

“Slow down, you move too fast..”



[Tompkins County Sheriff's Office](#) plays a major role<sup>1</sup> in enforcing traffic laws on the roads in and around Ithaca, NY. Prevention of speeding and of “driving while intoxicated” (DWI) are among their main priorities since both of these significantly increase the risk of accidents and the likelihood of severe outcomes when such accidents occur.

Your team’s task is to advise the Road Patrol Division within the Sheriff’s Office on the best use of their resources to achieve this. While DWI screening is mostly performed around holidays, the detection of speeding motorists is a daily responsibility, which Patrol Division officers perform as a part of their regular duties. On any given day, there might be up to three Sheriff’s Deputies spending some portion of their shift on traffic-related activities.

***We ask your team to address (1) and (2) + at most three other items from the following list.***

**(1) Scheduling speed check activities.** Right now, the locations and times/dates for speed checks are often selected in an ad-hoc fashion, partly based on anecdotal evidence of speeding behavior (& data on past accidents), but also heavily influenced by Deputies’ individual schedules and other responsibilities. If the Patrol Division wanted to switch to more centralized planning, what algorithm would you suggest they should follow?

**(2) How well does it work?** In developing this schedule, your main goal is not to catch every single violation, but rather to improve the overall safety of driving on local roads. Develop an approach for assessing the effectiveness of your scheduling algorithm.

**(3) Is it fair?** As you know, ensuring fairness and impartiality of law enforcement activities is a significant concern in our society. Provide a criterion for measuring the fairness of your scheduling and address its relationship with the effectiveness.

**(4) How robust is it?** Keep in mind that Deputies have many other responsibilities which might take precedence, making it necessary to suspend speed checks on specific days or at specific locations. Quantify the effects of such (relatively-common) disruptions on your proposed

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<sup>1</sup> Enforcing traffic rules around Ithaca is a joint responsibility of several organizations: New York State Police, Tompkins County Sheriff’s Office, and police departments of separate municipalities & even colleges (Ithaca College & Cornell). But for the purposes of this problem, we focus on the activities of the Sheriff’s Office only.

scheduling approach. If robustness is the real goal, how should your scheduling algorithm change to achieve it?

**(5) Lasting effects?** In many cases, getting a ticket (or even a warning) for a traffic violation alters a driver's future behavior. Moreover, even witnessing another car pulled over makes most motorists less likely to engage in risky driving behavior in the near future. Develop and validate a model for the lasting power of such effects, which might also be relevant to your main "optimal scheduling" approach.

**(6) Asymmetric information?** [Waze](#) and similar phone apps allow drivers to share information about current driving conditions and ongoing police activities. This can decrease the effectiveness of speed checks, and your proposed assessment should reflect this, possibly also affecting your scheduling recommendations.

**(7) Traffic Calming by other means?** NYS Department of Transportation (DOT) and the County Highway Department also have important roles in improving the road safety. Movable speed-warning signs (which alert approaching drivers to their actual speed and the relevant speed limit) are among their effective "traffic calming" measures. Assuming that Tompkins County has a total of 4 such movable signs, provide recommendations on where and when they should be deployed given your (already developed) schedule of speed checks by Sheriff's Deputies. Can you improve the effectiveness by developing both schedules jointly?

**In addition to your detailed manuscript, please write a one-page executive summary addressed to Undersheriff Jennifer K. Olin. Please make sure to explain your main proposals and their advantages, but also the possible drawbacks along with limitations of your modeling approach.**

**Please note:** Law enforcement officers are quite busy – please don't reach out to them to ask for clarifications or additional data. But feel free to use whatever data you find online; for example:

Sheriff's Office Activity Logs for [October](#), [September](#), and [August](#) 2022.

(Data for other months is also available [here](#) – please search for "Activity Logs".)

### [New York State Traffic Safety Statistical Repository \(TSSR\)](#)

Contains a lot of data on types of tickets issued + statistics on who issued them to whom for what and when. E.g., select "Ticket Reports" → "Speeding tickets" → "TOMPKINS COUNTY" + relevant year(s) on the right. Note that the NY State troopers are significantly more active in speed limit enforcement, but they usually do not work within municipalities, which have their own police departments. So, most of the speed limit enforcement within Ithaca is currently done by Sheriff's Office. Also worth noting: while we don't have statistics on speeding in particular, only about 2/3 of all traffic stops by Sheriff's Office result in warnings rather than citations/tickets and thus are not reflected in the above database.

### [A crowd-sourced list of a few common speed check locations around Ithaca, NY](#)

Note that this list is not exhaustive – many other locations are also used in practice.

Except for highways or "NY State Routes", the default speed limit on regular streets in Ithaca and most surrounding communities is 30 miles per hour. E.g., you can find a list of exceptions [here](#) for the City of Ithaca and [here](#) for the nearby Village of Lansing.

### [The list of all accidents recorded in Tompkins County in 2022 \(up to 11/01/22\).](#)

Note that the "contributing factor code = 19" means that some speeding was involved. The list of other "contributing factor codes" can be found [here](#).