New York City Intelligent Speed Assistance Pilot Evaluation

Analysis and Findings

U.S. DOT Volpe Center: Sarah Yahoodik, PhD, Alexander K Epstein, PhD, Alyssa Brodeur, Juwon Drake
NYC DCAS: Tomomi Landsman

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14. ABSTRACT

Close to 30 percent of traffic fatalities involve excessive speed. Although interventions such as traffic enforcement and road modifications can help reduce speeding, individual vehicle technology has not been widely studied or implemented in the U.S. Starting in 2022, NYC DCAS conducted the largest pilot of active Intelligent Speed Assistance (ISA) in the U.S., with approximately 500 vehicles equipped with a device that prevents acceleration beyond a set parameter over the speed limit. In an analysis of 270 vehicles equipped with ISA, there was a 64.18% relative decrease in the time driven >11 mph over the posted speed limit following ISA activation compared to before activation, and a similar decrease was observed in the ISA-equipped vehicles compared to non-equipped control vehicles. Speeding drive time reduction ranged from ~50% on 25 mph local roads, which have speed safety cameras set to the same enforced speed threshold, to 82% reduction on 50 mph roads. In addition, the impact of ISA on speeding behavior of habitual speeders in 130 vehicles was similar to that on the primary cohort, indicating ISA is effective at significantly reducing severe speeding across a wide range of drivers and fleet

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1 Introduction

1.1 Safe Fleet Transition Plan, Vision Zero, and National Context

The New York City Department of Citywide Administrative Services (DCAS) operates the largest municipal fleet in the United States with over 28,700 vehicles. In alignment with the NYC Vision Zero Action Plan, DCAS adopted its first New York City Safe Fleet Transition Plan (SFTP) in 2017.[1] The SFTP formalized a set of best-practice vehicle safety technologies and specifications for all City vehicles to prevent and mitigate crashes. The U.S. Department of Transportation's (U.S. DOT) John A. Volpe National Transportation Systems Center (Volpe) partnered with DCAS to broadly research these technologies and to develop best practice information for the 2017 SFTP launch and for the 2019 update. The next update to the plan is anticipated in early 2025. In January 2024, NYC DCAS and Volpe published a first-in-the-nation school bus SFTP that identified and examined technologies and training to improve the safety of school buses on NYC streets,[2] following a 2021 SFTP focused on the trade waste and private fleet industry.[3]

In the 2019 SFTP update, intelligent speed assistance (ISA) was first incorporated as a Tier 3 entry for future exploration and potential piloting.[4] Intelligent speed assistance is a safety technology that helps drivers to stay within the speed limit, which is 25 mph by default in New York City. In October 2024, Sammy's Law went into effect, which establishes 20 mph zones in selected areas of the City.[5] Depending on the system type, ISA either provides feedback to the driver and/or actively limits the top speed, although in all cases the driver remains ultimately responsible for maintaining a safe driving speed. The NYC Vision Zero Year 8 Scorecard specifically included ISA as Item 8.9 under DCAS[6], with support for ISA also articulated by NYC transportation safety advocacy groups.[7] In the 2024 School Bus SFTP, preliminary results from an ISA pilot of 10 school buses demonstrated the feasibility of shifting ISA from an "exploratory" technology to one that is more widely implemented.

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1 https://www.nyc.gov/assets/dcas/downloads/pdf/fleet/VOLPE_Recommendations_for_Safe_Fleet_Transition_Plan_SFTP.pdf
2 https://www.nyc.gov/assets/dcas/downloads/pdf/fleet/school-bus-sftp-final.pdf
3 https://rosap.ntl.bts.gov/view/dot/60703
4 https://www.nyc.gov/assets/dcas/downloads/pdf/fleet/Safe-Fleet-Transition-Plan-Update-2018.pdf
5 https://www.nyc.gov/html/dot/html/pr2024/reduce-speed-limits-select-locations.shtml
6 https://www.nyc.gov/content/visionzero/pages/vision-zero-scorecard
7 https://transalt.org/reports-list/7steps-city#scale

The National Transportation Safety Board (NTSB), in its 2017 study "Reducing Speeding-Related Crashes Involving Passenger Vehicles," recommended that the United States "incentivize passenger vehicle manufacturers and consumers to adopt intelligent speed adaptation (ISA) systems by, for example, including ISA in the New Car Assessment Program" (Recommendation H-17-24).[8] In 2022, the National Highway Traffic Safety Administration (NHTSA) sought public comments on updating the New Car Assessment Program (NCAP), including "exploring opportunities to encourage the development and deployment" of "emerging vehicle technology for safe driving choices" such as ISA.[9] At the same time, all new vehicle models sold in the European Union were required to have ISA from July 2022 and on all vehicles sold from July 2024.[10]

In 2022, the U.S. DOT announced the National Roadway Safety Strategy (NRSS), adopting a Safe System Approach consisting of five key elements (see Figure 1).[11] Safer Speeds and Safer Vehicles represent two of the five Safe System elements identified in the NRSS. The impetus for New York City's ISA pilot and for Volpe's pilot evaluation is to assess the potential of ISA technology to simultaneously address both Safe System elements. With its implementation involving hours and hundreds of dollars per vehicle rather than years and millions per roadway, ISA technology may have an outsize potential to complement proven but more capital-intensive, longer lead time road design strategies to combat the approximately 29 percent of traffic fatalities that involve speeding.[12] As a cross-cutting technology, ISA can also reduce vehicle energy consumption and advance fleet sustainability objectives, and these impacts will be considered outside the scope of the present study.

Figure 1. Five elements of the Safe System Approach

NYC DCAS has implemented a 500-vehicle retrofit project with active ISA. The current report expands on a smaller, 50-vehicle NYC pilot of ISA, launched in 2022, that demonstrated the technology resulted in vehicles traveling within the speed limit parameters 99% of the time.[13] The initiative has involved 19 NYC agencies and offices, and 23 distinct types of vehicles (Table 1).

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[8] https://www.ntsb.gov/safety/safety-studies/documents/ss1701.pdf The report notes that this was the "first study on speeding undertaken by the NTSB in our 50-year history."

[9] https://www.regulations.gov/document/NHTSA-2021-0002-0001

[10] https://road-safety-charter.ec.europa.eu/resources-knowledge/media-and-press/intelligent-speed-assistance-isa-set-become-mandatory-across

[11] https://www.transportation.gov/NRSS/SafeSystem

[12] https://www.nhtsa.gov/risky-driving/speeding

[13] https://www.nyc.gov/office-of-the-mayor/news/027-23/mayor-adams-results-successful-pilot-program-reduce-speeding-hard-braking-in

Table 1. Distribution of ISA retrofits and mileage with ISA enabled across NYC agencies, vehicle type, and weight class.

Agency	Mileage as of 10/9/24	Count of Vehicles
Administration for Children's Services	53,893.42	11
Business Integrity Commission	23,924.34	2
Department of Buildings	35,714.32	15
Department of Citywide Administrative Services	16,060.00	4
Department of Correction	40,531.25	6
Department of Education	8,565.38	3
Department of Environmental Protection	502,261.78	110
Department of Health and Mental Hygiene	41,376.32	11
Department of Homeless Services	321,551.83	45
Department of Parks and Recreation	182,101.46	47
Department of Probation	11,859.61	7
Department of Sanitation	171,508.00	39
Department of Transportation	231,993.79	35
Housing Preservation & Development	63,162.40	9
Human Resources Administration	2,726.95	1
New York City Fleet Share	633,991.29	92
NYCSBUS	528,491.03	50
Office of Chief Medical Examiner	31,696.44	10
Taxi & Limousine Commission	29,134.85	3
Grand Total	**2,930,544.45**	**500**

Vehicle Type	Mileage as of 10/9/24	Count of Vehicles
Aerial Lift	4,538.04	1
Attenuator Truck	2,733.51	1
Box Truck	12,798.76	3
Bus (Corrections)	25,474.24	1
Collection Truck	23,021.81	4
Container Truck	6,541.08	1
Crossover	23,177.76	9
Dump Truck	36,713.98	4
Graffiti Truck	1,110.92	1
Load Lugger	6,385.54	1
Minivan	19,026.60	3
Pickup	247,015.56	60
Rack Truck	1,469.63	1
School Bus	528,491.03	50
Sedan	1,417,737.72	261
SUV	228,856.96	46
Tractor Trailer	19,081.98	1
Utility Truck	14,806.38	2
Van	307,232.55	47
Water Truck	1,690.95	1
Welding Truck	2,639.46	2
Grand Total	**2,930,544.45**	**500**

Weight Class	Mileage as of 10/9/24	Count of Vehicles
Heavy Duty	686,386.38	73
Light Duty	1,874,041.31	344
Medium Duty	370,116.76	83
Grand Total	**2,930,544.45**	**500**

NYC Fleet vehicles have traveled over 2.9 million miles with ISA to date. In the pilot, 31% percent of the vehicles are medium or heavy-duty trucks or school buses. NYC plans to expand the initiative to up to 1,600 additional vehicles through support from a U.S. DOT FY2023 Safe Streets and Roads for All grant.[14]

The aftermarket ISA system used by DCAS does not affect braking on a vehicle. Instead, the ISA suspends the ability of a driver to further accelerate when driving at or above the enforced speed limit. However, unlike the implementation in the Europe Union, and unlike most automotive OEMs' ISA, the current system's speed feedback is not optional or subject to user deactivation. DCAS ISA is centrally managed by NYC Fleet and must be used whenever the vehicle is in operation.

Despite preventing accelerating past a certain threshold, active ISA does not prevent all speeding. A driver can briefly accelerate above the speed limit until the vehicle brings the speed back down. Due to the technical focus on acceleration control and not braking, if a driver coasts downhill, the vehicle may exceed the speed limit for a longer period. The driver also has a 15-second driver override button for emergency or unusual situations. Vehicles may additionally be flagged as speeding at the moment when entering a lower speed limit zone at a speed consistent with the previous higher speed limit.

1.2 What Is Intelligent Speed Assistance (ISA)?

While basic speed governors or limiters have been installed on vehicles for decades, notably on large commercial vehicles for highway applications, ISA is a newer, more capable technology relevant to all traffic environments. Speed governors cap the top speed of a vehicle regardless of the local speed limit. For example, if a speed governor is programmed to 65 mph, it will not slow down a vehicle driven at 65 mph on a street with a 25-mph posted speed limit. In contrast, ISA is aware of the local speed limit, using geospatial data, traffic sign recognition technology, or both, and it can limit the speed of the vehicle to either the local speed limit or to a user-defined threshold based on the local speed limit. DCAS has implemented a Fleet Office of Real Time Tracking (FORT) to live track through telematics all fleet vehicles. This type of implementation can complement ISA initiatives.

ISA is classified as either a "passive" or "active" system, as shown in Table 2. Passive ISA allows drivers to override the system and drive in excess of the local speed limit, but drivers are alerted as they exceed the local speed limit by a certain amount, for example between 0 and 10 mph above. Active ISA cannot be overridden except in limited cases, such as with the press of an override button or with kickdown of the accelerator pedal, which removes the ISA limitations for a defined period.

The City of New York is implementing active ISA. Although DCAS has preliminarily tested variants of passive ISA, this report is focused on assessing active ISA effectiveness in real-world use.

[14] https://www.nyc.gov/office-of-the-mayor/news/975-23/mayor-adams-nearly-30-million-federal-funding-queens-boulevard-safety-improvements

Table 2. Intelligent Speed Assistance (ISA) taxonomy

Type	ISA –Active	ISA –Passive	Speed Limiter/Governor
Override capabilities	Limited time override option, either button or accelerator press	Advisory can be completely overridden or ignored by driver	Enforced speed limit cannot be overridden
Mechanism	Utilizes local speed limit based on geospatial or road sign detection data	Utilizes local speed limit based on geospatial or road sign detection data	Maximum speed limit consistent regardless of local speed limit
Driver Feedback	Lack of acceleration, haptic, auditory, visual	Haptic, auditory, visual	None
Maturity	Developing	Developing	High
Implementation	NYC, Ventura County, Somerville, MA; London, UK	European Union	Truck fleets

Unlike other speeding interventions such as enforcement, education, and road-design, ISA has the advantage of being fast to install and modify on fleets to meet current safety needs and operating contexts. Individual drivers or fleet managers can change parameters such as override settings and speed thresholds depending on the purpose and desired behavioral outcomes. Although organizations such as the National Transportation Safety Board and Insurance Institute for Highway Safety have recommended implementation of ISA on all vehicles in the U.S., some public misconceptions around ISA remain, such as the belief that ISA would inhibit one's ability to drive quickly in an emergency.[15] More education and outreach may be needed to educate the public on the advantages of ISA as a risk-reducing technology and driver aid.

1.3 ISA Availability

Within the U.S., multiple aftermarket suppliers offer active ISA systems that can be installed in vehicles. In a non-exhaustive market scan, Volpe identified Sturdy Corporation, MAGTEC, and E-SMART as

[15] https://www.iihs.org/media/58eefc7b-1754-4058-9bf9-f7ff5a19e5d3/tjKRLQ/misc/Vehicle-based-speeding-prevention.pdf

examples of such suppliers that offer active ISA systems implemented by fleets in the U.S. A fourth supplier, V-tron, offers an aftermarket system in both passive and active variants.[16]

On the OEM side, automakers such as Ford, Mazda, and GM have begun to offer ISA on passenger vehicles that use either speed limit sign recognition or GPS. As seen in Table 3, about two-thirds of available OEM systems are currently of the passive type, and, as of model year 2023, five of 19 OEMs were including ISA as a standard feature on vehicles sold in the U.S.[17] However, most OEM-supplied ISA systems appear to be configured to allow drivers to easily disable ISA, and such systems may not be viable to meet the safety assurance needs of fleet operators. Transport for London has used OEM supplier Actia for ISA deployment on new transit buses in the UK, but availability in the U.S. is unclear.[18]

Table 3. Summary of OEM ISA system availability and types. (Adapted and expanded from NTSB[19])

Manufacturer	Speed Mitigation Technology Offerings	Availability	Active or Passive ISA
BMW Group (BMW, MINI, Rolls Royce)	• Speed limit recognition, warning, and active speed adjustment while adaptive cruise control (ACC) engaged	Only on certain models	Active while ACC engaged
Ferrari USA	• None or no public information available	Unknown	Unknown
Ford Motor Company (Ford, Lincoln)	• Speed limit recognition, warning, and active speed adjustment while (ACC) engaged • Teen driver settings – user-defined top speed limiter and speed warnings	Only on certain models	Active while ACC engaged
General Motors Co. (Buick, Cadilac, Chevrolet, GMC)	• Teen driving settings – top speed limiter and user-defined speed warnings	Optional	Passive
American Honda Motor Company (Acura, Honda)	• Traffic sign recognition and display	Only on certain models	Passive
Hyundai USA	• Speed limit recognition, warning, and active speed adjustment while (ACC) engaged	Only on certain models	Active while ACC engaged

[16] ISA-FIT Variant 1 is an advisory system that provides the driver with the current maximum speed and warns the driver through audio and visual signals when the speed limit is exceeded. ISA-FIT Variant 2 is an active system that limits the maximum speed directly on the accelerator pedal, though it is still possible to override the maximum speed by pressing down the accelerator pedal for two seconds. Per email correspondence with V-tron, April 23, 2024.

[17] https://www.ford.com/support/how-tos/ford-technology/driver-assist-features/what-is-intelligent-adaptive-cruise-control/

[18] https://public-transport.actia.com/intelligent-speed-assistance-module/

[19] https://www.ntsb.gov/investigations/AccidentReports/Reports/HIR2309.pdf

	• User-defined speed alerts	Available on most models; subscription required	Passive
Jaguar Land Rover North American LLC	• Traffic sign recognition and display • Adaptive speed limiter (user can engage/disengage function)[20]	Standard on almost all models	Active
Kia Motors Corporation	• Speed limit recognition, warning, and active speed adjustment while (ACC) engaged	Only on certain models	Active while ACC engaged
Mazda USA	• Speed limit recognition and warning	Only on certain models	Passive
Mercedes-Benz USA	• Speed limit recognition, warning, and active speed adjustment while (ACC) engaged	Standard on some models; optional on others	Active while ACC engaged
Mitsubishi Motors	• User-defined speed warnings	Only on certain models; subscription required	Passive
	• Speed limit recognition and active speed adjustment while L2 system (ACC plus Lane Keep Assist) engaged	Only on certain models	Active while L2 system engaged
Nissan USA (Nissan Infiniti)	• Speed limit recognition and active speed adjustment while L2 system (ACC plus Lane Keep Assist) engaged	Only on certain models	Active while L2 system engaged
Porsche Cars North America	• Traffic sign recognition and display	Optional	Passive
Stellantis (Chrysler, Dodge, Jeep, and others)	• Traffic sign recognition and display	Only on certain models	Passive
Subaru of America	• User-defined speed warnings	Only on certain models; subscription required	Passive
Tesla, Inc.	• Traffic sign recognition and display	Standard	Passive
Toyota Motor North America	• Traffic sign recognition and display	Standard on almost all	Passive

[20] For example: https://www.ownerinfo.jaguar.com/document/4K/2023/1656982/proc/G2459221/G2752759

(Toyota, Lexus)		models	
Volkswagen Group of America (VW, Audi)	• User-defined speed warnings	Available on all models; subscription required	Passive
	• Traffic sign recognition and display	Only on certain models	Passive
Volvo Car Corporation	• Top speed limit of 112 mph • Teen driving settings – user-defined top speed limiter and speed warnings • Traffic sign recognition and display	Standard	Passive

Volpe reviewed publicly available literature from selected OEMs listed above to summarize how they describe current ISA offerings and capabilities. The following is a summary of these examples for Ford, Mazda, and General Motors.

Ford incorporates Intelligent Adaptive Cruise Control in conjunction with Speed Sign Recognition within its Co-Pilot 360™ technology suite.[21] In models such as the Mustang Mach-E and the Explorer, the vehicle is stated to automatically adjust its cruise control settings based on speed limit data detected via onboard cameras.[22] The system is designed to enhance the adaptive cruise control feature by automatically reducing vehicle speed when a lower speed limit is detected, thereby aiding in adherence to traffic laws and improving road safety. The technology's effectiveness is contingent on the clear visibility of road signs and the proper functioning of the vehicle's sensors. In addition, the driver must manually turn on the Adaptive Cruise Control feature for the vehicle to adjust the speed based on the current speed limit.

Mazda offers ISA as part of its Advanced Driver Assistance Systems (ADAS), i-Activsense.[23] Integrated with the Traffic Sign Recognition (TSR) system, which utilizes a forward-facing camera to detect and interpret road signs, or the navigation system, the ISA notifies the driver when they exceed the set speed limit (set from a speed limit sign or an optionally set speed limit) using the display and a warning sound. The ISA flashing display and warning beep are activated until the vehicle speed decreases to the set speed or less. Figure 2 shows the Mazda CX-8 owner manual illustrations of the ISA system when a speed is set (right) and when the ISA is activated (left).[24]

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[21] https://www.ford.com/technology/driver-assist-technology/adaptive-cruise-control/#intelligent_adaptive_cruise_control
[22] https://www.ford.com/support/how-tos/ford-technology/driver-assist-features/what-is-speed-sign-recognition/
[23] https://www.mazdausa.com/why-mazda/safety?semid=1238050244656540&providertag=MazdaSEM&servicetag=1238050244656540&k_keyword=mazda%20safety&k_matchtype=e&gclid=3f5a0949ddb419bcaea46f30599116cb&gclsrc=3p.ds&msclkid=3f5a0949ddb419bcaea46f30599116cb
[24] https://owners-manual.mazda.com/gen/en/cx-8/cx-

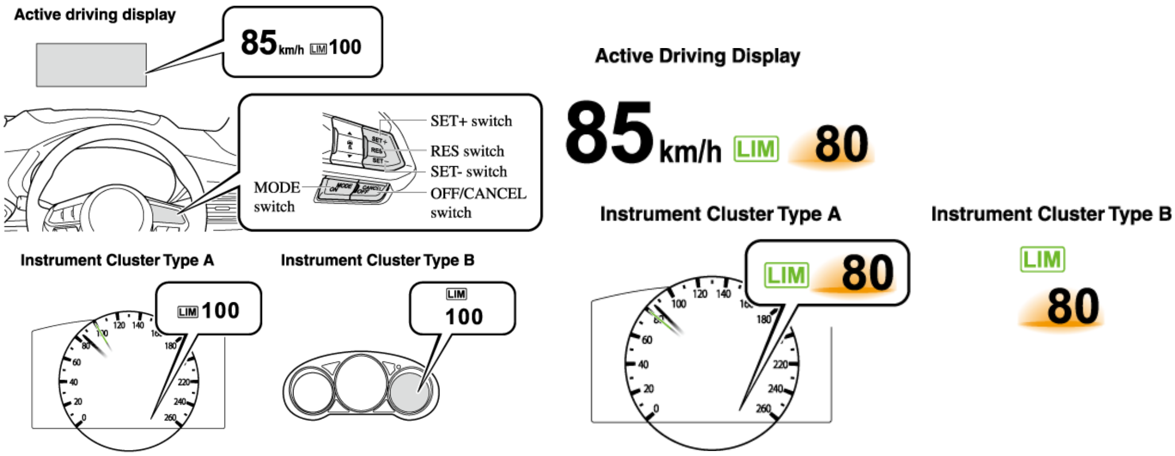

Figure 2. Mazda CX-8 ISA system manual illustrations.

General Motors (GM), through its Chevrolet and GMC brands, offers both passive and active ISA technologies within its own broader suite of ADAS.[25] GM vehicles equipped with Traffic Sign Recognition can detect posted speed limit signs and provide visual and audible alerts if the vehicle exceeds the speed limit, without taking control of the vehicle's speed.[26] In conjunction with this passive ISA, vehicles with Adaptive Cruise Control are capable of adjusting the vehicle's speed in response to the detected speed limits.[25] The active speed limiting feature supports compliance with traffic regulations, with the driver having the option to accept or reject the suggested speed adjustments. GM also offers Speed Limit Assist, which actively manages vehicle speed in relation to detected speed limits.[27] The system can automatically adjust the vehicle's maximum speed to match the detected speed limit, with the driver able to set an offset if desired. However, both systems require an active subscription to GM's OnStar Services for full functionality.

1.4 Deployment of ISA

Over the past year, ISA technology has become more visible to the public, with both road safety organizations and municipal and state governments promoting its deployment.

In January 2024, NTSB issued a safety recommendation to require all new vehicles to be equipped with either a passive or an active ISA system.[28] The recommendation was put forward in response to a

8_8hh9eo19a/contents/05283200.html#:~:text=The%20ISA%20is%20a%20function%20which%20keeps%20the,limit%20sign%20or%20an%20optionally%20set%20speed%20limit.

[25] https://www.gm.com/stories/safe-deployment

[26] https://www.gmc.com/support/vehicle/driving-safety/driver-assistance/traffic-sign-recognition#:~:text=When%20Traffic%20Sign%20Recognition%20detects,you%20know%20you%20are%20speeding

[27] https://www.chevrolet.com/support/vehicle/driving-safety/driver-assistance/speed-limit-assist

[28] https://data.ntsb.gov/carol-main-public/sr-details/H-23-014

high-profile multivehicle crash in which nine people were killed after a driver ran a red light, traveling at 103 mph on local streets. It was later revealed the driver had a history of speeding. Although this crash represents an extreme form of speeding behavior, the NTSB report concluded that ISA could prevent such speeding recidivism and those crashes involving habitual speeders.[29]

With the specific goal of reducing speed recidivism, the District of Columbia unanimously passed the first US legislation regarding ISA in February 2024.[30] The law requires the vehicles of drivers convicted of speeding or reckless driving to be equipped with active ISA systems. Relatedly, a New York State senate bill was proposed that would require drivers who accumulate six or more speeding tickets in one year (or 11 or more points on their license in 18 months) to have an ISA device installed on their vehicle.[31] A California bill passed by the State legislature in 2024 would have taken ISA implementation further, requiring all new vehicles sold in the state to be equipped with passive ISA from 2030, effectively applying the EU mandate six years later.[32] At least three municipal fleets in the USA have rolled out pilots on active ISA to date: Ventura County, CA, Somerville, MA, and most extensively New York City. An unknown number of private sector U.S. fleets have also deployed ISA.

Although public sector ISA implementation has only recently begun in the United States, Europe and the UK are further along in the process of rolling out ISA in fleet and new vehicles. According to NHTSA, ISA has been widely tested and is being implemented in Europe and other countries that have adopted and implemented the Safe System approach.[33] For example, Transport for London (TfL) has incorporated ISA into both its transit bus and fleet vehicles. Since 2019, all new London buses are required to be equipped with active ISA as part of a wider bus safety standard that also aims to improve direct and indirect vision for drivers, install audible warnings to alert pedestrians, and redesign buses to reduce the impact of collisions.[34] As of August 2024, approximately 4,500 buses, or half of the fleet, were fitted with ISA, with the interface display shown in Figure 3. In addition, 360 TfL fleet vehicles have been equipped with aftermarket active ISA.

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[29] https://www.ntsb.gov/news/press-releases/Pages/MA20231025.aspx
[30] https://www.fiafoundation.org/news/first-us-intelligent-speed-assist-legislation-passed-supported-by-fia-foundation
[31] https://www.nysenate.gov/legislation/bills/2023/S7621
[32] https://thehill.com/homenews/state-watch/4429740-california-bill-cars-in-vehicle-speed-limiting-devices-requirement-first-state/
[33] https://www.nhtsa.gov/book/countermeasures-that-work/speeding-and-speed-management/countermeasures/other-strategies-behavior-change/intelligent
[34] https://tfl.gov.uk/corporate/safety-and-security/road-safety/bus-safety?intcmp=35721#:~:text=The%20Bus%20safety%20standard%20includes,vehicle's%20path%20and%20brakes%20automatically

Figure 3. ISA display showing 20 mph speed limit on a TfL bus dashboard, part of the agency's Bus Safety Standard.[35]

ISA systems in passenger vehicles became mandatory in July 2022 for new models introduced into the market in the European Union.[36] Starting in July 2024, all new vehicles sold in the EU have been required to be equipped with ISA. The regulations require either passive or active ISA installations, with vehicle manufacturers having four options for feedback: cascading acoustic warning, cascading vibration, haptic feedback through the acceleration pedal, or speed control function. In the case of active ISA, it can be temporarily overridden by pressing on the accelerator. Importantly, any ISA system in the EU must be configured to turn on every time the vehicle is turned on, and it may not be permanently disabled by the driver.

More than a decade before ISA became mandatory on new vehicles in Europe, Euro NCAP added ISA in its five-star safety ratings of vehicles in 2009, awarding additional points to vehicles with systems where speed limit information is directly linked to the warning and speed limitation function.[37]

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[35] https://content.tfl.gov.uk/bus-safety-strategy.pdf

[36] According to the General Vehicle Safety Regulation (EU) 2019/2144, ISA is mandatory for new models/types of vehicles introduced on the market. ISA became mandatory for all new cars sold from July 2024. https://road-safety-charter.ec.europa.eu/resources-knowledge/media-and-press/intelligent-speed-assistance-isa-set-become-mandatory-across

[37] https://cdn.euroncap.com/media/1378/new-ncap-test-and-assessment-protocols-for-speed-assistance-systems-esv-2013-0-bc62bedc-5ccc-4df2-a65a-dd12b6f07a12.pdf

1.5 Published effectiveness data

The EU-funded project PROSPER considered ways that advanced assisted driving technology and technology related to speed limitation devices can improve safety.[38] The PROSPER project calculated expected crash reductions for six countries, projecting reductions in fatalities between 19% and 28%, depending on the country, in a market-driven scenario of ISA adoption. Higher reductions were predicted for a regulated scenario, between 26-50%. Benefits were generally projected to be larger on urban roads than on highways and larger if active forms of ISA were to be applied.[39]

Trials with ISA have been carried out in at least ten European countries: Austria, Belgium, Denmark, Finland, France, Hungary, The Netherlands, Spain and Sweden.[40] An earlier study in the Netherlands found that ISA could reduce the number of hospital admissions by 15% and the number of deaths by 21%.[41] Further, a study in the United Kingdom estimated not only the reduction in crashes due to ISA, but also the reduction in CO_2 emissions and cost savings.[42] The authors estimated that ISA could reduce crashes on 70 mph roads by 33% while reducing CO_2 emissions by 5.8%. Finally, the analysis suggested that the benefit-to-cost ratio from implementing ISA would range from 3.4 to 7.4, with the monetary savings of avoided fatal and serious crashes paying back implementation costs within 15 years.

As previously mentioned, TfL has implemented active ISA across nearly 5,000 buses and fleet vehicles. Based on the agency's evaluation study, TfL buses equipped with ISA saw large reductions in speeding on the two analyzed routes. For example, in 20 mph zones, the time spent speeding decreased from 14.91% to 0.95% on one route and 17.77% to 3.32% on the other. TfL fleet vehicles also demonstrated a reduction in the rate of speeding events, triggered by any recorded amount of time driven over the speed limit, per 1,000 miles of driving. The largest reduction was found in higher speed limit zones, with an 89% reduction in speeding events per 1,000 miles in 60 mph zones and 72% reduction in 50 mph zones, with a slightly smaller decrease seen in lower speed limits (e.g., a 60% reduction in 20 mph zones).[43]

The U.S. Department of Energy promotes efficient driving and speed management to improve fuel economy, noting that fuel efficiency usually decreases at speeds above 50 mph and due to aggressive

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38 https://road-safety.transport.ec.europa.eu/european-road-safety-observatory/statistics-and-analysis-archive/esafety/intelligent-speed-adaptation-isa_en
39 https://trimis.ec.europa.eu/project/project-research-speed-adaptation-policies-european-roads
40 https://archive.etsc.eu/documents/ISA%20Myths.pdf
41 https://homes.plan.aau.dk/agerholm/ISA%20litteratur/Intelligent%20Speed%20Adaptation%20(ISA).%20A%20Successful%20Test%20in%20the%20Netherlands.pdf
42 https://www.sciencedirect.com/science/article/pii/S0001457511000923?via%3Dihub#fig0010
43 https://content.tfl.gov.uk/analysis-of-the-effectiveness-of-retrofit-isa-technology-on-tfl-fleet-vehicles.docx#:~:text=In%202021%2C%20TfL%20started%20retrofitting,was%20completed%20in%20March%202022

driving behavior. According to the Department's Office of Energy Efficiency and Renewable Energy driver speed feedback devices can help the average driver improve fuel economy by about 3%, and those using them to save fuel can improve gas mileage by about 10%.[44]

2 Project overview

2.1 Purpose

The goal of this evaluation of New York City's ISA pilot is to assess the potential of ISA technology to address both the Safer Vehicles and Safer Speeds elements of the Safe System approach in a U.S. context. Specifically, the pilot's purpose is to test the effectiveness of ISA in reducing dangerous speeding in a public sector fleet. Speeding is a staff safety, public safety, and reputational issue for all fleets. Data on the benefits, best practices, and transition into ISA adoption to address these issues can be valuable for a wide range of fleet operators in both the public and private sectors. As a secondary benefit, an ISA pilot in a large fleet setting offers the opportunity to test the technology on a wider range of vehicle types, sizes, and applications than would be possible in the general vehicle population.

2.2 Equipment

Aftermarket active ISA devices manufactured by the supplier MAGTEC were deployed in the NYC Fleet ISA pilot. The MAGTEC "SafeSpeed" devices work by limiting the driver's ability to accelerate when the vehicle is traveling faster than a predetermined threshold above the posted speed limit, where the speed limit is based on a GPS mapset. The speed threshold is customizable and can be set on a vehicle-by-vehicle basis. In the pilot, most miles using the ISA devices were programmed to limit driving speed to 11 mph or above the actual speed limit; this was later adjusted to 10 mph over the limit to help prevent speed safety camera tickets. ISA was also implemented to enforce the actual speed limit in certain cases to assess driving impacts. The system employed by DCAS was found to operate well at all speed limits and all thresholds above the speed limits found in the City. DCAS chose to implement the system at a 10-11 mph threshold for most miles driven in the pilot to assist with driver adoption and transition to the technology.

[44] https://www.energy.gov/energysaver/driving-more-efficiently

Figure 4. Dashboard/steering wheel area after the ISA install was completed. The driver override button is located on the electrical access panel. (Source: NYC DCAS)

Drivers using ISA-enabled vehicles also had access to a dashboard-mounted button that could temporarily override the speed threshold for an adjustable duration, which was programmed to 15 seconds. The override button was implemented to ensure that drivers could exceed the threshold in case of emergencies, malfunction, or in circumstances where it could be unsafe for the driver to drive significantly slower than surrounding traffic, for example when merging onto a highway.

2.3 Training

Drivers of ISA enabled vehicles were trained in the functionality of ISA. Drivers of the first 50 pilot vehicles were given one hour of classroom training along with up to one hour of field training to test the device with a technician. During the demo, drivers could ask the technician questions about the system and how to override the ISA if necessary. NYC School Bus Umbrella Services (NYCSBUS) drivers received a similar hour-long classroom training. Other drivers of ISA enabled vehicles received a one-page handout that explained the ISA functionality along with how to use the override button.

3 Method

3.1 Vehicle sample

The pilot was designed to assess the robustness of ISA in reducing speeding risk across a wide range of vehicle types, agencies, and applications, as represented by a primary cohort of 540 vehicles, and across different driver speeding behavior histories, as tested by a separate cohort of 130 vehicles. The NYC pilot evaluation is therefore based on data collected from 670 total fleet vehicles consisting of 400 vehicles with ISA enabled and 270 control vehicles.

3.1.1 Primary cohort

The primary cohort dataset consisted of 540 vehicles operating in New York City, including 270 treatment vehicles with ISA installed and activated and 270 matched control vehicles without ISA. ISA devices on treatment vehicles were activated between July 13, 2022, and February 16, 2024. The control vehicles were selected such that the make, model, year and utilizing agency were matched as closely as possible to control for confounding factors (Table 4). Of the 540 primary cohort vehicles, 440 were vehicles operated by the City of New York (Table 5), and 100 vehicles were school buses operated by NYCSBUS.

Table 4. Characteristics of control vehicles that match the corresponding ISA treatment vehicles

Matching characteristics	Number of vehicles
Make, model, year, and utilizing agency	160
Make, model, and year	99
Make and model	9
Utilizing agency and vehicle weight class	2

Table 5. Distribution of study vehicles by City of New York agency

Utilizing agency	Number of vehicles		
	ISA	Control	Total
Department of Environmental Protection	38	69	107
Department of Parks and Recreation	59*	42	101
Department of Homeless Services	41	8	49
New York City Fleet Share	39	0	39
Department of Sanitation	12	20	32
Department of Transportation	12	12	24
Department of Correction	5	18	23
Administration for Children's Services	4	11	15
Department of Design and Construction	0	13	13
Department of Consumer and Worker Protection	0	11	11
Housing Preservation & Development	3	5	8
Taxi & Limousine Commission	3	2	5
Department of Citywide Administrative Services	2	2	4
Business Integrity Commission	2	2	4
NYC Emergency Management	0	3	3
Department of Buildings	0	2	2
Total	220	220	440

*This figure includes some New York City Fleetshare vehicles utilized exclusively for Parks operations

A 60-day pre-ISA period was selected for each ISA treatment vehicle, ending on the last day with driving prior to ISA activation, and a 60-day post-ISA period was selected beginning on the day after ISA activation. The same date ranges were selected for the corresponding control vehicles. Of the 270 treatment vehicles, 26 vehicles had no driving data for the pre-ISA period, as they were purchased shortly before ISA installation. These vehicles were removed for comparison between pre- and post-ISA.

Near-real-time location and speed data were obtained for each control and treatment vehicle from the Geotab telematics platform for both the pre- and post-ISA periods. Because obtaining second-by-second speed data for 540 vehicles was not possible, a Geotab event-reporting log record totaling 51 million rows was used. An event corresponding to each row in the log record was created each time that a vehicle initiated a change in direction or speed, typically once every few seconds while the vehicle was moving. Each event reported the duration, location latitude/longitude, instantaneous speed (in integer km/hr), and speed limit. The location, instantaneous speed, and posted speed limit data for the 60-day pre-/post-ISA periods were extracted for each vehicle. Data was analyzed for a total of 894,938.3 miles across the four groups (Table 6).

Table 6. Mileage covered by vehicles during the study period.

Total Mileage	Pre-ISA period	Post-ISA period
Control vehicles	239,265 miles	196,811 miles
ISA vehicles	267,762 miles	191,101 miles

3.1.2 Habitual speeder cohort

In addition to the 540 vehicles analyzed as the primary cohort, a further 130 vehicles were identified as having a history of being driven at excessive speeds. Habitual speeder status was determined based on either the prior issuance of automated speeding tickets to these vehicles or on multiple severe speeding alerts flagged via telematics. ISA was installed and activated on habitual speeder vehicles in July 2024. Analyses were conducted on this habitual speeding cohort by comparing speeding behavior from the 30 days prior to ISA installation to speeding behavior in the 30 days following installation, using a similar Geotab event-reporting log record consisting of 8.7 million rows. The vehicles drove a combined 76,188 miles in the 30 days prior to ISA installation and 65,992 miles in the 30 days after installation.

Table 7. Selection criteria to determine habitual speeding vehicles, by agency and vehicle type.

Agency	**Tier 1: Speeding camera tickets + excessive speeding alerts**	**Tier 2: 3+ tickets in past 18 months and 10+ tickets since 2021**	**Tier 3: 3+ speeding tickets in last 18 month**	**Tier 4: 10+ tickets since 2021, but none in past 18 months**	**Tier 5: High count of Geotab speeding alerts**	**Grand Total**
Administration for Children's Services					6	6
Department of Citywide Administrative Services					1	1
Department of Environmental Protection	4		5	1	17	27
Department of Homeless Services		1	1		1	3
Department of Buildings				9	6	15
Department of Education			2		1	3
Department of Transportation					13	13
Department of Parks and Recreation	1		18		2	21
Department of Sanitation				3	17	20
Housing Preservation and Development				1	5	6
Human Resources Administration					1	1
Office of Chief Medical Examiner					8	8
Department of Probation					6	6
Grand Total	**5**	**1**	**26**	**14**	**84**	**130**

Vehicle Type	**Tier 1: Speeding camera tickets + Excessive speeding alerts**	**Tier 2: 3+ tickets in past 18 months and 10+ tickets since 2021**	**Tier 3: 3+ speeding tickets in last 18 month**	**Tier 4: 10+ tickets since 2021, but none in past 18 months**	**Tier 5: High count of Geotab speeding alerts**	**Grand Total**
Container Truck					1	1
Crossover			1		5	6
Dump Truck					3	3
Graffiti Truck			1			1
Minivan					2	2
Pickup	5		9		9	23
Sedan		1	10	8	33	52
SUV			1	6	23	30
Van			4		8	12
Grand Total	**5**	**1**	**26**	**14**	**84**	**130**

3.2 Data corrections and processing

Although speed limits were obtained from the Geotab database, New York City roadways present challenges in determining speed limits from GPS data. For example, arterials with higher posted road speeds run parallel to local service roads with lower speed limits. In addition, on- and off-ramps (whose speed limits differ from main roads) are located close together. Because of these complexities, there were known errors in the speed limit designations from Geotab, with lower speed limits sometimes applied to vehicles when they were on a higher-speed arterial.

To correct these instances of erroneous speed limits, polygons representing regions of speed limits from 30 to 50 mph were created using NYC Open Data Vision Zero View Speed Limits.[45] Locations found within these polygons were assigned the highest corresponding speed limit. There is a city-wide speed limit of 25 mph unless otherwise posted, so any locations outside of these polygons were presumed to have speed limits no higher than 25 mph, and Geotab-designated speed limits were used for these locations. Analyses were limited to within New York City limits to assure confidence in the speed limit data. This restriction is also representative of the driving behavior of the study vehicles, as approximately 92% of the driving time of the 540 vehicles occurred within New York City limits. As will be seen later in the report, restriction of the analysis to locations within the five boroughs of NYC likely underestimates the effectiveness of ISA, which was found to increase on higher speed limit roads.

3.3 Opportunity to speed framework

There are times when a driver may *choose* to speed, but because of congested traffic, traffic signals, or road geometries they physically *cannot* speed. In the current pilot, this would potentially result in a large proportion of recorded drive time where ISA is not engaged because the driver already cannot travel at their intended speed. Given that heavy traffic is a reality of driving within New York City, analyses were conducted using an "opportunity to speed" framework. This method has been used previously in NHTSA analysis of naturalistic driving data to control for traffic conditions when analyzing speeding behaviors.[46] Only time spent driving at speeds 5 mph below the speed limit and faster were included in the analysis. This represents time when the driver reasonably had the opportunity to speed if they chose to do so. As shown in Figure 5, 20.75% of recorded driving time met all criteria for inclusion in the study: within the borders of NYC, faster than 5 mph below the speed limit, and removal of GPS errors.

[45] https://vzv.nyc/

[46] Richard, C. M., Joonbum, L., Brown, J. L., & Landgraf, A. (2020). Analysis of SHRP2 speeding data. (DOT HS 812 858). Washington, DC: National Highway Traffic Safety Administration

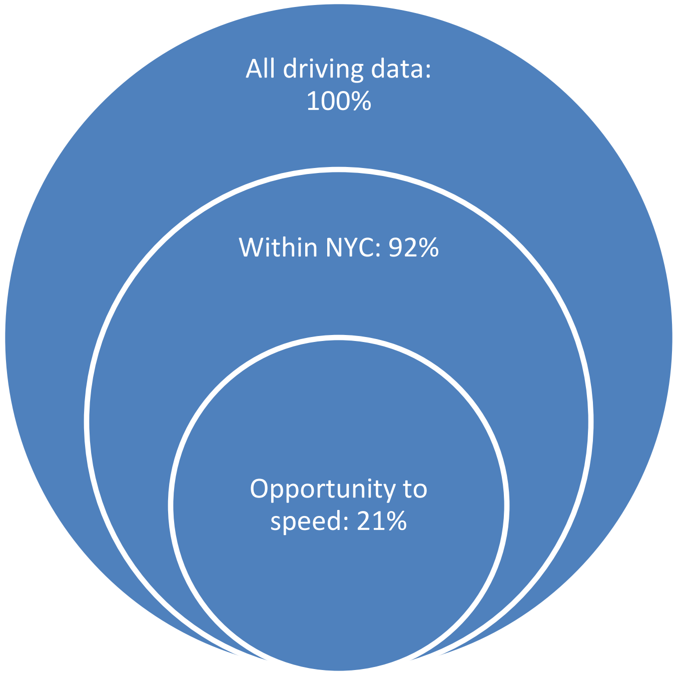

Figure 5. Filtering of driving data and resulting data subset used for evaluation.

To normalize for differences in miles driven, analyses were conducted on the percent of total driving time spent speeding over the limit, rather than the absolute times driven. When comparing time periods, only vehicles that were actively collecting data in the 60 days prior to ISA installation were included.

3.4 Analysis

The ISA devices were set to a threshold of 11 mph over the posted speed limit and to a global maximum speed of 65 mph. Thus, a vehicle traveling less than 11 mph over the posted speed limit, though it was speeding, was considered within the enforced threshold; and travel at a speed greater than 11 mph was considered to be severe speeding.

To determine the effect of ISA, a paired t-test was used to compare the percent of time each individual vehicle spent severely speeding (>11 mph over the speed limit) before and after the activation of ISA on that vehicle. Thirty-nine out of the 270 vehicles with ISA were removed from this portion of the analysis due to having insufficient driving data before installation and activation. The remaining 231 vehicles were used on a second paired t-test to compare the percent of time an individual vehicle spent speeding between 0 and 11 mph over the speed limit before and after the activation of ISA on the vehicle. At these speeds, the ISA devices was not limiting vehicle speed.

To visualize patterns in the reduction of time spent speeding, the total number of seconds spent speeding at each 1-mph increment above the speed limit was summed across all vehicles within the four treatments: pre-ISA time period in ISA vehicles, pre-ISA time period in control vehicles, post-ISA time period in ISA vehicles, and post-ISA period in control vehicles. These speeding time totals were then divided by the total time that all vehicles within a treatment were driving with opportunity to speed.

To estimate the magnitude of the effect of ISA, the percentage change in the time spent driving above the allowed speed threshold was determined for both the control and ISA vehicles. These percentage changes were also determined for driving in specific speed limit zones from 25 mph to 50 mph to determine if ISA had differing levels of effectiveness at different speed limits.

The same analysis was largely repeated for the additional cohort of 130 habitual speeding vehicles, including t-tests to compare pre- and post-ISA activation in the percentage of time spent speeding both between 0-11 mph over the speed limit and above 11 mph over the speed limit, and visualizations of the percentage of time spent at each 1 mph interval over the speed limit from pre- to post-ISA activation.

4 Results

4.1 Primary cohort

Vehicles equipped with ISA spent a smaller proportion of time traveling more than 11 mph over the speed limit after ISA was enabled compared to before it was enabled[47]. In contrast, there was no difference between the two time periods for ISA vehicles in terms of the proportion of time spent traveling up to 11 mph over the speed limit[48]. This finding indicates that the installed ISA device successfully limited speeding above the enforced speed limit. Figure 6 shows the detailed differences in percentage of speeding for the ISA group both before and after ISA was enabled. The figure displays one mph increments above the speed threshold, from 12 mph to 25 mph over the speed limit. While speeding was similar between the two time periods up to 11 mph (and in some cases, the post-ISA period showed higher rates of speeding below the enforced threshold), speeding by >11 mph over the limit in the post-ISA period dropped sharply in comparison to the pre-ISA period. Note that some speed increments (e.g., 14 mph) above the speed limit appear to have lower prevalence compared to other values. This may be an artifact of conversion from native km/h units in the telematics log record to mph for analysis purposes.

[47] Paired t-test: $t(230) = 8.922$, $p < .001$
[48] Paired t-test: $t(230) = 0.0229$, $p = .982$

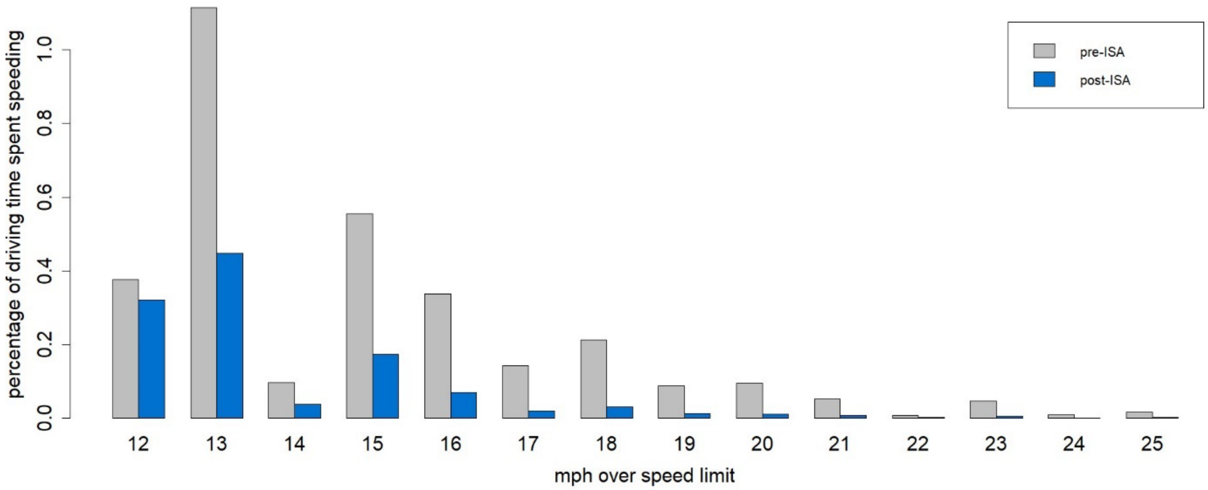

Figure 6. Percentage of time speeding pre and post ISA enabled, greater than 11 mph over the speed limit.

It is important to note that, even before the ISA system was enabled, speeding above 11 mph over the speed limit was rare within the sampled NYC fleet vehicles. Before ISA was enabled, 3.17% of driving time was >11 mph over the speed limit when drivers likely had the opportunity to speed.[49] As DCAS has previously reported from the initial 50-vehicle pilot,[50] approximately 99% of all miles driven with ISA were within the enforced speed limit set by DCAS. This continues to be the case. After ISA was enabled on the 270 primary cohort vehicles, 1.14% of driving time was 11 mph or greater over the speed limit, representing a **64.18% relative decrease** in time spent speeding. Note that this approximately one-percent speeding rate with ISA was only in time periods when drivers had the opportunity to speed. Of the *total* driving time within NYC, representing 894,938 miles driven with ISA over the study period, 99.74% was within the enforced speed limit.

Importantly, the **64.18% reduction effect was only seen in the ISA group**, as the matched control vehicles were driven >11 mph over the posted speed limit 3.13% of the time in the pre-ISA period and 3.43% of the time in the post-ISA period, consistent with a **9.71% relative increase in time spent speeding by the control group**. In combination, these findings suggest that the decrease in time spent speeding in the ISA group was due to the installation of the ISA device, not extraneous factors such as time, weather, or vehicle type. Figure 7 shows the percent of drive time spent above the enforced speed limit in the ISA and control groups, at which the ISA device engaged and prevented an increase in speed.

[49] Determined as traveling 5 mph below the speed limit or faster.

[50] https://www.nyc.gov/office-of-the-mayor/news/027-23/mayor-adams-results-successful-pilot-program-reduce-speeding-hard-braking-in

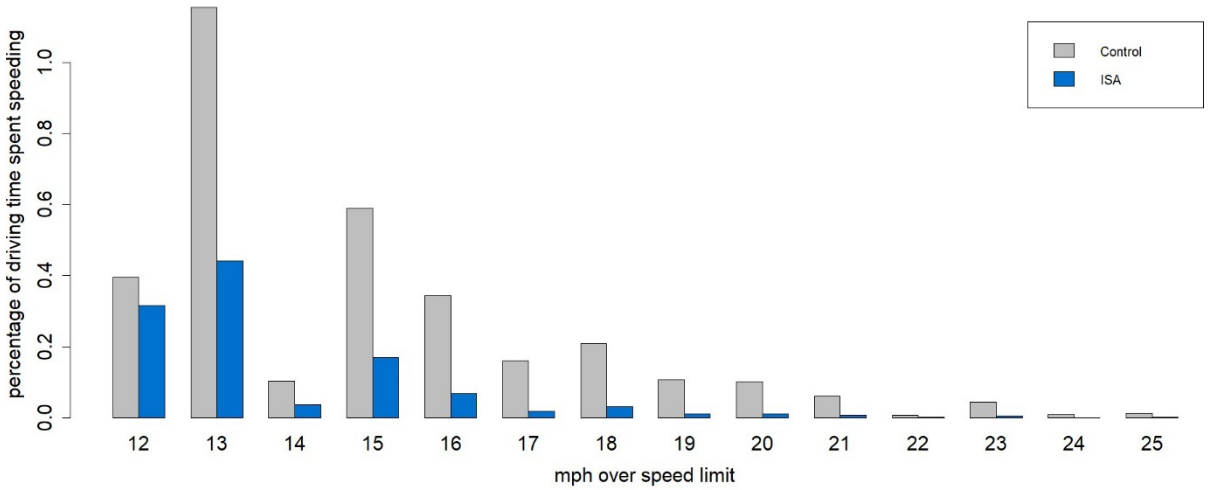

Figure 7. Percentage of time speeding of control and ISA vehicles, after ISA enabled, greater than 11 mph over the speed limit.

In addition to global comparisons between the control and ISA-enabled vehicles, the effect of ISA on speeding behaviors when driving on roads with different speed limits was analyzed.

Table 8 shows the proportion of time spent driving >11 mph over the speed limit in various zones, for both the control group and the ISA group. In the ISA group, the largest decrease in speeding occurred in higher speed limit zones (e.g., 45 mph zones and 50 mph zones).

Table 8. Percent of time spent driving >11 mph over posted speed limits in NYC

	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph
Pre-ISA Control (No ISA)	0.65%	2.36%	10.21%	10.20%	5.13%	5.66%
Post-ISA Control (No ISA)	0.68%	2.36%	9.49%	10.89%	5.31%	6.55%
Speeding Relative Change Control (No ISA)	4.77% increase	0.18% increase	7.09% decrease	6.76% increase	3.49% increase	15.77% increase
	25 mph	**30 mph**	**35 mph**	**40 mph**	**45 mph**	**50 mph**
Pre-ISA Treatment (ISA Off)	0.70%	3.47%	13.56%	9.09%	4.29%	5.38%
Post-ISA Treatment (ISA On)	0.35%	1.58%	4.86%	4.20%	0.98%	0.98%
Speeding Relative Change Treatment (ISA-enabled)	49.65% decrease	54.59% decrease	64.14% decrease	53.79% decrease	77.19% decrease	81.85% decrease

Figure 8 depicts the relative changes in drive time speeding percentage by speed limit zone, showing the clearly different outcomes of the ISA and control groups. While the ISA-enabled group exhibited decreased time spent speeding across all speed limits, the control group exhibited a smaller, overall *increase* in speeding.

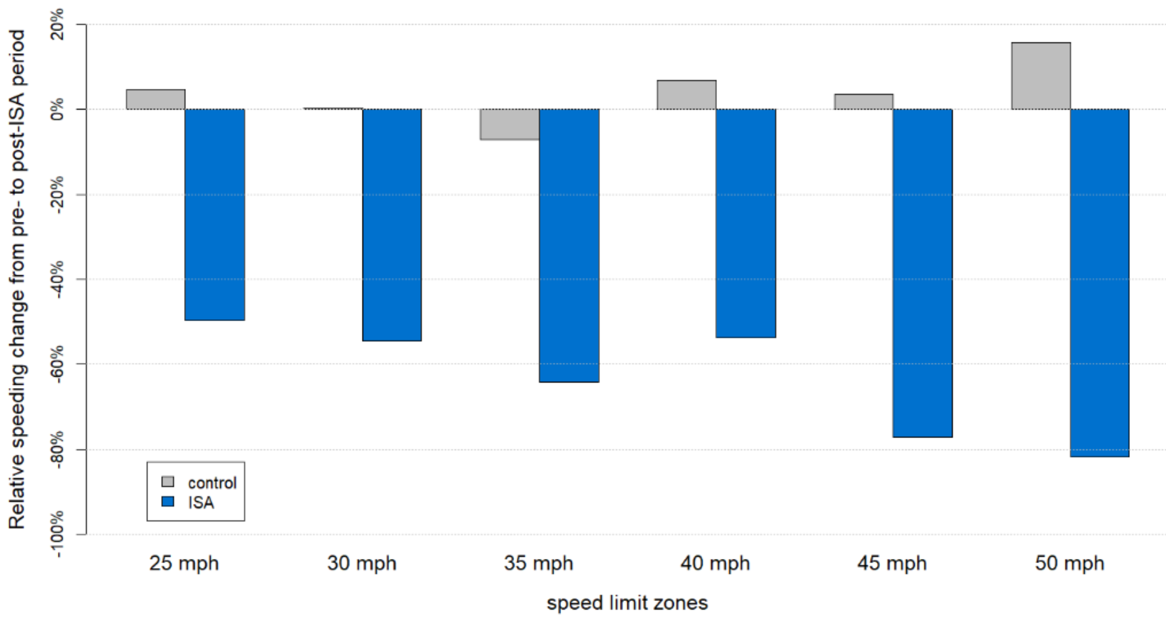

Figure 8. Relative speeding change by speed limit zones for control and ISA vehicles.

4.2 Habitual speeder cohort

In addition to the examining how ISA impacts the speeding behaviors of drivers in general, this study investigated the effectiveness of ISA for "habitual" or high-risk speeders. As part of its ISA rollout, DCAS installed ISA on 158 additional vehicles that had been designated as habitual speeders based on speed safety camera violations and/or excessive speeding alerts received by the DCAS Fleet Office of Real Time Tracking (FORT), which monitors telemetry from all fleet vehicles in real-time, including speed data. The goal of DCAS with this habitual speeder cohort was to utilize ISA to improve safe driving among the most challenging set of vehicles in the fleet.

Note, that due to the limited amount of driving data available (30 days before ISA installation and 30 days after ISA installation), these results should be treated as preliminary.

The impact of ISA on habitual speeders was found to be comparable to the impact on the main cohort of vehicles, demonstrating the technology's effectiveness in curbing even severe, habitual speeding behavior. Habitual speeders exhibited a **49.22% decrease** in the percentage of time speeding >11 mph over the speed limit after ISA was installed.[51] However, unlike in the primary cohort, there was a slight increase in speeding between 1 and 11 mph above the speed limit after the ISA device was installed.[52] This latter finding is plausible, as these vehicles have already shown a tendency to be driven at excessive speeds, and ISA was not set to engage until >11 mph over the speed limit. These preliminary findings suggest that ISA is impactful for addressing even the most unsafe drivers.

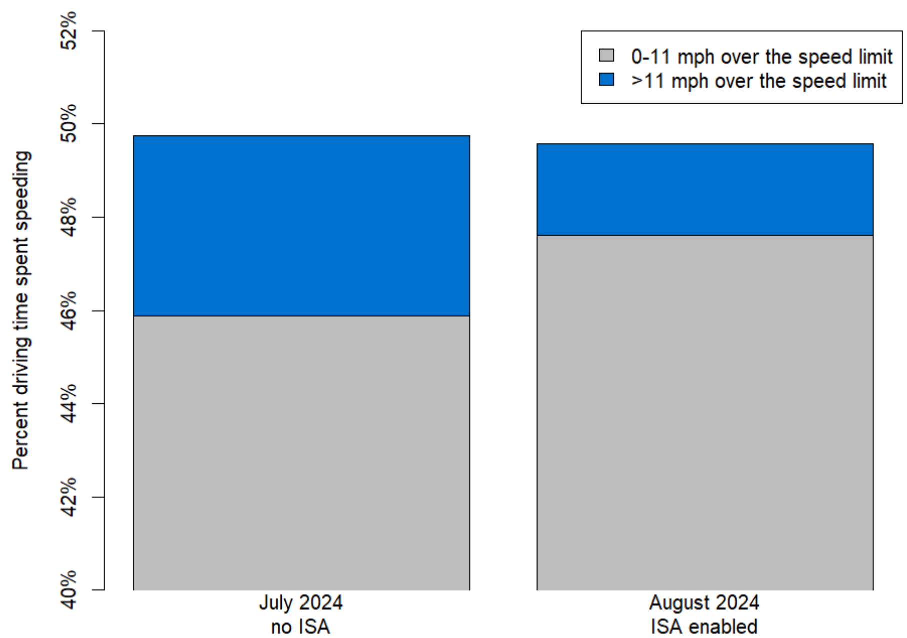

Figure 9. Percentage of driving time spent speeding among habitual speeders, before and after ISA was enabled. Note the y-axis starts at 40% to more clearly depict the nearly 50% decline in severe speeding with ISA (blue segment).

Figure 10 illustrates the detailed impact of enabling ISA device on the habitual speeder group, in the 12-25 mph range over the speed limit, speeds at which the ISA device engaged and thus prevented an increase in speed.

[51] Paired t-test: $t(112) = 6.40$, $p < 0.0001$
[52] Paired t-test: $t(112) = -3.5071$, $p < .001$

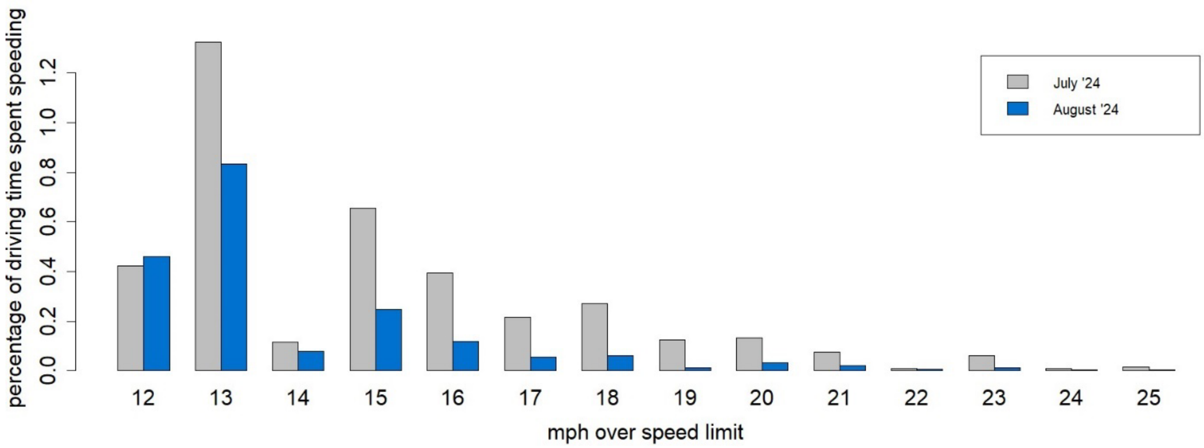

Figure 10. Comparison of percentage time speeding between pre-ISA (July 2024) and post-ISA (August 2024) for habitual speeders, greater than 11 mph over the speed limit.

4.3 Vehicle-level comparison

In addition to comparing total times driven above the enforced speed across all vehicles in each cohort to assess the impact of ISA, a vehicle-level analysis was also conducted.

The speeding behavior of each individual vehicle was summarized using a numerical score that penalized speeding in proportion to both speed and duration when driving >11 mph over the speed limit, divided by the total time each vehicle was driven with the opportunity to speed. Table 9 shows the percentage and number of vehicles whose speeding behavior decreased after ISA activation, broken out between the 50% of vehicles with the highest (worst) and the 50% with the lowest (best) speeding behavior prior to ISA activation. In both the original cohort and habitual speeders, ISA improved driving the most for the previously worst drivers. This finding suggests that ISA can be especially effective for addressing the least safe, most speeding-prone drivers.

Table 9. Vehicle-level comparison of decreases in speeding behavior by cohort and by initial speed behavior

Primary cohort, 50% worst drivers	**Primary cohort, 50% best drivers**	**Habitual speeder cohort, 50% worst drivers**	**Habitual speeder cohort, 50% best drivers**
94.8% improvement 109 out of 115 vehicles improved	76.7% improvement 89 out of 116 vehicles improved	96.7% improvement 59 out of 61 vehicles improved	67.2% improvement 41 out of 61 vehicles improved

5 Discussion and Conclusion

5.1 Speed limit thresholds

This study's finding of over **64% relative decrease in speeding drive time** following ISA activation adds to the existing significant body of evidence for the effectiveness of ISA technology.

Within the average 64% decrease, a notable trend emerges. As discussed previously, the post-ISA reduction in driving 11 mph or more over the posted speed limit was most pronounced on the higher speed roads, up to 82%. In contrast, the speeding reduction of about 50%, while still significant, was smallest on the lowest speed roads.

The study team hypothesizes two related explanations for this pattern.

1. It is more difficult to drive >11 mph over the speed limit on local NYC streets than on higher-speed arterials and limited access roads, since only the local streets have speed safety cameras, and since they present more friction: traffic lights, stop signs, (double) parking, and interaction with people walking, biking, etc.
2. Drivers tend to speed in proportion to the speed limit, not by a constant amount like 5 mph or 15 mph over. In a 2021 study, half of surveyed drivers responded that they had exceeded the speed limit by 15 mph on a freeway in the past month, and about half responded that they had exceeded the speed limit by 10 mph, a smaller amount, on a residential street.[53] The current ISA system's 11 mph threshold would be expected to curtail speeding by those surveyed drivers when on the freeway but not on the residential street.

As a percentage of the posted speed limit, the constant 11 mph speeding threshold afforded to ISA vehicles varies widely between the lowest and highest speed limits in NYC, as shown in Table 10. The lower the posted speed limit, the larger the percent over the speed limit the driver must exceed before ISA intervenes. On 20 mph local streets, a driver can go 55% over the posted speed limit, whereas, on 50 mph highways, a driver can only go 22% over the speed limit.

The larger percent above speed limit that the threshold allows on lower-speed streets may help explain the lower baseline of >11 mph severe speeding on NYC's 25 mph and 30 mph streets, as compared to the baseline speeding rates on NYC's 35+ mph roads.

[53] https://www.iihs.org/topics/speed#:~:text=In%20a%202021%20national%20telephone,for%20Traffic%20Safety%2C%202022).

Table 10. NYC ISA program settings for fixed threshold and corresponding proportion of the posted speed limit.

Posted speed limit (mph)	ISA enforced speed limit (mph)	Constant threshold over posted limit (mph)	Threshold as percent of the speed limit
20	31	11	55%
25	36	11	44%
30	41	11	37%
35	46	11	31%
40	51	11	28%
45	56	11	24%
50	61	11	22%

Since driving 31 mph in a 20 mph zone increases the risk of death to a person struck by the vehicle far more than does driving 61 mph in a 50 mph zone, speeding 11 mph over the limit on local streets may be seen as the more severe behavior to mitigate in an urban context.[54] To reflect this, DCAS could consider piloting a *proportional* speed threshold (see Table 11) rather than a *constant* threshold. While the current ISA system permits two separate thresholds (city/highway), if future systems allow, the City could, for example, deploy a threshold that is always the same percent above the posted speed limit—for example, 10% or 20%. This next phase of the ISA program could test the hypothesis that a proportional enforced speed limit approach will better align with how drivers tend to speed, result in even larger speeding reductions, and produce additional safety benefits on local streets. Alternatively, DCAS could reduce the 11 mph allowance to 5 or 6 mph on City streets with 20 or 25 mph limits.

Table 11. Proposed ISA system relative threshold approach, by posted speed limit.

Posted speed limit (mph)	ISA enforced speed limit (mph)	Fixed threshold over posted limit (mph)	Threshold as percent of the speed limit
20	24	4	20%
25	30	5	20%
30	36	6	20%
35	42	7	20%
40	48	8	20%
45	54	9	20%
50	60	10	20%

As in the current approach, geofenced exceptions could be added at locations where prevailing speeds are found to diverge by more than some percentage (e.g., 30% or 40%) from posted speed limits (e.g., on the Brooklyn Bridge). Until those road segments can be treated to calm their prevailing speeds to posted speeds, geofencing can continue to reduce the potential unintended consequences of any large speed mismatches between ISA vehicles and surrounding traffic on those segments.

[54] https://www.sciencedirect.com/science/article/pii/S000145751200276X

5.2 Technical lessons learned and best practices

Between NYC's unique road features and the NYC government's wide diversity of fleet vehicles, there were several technical and logistical challenges that had to be addressed to ensure a successful ISA pilot. First, NYC's reality of stacked and parallel roadways meant that the ISA device would occasionally recognize an incorrect speed limit, resulting in inappropriate speed limiting. To remedy this issue, manual geofencing was conducted to ensure that the fleet vehicle would be able to travel at the correct speed limit without needing to press the override button. Manual geofencing of areas with specialized speed limits (such as school zones and parks) is still being finetuned to ensure appropriate and safe speeds.

Second, while the ISA devices were installed on most vehicles without issue, there were certain makes and models that required troubleshooting to ensure the ISA worked properly. Only some medium- and light-duty makes required technical intervention. Heavy-duty vehicles were able to have the ISA device installed without issue.

Fleets that are planning on implementing ISA on their vehicles should be prepared to manually adjust parameters and geofence speed limits to ensure alignment between the vehicle and posted speed limits. In hindsight, NYC's fleet managers noticed that geographical "problem areas" where the ISA speed limit database did not match posted speed limits overlapped with the areas where the fleet-wide telematics system had previously encountered similar issues. Therefore, fleet managers implementing ISA could streamline their implementation by examining the speed limit readouts of their current fleet telematics system and proactively identify geographical areas where the telematics speed limit mapset has discrepancies; these areas are likely to be the same ones that will require manual geofencing for ISA. Having this knowledge in advance before deploying ISA can support a smooth rollout and support widespread driver acceptance.

5.3 Driver and stakeholder acceptance

Recently, the Insurance Institute for Highway Safety published a nationally representative survey study that investigated U.S. driver acceptability of various hypothetical ISA systems.[55] The study included passive ISA that only alerted the driver, accelerator pedal feedback that provided resistance when the driver was traveling over the speed limit, and an active ISA that would prevent accelerating over the speed limit. Overall, nearly two-thirds or 63.8% of 1,802 respondents agreed that passive ISA would be acceptable, 50% of respondents agreed that accelerator pedal feedback would be acceptable, and 51.5% of respondents agreed that active ISA would be acceptable. Perhaps unsurprisingly, drivers who reported speeding frequently were less likely to find the ISA systems acceptable compared to drivers who rarely speed. Although the public appears to be nearly evenly split on current perception of active ISA, it is important to note that most people have not yet experienced ISA firsthand. The opportunity to

[55] https://www.iihs.org/topics/bibliography/ref/2308

directly experience a new technology like ISA can help to diffuse concerns and increase user acceptance.[56] Even without such direct experience, the rates of acceptance reported by IIHS, especially for passive ISA, may be higher than some fleet managers and policymakers had previously assumed.

Another recent study investigated the perspectives of non-driver stakeholders on ISA adoption by interviewing representatives from a range of UK stakeholder groups, including policy and road infrastructure providers, road safety, the insurance industry, vehicle manufacturing and technology, police, driver training and motoring organizations. Interviews explored perspectives around effective ISA systems, whether and how to introduce ISA, and barriers to ISA adoption.[57] Approximately 75% of these stakeholders were in favor of adopting ISA in UK vehicles; of these, one third preferred active ISA and one third preferred passive. ISA was described as having the potential to reduce road crashes, improve speed compliance, protect vulnerable road users, and change ingrained speeding behaviors. Concerns around ISA included technical inaccuracies, reduced driver control, driver restrictions and system complexity.

One strategy that could accelerate ISA acceptability with fleet drivers (and the wider public) is addressing misconceptions regarding ISA. For example, there are system fail-safes in place that ensure that if GPS signal is lost and if the posted speed limit cannot be established, namely that the ISA device will default to either no limit or to a preset top speed. In addition, some drivers unfamiliar with the technology may assume that the ISA device will suddenly brake as their vehicle enters a new speed limit zone. However, current active ISA devices only reduce acceleration, causing vehicles to coast down to the enforced speed without braking. The NYC ISA pilot could be useful in providing real-world context to the public on how the devices really work to assist drivers and potentially address concerns and misconceptions surrounding the technology.

5.4 Future ISA deployment and research avenues

This evaluation finds that the rollout of active ISA technology has succeeded in achieving large, measurable decreases in dangerous speeding on vehicles where it has been installed and activated, even on those vehicles driven by habitual speeders. The results are consistent with those of the TfL ISA program and with literature expected values, and the results support continued expansion. As NYC equips 1,600 additional vehicles with ISA under a U.S. DOT Safe Streets and Roads for All grant, the NYC ISA program is expected to continue to be the largest active ISA deployment on a public fleet in the U.S.

Potentially informing the speeding recidivist program in Washington, D.C. and other proposed such programs, one relevant application of ISA is the ability of fleet managers to easily customize parameters for individual vehicles. If a driver consistently speeds and uses the override button in an inappropriate manner, the ISA device parameters can be changed remotely. This could allow ISA to

[56] https://www.iihs.org/news/detail/with-the-right-mindset-speed-limiting-technology-can-be-liberating
[57] https://www.sciencedirect.com/science/article/pii/S2214140524001142

function as guardrails to encourage employees—or other habitual speeders—to drive in a safer manner, reducing the risk and severity of crashes due to excessive speed.

Looking ahead, the NYC and other fleet ISA deployments present several research gaps and opportunities that could help advance the benefit of this effective Safe System technology.

- While the current deployment scale in the hundreds of vehicles is unlikely to measurably affect the prevailing speed of traffic citywide, how would scaled-up ISA implementation in NYC fleet vehicles affect traffic patterns and prevailing speeds? Traffic simulation models could be used to determine if NYC fleets would be able to change city-wide speeding patterns on its own, or potentially in concert with City contracted and regulated fleets, and what speeds the ISA vehicles would need to travel to produce that effect.

- How could variable or block-level speed limits, such as school zone, work zone, low-visibility weather, or day-night be incorporated seamlessly into the system?

- While speed limit information was seen to be accurate most of the time, as noted above, there were instances when manual geofencing had to be performed. The pilot ISA system uses a GPS mapset to link location to a posted speed limit database. Certain other ISA systems use traffic sign recognition cameras to detect road signs and input speed limit information, or a combination of camera and GPS inputs. Future research could examine how the three types of systems compare in terms of accuracy, cost, and availability, especially in urban canyons, and the potential tradeoffs of additional or upgraded physical speed limit signage.

- Future deployments of ISA, both in NYC and beyond, would benefit from focus on identifying the “sweet spot” for enforced speed limit relative to the posted speed limit. As noted previously, one approach may be to make the enforced speed limit a proportional threshold, in other words, based on a percentage of the posted speed limit. Another approach, as currently implemented by TfL, could be a combination of proportional and constant thresholds.[58] Multiple configurations could be compared, and the effects on speeding and user acceptance could be measured. To maximize safety benefits, it may be optimal to design enforced speed parameters that both minimize severe speeding and are sufficiently accepted by drivers to ensure consistent use.

- Considering that reduced speed and speed limits are associated with a reduction in CO_2 emissions during highway driving, what are the quantifiable environmental benefits to implementing ISA in NYC fleets?[59] Computational modelling has previously demonstrated the

[58] Discussion with Amy Pidwill and Harry Littlehales (TfL), August 15, 2024.
[59] Fondzenyuy, S. K., Turner, B. M., Burlacu, A. F., Jurewicz, C., Usami, D. S., Feudjio, S. L. T., & Persia, L. (2024). The Impact of Speed Limit Change on Emissions: A Systematic Review of Literature. *Sustainability*, 16(17), 7712.

hypothetical environmental benefits of ISA.[60] This is an area that could be further examined, including in the DCAS Clean Fleet Transition Plan initiative as part of Mayoral Executive Order 53 of 2020.

[60] https://www.sciencedirect.com/science/article/pii/S0001457511000923?via%3Dihub#fig0010

U.S. Department of Transportation
John A. Volpe National Transportation Systems Center
220 Binney St.
Cambridge, MA 02142-1093

617-494-2000
www.volpe.dot.gov

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