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Design Options for Main Street

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Review of Smithtown Main Street Traffic Data and Observations

Overview and Summary

This document supplements our earlier technical memo on this topic and provides more detailed analyses and professional recommendations for a workable, practical, safer, lower speed, more retail friendly Main Street through Smithtown, New York.

No single design tool will work alone to keep traffic flowing and, at the same time, reduce high end speeds and traffic crashes. But a carefully considered mix of tools will perform well. This project is too complex to simply add a few additional minor tweaks. This document summarizes recommended tools, to be used in combination, and it notes how they will work together to address community, transportation and safety needs.

If additional tools are added to the community-preferred solution -- the removal of one travel lane in each direction -- most objectives (especially slowing traffic speeds, reducing exposure time and street crossing distances, enhancing pedestrian safety and keeping traffic in motion) will be met. However, these combined objectives will require new intersection tools in order to work well. As detailed in this report, these goals call for a hybrid two-lane roundabout at Hauppauge Road and mini-roundabouts at several other important intersections.

Background

The Main Street roadway section through Smithtown is rated the second most dangerous in the state for pedestrian safety. Many people do not attempt to cross this street on foot, adding to the number of people who must drive across the street or travel elsewhere to shop. The consistently high driving speeds found here are inconsistent with the intended uses of the street. Design solutions must not only address safety, but bring about reductions in speed, noise, pollution and related auto impacts.

NYS Route 25/25A (Main Street) through the Town of Smithtown is a four-lane undivided road with all significant intersections controlled by traffic signals on overhead diagonal masts or diagonal span wire. In a number of cases turn restrictions are in place with several intersections adding exclusive left turn phases. The major issue on Main Street is the high number of pedestrian deaths. These tragedies can be attributed to many factors, but speed is the major contributor in all these events.

Because the current design is not meeting the needs of all roadway users, a fundamental evaluation of the street design is recommended. The choices under consideration by the community and NYDOT include:

1. **Retain the existing design with its known problems, modifying it around the edges, coordinating traffic signals, using improved signal heads, addition of some bulb outs, etc.**

Comment: This option can and should be performed short term, but it does not address the fundamental issues of speeding during off-peak hours, and it is not likely to address other key needs and issues surrounding safety and retail uses of the street. This solution does not take advantage of the strong community team support that exists today, as well as the political and media interest.

2. **NYDOT proposed reduction of one westbound through lane and adding a median, which can improve the pedestrian environment.** However, this action alone will not solve the fundamental roadway problems of: vehicle speeds at points of pedestrian conflict, noise and most vehicle/pedestrian crashes.

Comment: The technical analysis that I conducted shows that this solution will fail existing traffic flow at several key intersections (see charts in this memo). More significantly, this treatment does not address off-peak speeding issues, nor does it solve problems on each side of the street. The problems that this action would create at intersections are not likely to be supported by the community. We recommend "biting the bullet" and fixing the intersections as the only viable way to control speeding and addressing the main concerns.

3. **Community Preferred Design: design the road to remove two lanes, slowing all vehicles at points of pedestrian conflict and adding a median to further control vehicle speed, lower noise levels, and reduce pedestrian/vehicle conflicts to the lowest levels.** This design would include one through lane in each direction with a median and street parking on the North side. Mini-roundabouts would be placed at major intersections, and a two-lane roundabout would be placed at Hauppauge Road. To achieve successful design requires a reduction in through-traffic of several hundred vehicles each hour. These vehicles should be accommodated on the existing Smithtown Bypass, even if some minor adjustments are needed there. Some other local traffic could be supported on an inner circulating bypass, found behind the shopping district to the south.

Comment: The technical analysis performed (which follows) demonstrates that this community preferred design is expected to meet all objectives. This design is the more expensive option, but it is a complete and practical solution to meet both community and NYDOT objectives for safety, unrestricted traffic flow, and reduced speed.

There are no solutions that will not require some adjustments in traffic flow, but this solution honors the large capacity demands of this corridor, while encouraging safer, more civil and retail-friendly traffic behavior. The costs of this design can be offset by the overall added land values and ability for businesses to be competitive in this town center.

Capacity Analysis

To assist with decision making, a series of capacity analyses were undertaken for the following intersections along NYS Route 25/25A (Main Street) and summarized below:

1. NYS Route 111 (Hauppauge Road) at NYS Route 25A (North Country Road)
2. Landing Avenue and Miller Place
3. Lawrence Avenue
4. Maple Avenue
5. New York Avenue and Redwood Lane

Each intersection was analyzed for roundabout and signal controlled traffic using the traffic volumes provided by NYDOT on December 19, 2011. Traffic signal analyses used exiting lane configurations and phasing. An additional set of analyses were undertaken to look at the impact of using a single westbound lane. SIDRA 5.0 was used for all analysis to provide the most direct comparison possible between the two forms of traffic control.

1. Roundabout Analyses using a conservative Environmental Factor 1.2

AM	Level-of-service	Avg. Delay/vehicle (sec)	95th Percentile Queue
Hauppauge Road	B	19.9	504 (north)
Hauppauge signal	E	59.9	1,916 (east
Landing Avenue	F	95.5	4,319 (east)
Landing Signal	C	25.7	836 (east)
Lawrence Avenue	B	10.9	467 (east)
Lawrence Signal	B	14.6	325 (east)
Maple Avenue	F	104.3	3,892 (east)
Maple Signals	B	14.5	523 (east)
Redwood Lane	F	114.0	5,062 (east)
Redwood Signals	B	17.7	759 (east)

PM	Level-of-service	Average Delay per vehicle (sec)	95th Percentile Queue (ft) Approach
Hauppauge Road	B	18.2	334 (west)
Hauppauge signal	E	69.7	2,622 (east)
Landing Avenue	E	66.2	1,778 (west)
Landing Signal	C	25.5	633 (west)
Lawrence Avenue	B	11.9	1,117 (east)
Lawrence Signal	B	17.4	409 (west)
Maple Avenue	E	72.2	3,801 (west)
Maple Signals	B	16.7	541 (west)
Redwood Lane	A	9.9	684 (east)
Redwood Signals	C	21.5	436 (east)

2. Roundabout Analyses using the standard Environmental Factor 1.0 that is in keeping with actual practice at low speed, radial roundabouts.

AM	Level-of-service	Average Delay per vehicle (sec)	95th Percentile Queue (ft) Approach
Hauppauge Road	B	16.1	475 (west)
Landing Avenue*	D	43.5	1,273 (north)
Lawrence Avenue	A	8.8	150 (east)
Maple Avenue	A	10.0	553 (east)
Redwood Lane	B	16.8	1,595 (east)

PM	Level-of-service	Average Delay per vehicle (sec)	95th Percentile Queue (ft) Approach
Hauppauge Road	B	14.3	245 (south)
Landing Avenue	B	11.9	299 (west)
Lawrence Avenue	A	8.8	228 (west)
Maple Avenue	B	14.3	559 (west)
Redwood Lane	A	7.7	185 (east)

Vehicle queues are shown as 95th percentile, the longest queue expected for just 5 percent of the time. The likelihood of longer queues is minimal, and if one does occur, it is only for a minute or two. Normally, the average queue that most drivers are likely to experience is approximately half of the 95th percentile queue.

Capacity Summary

Using a *conservative analysis*, a two lane road with mini-roundabouts and a larger roundabout at Hauppauge Road does not fully meet heavy peak flow demands along Main Street. Under this scenario several hundred vehicles per hour must be diverted to the Smithtown Bypass NYS Route 347. This analysis, however, can be considered workable if the below factors are considered.

An Inner Circulation Road south of Main Street, between New York Avenue and Hauppauge Road could serve "interior circulation traffic." This route would reduce the need for local traffic and people to the south to use Main Street to access the shopping area on the south side of Main Street and reduce traffic on Main Street. Although a number of residents have discovered this unofficial “bypass” on their own, wayfinding signage would be beneficial to help with this traffic shift.

Using the standard roundabout analysis discussed above, diversion of a small number of through vehicles is still desirable because of higher side street traffic volumes at Landing Avenue.

It can be anticipated that drivers who want to continue to drive at high speeds (speeds inappropriate for Main Street) will choose to take the bypass route. The bypass was built for this

reason. As a result, some drop in traffic volume on Main Street may occur once these treatments are in place.

One Westbound Lane with Signalization Option

An alternate analysis was also prepared to analyze eliminating one westbound lane. Some sample analyses to show intersection operation under the three scenarios follow.

AM	Level-of-service	Average Delay per vehicle (sec)	95th Percentile Queue (ft) Approach
Landing Avenue 2 westbound lanes	C	25.7	837 (east)
Landing Avenue 1 westbound lanes	E	70.4	4,017 (east)
Landing Avenue with roundabout	B	14.6	325 (east)
Lawrence Avenue 2 westbound lanes	B	14.6	325 (east)
Lawrence Avenue 1 westbound lanes	B	35.4	897 (east)
Lawrence Avenue with roundabout	A	8.8	150 (east)
Redwood Lane 2 westbound lanes	B	17.7	759 (east)
Redwood Lane 1 westbound lane	D	48.4	4,101 (east)
Redwood with roundabout	B	16.8	1,595 (east)

Elimination of one through-lane will worsen the operation of intersections. This is a logical outcome. By deleting 50 percent of the road's lane space, a capacity decrease occurs in operation of signals. However, the more efficient form of intersection control supported by the New York legislature and NYDOT, a roundabout, can in many cases, restore the capacity of the road.

Inner Circulation Road

When reviewing the viability of an inner circulation road, the east and westbound through volumes (according to the 6/9/11 intersection traffic counts with the 5 day, 24 hour traffic counts taken the same week by VHB) a considerable difference emerged. The ADT showed a greater margin from the counts taken west of Redwood Lane to those taken east of Redwood Lane. Interestingly, the AM ADT counts were taken at the same time as the hourly count. This tally is a significant issue, as the differences between the two with the ADT count being consistent over

five days, could make a significant difference to the design option, especially if the roundabout option at Redwood Lane is considered. See the table below for a summary of the traffic volumes.

Intersection	Direction	Average Daily hourly Traffic from ADT counts	Hourly volumes from Intersection Counts
West of Redwood Lane	Westbound AM	846	1,497
	Eastbound AM	616	908
West of Redwood Lane	Westbound PM	769	1,465
	Eastbound PM	753	867

The differences at Landing Avenue are less pronounced but still significant for counts taken on the same day and in the same area.

Interesting features of the ADT counts are:

1. The traffic counts show that traffic levels remain fairly consistent from 7.00 AM to 8.00 PM.

2. There is a significant increase in traffic within the Town Center based on the differences between the two ADT count locations. However, the significant differences between the ADT counts and the manual counts are a concern.

Therefore, an inner circulation road could be beneficial by removing some local traffic from Main Street.

Other Pedestrian Issues

Traffic counts provided by NY DOT included pedestrian counts and a summary of the number of pedestrians who did or did not press pedestrian buttons, and in both cases how many crossed with or against pedestrian signals.

- Although pedestrian behavior varied considerably, many pedestrians did not press pedestrian buttons, and in most cases these pedestrians then crossed against the signals.

- This lack of respect for pedestrian signals and their potential role in pedestrian safety should be further explored, as it is relevant to the design of Main Street. Without solving these fundamental issues, solutions to pedestrian crossing safety will not be complete. Typically, inappropriate pedestrian crossing behavior, as in Smithtown, is due to traffic signals favoring through traffic at the expense of pedestrian crossings and side street traffic. These behaviors by pedestrians are symptomatic of greater signalization timing issues that are not achieving desired results.

- The pedestrian crossing data reveals that many pedestrians are crossing both Main Street and side streets against pedestrian signals. For instance, at the Main Street/Landing Avenue/Miller Place intersection 17 pedestrians crossed with the signal and 58 crossed against the signal, yet only a few pedestrian crashes have occurred there. However, at Lawrence Avenue, which has had the greatest number of pedestrian crashes, the majority of pedestrians are crossing with the signal, 45 with the signal and 15 against the signal between 4.00 and 6.00 PM.

Typically (as national studies have shown), pedestrians are likely to cross side streets without button assist because of low perceived risk, whereas crossing major roads without button assist is often due to impatience caused by signals focused on mainline traffic. This emphasis creates considerable delays for crossing pedestrians.

In addition to these pedestrian issues, the road is congested with drivers experiencing long delays with potential of being involved in a crash. The most likely cause of congestion and a contributing factor to pedestrian crashes is the high volume of through traffic, which also creates considerable noise, pollution and much less desirable and comfortable place to walk and enjoy.

Geometry

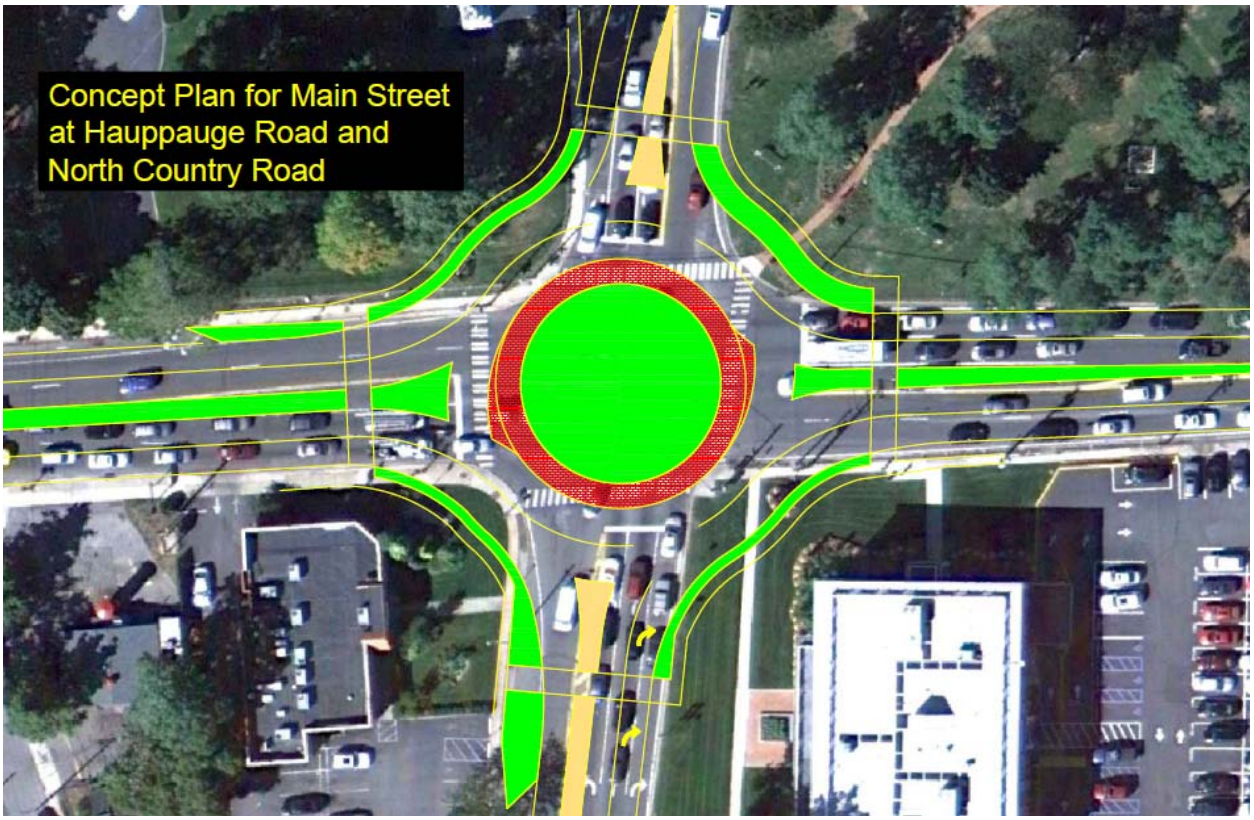
Pedestrian/vehicle conflicts,(many occurring at speed) are the primary concern for Main Street. The only traffic control system that will reduce pedestrian/vehicle conflicts with high traffic counts are modern roundabouts. The advantage of well-designed, low speed roundabouts is that they slow all vehicles 24/7. In addition, modern roundabouts, with their greater efficiency, could provide for all of the desired community needs. The combination of low speeds, lane reductions and the addition of a median will enable pedestrians to cross Main Street. One impact of this increased pedestrian mobility is the ability of shoppers to park once and shop at many stores by walking to destinations on both sides of Main Street.

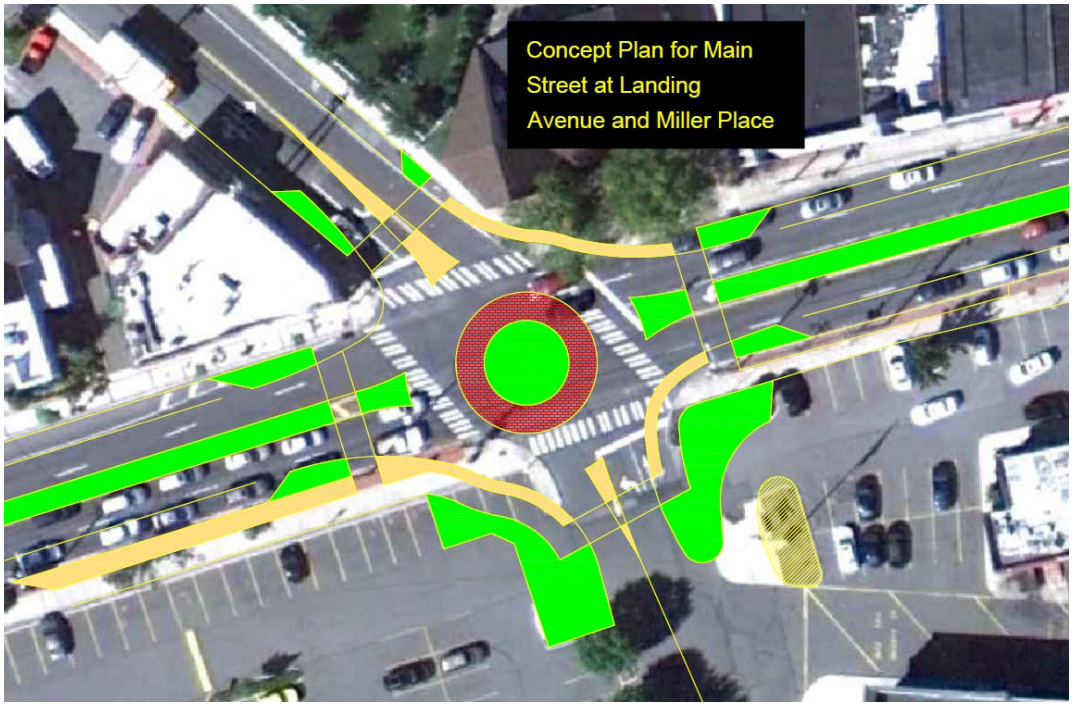
This concept for Main Street is the same as La Jolla Boulevard, San Diego. This is a similar, but slightly lower set of traffic volumes. La Jolla Boulevard redesign has shown that such a design concept improves safety for all users, significantly increases the pedestrian environment and lowers noise. Such a design can better enable a better built urban environment. Other similar designs prepared by Michael Wallwork have been constructed at, College Street, in downtown Asheville, NC, and Sante Fe Drive, Overland Park, KS, etc.

There are some important caveats that will be raised in the following comments about individual roundabouts. On the following pages are concept plans for roundabouts at the major intersections on Main Street.

1. NYS Route 111 (Hauppauge Road) at NYS Route 25A (North Country Road)

This two lane roundabout with several turn lanes provides a safer and more attractive intersection while accommodating the existing traffic volumes. Some right-of-way will be required from each corner as shown. Offsetting this loss of space the large central island of the roundabout provides the opportunity to install a gateway entrance and landscape theme, and provides a welcome to Smithtown.





2. Landing Avenue and Miller Place

This roundabout is a more challenging design due to the skewed approach of Landing Avenue and the parking lot on the south side that has a very short driveway/storage. To enable this roundabout to be installed, the parking lot entrance needs to be reconfigured and some right-of-way acquired. This roundabout could be landscaped to create a gateway to the retail area. Large, articulated trucks that need to access the shopping center would be restricted to right turns only. If they need to turn left they would have to use the mini roundabout at Lawrence Avenue. Non-articulated trucks should be able to make all turn movements at Miller Place. Miller Place can be designed with the narrow entrance without a ped refuge or additional space acquired and a [pedestrian refuge provided.

3.Lawrence Avenue

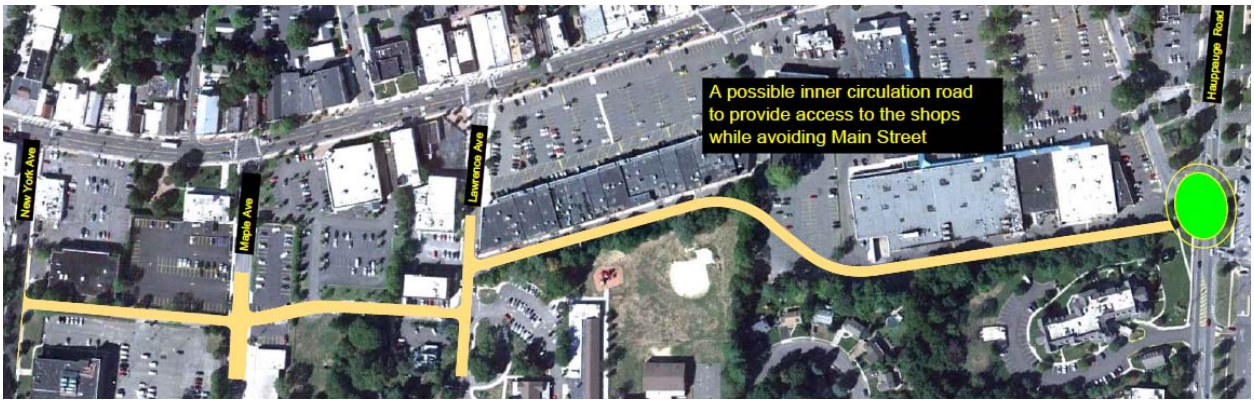
This roundabout is a mini-roundabout, it is different from a standard roundabout because its central island is only 3 to 4 inches high and is traversable by large trucks. No right of way is required. Special provision would need to be made for the driveway opposite Lawrence Avenue with movements restricted to out only.

4. Maple Avenue

This is a mini-roundabout which may require a very small corner clip of right-of-way on the southeast corner to enable small trucks to turn right. Small trucks should just be able to turn right from Main Street in to Maple Avenue, some by partially driving over the splitter island. The driveway opposite Maple Avenue will need to be reconfigured to enable entrance from the Because Maple Avenue is a narrow street there is no space for pedestrian refuge islands without acquiring right-of-way.

5. New York Avenue and Redwood Lane

This mini-roundabout does not require any right-of-way, enables on-Street parking and a median along Main Street with additional landscaping in the bulb outs on each corner. Because New York Avenue and Redwood Lane are narrow streets there is no space for pedestrian refuge islands on the two these streets without acquiring right-of-way.



6. Inner Circulation Road

Above is a layout for a possible inner circulation road designed to enable drivers particularly those coming from the south to use this road and avoid using Main Street while shopping in Smithtown. By removing retail trips from Main Street it either enables more vehicles to travel along Main Street or decreases the number of vehicles that need to move to the Smithtown Bypass and therefore facilitate the removal of two lanes on Main Street. Its usefulness is expected to rise between the hours of 6.00 Am to midnight because the daytime peak traffic flow is similar to the AM and PM peak flows. It will not be simple to implement but it has additional long term benefits in allowing the retail area to expand and draw more visitors.

This inner road would travel from New York Avenue east along Ma Bell lane to Maple Avenue. After crossing Maple Avenue it travels through a parking lot and along Percy Avenue to Lawrence Avenue. There it travels north along Lawrence Avenue to the rear of the strip of shops that face Main Street. At the eastern end of these shops it traverses a parking lot to the rear of the shops that extend to Singer lane. The biggest hurdle along its length would seem to be the two loading bays at the rear of the last section of shops. Variations of this concept are possible but limited and are mainly confined to the area behind the two strips of shops.

There is a possibility of a large elliptical roundabout at Hauppauge Road to include the new road, Hauppauge Road, Singer lane and the driveway on the east side that would also serve as a gateway to Smithtown and the shopping area and inner circulation road.

Conclusion

The community solution to place Smithtown's Main Street on a 4-to-2 lane road diet is workable. Meanwhile, for this design to work, additional tools, especially at intersections, are needed. In order to reduce driving speeds and keep traffic in motion, most intersections will require mini-roundabouts. Speeds through the area will be slower (from mid to high 30 mph range, down to 18 to 25 mph. Meanwhile, use of roundabouts will allow most motorists to stay in motion and to therefore pass through the corridor in reduced time. Walking will be improved, crossing Main Street as a pedestrian will have less delay. Lower speeds will produce less noise. Less stopping will reduce pollution. Overall, the safety of everyone, pedestrians, bicyclists and motorists, will improve.

The alternative proposed by New York DOT, to reduce one lane, but not replace signals with roundabouts, will cause serious delays. This design will not fully address speed and pedestrians' ability to cross Main Street.

Dan Burden and Michael Wallwork, P.E., are providing this planning analysis for discussion purposes to show there is a workable alternate concept that may meet citizen and community leader objectives. Developing this concept further requires an engineering study that considers the operation of Smithtown Bypass, resolves the differences in the ADT and intersection traffic volumes, looks at the inner circulation road in more depth and right-of-way impacts, etc.

This report commissioned by AARP, Courtney Sipes Foundation, Tri-State Transportation Campaign and Vision Long Island.