problem for emergency vehicles, can be used on arterial streets	may not be as effective as other measures	
Chicane	series of 3 bulb outs staggered at mid-block locations on alternating sides of the street creating S-shaped curves	speeding	physical	local streets	horizontal deflections (serpentine) reduces speed, large vehicles can negotiate easily	curb realignment costly, can impact driveway access,	

Traffic Calming Device	Description	Reduction Measure	Type of Control	Application	Advantages	Disadvantages	Municipalities Using the Device
Center island in median	raised islands along centerline of street that narrows travel lanes	speeding	physical	wide streets	increase pedestrian safety by reducing crossing width and creating refuge area	bicyclists may have to merge into traffic	
2 lane choker/slow point	curb extensions at midblock sections	speeding & volume	physical	local streets, used in conjunction with pedestrian crossing	reduce speed and volume, reduce pedestrian crossing width, increase visibility, minor inconvenience to drivers	can impact driveway access, bicyclists may have to merge into traffic, may not be very effective	
One lane choker/slow point	same as above but only in one direction	speeding & volume	physical	low volume streets	significantly reduce speed and volume, reduce pedestrian crossing width, increase visibility	oncoming traffic must yield to those in choker, bicyclists may have to merge into traffic	
Median barrier	barrier that prevents left turns and through traffic to and from a local street	cut through & volume	physical	local streets, block intersection to avoid left turn accidents	improve safety by prohibiting dangerous turns, reduce volume on cut through, increase pedestrian safety by reducing crossing width	requires available street width, limits turns for residents and emergency vehicles	
Traffic signs	varies	speeding & volume	passive	areas where speed limit, exclusion, restricted movement needed	provides speed limit reminder, redirects traffic, reduces cut through traffic, addresses time of day issues	not self-enforcing, may increase trip length	
Speed monitoring trailer	mobile device with radar equipment that measures and displays speed	speeding	passive	trailers, semi-permanent signs, covert counter	effective for temporary speed reduction, easy to implement, good public relations	effectiveness limited to duration of installation, equipment cost, aesthetics	

Traffic Calming Device	Description	Reduction Measure	Type of Control	Application	Advantages	Disadvantages	Municipalities Using the Device
Driver feedback signs	attach to speed limit signs-shows motorist's speed vs speed limit	speeding	passive	remind motorist of their travel speed	radar speed signs are effective as long-term solution		
Photo enforcement cameras	attach to traffic lights, school bus arms, rail crossings	speeding	passive	enforce speed limits	cameras record violations and issue citations via mail-saves personnel time	As of 2019, only legal in New York City, can be contentious (agencies just trying to collect revenue)	
Pedestrian activated devices	push button at traffic lights at intersections	speeding & pedestrian/ vehicle conflicts	passive	examples include beacons, rapid flashing beacons	creates safer pedestrian crossing sites	expensive	
Raised intersection/ crosswalk	raised surface, typically 3-6 inches high with long ramps on approaches. Can be textured	speeding & pedestrian/ vehicle conflicts	physical	local streets, where crosswalks exist and pedestrian traffic is high	improves safety for pedestrians and vehicles, calming for 2 streets at once	can be expensive, not as effective as humps or tables, may be slight delay for emergency vehicles	
Enhanced visibility crosswalks	crosswalks with special markings	pedestrian/ vehicle conflicts	psychological		increased visibility, focuses on pedestrian crossing areas	may induce false sense of security in pedestrians, maintenance	
Speed table/raised crosswalk	marked and elevated pedestrian areas that are extension of crosswalk typically 3-6 inches high with 1 foot flat sections. Can be textured surface	speeding & pedestrian/ vehicle conflicts	physical	local streets, used in conjunction with pedestrian crossing	can be in roadway or as crosswalk, effective in speed, traffic, and accident reduction, provides high visibility crosswalks	aesthetics if no texture used, expensive	
Neckdown/bulbout/ curb extensions	areas of expanded curbing at intersections that reduces the width of the road curb to curb	speeding	physical	local streets, intersections with high pedestrian volume	improves pedestrian safety, may create on street parking bays, reduces speed where lane narrows	may slow turning emergency vehicles, bicyclists may have to merge into traffic, snow removal	

Traffic Calming Device	Description	Reduction Measure	Type of Control	Application	Advantages	Disadvantages	Municipalities Using the Device
Forced turn lanes/diverter	raised islands that block certain movements on approaches to intersection. Forces traffic in a pre-designed direction. Can be diagonal across intersection	direct traffic at intersections	physical	intersections, single lane approaches, one movement only	improved safety, promotes designed traffic flow	if designed improperly drivers can maneuver around them, may divert traffic problem to a neighboring intersection, may increase travel time, can be confusing	
Realigned intersection	not common but used at T intersections to deflect through movement	speeding	physical	T-intersections	reduce speed, increase safety	curb realignment costly, need for right of way	
Roundabout	similar to traffic circles but used on higher volume intersections to allocate right of way among competing movements	speeding & traffic congestion	physical	intersections of collector streets, high volume, and more than one lane of traffic	moderates speed, circulates traffic efficiently, reduces number of possible conflict points	increased pedestrian crosswalk distance, expensive to build, may be confusing to motorists	
Street closures	barrier extending the width of roadway obstructing all traffic, creating a cul-de-sac	cut through traffic volume	physical	local neighborhoods	eliminates cut through traffic, may reduce speed, creates cul-de-sac	obstruct emergency access, can shift congestion elsewhere	

Appendix B. 3 Ranking Systems for Traffic Calming Assessments

Pennsylvania DOT, Traffic Calming Handbook

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	

Town of Colonie, Traffic Calming Guidelines

Initial Traffic Calming Screening Criteria

Criteria		Points	Basis for Point Assignment
Speed		0 to 30	Extent by which 85% speed exceeds posted speed limit; 3 points assigned for every 1 mph.
Average Daily Volume		0 to 10	Average daily traffic volumes (1 point assigned for every 350 vehicles)
Peak Hour Volume		0 to 10	Peak Volume in both directions (1 point assigned for every 35 vehicles)
% Cut Through Traffic		0 to 15	2 points assigned for every 10% above 20%
Crash History		0 to 15	15 points is multiplied by (the accident rate + (the personal injury rate * the accident rate))
Pedestrian/Bicycle Considerations	Pedestrian/Bicycle Generation: General	0 to 15 (5 points for each group)	5 points assigned if public facilities that might generate general pedestrian activity exist within walking proximity of the study area. Some examples might include but are not limited too: parks, playgrounds, sports fields, commercial plazas, community centers, etc.…
	Pedestrian Generation: Special Needs		5 points assigned if facilities for the young or elderly, handicapped or other special needs exist within walking proximity of the study area. Some examples might include, but are not limited, to: schools, senior centers, group homes, etc.
	Pedestrian Facility		3 points assigned if a continuous sidewalk exists on only side of the street; 5 points if there are no sidewalks
Residential Density		0 to 5	1 point assigned for every 25 dwelling units/mile of study area roadway
Total Points:		100	

City of Ann Arbor, Traffic Calming Guidebook

Award points on an incremental basis, with 10 points need for project qualification.

Criteria	Range	Points
Qualifying Petition Support • Resident initiated • Establish community buy-in early • Minimum requirement: Signatures from 50% of all addresses within the identified project area	<50% does not qualify	
	51 - 75 %	3
	76 - 90 %	5
	> 90%	7
85th Percentile Speed • The speed at which 15% of traffic is traveling over • Speed study conducted by City over seven consecutive days • Holidays and major events avoided for data collection	<25 mph	-1
	25 mph	0
	26 - 27 mph	3
	28 - 30 mph	5
	> 30 mph	10
Percent Violators • Percentage of vehicles exceeding the legal speed limit	0 - 30%	0
	31 - 50%	5
	> 50%	10
Average Daily Traffic (ADT) • Average number of vehicles counted over a 24 hour period	<=250 vehicles	0
	251 - 500	1
	501 - 750	2
	751 - 1000	3
	1001 - 1500	4
	1501+	5
Speed Related Crash History (5 years) • Reported crashes that cite excess speed in previous five calendar years • Must be a police report on file	No	0
	Yes	5
School Travel (max 5 pts) *defined by school • Walk Radius • Quarter mile around a public school	Outside of walk radius*	0
	Inside of walk radius*	2 each
	School property adjacent to project	5
	Published priority school walk route	
	Petition aligned with Safe Routes to School Committee Workplan	
Major Pedestrian Generators (e.g., park, library, shopping plaza, senior housing, community center.) (max 3 pts) • Locations people are likely to walk to.	Adjacent to corridor	3
	Within 1/8 mi. of project area	1 each
	Within 1/4 mi. of project area	1/2 each