

State of the Art Safety Research

by Precision Traffic Systems

Precision Traffic Systems provides state of the art traffic safety research tools. We enable municipalities to analyze dangerous driving behavior prior to implementing changes in law enforcement or intersection engineering. By doing so, Precision Traffic Systems helps customers understand the underlying causes of their intersection safety problems, allowing them to make informed decisions and select the most appropriate methods to effect rapid and lasting improvements in intersection safety.



Red Light Running Epidemic

An epidemic of red light running is making many cities' intersections increasingly unsafe. According to the Insurance Institute for Highway Safety, red light violations contribute to 260,000 crashes and 750 fatalities each year.¹ Fatalities from red light running are increasing at 3 times the rate of other traffic fatalities, and those involved in a red light accident are 150% more likely to be injured. Precision Traffic's first suite of products provides quality local information to support decision making by traffic engineering and law enforcement personnel, helping cities reduce the accidents and injuries associated with red light running.

Local Data Required for Effective Public Education

Cities are faced with two difficult challenges when trying to reduce red light running. The first is that comprehensive *local* data is required to educate the public about the severity of their red light running problem (often quoted national statistics don't have the same effect as data from the intersection next door). The quality of local information can help traffic engineering and law enforcement personnel make better decisions for their community and build support for alternative enforcement solutions, as needed.

Conventional Data Collection Incomplete

The second challenge is that conventional data collection methods don't gather everything that's needed to understand the nature of the problem. Today, data on red light running is typically based on limited hand or video counts, or on citations issued by police at the intersection. With both the hand and video counting methods, samples are typically too small (usually no more than a few hours, or at most 24 hours) to be able to discern any pattern in the violations. Forward looking cities, such as [Richardson, Texas {Traffic Case Study PTS Data}], have discovered that it takes up to 45 days of data collection at an intersection to get a real understanding of the traffic activity and violation patterns.

Officers issuing tickets at an intersection naturally affect driver behavior – visible law enforcement will tend to reduce the number of violations. And, the reductions are only temporary. Red light running quickly returns to pre-enforcement levels when the officers leave. What is required is a sampling method that doesn't affect the outcome. Finally, most analysis of red light running is performed in a vacuum. That is, violation numbers are not examined in the context of the rest of traffic traveling through the intersection. Without this context, it is very difficult to determine the severity of the problem. For example, an intersection with 10 violations (out of 100 cars) may present a greater danger than an intersection with 20 violations (out of 1000 cars).

Precision Traffic Systems Solutions

Safety Research Program

The Safety Research Program provides municipalities with comprehensive and accurate data on their local red light running problem. Precision Traffic Systems automates the collection of both violation and traffic data, twenty-four hours a day, seven days a week. The images, data, reports, and graphs are delivered real time over the Internet and can be viewed from any PC with a browser.

Statistics tracked by Precision Traffic include:

- 1) Traffic and violation volumes by time of day, day of week, and month.
- 2) Traffic and violation speed distribution.
- 3) Average traffic speed by time of day, day of week, and month.
- 4) Length of time into the red cycle that violations occur.
- 5) Percentage of violators accelerating or braking.

Because the system delivers data on a real-time basis, cities can very easily test the effect of changes in enforcement strategies (placing officers at intersections to issue citations), signal timing (altering yellow light timing), or engineering (clearing signal obstructions) on traffic flow and red light running. Additionally,

because the data collection is unobtrusive, the city can be sure it is getting an accurate, untainted picture of the local red light running problem.

The Safety Research Program can combine data from multiple intersections, and even multiple jurisdictions, and share the information via simple Internet access, providing municipalities a detailed analysis capability previously unavailable in traffic safety research.

The following charts are samples of data collected during a Safety Research Program in Richardson, Texas.



Fig. 1 – Violation Speed

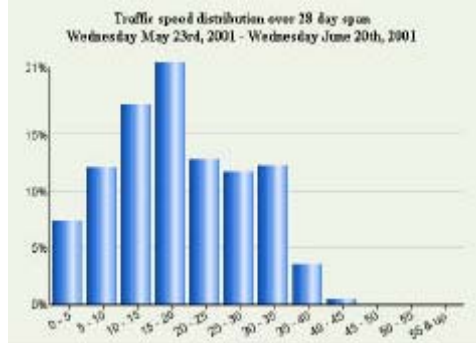


Fig. 2 – Traffic Speed

Nearly half of red light runners at this intersection were speeding, whereas 85% of all traffic was driving obeying the speed limit.

"The Internet-based interface has given us timely access to all violation data in a manner that far exceeds other systems"

Walter Ragsdale, P.E.,
City of Richardson, TX

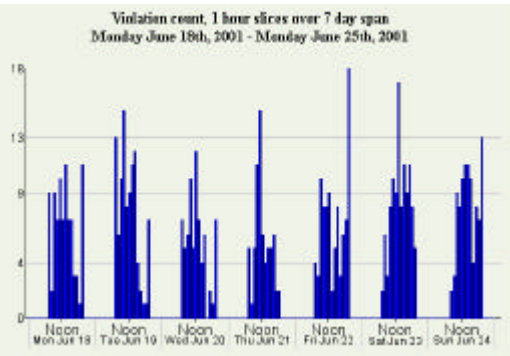


Fig. 3 – Violation Lag

Over 40% of the violations occur in the first half second after the signal turns red.



Fig. 4 – Seven Day Traffic Count Fig.



5 – Seven Day Violation Count

Traffic counts peaked during morning commute hours, while violation counts peaked on weekends.

Violation vehicle acceleration over 28 day span
Monday June 18th, 2001 - Monday June 25th, 2001



Fig. 6 – Violator Acceleration

65% of the vehicles running the light were accelerating.



Fig. 7 - Multi-Lane, Multi-Vehicle Violation Example – Elapsed Time 2.5 Seconds

Precision Traffic Systems – Product and Program Specifications

Data Collection and Access

“Day Zero” Data Analysis – Precision Traffic’s unique ability to unobtrusively collect pre-enforcement (Day Zero) statistics on red light running, combined with concurrent data on law abiding traffic at the same intersection, allow cities to thoroughly understand and represent the nature of their particular red light running problem. Research can be conducted with or without cameras.

Automated Combination and Delivery of Complete Information - All information relating to a specific violation (images, speed, date, time, time of amber, time after red, location) is organized by the system at the intersection before transmission to the Precision Traffic Systems server. Precision Traffic eliminates the typical manual information organization effort required to create a complete set of information for a violation (determining which images go with which violation, typing violation information into a form, etc.).

Combined Violation and Traffic Data – Precision Traffic Systems' information oriented approach delivers statistics on both law-abiding traffic and violations. The result is a clearer understanding of the nature of red light running, better informed decision makers, and more effective solutions.

Multi-Intersection, Multi-Jurisdiction Data Views – Precision Traffic's database architecture and online information delivery allows customers to collect and consolidate data at a rate and scale unique in the automated enforcement industry. Cities can view detailed (up to the minute) data from a single intersection, or consolidated data from multiple intersections in multiple jurisdictions across weeks, months, or years.

Technology

Continuous Automated Upload of Images and Data – A high speed Internet connection to each intersection means faster results. Traffic and violation data, including summary reports, are available immediately, not just at the end of each month. The effects of changes in engineering, signal timing or enforcement can be analyzed in real time.

Internet Browser Access to All Features - Precision Traffic Systems' web based applications provide unparalleled ease of access to any of the systems features – violation images, traffic and violation reports, and much more. Users do not incur any additional cost for client side software, hardware, or additional networking (no VPN required). A PC with an Internet connection is all that's needed.

Integral Database and Application Server – Precision Traffic's technology focus (real time, on line, database-centric architecture) provides users with programs that are designed from the outset to deliver information, not just create tickets. Our approach - designing a database and application server as integral components in the Program offerings - provides users with unequalled oversight and access to information. Violation data and traffic data are collected, stored, and made available to users *automatically*. No separate software license is required to set up and deliver municipality evidence and statistics. Because of our design approach, a huge amount of information can be made available at a fraction of the time and cost of other (for example, standalone wet-film camera) systems.

High Performance Image Capture – Delivering a camera latency of less than .01 seconds, Precision Traffic's proprietary software captures the most violations and delivers the highest percentage of usable images. The Precision Traffic Systems camera is rapid and accurate enough to capture multiple violations during a single signal cycle. Complete image capture is an important tool to help validate collected research data. Without a review of images it is possible that inaccurate violation counts may go undetected. For example multiple cars in parallel, cars following closely, cars stopping past the stop bar but not completely into the intersection, or a funeral procession may all be miscounted if there are no images associated with the data.

Multi-Level System Access Security – System administrators assign passwords, manage login authentication, and define access rights for each user. Access to each researcher's site requires a login and password for the site, and another login and password for individual user access to their specific job function.

Camera System

Single Digital Camera - Precision Traffic Systems uses a single high-resolution (1300 x 1000) digital camera to monitor up to 3 lanes of traffic. Most digital systems use multiple cameras per installation - a camera for each lane for license plate close-ups, and another camera for an intersection overview. The single camera solution delivers several benefits:

- High MTBF (mean time between failure) for the system
- Single pair of images per violation (no separate shot of license plate)
- Simple installation
- Easy to move between locations

Camera System Separate from Computer – Automated enforcement systems need either significant mechanical components (film based systems) or computing power (digital systems) to operate effectively. Most vendors provide camera and operating components in a single, large, heavy enclosure. Precision Traffic Systems delivers the camera enclosure separate from the computer system, providing a larger variety of camera mounting opportunities, pole specification choices, and integration possibilities with existing traffic equipment.

- Camera and Enclosure Weight – under 30 lbs
- Camera and Enclosure Dimensions – 7"x 5"x 18"

- Computer and Enclosure Weight – 70 lbs
- Computer and Enclosure Dimensions – 24" x 24" x 16.5"
- Camera location up to 100' from computer system (unobtrusive installation)

Remote Camera System Management - Via an Internet connection to the camera system, Precision Traffic Systems can perform system maintenance and management remotely, significantly reducing the cost and turnaround time of maintenance. Remote management features include:

- Adjustable speed threshold and image capture locations - Allows remote adjustment of violation capture timing to provide the best data.
- Software updates - Enhancements and fixes can be delivered to the system via the Internet.
- System reset - If a critical system error occurs, the system can be reset remotely.
- Auto-reboot - In the event of a power disruption, the system will automatically reboot to operating status.
- Low Power Requirement - Precision Traffic's camera system draws less than 7 amps at 110 V, eliminating the possibility of affecting the traffic signal circuit and the need for a separate power drop.

1 Insurance Institute for Highway Safety, Status Report, Vol. 37, No. 5, May 4, 2002

Precision Traffic Systems Technical Specifications

Software

- Military-grade, real-time, Linux engine for evidence capture, traffic statistics reporting
- 24 x 7 monitoring and archiving of all traffic activity
- Multi-vehicle, multi-violation image sequencing and evidence construction
- Secure, Internet access to violation images and traffic statistics
- Internet-based traffic reporting system
- Remote system management via Internet
- On-line dynamic upload of high quality digital images
- Wired and wireless Internet connectivity

Remote Camera System Management

- Adjustable speed threshold and image capture locations
- Dynamic software update over Internet or city network.
- Remote system reset
- Remote network reconnect
- Auto-reboot after power disruptions

Camera

- 30-bit true color
- Fully digital progressive scan
- 1300 x 1000 pixel resolution
- Variable lenses (9mm to 75mm) for range of camera locations
- Coverage up to 3 lanes per camera
- Electronic shutter for better reliability (no moving parts = longer lasting system)
- Automatic and remotely adjustable exposure settings
- Remote pan, tilt, and zoom
- Image capture latency of less than .01 sec = less than 1 foot of travel at 70 mph
(This means the location of the vehicle relative to the stop bar can be set very precisely for image capture.)

Camera Enclosure

- Weatherproof and locking
- Dimensions 7"x5"x18"
- Weight 20 lbs (highly portable)
- On board 110v power supply
- On board heating and cooling
- (camera functional from 0° F to +130° F)
- Pole mounted (10 to 30 ft high)

On-site PC

- Pentium processor
- 512MB RAM
- 30 GB Hard Drive
- 110v power supply
- 350W power conditioner

- Thermostatically controlled enclosure fan
- Active and passive disc specific cooling
- System functional from 0° F to +130° F

On-site PC Enclosure

- Custom locking enclosure
- .125" Aluminum – tamper and vandal resistant
- Dimensions 24" x 24" x 16.5"
- Weight 70 lbs
- Ground Mounted or Pole Mounted (0 to 10 ft high)

Environmental Requirements

- Less than 7 amps power at 110V
- Does not affect traffic signal circuit

© 2005 Microwave Data Systems

Provided by:

Western Systems, Inc.
909 SE Everett Mall Way, #A120
Everett, Washington, 98208
Phone: 425-438-1133
Fax: 425-438-1585

www.westernsystemsnetworks.com
info@westernsystemsnetworks.com