Is Robocop a Cash Cow? Motivations for Automated Traffic Enforcement

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Carlos Sun
University of Missouri
csun@missouri.edu

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I. Introduction

An automated enforcement system is an electronic device used by law enforcement to enforce traffic laws. An Automated Speed Enforcement System (ASE) is an increasingly common type of automated enforcement system that monitors vehicle speeds and captures images of speed limit violators. A Red Light Camera (RLC) is also a common type of automated enforcement system. Even though ASE differs from RLC in terms of technology and application, both are often accused of being deployed for revenue generation purposes. However, these accusations appear to be exaggerated after an examination of legal, engineering and policy issues.

Typically, ASE has three basic components: a speed detector, a processing unit and a camera. The detector could be radar, lidar or in pavement loops and monitors the speed of vehicles. The processing unit actuates the camera if a speed threshold is exceeded. The camera(s) captures images of the license plate and/or the driver. ASE units can be mobile or fixed.

RLCs monitor violators of the red signal phase at signalized intersections and railroad crossings. RLC is also composed of three basic components: detector, processing unit and camera. The detectors are typically installed on locations consistent with legal definitions of violations and also at a location immediately preceding the stopline. The latter establishes the fact that the vehicle entered the intersection after the signal turned red. The processing unit communicates with the detector, traffic signal and the camera and actuates the camera when it detects a violation. Camera technology could be film or digital. Some cameras only capture still photos while others capture motion video and provide the context in which violations occur.

The relationship between automated enforcement systems and traffic safety has sometimes been disputed. In analyzing this complex issue, authors have all too often been content with just using news headlines or cursory summaries instead of carefully examining safety reports performed by experts. This applies equally to both proponents and opponents of automated enforcement systems. For example, one law review author recounted the details of several red-light running crashes as reported in the San

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3 Id.
4 Id.
5 Id. at 12-13.
6 Id. at 13-15.
8 Id. at 24-25.
9 Id. at 22-23.
10 Id.
Francisco Examiner and the San Francisco Chronicles.\textsuperscript{11} The author described the shattered arm and broken neck suffered by one pedestrian, the serious injuries suffered by a twelve year-old boy and the tragic death of a two year-old.\textsuperscript{12} Such anecdotes, especially about children, are effective for tugging at heart strings and rousing public sentiments but are incomplete snapshots. In contrast, another scholar has cited articles in the \textit{Washington Post} and \textit{Wall Street Journal}\textsuperscript{13} to argue that automated enforcement system devices cause more problems than they solve and divert attention from more serious safety issues.\textsuperscript{14} Such news editorials are convenient for informing the public about certain perspectives regarding automated enforcement systems, but they trivialize the complicated issues involved with implementing safety counter-measures. It is thus important to examine available crash statistics to assess both the impact of red-light running and speeding on traffic safety and whether an automated enforcement system is a positive counter-measure to these safety violations.

According to the National Highway Traffic Safety Administration (NHTSA), 11,674 of the 37,261 traffic fatalities occurring in the United States in 2008 were speed related.\textsuperscript{15} The Federal Highway Administration (FHWA) contrasted the progress seen in major safety issues such as seatbelt usage and alcohol use with the lack of progress in the area of

\textsuperscript{12} Id.
\textsuperscript{13} Joel O. Christensen, \textit{Wrong on Red: The Constitutional Case Against Red-Light Cameras} 32 Wash. U. J. L. & Pol'y 443 n. 10.
\textsuperscript{14} Id. Here, the author blindly quotes an 8% figure mentioned in a Wall Street Journal editorial. This 8% figure supposedly represents the percent of accidents in which red-light running and speeding are implicated. The Wall Street Journal article itself does not cite the source for the 8% figure thus the origins for this figure is unknown. One possible source is a Virginia Transportation Research Council study that found an 8% decrease in red-light running crashes defined as those in which a driver was charged with a red-light violation. If this was indeed the source, then the figure was mischaracterized. Also this source suffered from methodological issues as pointed out in Bhagwant N. Persaud et al., Review of “The Impact of Red Light Cameras (Photo-Red Enforcement) on Crashes in Virginia” 2 (Insurance Inst, for Highway Safety 2008). Scientific sources contradict this 8% figure. See e.g., Forrest M. Council et al., Development of a Speeding-Related Crash Typology 1 (Fed. Highway Admin. 2009) (The speed-related traffic fatalities range between 30% and 33% of the total fatalities from 1990 to 2006.) and James Bonneson et al., Engineering Countermeasures to Reduce Red-Light Running 1-1 (Tex. Dep't of Transp. 2002) (“About one million collisions occur at signalized intersections in the U.S. each year ... at least 16 to 20 percent can be attributed directly to red-light-running.” (citing Richard A. Retting et al., Reducing Red Light Running Through Longer Yellow Signal Timing and Red Light Camera Enforcement: Results of a Field Investigation 2 (Insurance Institute for Highway Safety 2007) and Y. M. Mohamedshah et al., Association of Selected Intersection Factors with Red Light Running Crashes in Proceedings of the 70th Annual ITE Conference (Inst. of Transp. Eng’r 2000)).
speeding. The FHWA also reported that 36% of all fatal crashes on rural roads and 30% of all fatal crashes on urban roads involved excessive speeds. Speed-related crashes accounted for 54% of the fatal crashes on curves, compared with 27% on straightaways. There are also relatively higher accident rates in work zones when excessive speed is involved, accounting for 25% of all fatal crashes in those areas. Thus, high traffic speeds are a safety concern in highway work zones and a potential risk to both motorists and workers. Speed limit compliance is also poor in school zones.

Traffic statistics also show that intersection violations are significant. Red-light running crashes accounted for 883 fatalities and 165,000 injuries each year. Approximately 35% of all signalized intersection and signalized-intersection-related fatalities involve red-light running. Similarly, injuries due to red-light running account for approximately 44% of all intersection and intersection-related injuries involving traffic signals. At railroad crossings, there were a total 1559 accidents resulting in 227 fatalities and 585 injuries in 2009. Even though not all those accidents were related to red light running, the frequency and severity of highway-rail accidents underscore the importance of rail crossing safety. In short, accident statistics point to speeding and red light running as significant safety concerns in the United States, especially in high-risk locations such as work zones, school zones and railroad crossings. However, this does not necessarily

17 Id. at 67.
18 Id. at 38.
19 Nicholas J. Garber & Tzong-Shiou Woo, Accident Characteristics at Construction and Maintenance Zones in Urban Areas ix (Virginia Transportation Research Council 1990).
21 Kay Fitzpatrick et al., Speeds in School Zones 3 (Texas Transportation Institute 2009) (citing Patrick McCoy & J. Heinmann, School Speed Limits and Speeds in School Zone in Transportation Research Record n. 1254 1 (1990)).
22 Garber, supra note 19, at xi.
23 Federal Highway Administration, Red-Light Running (2010), http://safety.fhwa.dot.gov/intersection/redlight (citing figures derived from NHTSA’s Fatality Analysis Reporting System and General Estimates System (GES)).
24 This percentage is derived from supra note 14 at 52 and supra note 23. This is assuming that FHWA defined red-light running fatalities as involving both intersection and intersection-related fatalities. Otherwise, this ratio could be even higher.
25 Id.
26 Federal Railroad Administration, Office of Safety Analysis Web Site 2.18 (2010), http://safetydata.fra.dot.gov/OfficeofSafety/default.aspx. A database query was made of the 2009 highway-rail incidents for all railroads and all locations in the United States. The most recent year, 2009, highway-rail incidents are low compared to previous two years.
mean that safety is the only or primary objective in most automated enforcement system deployments.

In addition to just addressing the existence of safety problems, it is also important to examine the effectiveness of automated enforcement systems in improving safety. Proponents claim that an automated enforcement system is a cost-effective way of improving safety, while opponents question the effectiveness of the devices. Within the scientific community, there is controversy concerning the interpretation of safety studies analyzing the effectiveness of RLCs. One Northern Virginia study produced evidence that safety effects of red light cameras varied and concluded that RLCs are not universally effective. Another study involving a meta-analysis of previous studies concluded that RLCs may reduce crashes under some conditions but are ineffective overall as a safety measure. However, the previous two studies had methodological problems that were pointed out by other researchers. In contrast to the previous studies, the majority of literature either supports RLCs as effective or is inconclusive. This is not to imply that the quantity of existing literature supporting a particular viewpoint is dispositive. In most of these studies, reductions in more serious right-angle crashes are somewhat counter-balanced by increases in less severe rear end crashes.

One such study, involving seven jurisdictions across the United States, sought to correct for previous methodological problems and found a positive aggregate economic benefit of greater than $18.5 million or a moderate crash reduction benefit of approximately

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27 See, e.g. Forrest M. Council et al., Safety Evaluation of Red-Light Cameras 1 (Fed. Highway Admin. 2005) (“There was indeed a modest aggregate crash cost benefit of RLC systems.”) and supra, note 13 at 443 n. 14 (“nor is there conclusive proof that red-light cameras in fact enhance community safety” (paraphrasing People v. Hildebrandt, 126 N.E.2d 377 (N.Y. 1955)).

28 Two well respected researchers in the transportation safety statistics area, Nicholas and Garber and Bhagwant Persaud, seem to disagree with each other on the effectiveness of RLCs because of methodological issues.


$50,000 per site year.\textsuperscript{33} That study also pointed to indications of a spillover effect in the form of a city-wide safety improvement due to greater driver respect for red lights even in non-RLC intersections.\textsuperscript{34} Regardless of which safety study one gives more credence to, no study has claimed that RLCs are completely ineffective. The worst case scenario for RLCs is that RLCs would actually reduce overall traffic safety when implemented in poorly selected locations. When installed in proper locations, such as ones with large ratios of angle crashes to rear-end crashes, RLCs would produce net safety benefits.

In order to discuss the effectiveness of ASEs in improving safety, there are a few preliminary issues that need to be addressed: (i) the correlation between speed and crash involvement and (ii) the correlation between speed and crash severity. Although research in this area has produced some contradictory evidence, significant evidence supports a positive correlation between speed and crashes, and speed and injury/fatality.\textsuperscript{35} These issues are important in order to establish the inference that reductions in speed violations lead to reductions in crashes and crash severity. Studies have shown that ASEs indeed reduce vehicle travel speeds.\textsuperscript{36} Furthermore, there is direct evidence that ASEs improve safety by reducing crashes and injuries resulting from crashes.\textsuperscript{37} This evidence is more prevalent outside the United States where ASEs have been deployed for a longer period of time.

Even though the goals of revenue generation and of providing for public safety are not mutually exclusive, they are often set against each other. The previous review of safety statistics on red-light running, speeding, and the effectiveness of automated enforcement system devices shows that their opponents have an uphill battle in proving that safety is not a primary objective for an automated enforcement system implementation. But could safety concerns merely be a pretext to increasing municipal revenues? In tough economic times where tax increases are politically infeasible, do municipalities resort to methods such as an RLC or ASE? The balance of this paper examines the legal background for automated enforcement systems and the legal issues

\textsuperscript{34}Id. at 64.
\textsuperscript{36}See, e.g. Simon Washington et al., \textit{Evaluation of the City of Scottsdale Loop 101 Photo Enforcement Demonstration Program} (Ariz Dep’t of Transp. 2007) (reporting a 9 mph average reduction in speeds).
related to the argument that municipalities most often deploy the devices primarily for the purpose of revenue generation.

II. Background on Legal Issues with Automated Enforcement Systems

Because of the similarities between ASEs and RLCs, they share many similar legal issues. Both systems use cameras to produce photographic evidence of the vehicle, including the license plate and sometimes the driver. However, there are also significant differences between the two systems. First, ASEs involve the use of speed radar, which implicates legal issues involving the use of radars even when utilized in manual mode by a police officer. Second, the systems are deployed at variable road locations. RLCs are deployed at point locations such as intersections and railroad crossings while ASEs are typically deployed near a corridor or zone such as a school zone, work zone or a section of freeway. Third, RLCs are primarily designed to reduce the severe angle crashes, while ASEs could potentially influence a range of crash types that involve speeding. Fourth, RLCs are closely connected to the issue of signal timing, while ASEs are associated with the notion of speed distributions. The following review of the various legal issues provides the background for analyzing further the issue of revenue generation as a motive for using these devices.

A. Procedural Issues

One type of procedural issue relating to automated enforcement system use is whether a violator that is charged based on automated enforcement system-generated evidence receives all the process that is due under the Fourteenth Amendment. In *Gardner v. the City of Cleveland*, the court explained that the administrative proceedings associated with an automated enforcement system-enforced traffic violation provided notice, a hearing and an opportunity to present evidence. The court held that such processes, with the additional ability to appeal the finding of liability to a judicial court, were sufficient. Similarly, in *McNeill v. Town of Paradise Valley*, the court ruled that the ability to challenge a citation in municipal court constituted all the process that was due a violator. But in *City of Springfield v. Belt*, the court held that the administrative proceedings for the city were inconsistent with the State’s statutory requirements. This case will be discussed again in the context of state law preemption.

With respect to the timing between a violation occurrence and the violator’s receipt of notice, the court in *State v. Weber* ruled that a delay of more than a week between the

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38 *Gardner v. the City of Cleveland*, 656 F. Supp. 2d at 759.
39 Id.
40 *McNeill v. Town of Paradise Valley*, 44 Fed. App’x. 871 (9th Cir. 2002).
41 *City of Springfield v. Belt*, 307 S.W.3d 649, 653 (Mo. banc 2010).
time of the offense and issuance of the citation did not violate due process rights. In Weber, the defendant claimed the delay did not allow her to fix the incident in her mind, thus causing a lack of recollection that impaired her ability to defend herself. But the court held that, in order to rise to a due process violation, a defendant must show both substantial prejudice to her right to a fair trial and that the delay was done intentionally to gain a tactical advantage.

Once a violator either uses the available processes unsuccessfully or fails to avail oneself of the available processes, the concept of collateral estoppel can bar a violator from re-litigating a finding of liability. In Kovach v. District of Columbia, the Metropolitan Police Department eventually removed a RLC because it was confusing to motorists. The Department then dismissed outstanding fines but did not reimburse paid fines. The court held that res judicata did not bar the violator, Kovach, from challenging the District’s decision to forgive outstanding tickets and yet to refuse refunds because it was a different factual transaction than the determination that Kovach was liable for the infraction. However, the court held that collateral estoppel barred re-litigation of the issue of liability that was determined before the Bureau of Traffic Adjudication as provided by the D.C. administrative proceedings. Kovach’s payment of the fine was deemed a finding of liability according to the D.C. code, and it precluded Kovach from later asserting that he was part of a class of people who were confused by the stoplight and deserved a refund. Similarly, in Bentley v. West Valley City, the court construed the failure of the plaintiffs to challenge the legality of the ASE in the initial criminal proceedings as a waiver. The court held that the collateral attack against West Valley City was not allowed.

Some automated enforcement system cases involve the issue of a court’s jurisdiction. In Dajani v. Governor of Md., the plaintiff, Dajani, brought a 42 U.S.C. §1983 action challenging the constitutionality of Maryland’s RLC enforcement statute. The federal court held that it lacked jurisdiction because Dajani had failed in the same constitutional challenge in Maryland state court, and the federal court did not have jurisdiction to conclude that the state court decided wrongly. The adequacy of the service of process could also be an important procedural issue. In Tonner v. Paradise Valley, the court held that under Arizona civil procedure, the use of first-class mail for delivery of a summons

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43 Id.
44 Id.
46 Id. at 960.
47 Id. at 961.
48 Id. at 962.
49 Id.
50 Bentley v. West Valley City, 21 P.3d 210, 211 (Utah 2001).
51 Id. at 211.
53 Id. at 123.
and complaint for an ASE detected speeding violation was not complete until acknowledgment of receipt was executed.\footnote{Tonner v. Paradise Valley Magistrate’s Court, 831 P.2d 448, 450 (Arizona Ct. App. 1992).}

**B. Evidentiary Issues**

Some of the evidence-related legal questions surrounding automated enforcement system use involve the issues of hearsay, the authentication of the photographs, the chain of evidence, and the acceptability of photo-radar as scientific. In \textit{State v. Weber}, the court ruled that the photo radar inscription was not impermissible hearsay because the assertion was made by a machine and not a person.\footnote{Weber, 19 P.3d at 381.} On the issue of determining the adequacy of the foundation required to establish a chain of custody, the court said that the trial judge had discretion.\footnote{Id.} The trial court considered the fact that the officer contemporaneously maintained a log of vehicles he observed to be speeding, and the photograph and the information on the photograph corresponded to the officer’s contemporaneous observations.\footnote{Id. at 382.} Even though the photograph was out of police custody for several days, the trial court held that there was no indication that the vendor or anyone else tampered or altered the evidence during processing.\footnote{Id.} The court in \textit{Municipality of Anchorage v. Baxley}, similarly emphasized the corroborative nature of the photographic evidence and said that ASE evidence was not admissible unless there was also testimony of a trained police officer as to the officer’s own observations.\footnote{Municipality of Anchorage v. Baxley, 946 P.2d 894, 895 (Alaska Ct. App. 1997).} The \textit{Baxley} court nonetheless stated that the scientific principles behind the photo-radar were well established and had attained general acceptance in the relevant scientific community, thus satisfying the criteria established in \textit{Frye v. United States} for the admission of novel scientific evidence.\footnote{Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).}

**C. Substantive Issues**

One often-raised substantive issue is that the presumption that “the registered owner is the driver” impermissibly shifts the burden of proof onto those charged with automated enforcement traffic violations. In \textit{Gardner v. City of Cleveland}, the court held a Cleveland ordinance that imposes civil liability on vehicle owners for red light and speeding violations was rationally related to improving traffic safety because it encouraged vehicle owners to drive more safely and to take greater care with whom they entrust their vehicles.\footnote{Gardner v. City of Cleveland, 656 F. Supp. 2d 751, 761 (N.D. Ohio 2009).} The court said that it was rational for the City to assume that registered owners commonly drive their own vehicles, and the City could reasonably designate
proof of ownership as the point where the burden shifts to the registered owner to demonstrate that the owner was not driving at the time the violation was captured by the automatic camera. 63 Similarly, the court in in Agomo v. Fenty stated that it was entirely rational to presume that a vehicle is in the custody, care, or control of its registered owner. 64 The Agomo court held that even though a D.C. statute authorizing automated traffic enforcement did impose vicarious liability through a rebuttable presumption, it was not contrary to the notions of due process. 65 In Oregon v. Dahl, the court found that the statutory presumption that the driver of a vehicle was its registered owner did bear some rational connection to vehicle ownership. 66 The Dahl court found that a civil standard applied according to an Oregon traffic statute and that a presumption stood unless rebutted by a preponderance of the evidence. 67 Thus the burden of persuasion was not impermissibly shifted to the defendant. 68

Vehicle owners are differentiated from lessees, and depending on the automated enforcement system statute, a lessee may not be liable in some cases. In Dickson & Campbell v. City of Cleveland, the court in ascertaining legislative intent contrasted a Cleveland statute that made the registered owner liable with both an Akron City Code and a Cleveland parking statute. 69 The Akron code defined a vehicle owner as the registered owner or a six-month or longer lessee, and the Cleveland statute differentiated leased and rented vehicles from owned. [61] Thus the lessee was held not liable for the speeding ticket. 70 While in Tonner v. Paradise Valley Magistrate’s Court, General Motors Acceptance Corporation notified Paradise Valley of the lessee violators, and the ASE traffic ticket was re-issued to the lessees. 71

A few cases have even broached the subjects of the Fourth Amendment Search and Seizure Clause and the Fifth Amendment right against self-incrimination. For example, in McNeill v. Town of Paradise Valley, the court ruled that sending a traffic citation to the registered owner of a vehicle based on the photo radar system did not constitute a seizure under the Fourth Amendment. 72 And in Oregon v. Dahl, the court found that a violator’s failure to submit a certificate of innocence did not violate her right against self-incrimination because she was not exposed to any criminal liability. 73

63 Id. at 762.
65 Id. at 193.
67 Id.
68 Id.
69 Dickson & Campbell v. City of Cleveland, 908 N.E.2d 964, 969 (Ohio Ct. App. 2009).
70 Id. at 971.
72 McNeil, 44 Fed. App’x. at 871.
73 Dahl, 57 P.3d at 969.
D. State Law Preemption

State law, whether it deals with automated enforcement directly or not, has the potential to preempt local automated enforcement ordinances. For example, in *Mendenhall v. City of Akron*, the court ruled that a municipality had the power under Ohio constitution home rule to enact civil penalties for the offense of violating a traffic signal for speeding, both of which were criminal offenses under Ohio Code.\(^74\) The court applied a sequential three part test, asking whether: (1) ordinance was in conflict with the state statute, (2) the ordinance was an exercise of police power instead of local self-government and (3) the statute was a general law.\(^75\) The court concluded that the Akron Ordinance did not conflict with state law because it did not alter or supersede state law.\(^76\) Similarly, in *City of Davenport v. Seymour*, the court found that the local ASE ordinance was not preempted by the state statute because the state constitution provided municipalities with home rule so long as the local ordinance was not inconsistent with state laws thus municipalities may act without express legislative approval or authorization.\(^77\)

In contrast, in *State v. Kuhlman*, the court held that Minneapolis’ ordinance on photo-enforcement of traffic signals conflicted with a state traffic act thus the ordinances were preempted.\(^78\) The court held that the state act imposed uniformity on traffic regulations thus showing clear legislative intent to preempt except for limited local regulation expressly permitted.\(^79\) Likewise, in *City of Commerce City v. State*, the court found the regulation of automated enforcement system was a matter of mixed local and state concern and the state provisions superseded the conflicting provisions of the Cities' local ordinances.\(^80\) Furthermore, in *City of Springfield v. Belt*, the local provision for administrative adjudication was ruled to be inconsistent with state statutes that restricted adjudication to circuit and municipal courts for cities of 400,000 people or less.\(^81\)

III. Revenue Generation: Fact or Fiction?

In addition to the legal issues raised in the background section, the one issue that perhaps trumps them all in the eyes of the public is the issue of revenue generation. It has become quite popular to accuse agencies of deploying automated enforcement system for the primary purpose of generating revenue rather than that of protecting public safety. Regardless of the legal viability of challenging automated enforcement

\(^75\) Id. at 260.
\(^76\) Id. at 265.
\(^77\) *City of Davenport v. Seymour*, 755 N.W.2d 533, 538 (Iowa 2008).
\(^78\) *State v. Kuhlman*, 729 N.W.2d 577, 584 (Minn. 2007).
\(^79\) Id. at 580.
\(^80\) *City of Commerce City v. State*, 40 P.3d 1273, 1276 (Colo. banc 2002).
\(^81\) *Belt*, 307 S.W.3d at 652-53.
system on revenue generation grounds, many sources such as the popular media, advocacy groups, law review articles and agency policy manuals have raised the revenue generation issue. For example, an article in the L.A. Times questioned the motivation for the RLC enforcement of right turns and suggested that revenue generation was the true motive. The *New York Times* recently reported that the opposition by the Arizona Governor of the now discontinued ASE program in Scottsdale was primarily due to the revenue generation argument. The National Motorist Association, an organization started in 1982 with the initial goal of opposing the 55 miles per hour national speed limit, beats the drum that revenue and not safety is driving the use of RLCs. One law review article recounted local attorneys decrying the automated enforcement revenue stream as a scheme to defraud the public. Another suggested that additional revenue generation presumably induces agencies to implement automated enforcement. A third told of the state legislature’s belief that local agencies might be primarily motivated by revenue generation. The National Highway Traffic Safety Administration’s (NHTSA) operational guide for ASE stated that ASE could be labeled as “revenue machines” if locations were not appropriately justified. The National Sheriffs’ Association resolution in supporting the use of automated speed enforcement stated that the deployment should be without regard to fine revenues.

The previous review of legal issues demonstrates that there are many legal issues that are being litigated related to automated enforcement. These legal issues have been incorporated into federal guidelines for automated enforcement deployment and model laws. Even though most court decisions have sided with automated enforcement, there have been decisions on the other side. For example, the *Belt* court in Missouri invalidated the local administrative proceedings and the *Clay* court in Oregon found the automated enforcement system evidence insufficient because the City did not produce evidence of the owner’s registration. On top of all the aforementioned legal issues, there are also many issues that are related to revenue generation and how the government contracts with private automated enforcement system providers.

91 *Belt*, 307 S.W.3d at 653.
92 *Clay*, 29 P.3d at 1104.
A. Civil or Criminal?

One central question affecting other legal issues relating to automated enforcement system traffic law enforcement is whether the violations enforced with the devices are considered civil or criminal. Whether revenue generation drives automated enforcement system use can affect this debate, because courts have recognized the fact that public safety motivates automated enforcement ordinances to be a significant factor. Thus, evidence of a primary revenue generation motive could weaken arguments of a public safety purpose. In Kilper v. City of Arnold, the court needed to first decide whether the red-light camera ordinance was either civil or criminal in nature in order to address the §1983 claim of constitutional rights violation. A §1983 claim requires that the defendant acted under the color of state law and that the alleged wrongful conduct deprived the plaintiff of a constitutionally protected federal right. The characterization of the violation as civil or criminal thus determines the applicable federal constitutional protections. The Arnold ordinance in question expressed a legislative intent for a civil sanction because of its location in the Arnold Code, absence of the word “crime” and the limitation of the penalty to a fine. But even if the sanction were to be construed as civil, the sanction could still be so punitive that the penalty should be considered criminal in nature. The court applied the following seven-factor analysis from Mendoza-Martinez and held the nature of the sanction to be civil thus invalidating the §1983 claim:

1. A fine was not found to involve an affirmative disability or restraint.
2. Monetary penalty has not been historically regarded as punishment.
3. The ordinance did not require scienter.
4. While fines further the aim of deterrence, the mere presence of a deterrent purpose was insufficient to render a sanction criminal.
5. The fact that conduct for which the Ordinance’s penalty was imposed may also be criminal was insufficient to render the money penalties criminally punitive.
6. Public safety was a legitimate non-punitive purpose that was rationally assignable to the ordinance. The court seemed to emphasize this factor.
7. The amount of fine was not excessive in relation to the public safety purpose.

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95 Id. at 9.
96 Id. at 14.
97 Id.
98 Id.
100 Kilper, 2009 WL 2208404 at 14.
101 Id. at 15.
102 Id. at 16.
103 Id.
104 Id.
105 Id. at 17.
106 Id.
Similarly in *Mendenhall v. Akron*, the court decided that the Akron Ordinance authorizing the use of ASE was civil and not criminal. The court ascertained that the legislative intent was civil and non-punitive, and also applied the *Mendoza-Martinez* factors analysis and found the ordinance to not be punitive. The court noted as factors the lack of involvement by the criminal justice system such as a police officer or a traffic court, no reporting to the bureau of motor vehicles or to insurance, no awarding of points and no progressive repeat penalty.

**B. Other Revenue-Related Legal Issues**

One revenue-related issue is the contracting of private vendors in operating automated enforcement systems. In *Leonte v. ACS State & Local Solutions*, a California vehicle code required that only a governmental agency, in cooperation with a law enforcement agency, may operate automated enforcement systems. The court held that such a code did not prohibit a governmental agency from hiring a private company to perform functions in connection with the automated enforcement operation so long as the governmental agency retained the right to oversee and control the system functions. Thus the court construed the governmental agency as the ultimate system operator and permitted the contractual arrangement with a private company.

Some ASE contracts are problematic because the revenue generated by the vendor is tied to the number of tickets that are generated. Because vendors have a financial interest in the success of convictions, a court could question the objectivity of the private vendor testimony. In *Municipality of Anchorage v. Baxley*, the court noted that the company that operated the ASE system received seventy percent of the collected fines. The court found that individuals who have a great deal at stake financially, such as the ASE system vendor, possessed questionable objectivity in their testimony. The court further explained that the vendor had a pecuniary interest in not just a particular case but in the growth of the ASE market. However, the courts have not been willing to find bias in parties that are involved in the adjudication of automated enforcement system cases based on financial arguments. In addressing the separation of powers issue, the court in *Gardner v. the City of Cleveland* said civil administrative proceedings are common and neither hearing examiners nor courts have a pecuniary interest in the

107 *Id.*
109 *Id.* at 2.
110 *Id.* at 5.
112 *Id.*
113 *Id.*
115 *Id.* at 897.
116 *Id.*
outcome of the hearing. In *Agomo v. Fenty*, the automated enforcement defendant argued that large sums of money involved in the administration of the system created a biased adjudication process. Similar to the *Garner* court, the *Fenty* court held that the argument that the budgetary obligation to the contractor taints the impartiality of adjudicatory tribunals failed because hearing examiners and judges who make the ultimate liability determinations in automated enforcement cases had no direct connection to the Mayor or the City’s budget. In *Fenty*, the municipality had changed its compensation model from one based on the number of citations issued to one based on a monthly contract. Nonetheless, the defendant made the unsuccessful claim that the distinction in the contracting model did not matter.

Another revenue-related argument against automated enforcement is that fines are excessive, thus violating the Excessive Fines Clause of the Eighth Amendment. In *Gardner*, the amount of the fine increased when the speeding violation exceeded miles over the speed limit or occurred in a school or construction zone. But the *Gardner* court held that the penalties set by the ordinance were proportional to the offense. In *West Valley City v. McDonald*, the court also ruled that the automated enforcement fine was not inherently unfair or clearly excessive. The $60 West Valley fine exceeded the $50 as recommended by Utah’s Uniform Fine Schedule for going 51 miles per hour in a 40 miles per hour zone. In addition to the Eight Amendment issue, the amount of fine is also a factor in the determination of whether automated enforcement citation is construed as civil or criminal in nature as previously discussed.

Some courts have ruled on the procedures available to challenge automated enforcement on the revenue generation theory. In *Structural Components v. City of Charlotte*, the plaintiff alleged that the city maintained a sham safety program whose actual goal was the generation of revenue. The court held that the proper procedures were a non-judicial administrative hearing or a petition for certiorari to the superior court but not a suit for monetary damages of over $10,000 for an alleged violation of due process.

Some opponents of automated enforcement have even tried to challenge it by invoking the Racketeer Influenced and Corrupt Organizations Act (RICO).

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117 *Gardner*, 656 F. Supp. 2d at 759.
118 *Agomo*, 916 A.2d at 194-195.
119 *Agomo*, 916 A.2d at 198.
119 *Agomo*, 916 A.2d at 195 n. 11.
120 *Id*.
121 *Gardner*, 656 F. Supp. 2d at 763.
122 *Gardner*, 656 F. Supp. 2d at 763.
123 *Id*.
125 *Id* at 371 n. 1.
127 *Id* at 170-71.
explained the requirements for RICO as establishing the existence of an enterprise, the defendant’s association with the enterprise, the defendant’s participation in predicate acts of racketeering and the defendant’s actions as a pattern of racketeering activity. The Kilper court did not find evidence that the defendants engaged in conduct beyond those allowed by the city ordinance, engaged in racketeering, or engaged in predicate acts of mail fraud or extortion. In McNeill, the court ruled in favor of a city’s photo radar and said a municipal entity cannot constitute a RICO enterprise.

The use of RICO may seem far-fetched, but it is understandable in light of the organization structure of typical municipalities. According to the International City/County Management Association (ICMA), two popular management models are the council-manager and the mayor-council models. Regardless of the model, the department heads are overseen by the manager, the mayor, or the chief administrative officer. In the case of automated enforcement systems, two separate departments are usually involved: public safety and public works. Public safety, often headed by the chief of police, is responsible for the enforcement of traffic laws and work in conjunction with prosecutors. The director of public works oversees various levels of engineers including traffic engineers who perform signal timing, crash and safety analysis and speed studies. If there is collusion in the case of RLC, then both the traffic engineer who times the signal and the police who works with the RLC vendor would have to be involved. Similarly, if there is collusion in the case of ASE, then the traffic engineer who performs the crash and speed studies and the police are again involved. Thus a revenue generation scheme perpetrated by a municipality would probably have to involve a large number of people composed of the upper levels of management along with two separate departments. Even in cases where the department of transportation contracts directly with automated enforcement system vendor, the police could still be involved with the review of the citations. Thus it is highly unlikely, although not impossible, that such elaborate schemes could be perpetrated by the collective effort of the city management, the traffic engineers who knowingly violate a standard of care in timing signals and the police. Although it would seem that the RICO Act could be applicable to such an elaborate municipal scheme for defrauding citizens, there is no evidence that such a case has ever been proven in the United States.

135 See, e.g., Letter from Keith E. Matthews, Administrative Judge, to Martin O’Malley, Mayor of Baltimore (Nov. 25, 2002), available at http://www.thenewspaper.com/rlc/reports/02-baltimore.asp. Here, the Judge raised the concern that the RLC contract was with the department of transportation and not the police.
C. Empirical Evidence of Revenues

Empirical evidence of the financial effects of automated enforcement systems is one type of objective evidence of revenue generation, regardless of the subjective intent. One study presented evidence that few automated enforcement programs in the United States actually generate revenue and that most programs are either revenue neutral or require subsidy.\textsuperscript{136} The city of San Francisco, for example, was not able to generate sufficient revenue to cover maintenance and operation costs for its automated enforcement devices.\textsuperscript{137} Some automated enforcement programs in California have cited program costs as a contributing factor for their discontinuance.\textsuperscript{138} Even though Arizona’s Governor cited the revenue generation issue as the primary factor for that state’s discontinuance of automated speed enforcement, less than a third of the tickets issued in that state were paid and the revenues collected fell far short of the projections.\textsuperscript{139} In discussing automated enforcement system costs, the focus has been on the revenue generated by the vendor and not on the costs incurred by the agency. But the other side of the equation should also be considered. Thus all the costs incurred by the agency should be computed: costs for reviewing the evidence prior to the issuing of the citation, costs for following up with ignored notices and costs for prosecuting any contested citations.

D. Signal Timing and Revenue Generation

City governments have been accused of shortening yellow times in order to generate more revenue via RLCs since shorter yellow times lead to an increase in violations. A city councilman from Lubbock, Texas, expressed, “Many folks believe this [RLC] is a money grab and then we found out through KCBD Television there's a discrepancy in timing.”\textsuperscript{140} To examine the validity of such accusations, the principle of signal timing is necessary.

One fundamental function of a traffic signal is to assign the shared right-of-way by separating conflicting movements in time.\textsuperscript{141} The crossing conflict refers to movements crossing paths.\textsuperscript{142} The queuing conflict occurs when traffic joins an existing queue.\textsuperscript{143}

\textsuperscript{136} Caroline J. Rodier et al., \textit{Automated Speed Enforcement in the U.S.: A Review of Legal and Institutional Issues} 5 (California PATH 2007).
\textsuperscript{137} Id.
\textsuperscript{138} Id.
\textsuperscript{142} Federal Highway Administration, \textit{Roundabouts: An Informational Guide} 106 (U.S. Dep’t of Transp. 2000). Even though this guide focuses on roundabouts, it does an excellent job of comparing conflict movements between roundabouts and signalized intersections.
\textsuperscript{143} Id.
The diverge conflict occurs when vehicles separate.\textsuperscript{144} And the merge conflict occurs when vehicles merge into the traffic stream.\textsuperscript{145} In a typical four-legged intersection, there are 52 total conflict points: 4 queuing, 8 diverge, 8 merge, 16 vehicle-to-vehicle crossing and 16 vehicle-to-pedestrian crossing.\textsuperscript{146} Any adjustment of the signal timing has the potential to affect all 52 conflict situations.

In signal timing, a phase is defined as the portion of a signal cycle that is allocated to any single combination of one or more traffic movements simultaneously receiving the right-of-way.\textsuperscript{147} When there is a change in the phase, the vehicle clearance interval warns traffic that the green movement is being terminated and a red indication will soon follow.\textsuperscript{148} The vehicle clearance interval consists of the yellow change followed by the optional red clearance interval.\textsuperscript{149} A poorly timed interval could result in a dilemma zone such that a vehicle can neither stop\textsuperscript{150} nor clear the intersection safely.\textsuperscript{151} One way of eliminating the dilemma zone is to have a large enough clearance interval.\textsuperscript{152} Another way is to adjust the speed limit.\textsuperscript{153} The Manual on Uniform Traffic Control Devices (MUTCD) is the model law that has been adopted in some form by all fifty states.\textsuperscript{154} The MUTCD states that the duration of the yellow change interval shall be determined using engineering practices, and it should have a duration of approximately 3 to 6 seconds.\textsuperscript{155} The Institute of Transportation Engineers (ITE) gives guidance for determining the duration of the yellow change and red clearance intervals using a kinematic equation that considers the dilemma zone problem.\textsuperscript{156} However, statutory requirements and state practices vary significantly across various jurisdictions.\textsuperscript{157}

\begin{align*}
Y &= t + \frac{V}{2a+2\gamma g} \quad (1) \\
R &= \frac{w+L}{V} \quad (2)
\end{align*}

Where:

- $Y$ = yellow change interval
- $R$ = red clearance interval

\textsuperscript{144} Id.
\textsuperscript{145} Id.
\textsuperscript{146} Federal Highway Administration, supra note 143, at 30-31, 44-45, 221-222 (U.S. Dep't of Transp. 2004).
\textsuperscript{149} Federal Highway Administration, supra note 142, at 85 (U.S. Dep't of Transp. 2004).
\textsuperscript{150} Id.
\textsuperscript{152} Id.
\textsuperscript{153} Id. However increasing the speed limit could lead to a decrease or an increase in the dilemma zone depending on the particular intersection, because increasing speeds simultaneously decreases the ability to stop while increasing the ability to clear. The relationship between the dilemma zone length and speed limit is nonlinear.
\textsuperscript{155} Federal Highway Administration, supra note 149, at 4D-1, -9 (U.S. Dep't of Transp. 2003).
\textsuperscript{156} Kimberly Eccles et al., Response to Isaac Newton vs. Red Light Cameras: Derivation of Yellow Interval Equation 4 (Institute of Transportation Engineers 2010). ITE recommends the following equations:
There are many other traffic engineering considerations in setting the vehicle clearance interval beyond just the consideration of the dilemma zone. One is to achieve uniformity among similar types of intersections in order to accommodate driver expectations. Another is to reduce unnecessary delay that causes pollution and wasted energy. Unnecessary delay could also lead to driver frustration and result in risky behavior such as the acceptance of short gaps as illustrated by gap acceptance studies. Increasing clearance intervals increases the signal cycle length which affects the coordination of signals. Beyond vehicular considerations, the clearance interval is also important in timing signals for pedestrian safety. As discussed in the MUTCD, the complex trade-offs involved in signal timing show that there is significant engineering judgment involved in the setting of vehicle clearance intervals. Thus city governments should be given freedom in the performance of such a discretionary duty or else they will be over-deterred from adequately performing their duties.

\[ t = \text{perception/reaction time} \]
\[ a = \text{comfortable deceleration rate} \]
\[ V = \text{design speed} \]
\[ G = \text{acceleration of gravity} \]
\[ g = \text{road grade} \]
\[ W = \text{width of intersection} \]
\[ L = \text{length of vehicle} \]

157 Philip J. Tarnoff, *Traffic Signal Clearance Intervals*, Inst. Transp. Eng’r J., April, 2004 at 22-23 (stating that in addition to the ITE technique, other techniques are used including the setting of the yellow duration according to the approach speed and according to the road classification).
158 Id. at 23. A driver could be deceived into expecting a certain clearance interval if such an interval differs from intervals from similar intersections throughout a city.
159 Id. at 27.
160 See, e.g., Michael Kyte et al., *Empirical Models for Estimating Capacity and Delay at Stop-Controlled Intersections in the United States* in Intersection without Signals II, Proceeding of an International Workshop, 335-61 (1991). In other words, unnecessary delays could lead to driver impatience which reduces traffic safety. The authors explained that driver frustration may increase as length of the queue and queue time increase thus reducing critical gaps. This behavior is applicable to signalized intersections even though the workshop focused on un-signalized intersections.
161 See, e.g., Roger P. Roess et al., *Traffic Engineering* 637-38 (4th ed. 2010). Cycle length is a variable that affects the bandwidth which is a measure of the effectiveness of traffic signal coordination. Unnecessary increases in the vehicle clearance interval also increases the overall cycle times. This in turn affects the ability for signals to be coordinated so as to minimize the number of intersection stops in a signal corridor. See also Tarnoff, *supra* note 160, at 22 n. 6. This author also warns of the consequences of a long cycle length such as the impact on progression, intersection capacity and spillback.
162 Mannering et al., *supra* note 152, at 267-68 (4th ed. 2009). Once a pedestrian enters the crosswalk during the walk interval, the signal then needs to guarantee safe crossing of the pedestrian at the 15% walking speed (e.g. 3.5 feet/second) during the “flashing don’t walk” interval plus the clearance interval. Even though it might appear that lengthening the clearance interval might not affect pedestrian safety; in practice, the unnecessary lengthening of the clearance intervals effectively shortens the “flashing don’t walk” interval. A short “flashing don’t walk” interval could potentially panic a pedestrian into thinking that there is not enough time for crossing the intersection. See also Tarnoff, *supra* note 159, at 22 for a discussion on the performance impacts of pedestrian clearance intervals.
163 Federal Highway Administration, *supra* note 149, at 4D-1.
But some might claim that the deference to engineering judgment would make legitimate challenges too costly or infeasible. However, the topic of traffic signal timing and dilemma zone elimination is a subject included in all fundamental transportation engineering textbooks. 164 Most civil engineers would have had that subject in their engineering curriculum. 165 Expertise in the area of traffic signal timing would not be difficult to locate in an attempt to prove an arbitrary shortening of the yellow interval.

One final argument suggested by opponents of RLCs is that RLCs are clearly revenue generators because lengthening of the yellow interval makes RLCs unnecessary. 166 Most traffic engineers would not dispute the fact that lengthening the yellow interval could potentially reduce red light running and even improve intersection safety depending on the particular characteristics of an intersection. 167 However, there is evidence that drivers could habituate to the lengthening of the yellow and continue to run red lights. 168 Thus, it is arguable that the lengthening of the yellow should be the best counter measure in all circumstances. And the use of an RLC could complement the lengthening of the yellow and further reduce red light running. 169

The potential risk and liability of a city for failure to exercise the proper standard of care in timing signals is a strong motive against manipulating signal timing for revenue generation. The public authority is required to exercise reasonable diligence to construct and maintain its streets and highways in safe condition. 170 The defectiveness of traffic signal control could be a fact question in an action against the government agency responsible. 171 For example, in Tadros v. City of Omaha, the court held that the

164 See, e.g., supra note 152.
165 Accreditation Board for Engineering and Technology, Criteria for Accrediting Engineering Programs 10 (2009). The criteria for accrediting civil engineering programs requires that graduates can apply knowledge of four technical areas appropriate to civil engineering. One common area is transportation.
167 See, e.g., James A. Bonneson & Karl H. Zimmerman, Effect of Yellow Interval Timing on Red-Light Violation Frequency at Urban Intersections in Proceedings of the Transportation Research Board Annual Meeting 14 (2004). The authors conclude that an increase of 0.5 to 1.5 seconds in yellow duration, less than a maximum of 5.5 seconds, will decrease the frequency of red-light running by about 50 percent.
168 See, e.g. Id. at 14. This before-after study found that drivers do adapt to the increase in yellow duration. See also Federal Highway Administration, supra note 142, at 86. This guide cautions that lengthening of the yellow could breed disrespect for traffic signals, and says: “Although a study has shown that time of entry into intersections increases with the lengthening of the yellow interval, additional research is needed.”
169 See Richard A. Retting et al., Reducing Red Light Running Through Longer Yellow Signal Timing and Red Light Camera Enforcement: Results of a Field Investigation 9-10 (Ins. Inst. for Highway Safety 2007). The authors state that “the strong effects of red light cameras after having increased the duration of yellow signal timing provides evidence that provision for adequate yellow timing may not eliminate the need for or the potential benefits of red light camera enforcement.” Again, the authors state “even with proper yellow timing in place, red light running remains a problem that can be further reduced through the use of camera enforcement.”
170 6 Am Jur. 2d POR 683 §2.
171 6 Am Jur. 2d POR 683.
details of the pedestrian timing including the intervals corresponding to yellow and all-red were triable facts. In Smith v. City of New York, the court held that the adequacy of the traffic signal timing was a genuine issue of material fact that precluded an award of summary judgment. In Delosovic v. City of New York, the court upheld the jury conclusion that pedestrian timing lacked a reasonable basis. But a city may be protected by statutory immunity in the setting of its traffic signals. In Zank v. Larson, the dispute was over a one second red clearance interval. The Zank court held that the shorter red clearance interval was the result of a balancing of various safety considerations, and the City’s discretion was protected by statutory immunity and merited a grant of summary judgment. However, courts and statutes related to sovereign immunity vary among states. In Tadros, the court held that the setting of the clearance interval was not discretionary as specified in the MUTCD so the city was not protected by immunity. Consequently, it would be difficult to imagine that a city would completely ignore the liability associated with its streets and intersections in order to pursue revenue generation.

Does the fact that a signal was re-timed in conjunction with the deployment of RLC mean that revenue generation was the motivation? RLC has the potential to affect driver behavior, thus the timing of a signal should be checked and re-timed before the deployment of RLC. Thus the fact that the deployment coincided with the signal re-timing means that the city was diligent and should not automatically be considered evidence of a motive of revenue generation. A city manages its liability on the right-of-way it controls by being careful in how it deploys new safety counter-measures. Aside from occasions of RLC deployments, a city could re-time signals on a regular basis (e.g. every few years) depending on the importance of the intersection, and available staffing and budget. As traffic patterns change over time, the re-timing of signals helps to improve not just safety but also efficiency. Thus, the re-timing of signals should generally be viewed as a positive.

Does the fact that a clearance interval was shortened in conjunction with the deployment of RLC mean that revenue generation was the motivation? This is a more interesting question because research suggests that lengthening of the clearance interval could reduce red light running. But the same research also suggests that other counter measures such as RLCs could also be a complementary or an alternative

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175 Zank v. Larson, 552 N.W.2d 719, 721 (Minn. banc 1996).
176 Id. at 722.
177 Tadros, 694 N.W.2d at 186-187, 190.
178 Srinivasa Sunkari, The Benefits of Retiming Traffic Signals, Inst. Transp. Eng’r J., April, 2004 at 28-29. The author reported benefits of between 13 to 94 percent delay reduction after signals were optimized.
179 Bonneson & Zimmerman, supra note 169.
counter-measure depending on the specific conditions of a site.\textsuperscript{180} It is difficult to automatically equate shortening the clearance interval with revenue generation, because the timing of a signal requires engineering judgment in evaluating the particular circumstances of an intersection including the geometrics, the crash history, the traffic demand and the place of the intersection in the overall network. Thus the shortening of a clearance interval might be justified in light of ITE guidance or other engineering considerations.

Any person challenging the signal timing could verify objectively that the application of the ITE equations or other engineering considerations were reasonable. The objective evidence of revenue generation could be found if poor or no engineering judgment was used in shortening of the clearance interval. But neither should the lengthening of a clearance interval be automatically considered safe. ITE equations or other engineering considerations could still indicate that a lengthened interval was still not long enough or that it is too long because drivers habituate and effectively treat the long yellow as an extension of the green indication. Furthermore, the timing of a specific intersection is not performed in isolation but in consideration of network-wide characteristics. Transportation is generally acknowledged as a derived demand.\textsuperscript{181} Thus traffic engineering considers the effectiveness of intersection timing in light of the entire network so that travelers could move efficiently from origins to destinations. In evaluating signal timing, courts should give discretion to cities and traffic engineers so that they could optimize transportation on a network-wide basis. An accusation of revenue generation has to be considered in view of the reasonable engineering reasons for adjusting signal timing.

E. Managing Speeds and Revenue Generation

It is useful to examine the rationale behind the management and enforcement of speed in order to discern a possible motive of revenue generation. The Transportation Research Board lists three principle reasons for managing speed.\textsuperscript{182} First, inappropriate speed choices lead to the imposition of risks and uncompensated costs on others.\textsuperscript{183} Some could argue that drivers who choose to drive too fast for existing road and traffic conditions assume the higher risk of injury and death.\textsuperscript{184} However, such drivers not only increase the risk for themselves but for all other travelers who might be immediately or secondarily affected.\textsuperscript{185} Even if the only person injured is the speeder, such a crash

\textsuperscript{180} Id. at 15.
\textsuperscript{181} Patrick S. McCarthy, \textit{Transportation Economics: Theory and Practice} 251-52 (Blackwell 2001).
\textsuperscript{183} Id. at 79.
\textsuperscript{184} Id. at 79.
\textsuperscript{185} Id. A primary incident could easily produce secondary crashes downstream that are of greater severity than the original incident. See e.g., Carlos Sun & Venkata Chilukuri, \textit{The Use of Dynamic Incident}
imposes medical, and responder and property damage costs that are not completely paid for by the speeder.\textsuperscript{186} The costs associated with speeding are often termed externalities because they are incurred by parties who did not agree to the action causing the cost.\textsuperscript{187} In addition, externalities could appear in the form of greater fuel consumption or increased emissions, neither of which is paid for directly by gas taxes or licensing fees.\textsuperscript{188} A second rationale is that drivers have imperfect information which limits their ability to determine a proper driving speed.\textsuperscript{189} A third rationale is that drivers could misjudge the effect of speeding on crash probability and severity.\textsuperscript{190} Among the three aforementioned rationales, the externalities argument is the best rationale for regulatory intervention.

Speed limits could improve safety via two principal functions. One function is to limit the magnitude of speeds, thus reducing both the probability and the severity of crashes.\textsuperscript{191} Another function is to coordinate traffic so as to produce a more uniform speed distribution.\textsuperscript{192} Reducing the dispersion improves both safety and traffic flow.\textsuperscript{193} But safety is not the only consideration. Speed limits also involve a careful balancing between safety and mobility.\textsuperscript{194}

There are two typical ways of establishing speed limits: by administrative action and by legislative action.\textsuperscript{195} Legislative action establishes nationwide or statewide limits which avoid a patchwork of different speed limits.\textsuperscript{196} Administrative action establishes speed zones on specific sections of roads which result from an engineering study of the section.\textsuperscript{197} An engineering study could include the analysis of prevailing traffic speeds, crash history, traffic volumes, adjacent land use, and road and geometric conditions not apparent to drivers.\textsuperscript{198} Transportation agencies often utilize the 85\textsuperscript{th} percentile speed as a starting point for setting speed limits.\textsuperscript{199} This threshold is chosen because it accounts

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\textit{Progression Curve for Classifying Secondary Accidents in} Proceedings of the Transportation Research Board Annual Meeting \textit{passim} (2006) for a discussion about costs associated with secondary crashes and the importance of traffic incident management.
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\textsuperscript{186} \textit{Id.} at 82.
\textsuperscript{189} \textit{Id.} at 78.
\textsuperscript{190} \textit{Id.}
\textsuperscript{191} \textit{Id.} at 83.
\textsuperscript{192} \textit{Id.} at 41-54, 83.
\textsuperscript{193} \textit{Id.} at 83.
\textsuperscript{194} \textit{Id.} at 186. Transportation, land use and regional economy are closely interconnected. Thus both safety and mobility considerations impact societal costs.
\textsuperscript{195} \textit{Id.} at 82.
\textsuperscript{196} \textit{Id.}
\textsuperscript{197} \textit{Id.}
\textsuperscript{198} \textit{Id.} at 90.
\textsuperscript{199} \textit{Id.} at 91.
for a majority of drivers and is a break point in the cumulative frequency of speeds.\textsuperscript{200} In practice, the enforcement threshold is 5 to 10 miles per hour above posted speed limits.\textsuperscript{201} Thus the most frequent citations are to those who are the most extreme and create the most risk for themselves and others.

In summary, there are many sound rationales for setting and enforcing speed limits. Safety is a primary consideration that relate to various factors including speed magnitude, speed dispersion, road classification, road geometrics and land use characteristics. But mobility is also an important consideration thus making the setting of speed limits a delicate balancing act. In light of the tremendous discretion and engineering judgment required, it appears that it would be difficult to show objectively that the deployment of a specific ASE is primarily to generate revenue.

**F. Automated Speed Enforcement in Charlack, Missouri**

Despite the aforementioned arguments questioning the often levied accusation of revenue generation, there is always a good counter-example. And there is no better poster child for those who make the revenue generation accusation than the City of Charlack, Missouri. Charlack is a city in St. Louis County in the metropolitan St. Louis area. Charlack has a population of 1431 residents\textsuperscript{202} and a land area of 0.26 miles\textsuperscript{203}. Interstate 70 is one of the major east-west freeways in the United States, and Interstate 170 (I-170) is a spur off of Interstate 70. Approximately 0.27 miles of I-170 lie within the City of Charlack.\textsuperscript{204} The City deployed ASE on this stretch of I-170 in early July, 2010.\textsuperscript{205} To the author’s knowledge, there is no subjective evidence that the mayor or the police chief intended for ASE to be a revenue generator. According to the City, the goal of deploying ASE is for traffic safety purposes and specifically to reduce excessive speeding.\textsuperscript{206} However, the problem is with the objective appearance of a revenue generation motive for the system.

The lack of crash evidence, the questionable speed data, the short stretch of highway through Charlack, the vendor contract and the City’s budget are all objective evidence that safety was not the primary motivation for the city’s deployment of an ASE device. According to Missouri Department of Transportation (MoDOT), the I-170 section through Charlack had 61 accidents over a five-year period with no fatal crashes.\textsuperscript{207} MoDOT reported that the number of crashes was around two crashes more than

\textsuperscript{200} Id.
\textsuperscript{201} Id.
\textsuperscript{204} Ken Leiser, \textit{Charlack Puts Speed Camera on I-170}, St. Louis Post-Dispatch, July 13, 2010 at Metro.
\textsuperscript{205} Id.
\textsuperscript{206} City of Charlack, \textit{About the Safety Camera Program} (2010), http://www.cityofcharlack.com/services/municipal-court/speed-camera/about.
\textsuperscript{207} Leiser, \textit{supra} note 208.
However, the classification of a high crash location is not based on a high average number of crashes but on the fact that the number of crashes is unusually high for that type of location. Statistically speaking, a high crash location falls outside the normal bounds of variability among similar locations. As is typical in safety studies, one can examine the severity of crashes and also account for exposure using rate statistics. However, the City did not present such crash evidence: either evidence of a greater severity in crashes or the mean or critical crash rates.

The speed evidence presented by the City also did not point to a high risk location. Charlack claimed that a 60 minute long speed study showed that 117 vehicles traveled at 15 miles over the posted speed of 60 miles per hour and therefore the location was a high risk location. Certainly there is the possibility that the number of violators could be significant, but the City did not show that it was. In other words, the City did not present data in the proper context by showing the hourly flow and the distribution of speeds. I-170 is an urban interstate so the speed limit is set by state statute as sixty miles per hour. Rationales for setting statutory speed limits by roadway class include balancing safety and mobility and providing for uniformity. Implicit in this balancing is that speed limits are typically not set at the 100th percentile but the 85th percentile. Thus the fact that there are vehicles speeding among the I-170 vehicle population is not unusual unless there is statistical evidence that speeding was excessive. There is also a problem of proper inference with the 60 minute sample. In other words, how representative is that 60 minute sample of both directions of traffic, of various times-of-the-day and of days-of-the-week? Assuming arguendo that the 60 minute study is significant only for a short period of time throughout the week, then continuous enforcement would not make much sense.

The fact that only a short 0.27 mile stretch of I-170 through Charlack is enforced suggests that the city’s use of ASE was not part of a coordinated safety initiative for the I-170 corridor. The Charlack decision was not made after a systematic study of the I-170 corridor or of the St. Louis region. Since traffic enforcement on urban Missouri interstates is performed by many local police departments, any corridor safety effort requires the coordination among various municipalities. In fact, the St. Louis County police chief criticized the Charlack deployment for their unilateral decision. Since the Charlack deployment was not a corridor-wide decision, there has to be some localized

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208 Id.
210 Id.
211 Id. at 24-25.
213 Mo. Rev. Stat. §304.010(3) (2009) sets the speed limit for urban interstates at 60 miles per hour.
214 Transportation Research Board, *supra* note 186, at 83, 186.
215 Id. at 91.
216 Leiser, *supra* note 208.
safety reasons such as geometric concerns, sight distance problems or other special conditions. There is a horizontal curve through Charlack on I-170, but it does not appear any more unique than the other horizontal curves on I-170.

Perhaps most startling is the fact that traffic fines account for about 29 percent of Charlack’s overall budget.\textsuperscript{217} Even though smaller municipalities have fewer ways of generating revenue, the high proportion of city budget from traffic fines elevates the importance of such fines. In contrast, larger cities such as Oklahoma City derive only two percent of its budget from traffic fines.\textsuperscript{218}

\textbf{IV. Conclusion}

The accusation of revenue generation should be examined in the proper context and in consideration of the possible legitimate purposes for automated enforcement. The existing literature on traffic safety indicates that speeding and red-light running are national safety concerns. These concerns are more pronounced at certain locations, such as work zones, school zones, high-crash locations and railroad crossings. The literature also indicates that automated enforcement could be effective in improving safety at appropriate locations. Thus, automated enforcement systems should not be ruled out as a possible counter-measure unless there are problems with a particular location or a particular implementation. It is ironic that some seem to suggest that automated enforcement should be ruled out because they are very effective at enforcing existing traffic laws. The fact that effective enforcement could result in additional revenues does not mean that revenue generation is the motivation. Some empirical data suggest that automated enforcement systems are actually not the money makers they are sometimes made out to be. Traffic laws serve important purposes for the protection of the public at large so that people can share the public right-of-way safely and efficiently.

The revenue generation-related challenges to automated enforcement do not appear to have had much legal success so far. However, neither does the local political process offer much hope for success in a case like Charlack. That is because the constituents of Charlack have financial incentive to support their automated enforcement deployment and the mayor. The constituents receive financial benefits funded by travelers from outside Charlack. So the political process at the state level seems to be a better remedy to counter an automated enforcement deployment based on revenue generation. The state legislature could pass legislation pre-empting local ordinances by specifying safeguards against the use of automated enforcement for revenue generation.

State legislatures could adopt the guidelines promoted by federal agencies and uniform law committees in developing automated enforcement system statutes. Such guidelines and uniform laws could strike a balance between protecting public rights by providing for procedural safeguards and promoting public safety by allowing automated enforcement at appropriate locations. The state legislature could involve state agencies such as the department of transportation or the highway patrol in granting approvals for local automated enforcement systems thus coordinating safety efforts statewide.

Even without the adoption of state automated enforcement legislation, there exist some checks and balances to prevent the abuse of automated enforcement for financial gain. Cities still have an incentive to manage its liability relating to its roads and intersections. And typical municipal government structures result in separate departments enforcing the traffic laws and performing traffic engineering. Engineering license boards could also castigate traffic engineers for violating ethics rules such as putting revenue generation ahead of traffic safety. Agencies and organizations involved with highway safety could even coordinate and monitor automated enforcement efforts. For example, St. Louis County police chief spoke out openly against the Charlack deployment.219

Is the problem of revenue generation so severe that citizens everywhere should figuratively storm the streets to tear down camera masts like fans taking down goalposts after a huge football upset? No. It appears the accusations of rampant revenue generation are mostly overblown. There are checks and balances in the existing system, and the political process offers the ability for state legislators to uniformly regulate automated enforcement systems. This is not to say that there is absolutely no potential for abuse. So is Robocop a cash cow? I know how Bart Simpson would answer that question: “Don’t have a cow, man.”

219 Leiser, supra note 208.