

ADDENDUM NUMBER ONE
TO THE EXISTING AUTOMATED TRAFFIC ENFORCEMENT AND CITATION
PROCESSING PILOT PROGRAM AGREEMENT

WHEREAS, Nestor Traffic Systems, Inc. a Delaware corporation having a place of business at 400 Massasoit Avenue, Suite 200, East Providence, Rhode Island, 02914 ("Nestor"), and the City of Cerritos, California, a public corporation, having an address of Post Office Box 3130, Cerritos, California, 90703 (the "City" and together with Nestor, the "Parties" and each singularly a "Party") entered into a Traffic Signal Violation Video-Monitoring System Agreement dated the 11th day of July 2002 (the "Agreement"); and

WHEREAS, the City desires to modify the Agreement to address retention periods for citation data.

NOW, THEREFORE, the Parties hereby agree to enter into this Addendum Number one ("Addendum One") dated this 11th day of September, 2003.

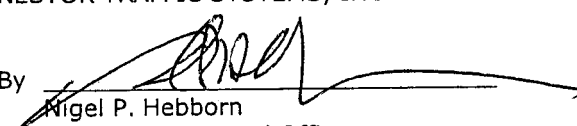
BE IT FURTHER RESOLVED that in consideration of the mutual covenants between the Parties, it is agreed as follows:

1. All Citation Information or copies, duplicates, or back-ups thereof (including, but not limited to, violator information and video evidence) ("Data") contained in or created as a result of red light citations that do not meet initial citation issuance criteria, and are subsequently discarded, shall be purged from the electronic database, and destroyed within sixty (60) days from the date of discard.
2. All Data contained in or created as a result of red light citations that result in an initial citation issuance and are later dismissed, either by a reviewing officer, or by the court (unless pending appeal), shall be destroyed within sixty (60) days from the date of dismissal.
3. All Data contained in or created as a result of red light citations in which the citation is paid, bail is forfeited, or after trial or appeal, shall be retained for a period of three years from the date of issuance and then destroyed not later than six (6) months of the end of such three-year period.
4. The method of destruction of all citation Data shall be in a manner such that it cannot be reproduced or identified in any form, including but not limited to physical or electronic form. Said method of destruction of all Data and documentation of destruction shall be approved by and provided to the City or its authorized representative, upon reasonable notice, and the City shall have the right, during normal business hours, to examine and audit any and all records, books, papers, and documents related to the maintenance or destruction of Data by Nestor to the extent City believes necessary to assure verification and compliance thereof.

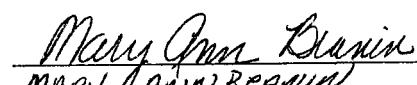
IN WITNESS WHEREOF, the Parties hereto have set their hands by their duly authorized representatives as of the day and year first above written.

NESTOR TRAFFIC SYSTEMS, INC.

By

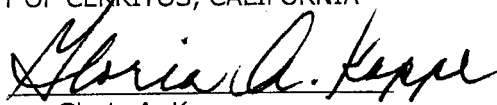

Nigel P. Hebborn
EVP-Chief Financial Officer

Attest
Name
Title



MARY ANN BRANIN
Executive Secretary

CITY OF CERRITOS, CALIFORNIA

By


Gloria A. Kappe
Mayor

Attest


Josephine Triggs
City Clerk

Nestor Agreement
No Addendum 2

AGREEMENT

This Agreement governed by the Laws of the State of California made and entered into this 11th day of July, 2002 by and between the CITY OF CERRITOS, a public corporation, hereinafter "CITY" and NESTOR TRAFFIC SYSTEMS, INC. hereinafter "NESTOR".

RECITALS

- A. Traffic accidents caused by motorists failing to stop at red indications at signalized intersections throughout the CITY.
- B. Red light violations result in significant personal and property damage.
- C. Recent State of California law allows local jurisdictions to implement automated traffic signal enforcement programs to reduce personal and property damage.
- D. The CITY intends to implement an automated traffic signal enforcement and citation processing system pilot program at four locations within the CITY ("Project").
- E. The CITY wishes to engage a qualified Consultant to develop, construct, and assist in the operation and maintenance of the Project.
- F. The CITY shall operate the Project and have ultimate control over how it is administrated.

NOW, THEREFORE, in consideration of the performance by the parties of the covenants and conditions herein contained, the parties hereto agree as follows:

ARTICLE 1 RESPONSIBILITIES OF NESTOR

1.1 The NESTOR shall perform any and all work reasonably necessary for the completion of the tasks and services set forth in Attachment "A" - NESTOR's Proposal, Attachment "B" - the CITY's Request for Proposal (excluding sample agreement), and Attachment "C" - Description of Services.

1.2 The NESTOR represents that all tasks and services required herein will be performed by the NESTOR, or personnel under its supervision, and that all personnel engaged in such work shall be fully qualified and shall be authorized and permitted under applicable State and local law to perform such tasks and services.

1.3 The NESTOR shall not subcontract any portion of the required work herein without prior written approval of the CITY, which approval shall not be unreasonably withheld.

1.4 The NESTOR shall work closely with the Deputy City Manager/Public Works or his/her designated representative, who shall be the liaison representative of the CITY. NESTOR shall comply with CITY directives and regulations regarding the operation of the Project consistent with the contract documents.

1.5 The NESTOR designates as its representative for supervision of the tasks and services required by this Agreement, the following Project Manager: Ms. Julie Dixon. Said representative shall not be replaced by the NESTOR without prior written notice to the CITY.

1.6 The NESTOR shall comply with all applicable Federal, State, and local laws, ordinances and regulations.

1.7 The NESTOR shall make no change in the character or extent of the work required by this Agreement, except as may be authorized in writing by the CITY. Such supplemental authorization shall set forth the specific changes of work to be performed and any related extension of time and/or adjustment of fee to be paid to the NESTOR by the CITY.

1.8 The CITY understands and agrees that the traffic signal violation detection system ("System") will be owned by NESTOR (or its designees).

1.9 If and to the extent the CITY has or obtains during the Term (as hereinafter defined) custody, possession or control over any of the Equipment or Software to be supplied or installed by NESTOR in accordance with Attachment "C", the CITY agrees:

1.9.1 such Software, if manufactured by NESTOR, is supplied under the license set forth in a license agreement ("License") concurrently entered into by NESTOR and the CITY (Attachment "D");

1.9.2 such Software, if manufactured by third parties, is supplied under third-party licenses accompanying the Software, which licenses the CITY acknowledges received; and

1.9.3) such Equipment is supplied under the lease agreement ("Lease") concurrently entered into by NESTOR and the CITY (Attachment "E").

ARTICLE 2 TERM

2.1 The initial term of this Agreement, with license entered into concurrently herewith, and the Lease shall begin upon the date of this Agreement and shall continue until the third (3rd) anniversary of the installation date of the System (the "Initial Term"). Thereafter, this Agreement, the License and the Lease shall continue in effect on a month-to-month basis, unless either Party shall have provided 90 days prior written notice to the other Party of such Party's intention to terminate this Agreement, the License and the Lease (the "Renewal Term" and together

with the Initial Term, the Term). The "Installation Date" shall be the latest date that the System becomes installed and operational at any of the intersections described in Section 1.1 or 1.2 of Attachment "C".

**ARTICLE 3
BASIC SERVICES OF NESTOR**

3.1 The NESTOR shall provide to the CITY, any and all services in accordance with Attachments "A", "B", "C", "D" and "E" and as set forth in this Agreement.

3.2 Priority of Contract Documents. The contract documents consist of and shall be given the following priority: 1) Agreement, including Attachment "C"; 2) the Lease; 3) the License; 4) CITY's Request for Proposals (excluding sample agreement); and 5) the Proposal submitted by NESTOR.

**ARTICLE 4
RESPONSIBILITIES OF THE CITY**

4.1 The CITY shall provide full information regarding its requirements as outlined in this Agreement and its Attachments for the Services, and shall furnish without charge to the NESTOR, any and all information, data, reports, maps, and records which are available within the offices of the CITY and are necessary for the NESTOR to provide and perform the tasks and services set forth herein. NESTOR shall be entitled to rely upon their accuracy and completeness.

4.2 The CITY shall designate the Deputy City Manager/Public Works as its authorized representative.

4.3 The CITY shall provide NESTOR with such "as built" drawings in electronic format as NESTOR, in NESTOR's sole discretion, may require for the preparation of drawings for the installation of the System and shall process NESTOR's engineering drawings without unusual or unreasonable cost or delay.

4.4 The CITY shall diligently prosecute each citation and defend any challenge in any court to the use of the System or validity of its results and/or the use of the U.S. Mails to deliver the citation. NESTOR may, at its own expense, participate in any proceeding challenging the use of the System or validity of its results and/or use of the U.S. Mails to deliver the citation. The parties acknowledge that although NESTOR is supplying the system to the CITY, it is the CITY's responsibility to implement, monitor, supervise, run and oversee the System and Project.

4.5 The CITY shall provide all electrical connections and power required by the System.

4.6 The CITY shall provide NESTOR with advance written notice of any modifications proposed to intersections, including traffic signal operations, after installation of a System. In the event of any such intersection modification, the CITY shall pay the costs reasonably incurred by NESTOR to adapt the affected Installed Approach(es) to make such Installed Approach(es)

compatible therewith. Notwithstanding the above, NESTOR makes no guarantee that it will be able to make any such adaptation. In addition, NESTOR does not, and will not, make recommendations or otherwise manage the configuration or operation of the intersection traffic light system.

4.7 The CITY shall provide such assistance as may be required for NESTOR to obtain any information and approvals from the Court(s), other governmental instrumentalities, or entities necessary or desirable for NESTOR to provide the Services.

4.8 During the term of this Agreement, except as expressly permitted by this Agreement, the CITY shall not use the System, or allow the System's use by a third party, without the prior written permission of NESTOR.

ARTICLE 5 COMPENSATION

5.1 The CITY shall pay NESTOR a citation fee equal to \$77.75 (the "Per Citation Fee") for each citation issued. As used herein, "Issued Citation" means a citation mailed to the registered owner of the vehicle photographed and/or videotaped running a red light after the CITY or its designated law enforcement agency reviews the information provided by NESTOR to determine that the CITY should proceed with the citation.

5.2 Notwithstanding Section 5.1 above, from and after the issuance of the first citation issued pursuant to the System, the CITY shall pay NESTOR a monthly fee equal to the greater of (A) the product of (a) the Per Citation Fee, multiplied by (b) the number of Issued Citations in such month or (B) the Monthly Minimum. ~~The Monthly Minimum shall equal \$3,986.50 times the number of Installed Approaches monitored during the month in question (partial months shall be pro rated). "Installed Approach" shall mean a direction of travel for any individual access road or street to any intersection that is monitored by the System.~~

5.3 Except for any termination and cancellation fee and other charges owed pursuant to Sections 7.1, 7.2, 7.3 or 7.4, payment of all fees and other charges owed pursuant to this Agreement is due within (30) days after invoice date. Invoices will be sent to the CITY at:

CITY OF CERRITOS
P.O. Box 3130
Cerritos, California 90703
Attention: Hal Arbogast

ARTICLE 6 LIMITED WARRANTY AND LIMITATION ON DAMAGES

6.1 NESTOR warrants that the System's functionality will conform in all material respects to the description of the System set forth on Attachment "C".

6.2 EXCEPT AS SPECIFICALLY PROVIDED HEREIN IN SECTION 6.1, THE SERVICES AND SYSTEM ARE BEING PROVIDED "AS-IS" WITHOUT WARRANTY OF ANY KIND AND NESTOR HEREBY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO THE SERVICES AND SYSTEM, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF TITLE, NON-INFRINGEMENT, NON-INTERFERENCE WITH ENJOYMENT, ACCURACY, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE AND ALL WARRANTIES IMPLIED FROM ANY COURSE OF DEALING OR USAGE OF TRADE. CITY ACKNOWLEDGES THAT EXCEPT AS EXPRESSLY PROVIDED HEREIN, NO OTHER WARRANTIES HAVE BEEN MADE TO CITY BY OR ON BEHALF OF NESTOR OR OTHERWISE FORM THE BASIS FOR THE BARGAIN BETWEEN THE PARTIES.

6.3 The CITY acknowledges and agrees that:

6.3.1 The System may not detect every red light violation;

6.3.2 Since the System may flag as a violation conduct that is in fact not a violation, the output of the System will require review, analysis and approval by personnel appropriately qualified and authorized by the CITY under applicable law prior to the issuance of any citation;

6.3.3 The System has no control over, and relies on the proper functioning of CITY supplied equipment for signal light changes;

6.3.4 The warranty set forth in section 6.1 is not intended to, and shall not be construed as a warranty of the level of performance of the System;

6.3.5 The proper functioning of the System requires the CITY compliance with the Systems' operating instructions, which it hereby agrees to do; and

6.3.6 The CITY shall be responsible for the configuration and/or operation of all intersection traffic light systems and NESTOR shall have no liability or obligations with respect thereto.

ARTICLE 7

~~TERMINATION OR SUSPENSION OF AGREEMENT~~

7.1 This Agreement may be terminated by either party if the other party defaults in the performance of any material obligation under this Agreement and such default continues for more than thirty (30) days after notice thereof to the defaulting party.

7.2 The CITY may terminate this Agreement upon (A) notice of default if NESTOR breaches any material provisions of this Agreement, including cessation of services as a result of a bankruptcy filing, and does not cure such breach within thirty (30) days' notice, or (B) determination by a Court of competent jurisdiction that the Program or System is illegal or unenforceable. If this

Agreement is terminated pursuant to Section (A) of this paragraph, NESTOR shall be paid for the services provided as stated in Section 7.4. If this Agreement is terminated pursuant to Section (B) of this Section, NESTOR shall be paid for the services provided at 50 percent of the termination and cancellation fee calculated pursuant to Section 7.5.

7.3 NESTOR's right to terminate the Agreement upon notice for default is limited to the following reasons: (A) if the CITY breaches any material provision of the Agreement or the Specifications for the Project and does not cure such breach within thirty (30) days' notice. If this Agreement is terminated pursuant to this paragraph, NESTOR shall be paid for the services provided as stated in Section 7.5.

7.4 In the event of the discontinuation, suspension or termination of this Agreement pursuant to paragraph 7.2, NESTOR shall be paid for the reasonable value of any unpaid and earned services provided up to the time of such discontinuation, suspension or termination and no other expenses or costs shall be due or owing or paid. Lost profits or overhead will not be paid if the Agreement is terminated. Upon receiving notice of discontinuation, suspension or termination, NESTOR shall exercise all reasonable controls to terminate all activity and mitigate further costs to the CITY.

7.4.1 NESTOR shall keep adequate records to substantiate the cost claimed and shall provide copies of original records.

7.4.2 Prior to receiving the pro-rata payments upon discontinuation, suspension or termination, NESTOR shall deliver all reports, data or other materials to the CITY.

~~7.5~~ If this Agreement is terminated due to the CITY's default pursuant to Section 7.3, the termination and cancellation fee shall equal the product of (a) the Monthly Minimum as calculated in Section 5.2 for the month before the Agreement is terminated, multiplied by (b) the Remaining Term. The Remaining Term shall equal the number of months in the Initial Term of this Agreement minus the number of whole months from the Installation Date to the date of termination.. If this Agreement is terminated pursuant to Section 7.2(B), the termination and cancellation fee shall be 50 percent of the calculation in the prior sentence. This fee shall be paid within sixty (60) days from the termination of the Agreement assuming an invoice is submitted within fifteen (15) days from such termination. If no invoice is received, this fee shall be paid within ninety (90) days from the Agreement's termination.

7.6 Upon termination or expiration of this Agreement, the CITY shall immediately cease using the Software and equipment in its possession, custody or control and shall, at NESTOR's direction, either (A) immediately return to NESTOR its Equipment and immediately deliver to NESTOR or irretrievably destroy, or cause to be so delivered or destroyed, any and all copies of Software in the CITY's possession, custody or control and within thirty (30) days deliver to NESTOR a certificate thereof or (B) allow NESTOR access to the System(s) on which such Software is loaded and grant permission to NESTOR to remove such Equipment and Software.

**ARTICLE 8
EMPLOYMENT PRACTICES OF NESTOR**

8.1 In providing for the performance of the tasks and services required by this Agreement, NESTOR shall not discriminate against any employee or applicant for employment on the basis of race, religion, color, sex, disability or national origin.

8.2 NESTOR shall take affirmative actions to ensure that applicants are employed and employees are treated during their employment without regard to race, religion, color, sex, disability or national origin.

8.3 Affirmative actions shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

These provisions shall be included in any subcontract for the services provided under this Agreement awarded by NESTOR.

**ARTICLE 9
CONFLICTS OF INTEREST**

9.1 No officer or employee of the CITY shall have any interest, direct or indirect, in this Agreement, the Project or the proceeds thereof during his/her tenure with the CITY or for a period of one (1) year thereafter.

9.2 NESTOR hereby covenants that it has, at the time of the execution of this Agreement, no interest, direct or indirect, which would conflict in any manner or degree with the performance of services required under this Agreement, nor shall it acquire any such interest at any time during such performance of services. NESTOR further covenants that during the performance of this Agreement, no person having any such interest shall be employed by NESTOR.

9.3 The CITY and NESTOR hereby covenant and agree that to their best knowledge, no member of the City Council, nor any officer or employee of the CITY has any interest, whether contractual, non-contractual, financial or otherwise direct or indirect, in this Agreement or in the ~~business of subcontracting work required under this Agreement;~~ and that if any such interest comes to the attention of either party at any time during the performance of this Agreement, a full and complete disclosure of such information shall be made in writing to the other party, even if such interest would not be considered a conflict of interest under applicable laws and the Parties shall take such action, if any, as required by law to eliminate the conflict of interest.

9.4 NESTOR hereby covenants that it has not employed or retained any person or company to solicit or secure this Agreement; and that it has not paid or agreed to pay any person or company any fee, commission, percentage, brokerage fee, gift, or other compensation, contingent upon or resulting from the award of making of this Agreement. For breach or violation of this

covenant, the CITY shall have the right to annul this Agreement without liability, or in its discretion to deduct from the contract price, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift, or contingent fee.

ARTICLE 10 INSURANCE

10.1 NESTOR's attention is directed to the insurance requirements below. It is highly recommended that NESTOR confer with its respective insurance carriers or brokers to determine in advance of proposal submission the availability of insurance certificates and endorsements as prescribed and provided herein. If NESTOR fails to comply strictly with the insurance requirements, then the Agreement may be terminated in accordance with Section 7.1.

NESTOR shall procure and maintain for the duration of the Agreement insurance against claims for injuries to persons or damages to property that may arise from or in connection with NESTOR's performance. The cost of such insurance shall be borne by NESTOR. Failure to procure and/or maintain the proper insurance is grounds for termination of this Agreement.

10.2 Minimum Scope of Insurance shall be at least as broad as:

10.2.1 Occurrence-based Broad Form Comprehensive General Liability.

10.2.2 Worker's Compensation insurance as required by the Labor Code of the State of California and Employer's Liability Insurance.

10.2.3 Hold harmless and additional insured endorsements.

10.3 NESTOR shall maintain limits no less than:

10.3.1 General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance with a general aggregate limit is used, either the general aggregate limit shall apply separately to this Agreement, or NESTOR shall receive written permission by the CITY for variation.

10.3.2 Workers' Compensation and Employers Liability: Workers' Compensation limits as required by the Labor Code of the State of California and Employers Liability.

10.4 Any deductibles or self-insured retentions must be declared to the CITY. At the option of the CITY, either; the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the CITY, its officials, officers, employees and agents; or NESTOR shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expense.

10.5 The policies are to contain, or be endorsed to contain, the following provisions:

10.5.1 General Liability: The CITY, its officials, officers, employees and agents are to be covered as additional insureds. The coverage shall contain no special limitations on the scope of protection afforded to the CITY, its officials, officers, employees or agents.

10.5.2 The NESTOR's insurance coverage shall be primary insurance as respects the CITY, its officials, officers, employees and agents. Any insurance or self-insurance maintained by the CITY, its officials, officers, employees or agents shall be in excess of the NESTOR's insurance and shall not contribute with it.

10.5.3 Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the CITY, its officials, officers, employees or agents.

10.5.4 Coverage shall state that the CITY's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

10.6 Workers' Compensation and Employers Liability Coverage: The insurer shall agree to waive all rights of subrogation against the CITY, its officers, officials, employees and agents for losses.

10.7 All Coverages: Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the CITY.

10.8 Acceptability of Insurers: Insurance is to be placed with insurers with a Best's rating of no less than A:VII.

10.9 Verification of Coverage: NESTOR shall furnish the CITY with certificates of insurance and with original endorsements effecting coverage required by this clause. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The CITY reserves the right to require complete, certified copies of all required policies at any time.

ARTICLE 11 INDEMNITY

11.1 NESTOR agrees to indemnify, defend, and hold harmless the CITY from any claim of damages (including the payment of reasonable attorney's fees and costs) by a third party arising solely from (A) a finding that the System infringes any validly issued United States patent or (B) NESTOR's negligence or intentional act, provided that liability is not attributable to (a) any act or omission set forth in Section 11.2 or (b) any third-party software or other third-party products used

with, required for use of, or supplied under their own names with or as part of the System that are installed at NESTOR's, and not the CITY's request. If, as a final result of any litigation of which NESTOR is obligated to indemnify the CITY, the use of the System by CITY is prevented, in whole or in part, by an injunction, NESTOR's sole obligation to the CITY as a result of such injunction shall be, at NESTOR's option, either to (A) replace such part of the system as has been enjoined, or (B) procure a license for NESTOR or the CITY to use a replacement part or system, or (C) remove the enjoined part or system at no additional cost to the CITY or (D) terminate this Agreement. Any replacement part or system should have equal functionality, usage and reliability as the system originally installed. If not, the CITY can terminate this Agreement at no additional cost to the CITY. Any payment to NESTOR owed upon termination pursuant to this paragraph shall be as provided in paragraph 7.4.

11.2 The CITY will indemnify, defend, and hold harmless NESTOR, its officers, directors, shareholders, agents, and employees from any claim of damages (including the payment of reasonable attorneys' fees) by a third party arising from or related to (A) NESTOR's compliance with any designs, specifications, or instructions of the CITY, (B) any modification of the System made by the CITY, (C) the negligence or intentional act of CITY, (D) failure of the CITY to use the System in the manner described by NESTOR, (E) the failure of any hardware, software or equipment of any kind used by, in or on behalf of the CITY (other than that supplied by NESTOR) to function properly, (F) the review and analysis of the System data output by CITY personnel for citation preparation, (G) the CITY's use and/or administration of the System and/or any traffic signal, and (H) an allegation regarding the permissibility under the law of the use of photo citation or the System.

11.3 The rights of a Party seeking indemnification under this Article shall be conditioned upon (A) the indemnified Party notifying the indemnifying Party promptly upon receipt of the claim or action for which indemnification is sought (but the failure to do so shall not relieve the indemnifying Party of its obligations under this Article unless and then only to the extent it is materially prejudiced thereby) and (B) the indemnified Party's full cooperation with the indemnifying Party in the settlement or defense of such claim or action at no cost to the indemnifying Party (except for reasonable out-of-pocket traveling expenses). Such cooperation shall include, but not be limited to, the CITY providing access for, and permission to, NESTOR for the purpose of the replacement of such party or parts of System as NESTOR may deem necessary or desirable. An indemnified Party may participate in the defense of any indemnified matter through counsel of its own choice and at its own expense provided that the indemnifying Party shall remain in, and responsible for, control of the matter. This Article states the entire liability and obligation and the exclusive remedy of the Parties with respect to any actions or claims (A) of alleged infringement relating to or arising out of the subject matter of this Agreement or (B) otherwise the subject of this paragraph.

ARTICLE 12 MISCELLANEOUS

12.1 The execution of this Agreement by the parties hereto does not constitute an authorization to proceed with the work specified in said Agreement. The Deputy City Manager/Public Works of the CITY shall separately authorize NESTOR to proceed on each phase, as listed in Attachment "C", and each such phase shall be completed within the time limits mutually agreed upon by the parties as set forth in this Agreement. NESTOR shall have no claims for compensation for services on all or part of any phase of work upon which the Deputy City Manager/Public Works has not authorized NESTOR to proceed.

12.2 NESTOR is an independent contractor and is not an employee of the CITY:

12.3 Except as specifically provided in this Agreement, this Agreement may not be assigned by either Party without the express written consent of the other Party, except that Nestor may assign or otherwise encumber this Agreement (a) for the purpose of financing the costs of the System contemplated to be implemented hereby, (b) to any entity owned or controlled by Nestor or (c) to any third party that acquires all or substantially all of Nestor's business relating to the System. Consent to an assignment of this Agreement shall be expressly conditioned upon the assignee's execution of such documents as reasonably required by CITY including, without limitation, any and all documents reasonably deemed necessary by CITY to provide for said assignee's assumption of all of the obligations of NESTOR hereunder.

12.4 The CITY acknowledges and agrees that (A) NESTOR's work products are instruments of professional services, ~~(B) all work product including reports, investigations, data, and computations prepared under this Agreement and all Software and know-how used or supplied pursuant to this Agreement shall be and remain the property of the NESTOR (or its licensors), whether or not the services for which they are prepared are completed. Nevertheless, all citations prepared by the System (whether or not issued) and all data contained therein (collectively, the "Citation Information") are and shall be, as between NESTOR and the CITY, the property of the CITY. The CITY hereby grants to NESTOR a perpetual, fully paid-up, royalty free, world wide, non-exclusive right and license to (A) copy and use the Citation Information internally to NESTOR for any purpose whatsoever and (B) copy, use, publish, disseminate and otherwise disclose the Citation Information so long as such disclosure is in aggregated form and does not disclose to third parties the identities of any individual who received a citation. In the event NESTOR's materials are misplaced, lost, destroyed, stolen, or misused by third parties, NESTOR's sole and exclusive remedy against the CITY shall be the replacement of the materials. Nothing in this Section shall limit, hinder or alter the CITY's obligation under a public records request.~~

12.5 All disputes, claims, or other matters in question arising out of or relating to this Agreement or the breach thereof shall be decided by means of legal action provided by California law, and any and all attorneys' fees and associated costs arising from such legal action shall be paid to the successful party.

12.6 NESTOR shall begin work upon receipt of the "Notice to Proceed" and shall perform the services required of it by this Agreement.

12.7 Records of NESTOR's expenses pertaining to the performance of additional services under this Agreement, and records of accounts between the CITY and NESTOR shall be kept on a generally recognized accounting basis and shall be available to the CITY or its authorized representative at mutually convenient times for inspection.

12.8 No waiver of any breach of this Agreement shall be held to be a waiver of any other subsequent breach. All remedies afforded in this Agreement shall be taken and construed as cumulative, that is, in addition to every other remedy provided therein or by law. The failure of either Party to enforce at any time any of the provisions of this Agreement, or to require at any time performance by the other Party of any of the provisions, therefore, shall in no way be construed to be a waiver of such provisions, nor in anyway affect the validity of this Agreement or any part thereof or the right of any Party to thereafter enforce each and every such provision.

12.9 Whenever it shall be necessary for either party to serve notice on the other respecting this Agreement, such notice shall be served by personal delivery or by certified mail addressed at the following address, unless and until different addresses may be furnished in writing by either party to the other, and such notice shall be deemed to have been served within seventy-two (72) hours after the same has been deposited in a United States Post Office by certified mail or has been delivered personally, and shall be valid and sufficient service of notice for all purposes:

CITY OF CERRITOS
P.O. Box 3130
Cerritos, California 90703
Attention: Hal Arbogast

NESTOR TRAFFIC SYSTEMS, INC.

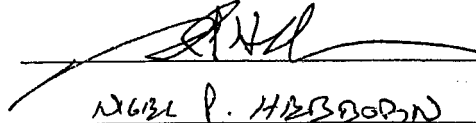
400 Massasoit Avenue, Suite 200
East Providence, RI 02914
Attention: President

12.10 This Agreement may be modified or amended from time to time by the Parties, ~~provided however, that no modification or amendment hereto shall be effective~~ unless it is stated in writing, specifically refers to this Agreement and is executed on behalf of both Parties hereto.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the date first above written.

CITY OF CERRITOS

NESTOR TRAFFIC SYSTEMS, INC.



_____

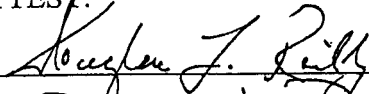
MAYOR

NGR P. HERRON
Executive Vice President – CFO

ATTEST:

ATTEST:



CITY CLERK

Douglas L. Reilly
Executive Vice President – CEO

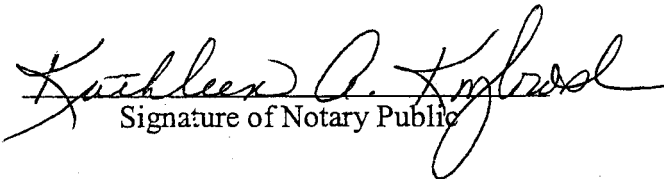
Contract awarded by the Cerritos City Council on September 10, 2001


State of Rhode Island
County of Providence

On June 27, 2002 before me, Kathleen A. Kozlowski, Notary Public, personally appeared Nigel Hebborn, CFO, and Douglas Reilly, COO.

Personally known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same in their authorized capacities, and that by their signatures on the instrument the persons, or the entity upon behalf of which the persons acted, executed the instrument.

WITNESS hand and official seal.


Signature of Notary Public


Date

ATTACHMENT "A"



July 18, 2001

Hal Arbogast, Assistant City Engineer
City of Cerritos
Engineering Division
18125 Bloomfield Avenue
Cerritos, CA 90703

Dear Mr. Arbogast:

Nestor Traffic Systems is pleased to propose its CrossingGuard® video-based traffic light enforcement and intersection safety system in response to Cerritos' request for proposals for an automated enforcement system for red light violators.

CrossingGuard is a non-invasive, video-based traffic monitoring system for automated enforcement of red light violations and for red-light-running collision avoidance. CrossingGuard uses video cameras and advanced computer-vision technology to monitor intersections and detect violations, to record violation images, to transmit digital images electronically in real-time, and to issue citations.

CrossingGuard's digital video imaging technology not only provides the most efficient process for violation data capture, real-time communication and review, it also captures the most effective evidence of what happened at the intersection. With the ability to view an "instant replay" of the incident, law enforcement officials have the information and tools they need to ensure that citations are issued only when they are warranted. ~~This is the basis for maintaining program credibility and the public's confidence in the fairness of the program and the integrity of the City's goals for safer intersections.~~

CrossingGuard also offers an optional, unique intersection-safety feature. Through its advanced video detection technology, *CrossingGuard can predict red light violations before they happen*, and signal the traffic controller to briefly extend the red light for cross traffic *to reduce the chances of a collision*. Studies have shown that more than 70% of red-light violations occur within 1.5 seconds of the light change. Predicting such violations and invoking an all-red extension can help to prevent broadside collisions.

Additionally, CrossingGuard offers advanced ITS (Intelligent Transportation System) functionality for improved intersection safety. Its video cameras can be used to help officials assess and respond to traffic or emergency situations at any CrossingGuard-equipped intersection. ~~CrossingGuard's video and computer vision technology provides a platform for future capabilities for traffic data collection and automated incident alert functionality.~~

NTS offers CrossingGuard as a full turnkey system including a comprehensive suite of services to meet Cerritos' automated enforcement program requirements.

This binder contains both CrossingGuard program information as well as a specific response to the requirements outlined in the City's Request for Proposals. The binder includes:

- | | |
|---|---|
| CrossingGuard Overview | - general information on CrossingGuard operation and features |
| CrossingGuard Program Description | - general information on the program support available from NTS |
| Sample Reports, Citations & Images | - samples of CrossingGuard management reports, captured violation images and image sequences and sample citations |
| CrossingGuard Program Team | - information on NTS and its program subcontractors, including qualifications and experience |
| Additional Program Information | - additional information on future CrossingGuard functionality and other NTS products |
| Proposal | - a specific response to the City's requirements as stated in the RFP, along with CrossingGuard program fees, any completed RFP forms and a sample CrossingGuard contract |
| Financial & Insurance Information | - company financials and insurance coverage |
| Equipment Specifications | - technical specifications on CrossingGuard components |

NTS will be happy to answer any questions you may have as you review the enclosed information. We would appreciate the opportunity to discuss any issues or program elements in any detail as you move forward with your vendor selection process. NTS looks forward to the opportunity to provide CrossingGuard for the City of Cerritos.

Yours truly,



Rob Kerr
Vice President
West Coast
Nestor Traffic Systems, Inc.

CROSSING GUARD

A PROGRAM FOR AUTOMATED ENFORCEMENT OF RED LIGHT VIOLATIONS AND TRAFFIC SAFETY AT INTERSECTIONS

PROGRAM DESCRIPTION



***Nestor
Traffic
Systems***

10145 Pacific Heights Blvd.,
Suite 510
San Diego, CA 92121

Tel: 858-657-9390
Fax: 858-657-9392
Web: www.nestor.com

With the exception of Section 6 of this document, "Proposal, Fees and Sample Contract", all other sections of this document contain general information on the CrossingGuard system and program services and are intended as an overview and guide only. By supplying these document sections with, or by making reference to them in a response ("Response") to any request for proposals ("RFP"), Nestor Traffic Systems does not intend to make them, and ~~these sections shall not be deemed, a part of any contract which is~~ contemplated by such RFP or Response. Any such reference is intended as exemplary only. Nothing in these document sections shall constitute a warranty or guarantee of any kind.

EXECUTIVE SUMMARY

This document describes the CrossingGuard® system and services available from Nestor Traffic Systems (NTS). CrossingGuard is a non-invasive, video-based traffic monitoring system for automated enforcement of red light violations and for red light running collision avoidance. CrossingGuard offers a sophisticated suite of features to make intersections smarter and safer.

CrossingGuard monitors intersections to automatically detect violations, record violation evidence as digital video images, transmit these images electronically in real-time and provide electronic processing support for timely citation issuance. CrossingGuard's above-ground components eliminate the need to install or maintain in-ground loops; its pan-tilt-zoom video cameras capture full video sequences of violations to dramatically increase the number of captured violations and its real-time transmission of the violation video eliminates time delays and risks associated with wet-film violation picture retrieval and developing.

CrossingGuard uses digital video imaging technology to provide the most accurate and convincing evidence of red light violations and the most efficient process for violation data capture, real-time communication and review. By providing an "instant replay" of full-motion video violation sequences, CrossingGuard gives the police, the motorist and the courts an accurate, unbiased look at what happened in the intersection. This ensures enforcement decisions that are well-informed and fair; it results in fewer contested citations; and, if a case ever does go to court, it provides dramatic evidence that is hard to refute, as the multiple camera views show what happened in each fraction of a second, video frame by video frame.

Additionally, CrossingGuard offers an optional, unique intersection-safety feature. Through its advanced video detection technology, *CrossingGuard can predict red light violations before they happen*, and signal the traffic controller to briefly extend the all-red light for cross traffic *to reduce the chances of a collision*. Studies have

shown that more than 70% of red-light violations occur within 1.5 seconds of the light change. Predicting such violations and invoking an all-red extension can help to prevent broadside collisions with cross traffic.

Because CrossingGuard uses video-based vehicle detection and tracking, without in-ground loops, no roadway needs to be torn up or damaged to install or maintain the system. The equipment is installed in easily maintained, secure, aboveground structures. CrossingGuard's non-invasive installation protects the client's investment in its roadways now and into the future.

CrossingGuard transmits violation video and data from each intersection over a high-speed communications network to provide real-time, secure access to violation data. The Nestor Communications Network (NCN) makes use of a scalable fiber-optic backbone that provides cost-effective, secure, high-speed two-way communications from each intersection to any other CrossingGuard workstation on the network, including CrossingGuard PC server equipment at the citation processing center, walk-in centers, police department and/or traffic management facilities.

Through built-in and customizable management reports, CrossingGuard enables the client to measure the effectiveness of the program at the designated intersections in improving traffic safety, traffic law compliance and roadway usage.

More than just a red light camera system, CrossingGuard offers additional capabilities for collision avoidance that enhance intersection safety. CrossingGuard provides a platform for future functionality that will address other safety and traffic flow needs to further improve traveler and pedestrian safety while reducing travel time, fuel consumption and pollution levels.

NTS offers CrossingGuard as a full turnkey system, including site planning and installation, user training and support, citation preparation and processing services, equipment maintenance and support, public education and expert testimony. NTS tailors this

CrossingGuard Program Description

comprehensive suite of services to meet the client's requirements for automated traffic signal enforcement.

This document includes:

- NTS corporate profile,
- description of the CrossingGuard system, highlighting its market-leading features,
- description of CrossingGuard's program scope of services,

- NTS qualifications and experience,
- additional program information

Through its CrossingGuard program for automated enforcement and intersection safety, NTS can help bring greater levels of traffic signal compliance to roadway intersections, improving safety and quality of life for residents and visitors to our client states, towns, cities and counties.

TABLE OF CONTENTS

| | |
|---|------------|
| EXECUTIVE SUMMARY | III |
| TABLE OF CONTENTS | V |
| FIGURES..... | VI |
| TABLES..... | VI |
| 1 CROSSINGGUARD OVERVIEW..... | 1-1 |
| 1.A INTRODUCTION | 1-1 |
| 1.B STANDARD CROSSINGGUARD ENFORCEMENT FEATURES | 1-4 |
| 1.C OPTIONAL CROSSINGGUARD FEATURE: COLLISION AVOIDANCE..... | 1-15 |
| 2 CROSSINGGUARD PROGRAM DESCRIPTION..... | 2-1 |
| 2.A A TURNKEY PROGRAM FOR THE CLIENT | 2-1 |
| 2.B QUALITY FIRST | 2-1 |
| 2.C PROGRAM STAFF AND ORGANIZATION..... | 2-1 |
| 2.D PROGRAM PLANNING..... | 2-3 |
| 2.E SITE SELECTION AND ANALYSIS..... | 2-3 |
| 2.F CONSTRUCTION AND INSTALLATION PLAN & SCHEDULE..... | 2-5 |
| 2.G EQUIPMENT AND INSTALLATION | 2-6 |
| 2.H EQUIPMENT MAINTENANCE..... | 2-12 |
| 2.I USER TRAINING | 2-14 |
| 2.J CITATION PROCESSING..... | 2-15 |
| 2.K PAYMENT PROCESSING (SERVICE OPTIONAL)..... | 2-20 |
| 2.L CUSTOMER SUPPORT | 2-22 |
| 2.M COURT SUPPORT..... | 2-23 |
| 2.N PROGRAM DATA, MANAGEMENT REPORTS AND RECORD-KEEPING | 2-23 |
| 2.O PUBLIC EDUCATION AND COMMUNITY OUTREACH PROGRAM..... | 2-25 |
| 2.P PROGRAM PARTICIPATION BY CLIENT..... | 2-28 |
| 2.Q SAMPLE PROJECT SCHEDULE..... | 2-29 |
| 3 SAMPLE REPORTS, CITATIONS & IMAGES | 3-1 |
| 3.A REPORTS..... | 3-1 |
| 3.B EXAMPLE IMAGES AND SAMPLE CITATIONS..... | 3-12 |
| 4 CROSSINGGUARD PROGRAM TEAM | 4-1 |
| 4.A CORPORATE OVERVIEW..... | 4-1 |
| 4.B NTS ORGANIZATIONAL CHART | 4-1 |
| 4.C CONTACT INFORMATION..... | 4-2 |
| 4.D PROJECT PRIME AND SUBCONTRACTORS | 4-2 |
| 4.E NTS QUALIFICATIONS AND EXPERIENCE | 4-2 |
| 4.F EDS CLIENT REFERENCES..... | 4-8 |
| 4.G TURBO DATA SYSTEMS, INC. (TDS) | 4-10 |
| 4.H LOCAL CONTRACTOR CROSSTOWN ELECTRICAL AND DATA, INC..... | 4-13 |
| 5 ADDITIONAL PROGRAM INFORMATION..... | 5-1 |
| 5.A RED LIGHT RUNNING: PROBLEMS AND SOLUTIONS | 5-1 |
| 5.B NESTOR TRAFFIC SYSTEMS RESEARCH: PIONEERING TECHNOLOGY AND APPLICATIONS | 5-2 |
| 6 PROPOSAL, FEES & SAMPLE CONTRACT | 6-1 |
| 6.A RESPONSE TO CLIENT MINIMUM REQUIREMENTS | 6-1 |

| | | |
|-----|---|-----|
| 6.B | PROGRAM FEES | 6-6 |
| 6.C | SAMPLE CROSSINGGUARD CONTRACT | 6-8 |
| 7 | FINANCIAL & INSURANCE INFORMATION | 7-1 |
| 7.A | COMPANY FINANCIALS | 1 |
| 7.B | PROOF OF INSURABILITY | 1 |
| 8 | EQUIPMENT SPECIFICATIONS | 8-1 |

FIGURES

| | | |
|-----------|---|------|
| Figure 1 | Software-Controlled Close-Up Camera Puts Camera Pixels on the Violating Vehicle | 1-5 |
| Figure 2 | Illustration of CrossingGuard Fast-Tracking PTZ Camera Capturing Front & Rear Vehicle Images..... | 1-6 |
| Figure 3 | Software Controlled Close-Up Camera Captures Clear Images..... | 1-7 |
| Figure 4 | Video Sequence Provides Multiple Opportunities To Capture Clearly Readable License Plate Images.. | 1-8 |
| Figure 5 | Image of Vehicle License Plates Captured under Dark Night Conditions | 1-9 |
| Figure 6 | Operator Images Captured by CrossingGuard | 1-10 |
| Figure 7 | Qwest Backbone for Nestor Communications Network | 1-11 |
| Figure 8 | CrossingGuard Predicts Red Light Runner..... | 1-16 |
| Figure 9 | Project Organization - Division of Responsibilities | 2-2 |
| Figure 10 | CrossingGuard RoadSide Station Ruggedized PC..... | 2-7 |
| Figure 11 | Hall Effect Sensor Schematic. | 2-7 |
| Figure 12 | Diamond SmartScan III/B Camera/Dome Tracking System..... | 2-8 |
| Figure 13 | CrossingGuard Camera Installed at Intersection in Vienna, VA | 2-9 |
| Figure 14 | CrossingGuard Camera Configuration Monitoring a Single Direction of Travel | 2-11 |
| Figure 15 | Four Cameras Monitoring Two Directions Providing Front, Rear and Close-up Views..... | 2-11 |
| Figure 16 | Citation Processing Steps | 2-16 |
| Figure 17 | Roadway Signs Help Inform the Public of the Use of Automated Enforcement | 2-25 |
| Figure 18 | Citation Inquiry Screen | 3-8 |
| Figure 19 | Citation Inquiry by License Screen..... | 3-10 |
| Figure 20 | Screen for Entering/Displaying Notes Related to Violator Processing..... | 3-11 |
| Figure 21 | Sample Daytime Violation Images | 3-13 |
| Figure 22 | Daytime Violation - Sample of Images from Video Sequence | 3-14 |
| Figure 23 | Sample Daytime Citation..... | 3-15 |
| Figure 24 | Video Clip Shows Clear Images, Including the Driver..... | 3-16 |
| Figure 25 | Sample Daytime Citation..... | 3-17 |
| Figure 26 | Nighttime Violation - Sample of Images from Violation Video Sequence | 3-18 |
| Figure 27 | Sample Nighttime Citation..... | 3-19 |
| Figure 28 | Multiple Camera Views Justify Motorists Violating Light for Emergency Vehicle | 3-20 |
| Figure 29 | Multiple Video Frames Justify Motorist Violating Light to Prevent Rear End Collision..... | 3-21 |
| Figure 30 | CrossingGuard Captures Multiple Violations | 3-22 |
| Figure 31 | NTS Traffic Systems Organization Chart | 4-1 |
| Figure 32 | Vehicle Presence Detection at Crossing..... | 5-3 |
| Figure 33 | Grade Crossing Signalization Monitoring | 5-3 |

TABLES

| | | |
|---------|--|------|
| Table 1 | Summary of CrossingGuard Current Features..... | 1-18 |
| Table 2 | Project Planning Tasks..... | 2-3 |
| Table 3 | Agenda for CrossingGuard Program Launch Meeting | 2-4 |
| Table 4 | Objectives of Pre-Installation Site Visit..... | 2-5 |
| Table 5 | CrossingGuard Installation Tasks at the Intersection | 2-10 |
| Table 6 | Intersection Setup Tasks at Central Facility..... | 2-10 |
| Table 7 | Tasks for Setting Up Citation Processing Services..... | 2-19 |

CrossingGuard Program Descripti

Table 8 Public Education Campaign Tasks..... 2-28
Table 9 Draft Project Schedule 2-30
Table 10 TDS Client References..... 4-13



1 CROSSINGGUARD OVERVIEW

1.A INTRODUCTION

Red light violations are one of the leading causes of serious motor-vehicle injury accidents in the United States. To deal with this growing problem, cities are introducing red light camera automated enforcement programs with the goal of reducing the number of accidents at signalized intersections where there is a history of red light running. Since better enforcement of traffic laws at intersections can be expected to discourage violations and reduce the number of accidents, the goal of such programs is to introduce a red light camera system to deliver round-the-clock automated enforcement.

CrossingGuard can improve public safety through a reduction in red light violations and a reduction in accidents due to red light violations.

NTS can meet and exceed client program objectives in deterring red light running violations, reducing traffic collisions caused by such violations and improving traffic safety through its CrossingGuard automated red light enforcement program. CrossingGuard will bring an unprecedented level of effectiveness to the enforcement of the client's traffic signal violation laws. This increased enforcement rate, together with a public education campaign that promotes this message to the motorists in the area, can promote a substantial decrease in red light violations.

CrossingGuard delivers powerful enforcement and safety features through innovative advanced video technology. CrossingGuard's patented digital video technology provides red light violation detection without requiring in-ground loops, and provides the additional capability of collision avoidance. CrossingGuard's use of software-controlled pan-tilt-zoom cameras and digital video technology for

violation recording provide the strongest possible evidence of the violation: ***a full-context video sequence of the entire violation.*** This unique approach to documenting red light violations results in a higher rate of citationable violations and a lower rate of contested citations, thus reducing the impact on courts and/or adjudication bodies. These factors combine to produce a higher rate of motorist compliance, resulting in fewer future violations and increased intersection safety.

Where public concerns exist over the use of automated enforcement systems, they almost always touch on the issue of ***fairness.*** By deploying CrossingGuard, the client will demonstrate its commitment to protecting the public's interests not only in terms of safety, but also in terms of program integrity. By capturing the whole story of what happened at the intersection, CrossingGuard protects the public by ensuring that unwarranted citations are never issued.

With CrossingGuard's "instant replay" video evidence, officers get the full context of what happened, enabling them to make the best-informed decision possible. The innocent public is well-protected because video is an objective eyewitness of what really happened at the intersection.

CrossingGuard's video record of the violation

CrossingGuard's "instant replay" video evidence is an objective eyewitness of what happened at the intersection.

captures exactly what happened at the intersection when the violation occurred. If there are extenuating circumstances that would exonerate the motorist, the "instant replay" video shows it.

For example, CrossingGuard has captured video of a vehicle entering the intersection after the light turned red to avoid being struck from behind by a tailgating vehicle skidding out of control. Instead of basing a decision on 2 or 3 isolated photo snapshots, an officer was able to view the entire digital video sequence of the violation. The video showed that the vehicle violated the light to avoid a collision, and no ticket was issued. With CrossingGuard's video evidence, officers get the full context of what happened, enabling them to make the best-informed decisions possible.

CrossingGuard's full video sequences and multiple color images of the violation provide a better evidentiary record of the violation. This translates into important benefits to communities.

When CrossingGuard captures a violation, the high frame capture-rate of video (20-30 pictures per second) ensures that the necessary vehicle, plate and (if required) operator-identifying information can be clearly found in at least some of the video images. This results in a higher rate of captured violations.

CrossingGuard increases public confidence in the integrity of a red light camera program. CrossingGuard records what happened at an intersection, not just a few incriminating photographs.

thus providing more consistent enforcement. CrossingGuard is designed to provide a level of effectiveness that will improve overall intersection safety.

Finally, CrossingGuard's "instant replay" video record of the violation clearly substantiates the basis for any issued ticket. The full violation video sequence provides solid evidence of the violation and the offender, so that the citation can be successfully defended in court. In the face of such evidence, motorists seldom challenge the ticket. This greatly reduces the impact of the program on the court system.

CrossingGuard Video Evidence

See what really happened!

→ **Better Enforcement Decisions**

Highest rate of citationable violations

→ **Total Enforcement**

Discourages contested tickets

→ **Reduces Court Impact**

Shows client's commitment to fairness

→ **Video is an objective "eyewitness"**

Over time, all of these factors combine to produce a higher rate of motorist compliance, resulting in fewer future violations and increased intersection safety.

CrossingGuard's digital video images are transmitted directly from the roadside to the City's facility or other authorized agency. Violation data is delivered securely, in real-time, with no added servicing expense or delay in retrieving evidence. Within a few minutes after a violation occurs, the complete digital violation video record is transmitted and available for review. Such quick delivery to the secure central facility provides protection against tampering, since all evidence then resides at the central facility. With CrossingGuard's use of digital video and high-speed communications, it is possible to issue tickets the same day as the violation.

Because it does not use in-ground loops for vehicle detection, **CrossingGuard can be installed and maintained without any damage to roadway surfaces** and with minimal lane closures. All of the CrossingGuard equipment installed at an intersection is deployed in secure, aboveground, easy-to-maintain enclosures. Cameras are mounted at heights and locations that prevent tampering or unauthorized access.

Furthermore, **CrossingGuard can be installed at many intersections where it is not possible to deploy a loop-based red light camera system** because of difficulty in locating space for the loops.

At many intersections where loops are already installed for intersection control, the location of these loops conflicts with the location needed for the installation of the additional loops dedicated to the red light camera system. CrossingGuard's video detection eliminates any such conflict with existing loop installations, making it possible to install CrossingGuard in many places where traditional red light camera systems cannot even be considered.

CrossingGuard uses NTSC video cameras, avoiding the need for costly high-resolution or digital video cameras. CrossingGuard employs industry standard video image compression, ensuring that video data is readily accessible to commonly available video/computing hardware and software. Through its use of widely accepted industry standard PC hardware and operating system components, CrossingGuard leverages the investments of PC industry giants' core computing and networking capabilities. This ties CrossingGuard to the ever-increasing PC price performance curve, delivering more and more functionality for the same or comparable costs.

CrossingGuard's advanced video detection technology was developed originally in the context of military applications, to detect and track targets. NTS has adapted and extended this technology to enable it to detect and track vehicles approaching an intersection. Through this uniquely effective video technology, CrossingGuard is more than just a red light camera system, offering additional "ITS" (Intelligent Transportation System) functionality that directly improves intersection safety and traffic management.

Red light violations are a risk to the public health and safety because they can cause accidents in which motorists and pedestrians can be injured or killed. Even the most effective automated enforcement system can only discourage red light violations; it cannot, in fact, prevent them. Unlike any other automated enforcement system, CrossingGuard can help to reduce the risk of a red light running collision. In so doing, CrossingGuard makes a powerful and unique contribution to the client's objective of improving intersection safety.

Using its advanced ITS-based video processing technology, CrossingGuard tracks vehicles approaching the intersection like targets in the camera's field of view. By detecting vehicle locations and measuring vehicle speeds, CrossingGuard applies simple laws of physics to predict red light violations before they happen.

Unlike systems that just capture violations, CrossingGuard can help to reduce the risk of a collision through its collision avoidance feature.

When CrossingGuard determines that a vehicle is about to run the light, it signals the traffic controller to briefly extend the red light for cross traffic to reduce the chances of a collision. The signal timing in the direction of the violator does not change, and CrossingGuard records the violation so that a citation can be issued.

CrossingGuard's collision avoidance functionality is an optional feature. If signal timing or other traffic-flow parameters should not be disturbed, this feature can be deactivated at each approach and at any time of day. Traffic engineers have the flexibility to select the intersections for which the function is implemented and the amount of red extension given each direction.

CrossingGuard's ability to detect vehicle location and track vehicle movements in the camera field of view has prompted the development of a future capability to collect an array of traffic data from each monitored intersection. This information will assist in identifying traffic patterns or trends to help enhance overall traffic flow and safety at the intersection.

The video traffic sensor and PC infrastructure that CrossingGuard brings to an intersection is a versatile platform on which such future functionality can be delivered to address the needs of improved traffic flow and safety. By deploying CrossingGuard, the client takes an important step along the path of realizing national transportation objectives for increased safety, reduced road congestion and reduced vehicle emission levels.

1.B STANDARD CROSSINGGUARD ENFORCEMENT FEATURES

CrossingGuard can automatically detect a vehicle that is violating the red light, measure and record the time of violation, the preceding programmed amber-phase time, the elapsed time between the onset of the red light and the time of violation, and the speed of the vehicle when it enters the intersection. This information is captured by CrossingGuard equipment at the intersection, transmitted in real-time to a central monitoring facility and stored in a violation database. Authorized personnel can review these violations, imposing user-defined criteria for minimum required vehicle speed or time-since-onset-of-red light to be used in filtering the events to identify violations for citation issuance.

Using a video camera mounted to give an overview of the intersection and its immediate approach, CrossingGuard detects and continuously tracks the location of each vehicle approaching the intersection. The video detection capability of CrossingGuard works day and night, under a variety of weather and visibility conditions, to provide 24-hour, 7-day-a-week monitoring.

To minimize operator error, all equipment operation is automated to the maximum extent possible and under software control. This includes automatic aperture setting on the cameras and automatic camera positioning using pre-defined camera "pre-shot" Pan-Tilt-Zoom and focus.

CrossingGuard records two different kinds of image information to document a violation. The first is a color video sequence captured from one or more video cameras positioned to give an overview of the intersection, including a record of the vehicle at the

"The video-based CrossingGuard system, with its ability to stop the action, to back it up and then replay it, plus the benefit of additional camera views, offers us the significant advantage of being able to see what is actually happening. We believe that this added level of fairness and objectivity that is afforded by a video-based system is a significant factor in our low rate of contested violations (less than 1%), and in the overwhelming support that we receive from our community."

**Chief Daniel V. Boring
Vienna Police Department
Vienna, VA**

stop line and a view of the controlling signal light. The second is a series of high-resolution color images from a camera that is automatically controlled by CrossingGuard's advanced vehicle-tracking software to provide close-ups of the front and/or rear view of the vehicle, the vehicle license plate(s) and the operator if it's a legislative requirement of the city or town.

1.B.1 VIDEO CLIP OF THE VIOLATION

For each violation, CrossingGuard records one or more full intersection video sequences showing the vehicle as it approaches the intersection, crosses the violation line and proceeds on through the intersection. This information is captured as a digital video file.

CrossingGuard's video ensures that whoever is responsible for deciding whether to issue a citation has the best possible information on which to base their judgment. By capturing a digital video sequence of the violation, CrossingGuard can provide the full context of the violation, thus providing law enforcement an opportunity to see an "instant replay" of the entire violation. This replay helps in determining whether there were mitigating

circumstances that should affect the decision of whether or not to issue a citation. The video helps produce better decisions and ensure a commitment to fairness that the public can trust.

The video frames shown in Figure 29 (see page 3-21) show a situation in which a station wagon, initially slowing down to come to a stop at an intersection, accelerated at the last minute to run the light. The video clearly shows that the driver was trying to avoid being struck from behind by a van following too closely. On the basis of viewing the video sequence, the police officer decided against issuing a ticket to the station wagon. Similarly, Figure 28 (see page 3-20) shows selected frames from a video of a red light violation in which the vehicles "jumped the light" in order to get out of the way of an



Figure 1 Software-Controlled Close-Up Camera Puts Camera Pixels on the Violating Vehicle

Day (above) and Night (below) Violation Video Samples: Pictures in lefthand column are video frames from rear tracking camera. Pictures in righthand column taken by software-controlled Close-Up camera, zooming in on the violating vehicle.

approaching ambulance. Once again, CrossingGuard's video evidence showed the complete picture of what happened at the intersection, clearly establishing that these

a system that objectively records what really happened at the intersection. Use of video is a sign of the client's commitment to fairness in dealing with the driving public. This creates credibility and builds support for the automated enforcement program and its goals.

CrossingGuard – a commitment to fairness that the public can trust.

"violations" did not warrant a ticket.

The video sequence plays the role of an impartial eyewitness to the violation, and becomes part of the electronic information permanently captured to document the violation. It is available to be shown to the driver as well as to the court in the case of any subsequent challenge to the citation. The availability of a video sequence to document the full context of a violation helps ensure that the system is recognized as being fair, helping to build and maintain public support for the program. The public appreciates that their driving actions are not being judged on the basis of 1-2 snapshots, but that the client has implemented

1.B.2 HIGH-RESOLUTION COLOR IMAGES OF LICENSE PLATE AND DRIVER

CrossingGuard uses information from its "Tracking Camera" to control its "Violation Close-Up Camera", a fast-moving pan-tilt-zoom camera that automatically captures clear close-ups of the red light violating vehicles. CrossingGuard uses advanced target tracking and real-time camera control software to achieve this capability. Figure 2 illustrates how it works.

When CrossingGuard detects a vehicle about to enter the intersection against the red light, it automatically issues a command to the violation-close-up camera to adjust its pan and tilt to "acquire" the target vehicle and zoom in on the violator as it enters the intersection. For states with front license plates, CrossingGuard uses this view to record front license plate images. As the vehicle exits the intersection, CrossingGuard commands the camera to flip around

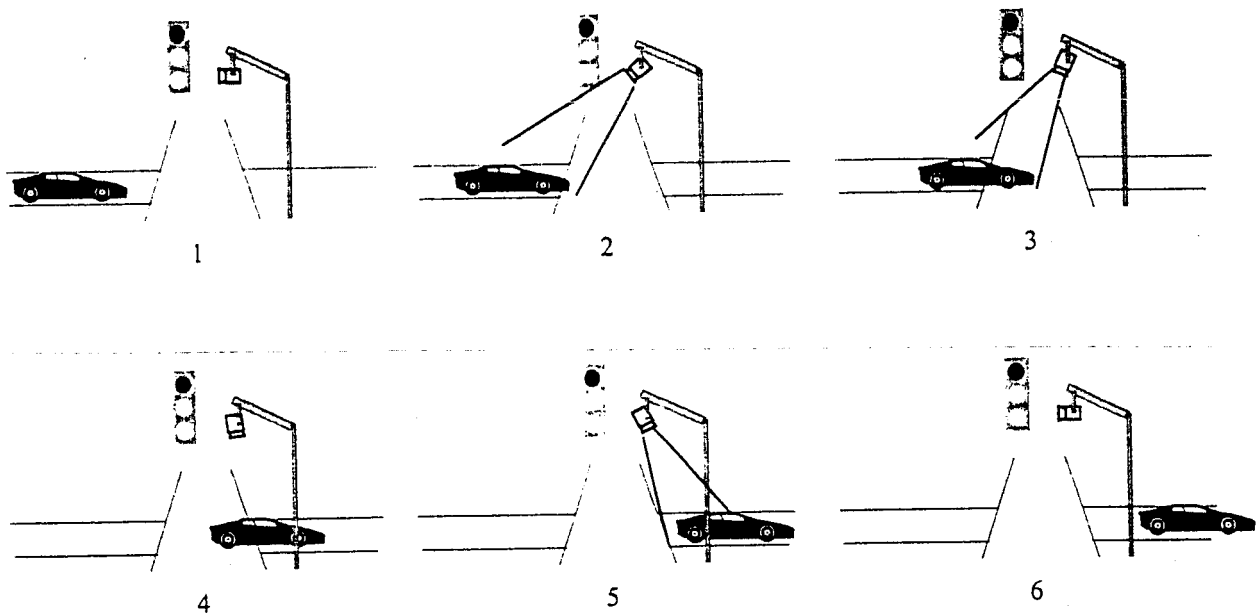


Figure 2 Illustration of CrossingGuard Fast-Tracking PTZ Camera Capturing Front & Rear Vehicle Images

- (1) Vehicle approaches intersection. (2-3) Fast PTZ camera automatically moves to zoom in on vehicle and begin optional capture of multiple video images of front license plate. (4) As vehicle moves through intersection, camera moves to acquire target as it recedes. (5) Camera captures multiple rear plate video images. (6) Camera repositions for next violation.

and image the violating vehicle from the rear. It acquires the target and records close-up images of the rear plate of the vehicle as it drives away. For states with only rear-mounted plates, the software can be configured to control the camera to only record close-up images of the rear of the vehicle.

The fast-tracking Violation Close-Up camera is responsible for capturing *multiple images of the vehicle*, producing a number of high-resolution color frames that clearly show the vehicle, driver and license plate. Up to 30 color frames are captured by the Violation Close-Up camera, in addition to the overview video sequences recorded from the Tracking and Signal View Cameras. This extensive violation video record provides comprehensive evidence of the event, including the verifiable vehicle identification needed to issue a citation. This provides a wealth of information that documents the violation and from which vehicle-identifying

information can be extracted. This easily meets and exceeds even the most stringent of client requirements for capturing violation images.

CrossingGuard's use of video to capture multiple images of the violation, and its ability to control a camera to capture close-up violation views, virtually guarantee that the information needed to document the violation is visible in the captured footage. See Figure 5, page 1-9. By controlling the camera to put the camera pixels on the violating vehicle itself, CrossingGuard ensures that the recorded video images have the necessary resolution to provide clear, readable license plate and driver images without the need for any image enhancement techniques. This ensures the complete integrity of the information against any suggestions that the images have been altered or manipulated in order to "fill in the blanks" to add missing information. Figure 3, shows captured license plate images in day and night.

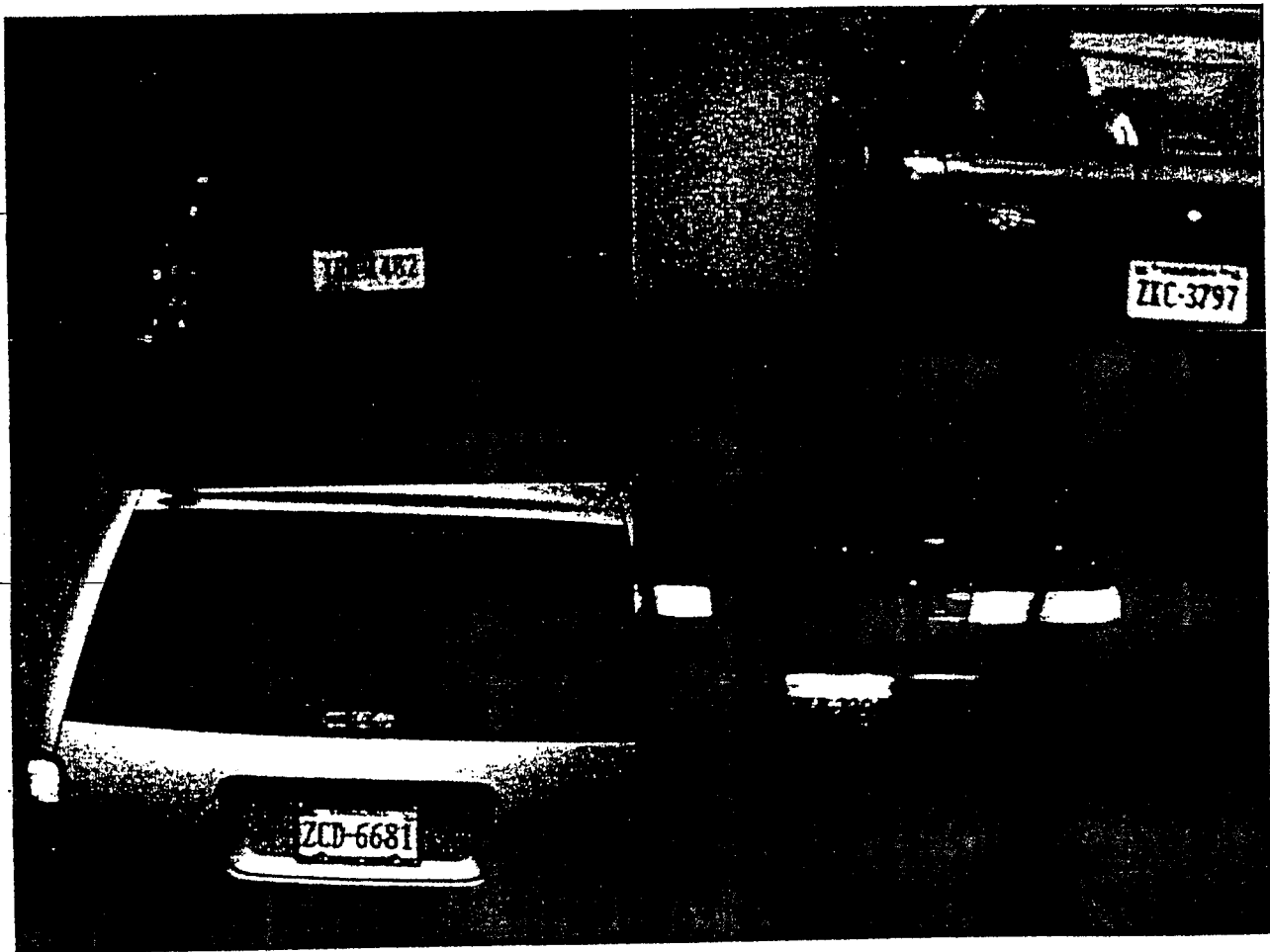


Figure 3 Software Controlled Close-Up Camera Captures Clear Images

Day (above) and Night (below) Violation Video Samples. Additional violation images showing clarity of license plate images produced by software-controlled Close-Up camera.

CrossingGuard's high-resolution color images of each violation are created using a sophisticated series of algorithms specifically designed to optimize the image resolution needed to properly identify the license plate of each offending vehicle. High-resolution digital images are the sum result of the collective incorporation of several dimensions including, spatial resolution (X, Y), brightness of a

By providing more pictures, video increases the chance of capturing the right information even under difficult lighting or traffic conditions, thus ensuring the highest rate of citable violations.

pixel (Z), wavelength of exposure (R, G, B), as well as the refresh rate of the image. Given this criterion, the overall resolution of each violation image is equivalent to 9,105,403 bits/frame or 273,162,090 bits per 1 second of violation images. CrossingGuard's unique ability to automatically zoom in to specific regions within the camera's field of view allows for a 16X magnification of the specified region, incorporating over 4,100 pixels with an overall resolution of 2,952,000 bits/frame for each square inch of the viewable region.

Video has another important advantage. By providing more pictures, video increases the chance of capturing the right information even in cases where the violation is difficult to observe because of obscuring lighting or traffic conditions. While glare or shadows may prevent clear imaging at one point in the road, they do not prevent it at all points. By capturing images at 30 frames per second, CrossingGuard creates a more complete visual record of the violation that has a better chance of containing at least one frame where the license plate is clearly visible. (See Figure 4.)

1.B.3 VIOLATION IMAGES

The video sequence and full resolution color frames provide the basis for extracting the images that are required to legally issue a citation. These images include

- 1) a color image of the vehicle shown just entering the intersection,
- 2) a synchronized image of the traffic signal head visible to the driver,
- 3) a color image of the vehicle at a client-defined distance into the intersection, (e.g. from the stop bar)
- 4) the vehicle in violation, clearly identifiable by color, make and model of vehicle and
- 5) one or more images of the rear license plate of the vehicle, including license plate numbers and letters and the state of issuance and

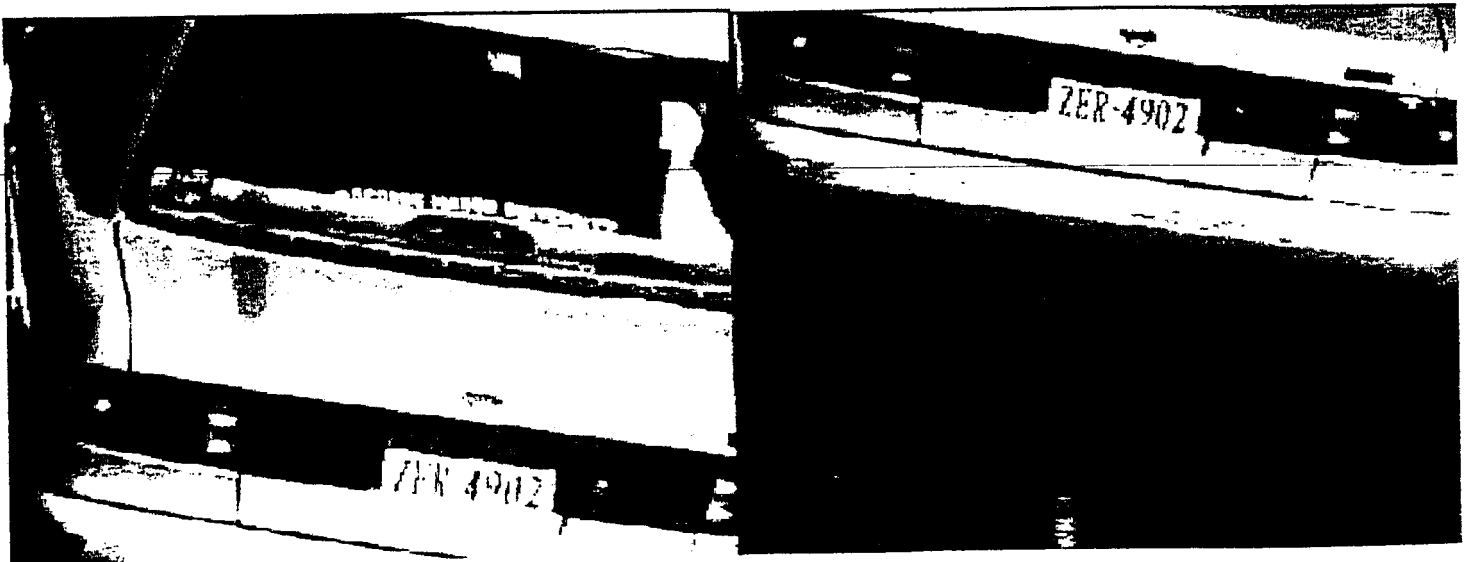


Figure 4 Video Sequence Provides Multiple Opportunities To Capture Clearly Readable License Plate Images

6) one or more color images of the driver.

1.B.4 ADDITIONAL IMAGE INFORMATION CONTENT

Without obstructing the images of the vehicle or license plate, the system will show a "data box" containing at least:

- violation number
- day, month and year of the violation
- time of the violation, stated in military time of hours, minutes and seconds
- a unique identifier linking back to the digital video sequence used to create the citation
- identification of the intersection, specified by the names of intersecting streets or appropriate location code, along with lane and direction
- number of seconds intersection amber time (as programmed)
- amount of time, in hundredths of seconds, from the time the signal turned red to the time of the violation (when the frame was captured)
- vehicle speed

This information is stored with each video frame and can be printed anywhere on the citation, including on the image itself.

1.B.5 IMAGE CLARITY UNDER ALL-WEATHER/ALL-LIGHTING CONDITIONS

❖ *Computer-controlled PTZ camera captures crystal-clear license plate images without any artificial image enhancement.*

❖ *Eliminates any question of image integrity in court.*

The camera and video acquisition equipment will provide clear and readable video images, from which individual video frames can be extracted during day or night illumination conditions, 24 hours a day. Performance is maintained in a range of weather-related visibility conditions, including bright sun, overcast skies and rain. Camera motion due to wind or pole vibrations is eliminated through the use of a unique software image-stabilization function within the system.

To provide extremely high image clarity, even at night, NTS uses a unique combination of the latest in infrared and visible-light camera technology together with proprietary adaptive software control of camera functions. CrossingGuard uses dual mode video camera technology that can operate either in color or in monochrome (black and white) image capture. When operating in black-and-white mode, the cameras are sensitive to as little as 0.015 lux.

At night, CrossingGuard software toggles the cameras in real-time between color and black-and-

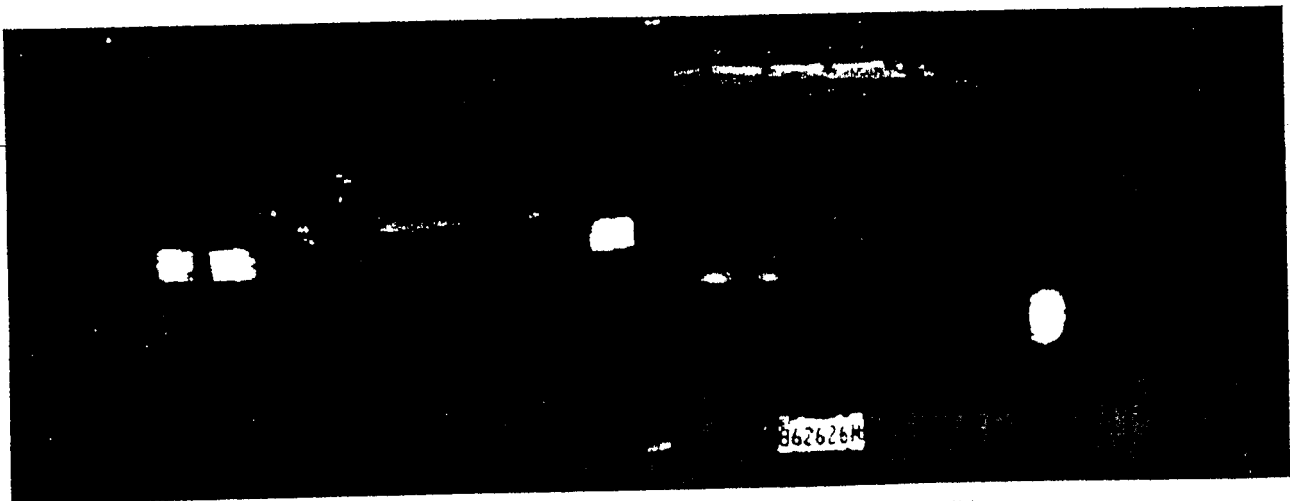


Figure 5 Image of Vehicle License Plates Captured under Dark Night Conditions

white modes, using the mode best suited to the particular requirements of the different violation information elements (e.g., color capture for vehicle, traffic light; driver image, black-and-white for license plates with low-level lighting). Figure 5 shows how this sophisticated software and advanced highly sensitive camera technology combine to capture a clear image of a license plate even under conditions of extremely low levels of illumination at an intersection.

In some cases, visibility may need to be enhanced at the intersection by pole-mounted constant-level natural light or infrared illuminators. NTS does not use flash illumination due to the potential risk of such lighting distracting drivers' attention as well as affecting driver nighttime visibility.

1.B.6 VIDEO/IMAGE ARCHIVE OF THE VIOLATION

In addition to the images that are used to prepare the citation issued for the violation, the system stores the

CrossingGuard does not use flash or strobe lighting at nighttime. Such lighting can be distracting and dangerous to drivers.

source video sequences that show the full context of the violation. All of this information is archived as part of the permanent record of evidence that documents the violation. As such, it is available for review by the motorist prior to making a decision on whether to contest a ticket, and it is available for review during any phase of the adjudication process to resolve a contested ticket.

1.B.7 NON-INVASIVE VIDEO-BASED VIOLATION DETECTION

CrossingGuard uses advanced video detection technology, developed originally in the context of military applications, to detect and track vehicles approaching an intersection. CrossingGuard's video monitoring technology was developed as part of a Federal Highway Administration program to develop

next generation traffic sensors. CrossingGuard's video detection works day and night, under a variety of weather and visibility conditions to provide 24-

CrossingGuard's aboveground detection can be installed without any damage to roadway surfaces.

hour, 7-day-a-week monitoring.

CrossingGuard's use of aboveground video monitoring for violation detection simplifies the equipment installation process. Unlike loop-based detection systems, no lane closures are required for roadway surfaces to be cut and damaged for in-ground loop installation. Because CrossingGuard can be installed and maintained without any damage to roadway surfaces it protects the investment that the client has made in roadway infrastructure, and ensures the least disruption to traffic flow during installation and routine maintenance.

Additionally, at some intersections, it is impossible to install loop detector-based red light camera systems. The presence of existing detection loops for intersection control makes it impossible to install additional detection loops dedicated to red light camera operation. By avoiding such limitations,



Figure 6 Operator Images Captured by CrossingGuard
Images taken from actual CrossingGuard cameras tracking vehicles moving through the intersection at approximately 45 mph.

CrossingGuard can be installed at intersections that cannot be equipped with conventional red light camera systems.

**1.B.8 NESTOR COMMUNICATIONS NETWORK:
REAL-TIME ACCESS TO VIDEO & DATA**

The Nestor Communications Network (NCN) is the backbone that connects equipment at the intersection with NTS processing centers, both local and remote, as well as any CrossingGuard workstations, which the client may elect to install in other facilities. This communications network uses the latest telecommunications and computer technology to deliver video and data in real-time, where it is needed, securely and at affordable costs. The NCN is completely scalable to accommodate any number of intersections which the client may choose to equip, and can grow as the need arises in the future.

unauthorized access, and the Nestor Communications Network is a private circuit within this private network. Over this network, intersection violation video and data flow securely from each CrossingGuard-equipped intersection to NTS' Processing Operations Center and Citation Service Provider facilities, which are additional nodes on the network.

CrossingGuard equipment at the intersection is connected to the Qwest network through any of a variety of means: high speed transmission (equivalent to T1 speed), land based phone lines (offered through arrangement with the local telephone provider), or wireless LAN's. Even spare capacity on client owned "interconnect" between intersections can be used to connect the CrossingGuard equipment at the intersection. Wireless LAN's provide excellent high band width

Qwest Nationwide Network

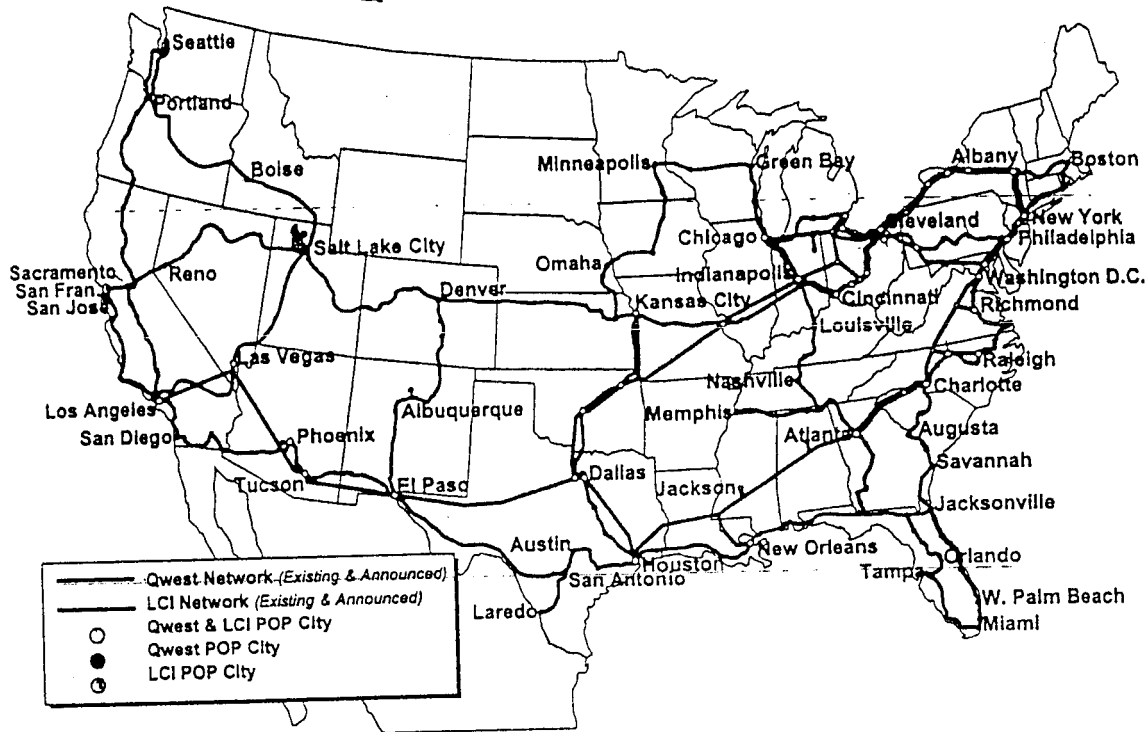


Figure 7 Qwest Backbone for Nestor Communications Network

CrossingGuard's communications architecture is built on top of the Qwest national fiber-optic communications backbone (See Figure 7), as a private communications network, the Qwest frame relay network enjoys inherent security against

transmission, more than adequate for the transmission of violation data. A survey of the intersection and its surroundings can establish if the required "line-of-sight" communications path is available at the intersection for wireless transmission.

All nodes on the NCN are Microsoft NT-based computers, which provide their own level of log-on and network security, password-protected with automatic log-off after a configurable number of unsuccessful log-on attempts.

CrossingGuard workstations installed at the police department, traffic monitoring facility or local walk-in centers can also connect to the NCN via the Internet. This Internet-based access is supported with hardware/software to implement the full "3DES" encryption standard for secure Internet communications. Hardware-based firewalls between CrossingGuard workstations and the NCN create, in effect, an "encryption tunnel" through which all video and data flow.

The NCN frame-relay based network is scalable to accommodate any number of intersection connections. Its high bandwidth communications provide speedy access to all violation evidence. Within a few minutes after a violation occurs, complete violation video and image data are automatically forwarded from the intersection to the network facility where processing can begin. This real-time communication of violation data ensures timely processing of citations at the central facility. Further, by removing violation data immediately from the intersection CrossingGuard avoids the information security risk created by other systems that leave sensitive violation data at the roadside until it is manually retrieved.

CrossingGuard's design provides for robust fault-tolerant communications. At the intersection, all violation data is temporarily buffered to the disk of the CrossingGuard PC (the "RoadSide Station"). It is erased from the disk once it has been successfully transmitted over the network to the central processing facility. The six-gigabyte RoadSide Station disk has the capacity to buffer violation data for up to 300 violation events, more than enough storage in the event of any possible disruption of communications.

At the client's option, CrossingGuard Workstations will be installed at the police department(s) and/or local traffic management center(s). These sites can be additional nodes on the CrossingGuard network, with user-access privileges that provide real-time access to violation video and data.

The same network that provides real-time access to intersection violation data also enables real-time remote access by authorized NTS support staff to each individual CrossingGuard intersection computer and camera. This facilitates remote equipment monitoring, diagnostic troubleshooting and maintenance. For example, software upgrades can be remotely uploaded over the network to any designated CrossingGuard PC. The Nestor Communications Network enables NTS to deliver the highest level of equipment support, ensuring unparalleled levels of system performance and reliability.

CrossingGuard's communication network delivers real-time video and data wherever it's needed, securely and at affordable costs.

1.B.9 ELECTRONIC VIOLATION REVIEW AND CITATION PREPARATION

Once the violation data has been received over the NCN by the CrossingGuard Server at the citation processing office, it is automatically stored in a violation database. Authorized users can access the centrally stored violation database, retrieve a violation record, and display the violation video sequence and full resolution close-up vehicle images documenting the violation. The CrossingGuard CitationManager software provides backoffice support for all citation preparation tasks, including selection of violation images, vehicle identification and retrieval of driver information from the Department of Motor Vehicles. Fully prepared citations are available as electronic files over the NCN, along with full back up video violation data, for review and final verification by authorized personnel.

CrossingGuard backoffice support also includes program and financial reporting capabilities that provide the necessary information for financial tracking and monitoring, as well as assessing overall program effectiveness in improving traffic safety at



each of the monitored intersections. A variety of standard reports are available, as well as the capability for supporting user-defined program analysis reports. (See *Management Reports*, page 3-1.)

1.B.10 REMOTE CONTROL OF INTERSECTION EQUIPMENT

CrossingGuard ServerNT provides easy setting of user-defined parameters controlling each CrossingGuard RoadSide Station. A graphical user interface (GUI) enables complete remote control of set up and operation of a RoadSide Station, including specifying such parameters as the location of violation stop lines at the intersection. Values for other parameters related to the criteria for establishing a violation (e.g., minimum elapsed red signal time or minimum violator speed) can be remotely specified as well. CrossingGuard will capture all violation events and allow the user to set a threshold for filtering out any violations captured at less than a user-specified vehicle speed or minimum-elapsed-red time. The minimum elapsed red time can be set in hundredths of a second. The minimum vehicle speed can be adjusted in increments of 1 mph.

1.B.10.a ELECTRONIC VIOLATION REVIEW/CITATION PREPARATION

CrossingGuard CitationManager back-office software runs on Microsoft WindowsNT workstations providing a distributed citation-processing application that enables multiple users on the network to access the centrally stored violation database, view individual violation records (including the video sequence documenting the violation), approve or reject a record for citation issuance and prepare a batch of violation data for subsequent processing. The CitationManager software supports processing functions that include selection of frames for inclusion in a citation, importing of information from DMV vehicle and driver registration records, printing of citations and the management of the citation database. Reports can be easily generated to view summary statistics on violation data, to identify trends in violation occurrences as well as to monitor the efficiency of critical steps in the violation detection and processing functions.

Clients can elect to install whatever violation review and citation processing functions they wish to staff with in-house resources. Alternatively, the client can elect to out-source any or all of these functions to NTS.

1.B.11 DATABASE FOR PERFORMANCE AND VIOLATION TREND ANALYSIS

1.B.11.a EQUIPMENT OPERATIONAL DATA

CrossingGuard maintains a database of vital statistics to characterize system operation. The system will, for example, maintain a log of the operation of each CrossingGuard PC-based RoadSide Station installed at the monitored intersections. The log will document any equipment downtime (i.e., times when the station was not operating) in addition to system diagnostic information that characterizes the reason for a non-operative RoadSide Station.

1.B.11.b CHAIN OF EVIDENCE FROM VIOLATION/CITATION DATABASE

CrossingGuard maintains a database of information that provides a complete record of the facts and processing trail associated with each violation. Included in this information is a flag indicating whether or not the violation was certified for citation preparation, and if so, the reviewer ID and time/date of the review, the frames selected for citation processing and the unique name of the video sequence recorded for the violation. Further, the vehicle license-plate information (number and state) is also stored with the violation record, along with any information retrieved from the California DMV that relates to the vehicle and driver registration information (name and address, as well as a match/no-match flag). Citation issuance information (citation number, issue date and time, mailing date(s) of first and second citation/notices, etc.) as well as payment information (amount and dates received) will be also be stored and available in the CrossingGuard database.

In addition to supporting a range of performance-related analyses and reports, the violation/citation database maintained by CrossingGuard can be queried to provide a chain of evidence for each citation. Each violation is identified by a unique number as well as the time/date of the violation and location information identifying where the violation



occurred. Each action taken to review violation data, reject or approve the data for citation preparation, and if approved, to prepare, authorize and issue a final citation, is recorded to the database, along with the ID of the user who initiated the action and the time/date of the action. This processing audit trail is available as a chain of evidence to substantiate each step of the process leading up to the issuance of a citation.

1.B.11.c MANAGEMENT REPORTS

Among the management reports that can be generated based on the CrossingGuard violation/citation database are: the CrossingGuard Financial Report, Status Performance Report, Completed Citation Summary Report, Non-Issued Violation Summary Report, CitationManager User Report and the Citation Report. These reports are available as part of the citation preparation and processing services provided to the client by NTS, or the client can directly generate them if they choose to install and operate CrossingGuard's back-office citation software.

1.B.11.c.1 FINANCIAL REPORT

The CrossingGuard Financial Report lists, per intersection, the financial statistics of the CrossingGuard system. These include the Violation Amount (total dollars in issued citations during the period specified at the time the report was generated), Amount Collected (total dollars which were paid by violators who were issued citations) and the Amount Outstanding (total dollars of issued citations for which payment has not yet been received by the date the report was printed.)

1.B.11.c.2 STATUS PERFORMANCE REPORT

The Status Performance Report lists, by intersection, the quantity of citations in various stages of the citation review process. These include: new citations, officer review, deferred, DMV export, DMV import, DMV review, citation processor export, citation processor import, await response, delinquent, court summons, open, archived, complete, citations and the no-citation percentage.

1.B.11.c.3 COMPLETED CITATION SUMMARY REPORT

The Completed Citation Summary Report lists, by intersection, the quantity of citations in the following categories of payment status: paid, court upheld, court dismissed, delinquent paid, uncollectable, invalid information, jurisdiction, refunded, citation processor dismissed, other, delinquent write-off, unknown and the totals of completed citations.

1.B.11.c.4 NON-ISSUED VIOLATION SUMMARY REPORT

The Non-Issued Violation Summary Report lists, by intersection, the quantity of detections for which no citations were issued, in a number of categories; among them: emergency vehicle, no license plate, vehicle obstructed, plate obstructed, plate illegible, state illegible, DMV mismatch, funeral procession, officer directing traffic, lease vehicle, other and the totals for these events.

1.B.11.c.5 VIOLATIONS SORTED BY TIME

The Violations Sorted by Time report lists, per intersection, the number of violation events (all violation events, not just the events that have been deemed citationable offenses) recorded on the roadside and reported to the CitationManager database. These are cumulative counts, reported in hourly intervals. In other words, the reports lists all events (possible violations) in the database which occurred between 7:00am and 8:00am, between 8:00am and 9:00am, between 9:00am and 10:00am, etc. in hourly intervals for 24 hours. The user may specify a date range to be used in determining these counts, e.g. from 1/1/2000 to 1/15/2000, and the counts in the report would reflect only those events occurring during that time period. This report provides the information needed to profile violation distributions to determine those times of day with the most violation occurrences.

1.B.12 INFORMATION SECURITY

CrossingGuard offers information security both for violation data generated by the intersection-based PC equipment, and access to violation data and violation review functions by users at CrossingGuard workstations connected on the CrossingGuard network.



1.B.12.a SECURE TRANSMISSION OF INFORMATION FROM THE INTERSECTION

As the backbone of the Nestor Communications Network, the Qwest frame-relay private network provides inherent security to prevent unauthorized access to video and data transmission. All CrossingGuard equipment, whether at the intersection, or workstations at the processing facility, walk-in centers, police department or traffic monitoring facility, are WindowsNT stations, with full password protection against unauthorized node and network login.

Each CrossingGuard RoadSide Station has a hardware-embedded Internet Protocol (IP) address that prevents unauthorized telephone dial-up. Real-time uploading of violation video data from the RoadSide Station to the CrossingGuard Server and its subsequent deletion of transmitted violation data from temporary storage on the RoadSide Station ensures immediate notification of violation events and eliminates any security concern over storage of violation data locally at the RoadSide Station for an extended period of time.

1.B.12.b CITATIONMANAGER ACCESS

Within the CrossingGuard back-office CitationManager software, several levels of security ensure that access to various software functions is only available to authorized users. User access to CitationManager functions is restricted based on User ID, password and User Type. These functions include reviewing a violation event, importing/exporting DMV information, importing/exporting citation information to the citation processor, archiving violation events and citations, setting-dollar amounts for fines and defining citation data requirements, such as the number and type of images required. The highest level of security permits access to every function within the software.

CitationManager provides the capability to define the access privileges for each user type within the system. Whether citation processing is undertaken directly by the client or is provided under contract by NTS, the CitationManager software ensures that only authorized users have access to data and functionality, and only to the extent that their authorization provides.

1.C OPTIONAL CROSSINGGUARD FEATURE: COLLISION AVOIDANCE

CrossingGuard is more than a red light camera system. Through its use of advanced video, software and communications technologies, CrossingGuard can provide additional functions that address intersection safety and traffic flow. As an *optional capability* the client can choose to deploy at some or all of the intersections to be equipped with CrossingGuard, either at the outset of a project or as upgrades in the future.

***Red light camera systems are only a deterrent to red light running.
But, one red light camera system and can actually help prevent red light running collisions - CrossingGuard.***

1.C.1 COLLISION AVOIDANCE

The automated enforcement provided by a red light camera system is a deterrent to drivers running red lights, but it is only a deterrent. No red light camera system can prevent a driver from running a red light. And no matter how effective a red light camera system is, drivers will run lights – either through carelessness, drunkenness, poor judgement, or other causes. In fact, a recent study by the National Highway Traffic Safety Administration (NHTSA) reports that 40 percent of crashes at signalized intersections, were due, not to deliberate red light running, but to driver inattention or conditions that obstructed driver vision¹.

Even if there is no way to prevent drivers from running red lights, there is one red light camera

¹ Tijerina, L., Chovan, J. D., Pierowicz, J. and Hendricks, D. L. 1994. Examination of signalized intersection, straight crossing path crashes and potential IVHS countermeasures. US DOT, National Highway Traffic Safety Administration.

system that can help prevent collisions caused by red light running – CrossingGuard.

CrossingGuard's video vehicle detection technology continuously tracks each vehicle in each lane of traffic approaching the intersection. Multiple times a second, CrossingGuard updates its measurements of each vehicle's speed, acceleration/deceleration and distance from the intersection. By continuously

*"We want pictures of violations,
not collisions."*

**Chief Robert Murray
Falls Church Police Department
Falls Church, VA**

**Falls Church has contracted with NTS to
install CrossingGuard with collision
avoidance at 3 intersections.**

measuring the trajectory of each approaching vehicle, and knowing when the traffic light is about to turn red, CrossingGuard applies the laws of physics to predict which vehicles are about to enter the intersection in violation of the red light.

Studies have shown that over 70% of red-light violations occur within 1.5 seconds of the change from amber to red. *CrossingGuard's video tracking technology lets it see these red light runners coming.* - Importantly, CrossingGuard can often detect an impending violation before the cross traffic is given the green light that might cause unsuspecting motorists to pull out into the intersection, right into harm's way.

When CrossingGuard sees that a vehicle is about to run the light before the light has turned green for cross traffic, it sends a signal to the traffic controller to extend the all-red light for cross traffic. *This violation alert signal directly reduces the risk of collisions involving cross traffic and red light violating vehicles.*

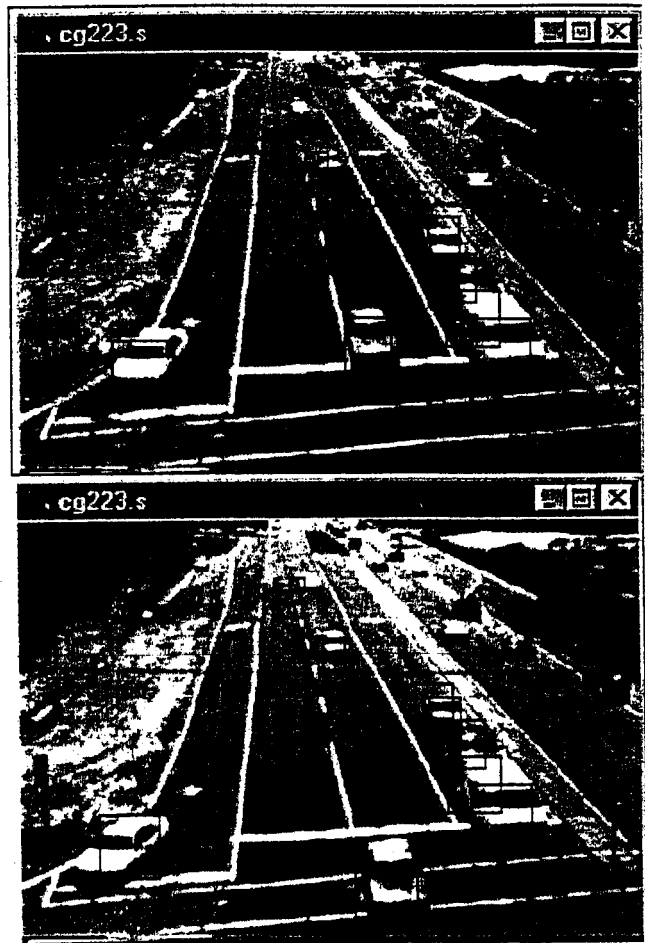


Figure 8 CrossingGuard Predicts Red Light Runner

Top picture: CrossingGuard identifies vehicle about to run red light with blue tracking box. (Vehicles predicted to stop have red tracking boxes.)

Bottom picture: As predicted, violator crosses the stop line (bottom-most line; see text at right) against the light. Smoke can be seen rising from tires as vehicle attempts to stop.

The timing of the light for the violating vehicle remains unchanged – the violation is recorded, permitting a citation to be issued. This optional emergency all-red extension time, typically only a few seconds, is user-programmable to maximize safety without undue interference with traffic flow.

Figure 8 shows CrossingGuard's ability to make this red light violation prediction. In the top picture, the traffic signal has just turned red. The colored boxes around the vehicles represent vehicles "seen" by CrossingGuard's video detection. The red boxes denote vehicles that CrossingGuard predicts will stop for the red light. A blue box indicates a vehicle that CrossingGuard predicts, by virtue of the vehicle's trajectory, will run the red light. (In the case

illustrated here, the "stop line" was chosen by local authorities to be the bottom-most white line in the image. Actual violation lines are determined by the client and can vary from intersection to intersection.)

The second picture shows the same approach a fraction of a second later. The vehicle marked with a blue box is braking aggressively (note the smoke rising from the passenger side tires), but is unable to stop before crossing the violation line. Subsequent video frames show the vehicle penetrating into the middle of the intersection. CrossingGuard accurately predicted its inability to stop in time for the red light.

CrossingGuard's collision avoidance feature would signal the traffic controller to extend the red light for cross traffic for a second or two, thus averting a potential collision with the red light violating vehicle.

Because NTS is committed to traffic safety, we offer CrossingGuard's optional collision avoidance functionality to the client *at no additional cost*. A client's traffic engineers have the flexibility of deciding the intersections for which the function is implemented and the amount of red extension given each direction.



| System Feature | Description |
|--|---|
| High Citation Rate | One or more video sequences clearly showing the traffic light, stop line and violation context, plus many high-resolution close-ups. Assures highest rate of captured citations. |
| Clear Identifying Images of Violating Vehicle | Software control of PTZ camera to track and capture close-up images of violating vehicle. |
| Real time Transmission | Video enforcement data is transmitted in real-time from the intersection to the central traffic-monitoring facility, eliminating frequent roadside visits to gather citation data and security risks from leaving sensitive data at intersection. |
| Flexible, High-Speed Communications | High speed Nestor Communications Network retrieves video and data from intersections to processing facility, police department or traffic management center. |
| Information Security | Nestor Communications Network provides 3DES encryption for secure data transmission. Hardware embedded Internet Protocol (IP) on each network node prevents unauthorized connections. |
| No Loops Needed | No roadway damage for installation or maintenance of video traffic sensors. |
| No Film Handling | Eliminates requirement to download wet film daily or on a periodic basis. Saves time and money. Eliminates any risk of lost violations due to exposed film. |
| Reduces Court Workload | Violation video sequence provides indisputable evidence of violation. Motorists seldom challenge video record of the violation, creating fewer court cases. |
| Support for Viewing Violation Video in Court | Documentary digital video sequence can be easily extracted from CrossingGuard database, stored to CD and displayed as evidence on laptop. Irrefutable video evidence of violation wins cases. |
| Optional Collision Avoidance | When a red-light violation is about to occur at the onset of green for cross traffic, CrossingGuard generates a request for a red extension from the traffic controller. |
| Future Upgrade: Intersection Surveillance | Optional user-controlled PTZ camera positioning from the remote central traffic facility, for "live" management of traffic incidents, supplementing automated intersection surveillance. |
| Remote Restart and Set Up | CrossingGuard can be remotely restarted and re-configured from remote central traffic facility without dispatching technician to roadside. |
| All Weather, Day-Night | Images violations under the broadest range of visibility conditions, accurately handling shadows, camera blooming, day/night transitions and bad weather. |
| Stable, Accurate Video | Built-in software image stabilization retains accurate camera operation despite sway, vibration, wind or PTZ positioning variance. |
| System Performance Monitoring and Testing | Real time diagnostics and status of system performance and component integrity. |
| Optional Citation Processing Software | Easy-to-use point-and-click citation processing software to examine violation video, access DMV information and print high quality color citations. |
| Citation Processing Services | Customizable services for summons, payment and delinquent notice processing, account status tracking and a telephone hotline for motorist inquiries, with minimal impact on existing law enforcement resources. |
| Violation/Process Information | Customizable statistical summaries by intersections, group of intersections and time intervals, as well as citations issued, citation payments and citation processing time. |

Table 1 Summary of CrossingGuard Current Features



2 CROSSINGGUARD PROGRAM DESCRIPTION

2.A A TURNKEY PROGRAM FOR THE CLIENT

NTS understands that many clients wish to install a complete turnkey system for automated red light enforcement. NTS offers CrossingGuard as a complete turnkey system for the client, with comprehensive services that include ...

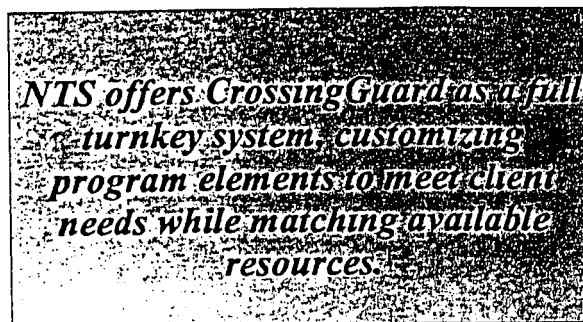
- Site Installation Planning and Design
- Equipment Installation
- User Training
- Citation Preparation and Processing Services
- Maintenance and Support
- Public Education Campaign and Community Outreach
- Expert Witness Testimony
- Violation Review Stations for Walk-in Evidence Viewing

Each client's needs and available resources are different, and NTS will actively work with the client to tailor the CrossingGuard program to its requirements.

2.B QUALITY FIRST

NTS conducts all aspects of its CrossingGuard service program and, in particular, its interaction with the public, with the highest levels of quality and integrity. Public confidence in the program is vitally important if the client is to achieve its goal of safer intersections. NTS is committed to maintain the highest standards of quality in its public dealings to earn the public trust and to maintain it throughout the program. NTS is committed to delivering a video enforcement program in which the client can take pride and through which the client can enhance the quality of life for their residents.

Each CrossingGuard program is carefully fitted to the needs of a particular community. NTS works within a well-organized and field-tested framework to plan and deliver a CrossingGuard program for a community. In what follows, we describe the scope



of services we provide and our methodology for delivering them.

To implement a successful CrossingGuard program requires a skilled program team to launch and support the program, careful planning and good communication between the client and NTS. Accordingly, we begin with a description of NTS' Program Team, including project organization and the division of project responsibilities between NTS and its subcontractors.

2.C PROGRAM STAFF AND ORGANIZATION

Each CrossingGuard program is provided through a team of highly skilled, experienced, full-time NTS professionals. Brief biographies of team members may be found in Section 4.E.1, along with Principal Staff Qualifications, beginning on page 4-2. Each individual on the team has primary responsibility for a well-defined aspect of the program. The blend of their skills and experience, orchestrated by effective program management, ensures quality program execution to meet the client's requirements and objectives.

The Program Team consists of:

- Program Manager (PM)
- Installation Specialist (IS)
- Systems Specialist (SS)
- Operations Specialist (OS)

- Trainer (TR)
- Communications Liaison (CL)

One of the most seasoned members of NTS' staff, the Program Manager has overall responsibility for all aspects of the CrossingGuard launch, managing NTS staff as well as subcontractor support.

The Installation Specialist is a field engineer who is responsible for planning and executing all equipment installation and construction tasks. The Installation Specialist works in close coordination with the client's Public Works Department to review all proposed installation designs, tasks and schedules, and manages the execution of those tasks as provided by NTS' local dealer/contractor.

The Systems Specialist is a seasoned product-support engineer who is responsible for installation tasks required to bring an equipped intersection online. The Systems Specialist has a thorough grounding in

the design, implementation and operation of the CrossingGuard hardware/software.

The Operations Specialist is responsible for all aspects of the program related to the generation of citation processing support, including citation design, citation processing and review, work flow, task definitions, telephone inquiry support, etc. The Operations Specialist coordinates this support with NTS' Citation Service Provider and in close conjunction with the client's law enforcement, finance and court personnel.

The Program Trainer is responsible for the creation of any client-specific training materials, and for scheduling and conducting the CrossingGuard training course. Working in close coordination with all other team members, the Trainer identifies any client-specific program elements and requirements, integrating them into the training course lectures and exercises, as appropriate, and documenting them in

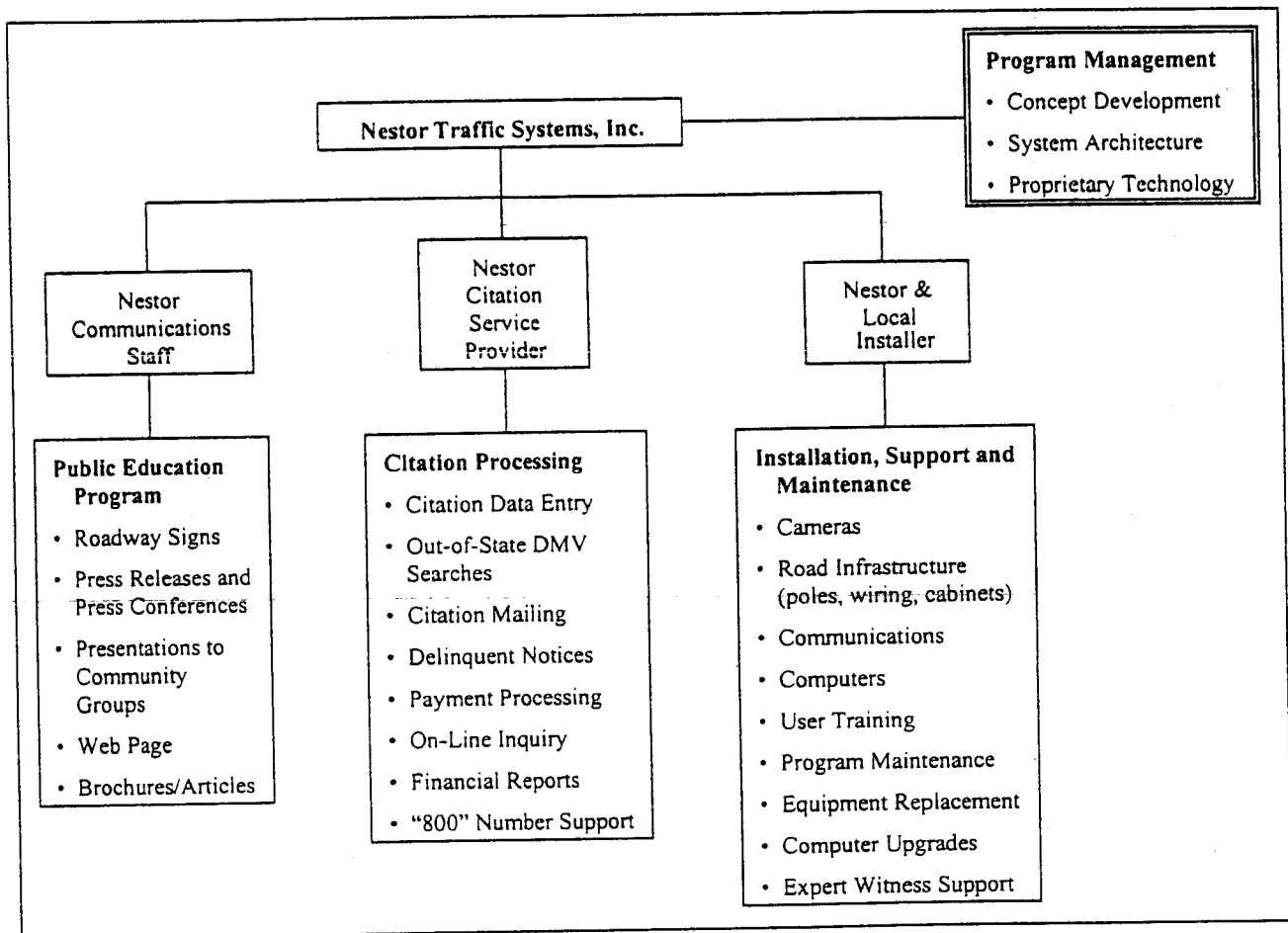


Figure 9 Project Organization - Division of Responsibilities

any program and/or system reference material.

The Program Communications Liaison is responsible for developing and orchestrating the execution of all aspects of the Public Education Campaign, in coordination with the client's Communications

PROJECT PLANNING

1. Project Launch Meeting
2. Review information access with DMV
3. Pre-installation visit to intersections and equipment facilities
4. Obtain intersection engineering drawings (as built) from Cities
5. Generate intersection CAD models to simulate camera positions & fields of view
6. Develop Equipment Installation Plan
7. Develop Installation Schedule
8. Review Installation Plan and Schedule with Cities
9. Obtain necessary sign-offs and approvals
10. Order all equipment

Table 2 Project Planning Tasks

Department. The Communications Liaison is responsible for ensuring that the community is well informed of the program objectives, operation and benefits, in order to build and maintain strong community support. In addition to these NTS personnel, NTS' installation subcontractor performs construction and electrical contractor work.

The diagram in Figure 9 summarizes the nature of the work and services performed in the CrossingGuard program, and the division of responsibilities between NTS and its contractors. NTS has overall responsibility for delivering the program and for ensuring quality control of all program tasks and components.

2.D PROGRAM PLANNING

Implementing a CrossingGuard program involves a set of tasks related to equipment installation and configuration, set up of the citation processing services, conducting user training sessions in equipment and operations responsibilities and launching a public education campaign that both prepares and informs the community of the automated enforcement program. Before any of these steps are taken, there is a planning phase led by

the NTS program team to identify what needs to be done and the level of client participation in the program.

Immediately after a contract has been signed, NTS holds a Project Launch meeting with the client's designated program team to introduce project personnel, review the CrossingGuard program and services, the preliminary program plan and the client's role in the program. NTS will present and lead discussions on planning for intersection site selection, equipment installation and user training, setup of citation processing services and the execution of a public education campaign. A sample outline for the meeting is presented in Table 3.

NTS' planning activities will culminate in the development of the Program Schedule. This schedule will show specific dates for the major tasks and milestones related to equipment installation, citation services setup, user training and the public education campaign. NTS creates and manages the Program Schedule using Microsoft Project. This advanced project management software tool provides clear information to track tasks, milestones, task dependencies, resources, assignments, as well as scheduled task start and completion dates.

The Construction and Installation Schedule component of the Program Schedule will be finalized once all construction permits and approvals have been obtained from the client. This phase of the Program Schedule will be developed to take advantage of as much task concurrency as possible.

2.E SITE SELECTION AND ANALYSIS

The selection of intersections to be equipped with automated enforcement is a critical step in the program. As part of NTS' comprehensive program services, NTS will work with the client to review candidate intersections and gather the information necessary to advise the client on which intersections warrant the deployment of automated enforcement equipment.

PROGRAM OVERVIEW

Introduce participants (Nestor & Cities), review CrossingGuard equipment & services; review preliminary program plan; discuss Cities' role in program

EQUIPMENT INSTALLATION PLANNING

Review monitoring objectives/requirements at each intersection; review Nestor's requirements for installation planning support materials (intersection engineering diagrams, etc.), review process for sign-offs & approvals; review equipment delivery instructions; schedule pre-installation visits to intersections and equipment facilities

TRAINING PLAN

Review Cities' role in equipment operation and citation processing, requirements for and background of trainees; identify schedule for training and who will participate

CITATION PROCESSING PLANNING

Review procedures for DMV access, citation design requirements and citation approval process

PUBLIC EDUCATION PLANNING

Identify lead persons from Nestor and Cities'; review goals and theme of public education campaign; review media available for use; identify target audiences for presentations; 3rd parties to be approached for campaign support; identify target public education events and schedules

SUMMARY

Next steps and timetables

Table 3 Agenda for CrossingGuard Program Launch Meeting

In most cases, clients already have a list of candidate intersections and/or locations, which they believe merit consideration for automated enforcement. NTS will review any available information on these intersections to profile the severity of the red light running problem and the history of crash risk. As necessary, NTS will go into the field to capture current violation counts. These counts can reveal patterns of traffic behaviors that may be correlated with different times of day or local events, which may contribute to red light running activity at the intersection.

Additionally, intersection geometry and the nature of traffic control at an intersection are factors that will be assessed to help determine red light running risk and the risk of red light running crashes at the intersection. There is well-founded research that indicates a number of such factors are contributors to the risk of serious red light running crashes, including average daily traffic counts, intersection width and traffic signal activation.²

As part of its survey and analysis of the intersection, NTS will conduct an engineering assessment to determine installation requirements so that an

accurate and comprehensive construction plan can be submitted for client approval. Table 44 presents a list of some of the installation-related considerations that NTS will address during intersection site visits.

At each intersection, NTS will collect basic geometric measurements, review possible sites for camera locations, inspect the traffic controller equipment and cabinet, and assess intersection lighting requirements. NTS will also evaluate existing conduit to determine if there is sufficient space available to accommodate power and video cable for cameras. Using existing conduit is the simplest and least expensive solution, but it is also possible to run power/video cable to the intersection cameras using overhead span wires. When sufficient conduit space and/or span wire solutions are not possible, additional construction may be required to lay additional conduit.

During the intersection site survey, communications requirements are also assessed to determine the most cost-effective means of linking the intersection to the Nestor Communications Network (NCN). Among the communications options are high-speed land-based phone lines, wireless LAN's and available city interconnect.

² Association of Selected Intersection Factors With Red-Light-Running Crashes, FHWA Highway Safety Information System Summary Report, July, 2000.

INTERSECTION CONSIDERATIONS

Camera Locations

Review existing poles (locations, heights; Cities' or utility-owned?); identify candidate locations for additional poles; note any view obstructions that may need treatment; review existing cabling/conduit and determine any new requirements

Communications

Identify existing phone line drops at intersection as well as any available intersection interconnect

Traffic Controller & Controller Cabinet

Review existing space in controller cabinet to locate CrossingGuard equipment; determine need for and location of possible additional cabinet; inspect controller at intersection to identify make/model and determine interface requirements.

Lighting

Identify lighting at intersection; inspect for proper operation (DPW to repair); measure effectiveness of night illumination

Intersection Measurements

Measure lane widths, size of intersection body; height and offset of all camera-mounting poles; road grade (tilt and bank); generate intersection drawing showing location of stop lines, median strips, significant obstructions, overhead wires, cabling, visibility limitations due to road curvature, bank, tilt, etc.

Other Equipment Location Considerations

Inspect designated space for location of PC/Server equipment; inspect existing power and communications hookups; identify any required facility changes

Table 4 Objectives of Pre-Installation Site Visit

The "interconnect" in a city is the city-owned communications lines that connect their intersection traffic controllers. Spare wires on the interconnect can, in some cases, be easily configured to link the CrossingGuard intersection equipment into the NCN. This can be the most cost-effective means by which violation video and data can be automatically retrieved from the CrossingGuard RoadSide Stations. A review of the location and availability of spare city interconnect is done as part of the intersection site survey.

Although a detailed site survey of the intersection is an essential requirement of planning for a successful installation, a number of the issues and details relating to installation at the intersection should also be examined through a review of the intersection as-built engineering drawings. Engineering drawings of the intersections will be required from the client to determine the location of all conduits and utilities. Mark-ups of these drawings will be generated and reviewed with the client project team as part of the process of obtaining necessary permits and approvals prior to any construction work by NTS or its subcontractors.

In addition to the intersection site analysis, NTS and the client's representatives will tour the client's facilities where the CrossingGuard Server equipment is to be located. These facilities will be reviewed to determine power and communication hookups, as well as workspace layout.

Based on information learned during these site visits, NTS and the client will mutually agree upon the specific sites to be equipped. The next step will be to draw up formal installation plans for these intersections.

2.F CONSTRUCTION AND INSTALLATION PLAN & SCHEDULE

With site selection completed, NTS will develop a Construction and Installation Plan, drawing upon information gathered from the site analysis as well as intersection as-built engineering diagrams provided by the client. The Construction and Installation Plan will detail, for each intersection and for any client location where CrossingGuard equipment is to be installed (e.g., police department, walk-in centers,

court building, etc.), the list and location of all equipment to be installed, interface to communications, power and traffic controller equipment, and any site or equipment modifications required to be performed by the client prior to or as part of system installation (e.g., at intersections, lamp replacements in signal lights, foliage trimming, etc.; in office buildings, wiring for power and communications).

NTS will submit the Construction and Installation Plan to the necessary authorities for final approval, securing, where necessary through its electrical contractor, all required permits and permissions.

Once the Construction and Installation Plan has received the necessary approvals from the client and other reviewing parties, NTS will establish, with its subcontractors, firm construction schedules showing timetables for all construction activity (installation of poles and cabinets, as required), communications and electrical work, the installation of all cameras and computer equipment and equipment power-on. Final Construction and Installation Plan approval will also trigger the placing of orders for any custom equipment that may be required for the installation.

The Installation Schedule will specify the installation sequence for the targeted intersections. The schedule will be designed to take advantage of as many task concurrencies as possible, and will detail any particular strategies to be employed to meet installation timetables (e.g., use of multiple contractor crews, beginning construction tasks at one intersection before equipment installation has been completed at another, etc.) Any timing tradeoffs will be reviewed with the client so that there is an opportunity to request and approve any time vs. cost tradeoffs deemed necessary.

2.G EQUIPMENT AND INSTALLATION

2.G.1 CROSSINGGUARD EQUIPMENT

The principal components of a CrossingGuard installation are CrossingGuard PC's and cameras. As needed, NTS also provides camera poles and mast arms, equipment cabinets, additional intersection lighting and, at the police or central

monitoring facility, one or more CrossingGuard Server PC's and a color printer.

2.G.1.a INDUSTRY STANDARD COMPUTER PLATFORM AND INDUSTRY-LEADING VIDEO CAMERAS

CrossingGuard computer equipment consists of CrossingGuard RoadSide Stations and CrossingGuard Server PC's. Deployed at the intersection, the RoadSide Station is an environmentally ruggedized PC that provides the full suite of violation detection, recording and communication functions over the NCN. A CrossingGuard PC Server (either a single machine or a local area network of workstations) is installed within an office environment at a distant monitoring or processing facility, communicating over the NCN with multiple RoadSide Stations.

NTS has designed CrossingGuard to run on industry-standard, PC-based computer equipment. NTS' product development strategy leverages the investments of such industry giants as Microsoft, Intel and Cisco in the development of core computing and networking capability. This ties CrossingGuard to the ever-increasing PC price/performance curve, delivering more and more functionality for the same cost.

NTS has created advanced image capture and camera control software that can work with standard NTSC video cameras to produce effective vehicle detection and violation recording. CrossingGuard

makes use of video cameras provided by such well-known camera manufacturers as Sony and Hitachi. These cameras are an order of magnitude less expensive than wet-film or digital cameras used by other red-light camera systems. Continued investment by these camera industry leaders has established an aggressive price/performance curve in this consumer-driven industry that continues to deliver more capability at the same or lower cost. This enables NTS to leverage the substantial R&D efforts of these camera industry titans to provide our clients with video cameras that offer the latest technology in auto-image adjustment, light sensitivity and image clarity.

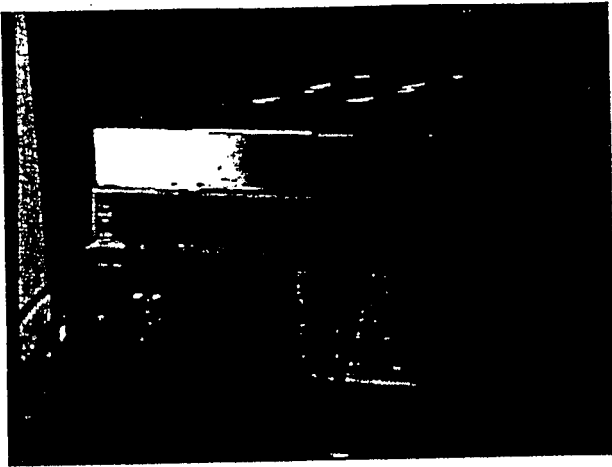


Figure 10 CrossingGuard RoadSide Station Ruggedized PC

2.G.1.b AT THE INTERSECTION:
CROSSINGGUARD ROADSIDE STATION

Each monitored intersection is equipped with CrossingGuard RoadSide Station, a PC inside a ruggedized, NEMA-compliant enclosure. (See Figure 10.) The RoadSide Station performs functions for violation detection, recording and communication. Each RoadSide Station can support up to 4 cameras, 2 of which are rapid-scan pan-tilt-zoom violator-tracking cameras to record violation information.

CrossingGuard ensures that there is no loss or corruption of data in the event of power loss or interruptions to communications services.

The RoadSide Station controls the appropriate high-speed tracking camera to zoom in on and track the violating vehicle as it moves through the field of view. Time-synchronized violation video sequences from multiple cameras are captured and transmitted over the NCN for central storage and review. The RoadSide Station will also provide live video monitoring to a CrossingGuard Server/Workstation located in the police and/or traffic control facilities in the near future.

The RoadSide Station stores untransmitted violation data temporarily to disk until it receives confirmation that the violation data has been successfully received by the CrossingGuard Server. By temporarily buffering violation data to non-volatile storage, CrossingGuard ensures that there is no data loss or

corruption due to possible interruptions in communication services or a power failure of any duration. A minimum 6-gigabyte hard drive provides adequate space for storing hundreds of violations to guard against any data loss.

The RoadSide Station includes an interface to the NCN for two-way, real-time communications. This provides for remote control of all RoadSide Station functions, as well as real-time violation video and data transmission from the RoadSide Station to a remote review and processing facility. Where required, violation data can also be directly retrieved from the RoadSide Station by downloading it to a laptop connected via a simple LAN connection. Additionally, the RoadSide Station can be optionally equipped with a radio modem transmitter so that data can be retrieved wirelessly by a laptop that is brought within a line of sight of the intersection. This allows data to be retrieved by a service technician from within the safety and convenience of a vehicle driven to the intersection location.

If equipped with the optional collision avoidance feature, the RoadSide Station sends an electronic signal when it detects an impending

violation notifying the traffic controller to extend the red light for cross traffic, reducing the risk of collisions at the intersection. The all-red phase is extended by a pre-set amount, determined by the

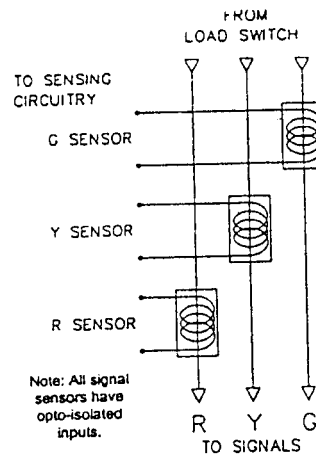


Figure 11 Hall Effect Sensor Schematic.

traffic engineer after taking into account such considerations as intersection size and traffic flow. Each intersection can have its own pre-set red extension. Typical values are on the order of 2-3 seconds.

CrossingGuard RoadSide Station does signal sensing (to determine the amber and red phase information) using Hall Effect sensors, an approach that will work with a broad class of traffic controllers, including NEMA, Type 170 and 2070. (See Figure 11.) NTS' collision avoidance function works with any controller that supports "pre-empts" (such as used for emergency vehicles and near railway crossings), including NEMA and Type 170 controllers. "Stop-timing" can also be used to implement the all-red extension. (Additional custom interfaces to other controllers are available from NTS.)

The RoadSide Station is housed in a standard traffic controller cabinet, weatherproof, vandal proof and lockable, providing power, communications and ventilation. The overall dimensions of the RoadSide Station PC are 18 ½ inches wide x 14 inches tall by 17 inches deep, available shelf-mounted. The need for additional space for air inlet clearance and cable connectors adds 2 inches to the height requirement and approximately 5 to the depth requirement.

If sufficient space is not available in an existing controller cabinet, NTS will provide and install an additional secure cabinet, co-located with the first for convenience of accessing roadside power. This cabinet can be ground-mounted or strap-mounted on a nearby pole to minimize its intrusion into sidewalk space (in urban areas) or for additional security considerations.

2.G.1.c CROSSINGGUARD CAMERAS

At an intersection, CrossingGuard uses NTSC video cameras in two different ways. Violation detection is performed by processing video from the CrossingGuard Tracking Camera. The Tracking Camera can be either a fixed-mount or pan-tilt-zoom camera oriented to provide an overview of oncoming traffic at an intersection. The Tracking Camera can image up to 6 lanes of traffic for violation detection and recording. CrossingGuard records video from the Tracking Camera to show the overall context of the violation.

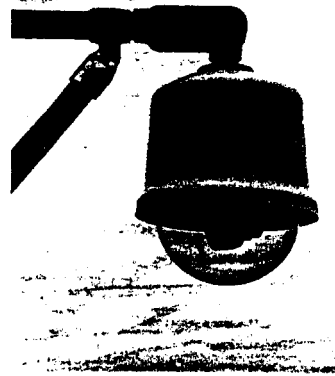


Figure 12 Diamond SmartScan III/B Camera/Dome Tracking System

CrossingGuard uses a second NTSC camera, the Violation Close-up Camera, to record high resolution video of the vehicle's driver and license plate. As the name implies, the Violation Close-up Camera is a high-speed pan-tilt-zoom camera that CrossingGuard dynamically controls to "zoom-in" on the violating vehicle, capturing close-up color frames of the vehicle's driver and license plate.

Both types of cameras are pole-mounted for stability, and located so as to provide adequate views of the intersection for both violation detection and event recording. Their relatively small size (9-inch camera dome) makes them unobtrusive and unlikely to attract much attention from passersby.

NTS uses PTZ cameras provided by Ultrak Inc. (See Figure 12.) Ultrak, Inc. is a well-established manufacturer of high quality PTZ surveillance systems for the security and traffic markets, serving both indoor and outdoor surveillance needs. Specification sheets on the cameras are provided in Section 8.

2.G.1.d CAMERA MOUNTING: TAMPER-PROOF ENCLOSURES

All video camera equipment is mounted under camera domes suspended from pole mast arms above the roadway. This places cameras at 16-22 feet above the roadway, and over the travel lanes. Locating the equipment in this position makes the cameras inaccessible and prevents tampering and/or vandalism.

Camera domes are sealed, weatherproof enclosures equipped with heater-blowers to ensure proper camera and PTZ control operation under even the most extreme weather conditions.

2.G.1.e CAMERA POLES AND MAST ARMS

Wherever possible, cameras are mounted on existing intersection poles and mast arms, to minimize the need for additional infrastructure at the intersection. However, the need to provide desired camera views and to avoid view-obstructing trees, signs and other decorative treatments may require the installation of new poles and mast arms at the intersection. NTS provides client-approved pole and mast arm equipment as needed.

2.G.1.f SUPPLEMENTARY ILLUMINATOR

As part of initial site selection and analysis services, NTS evaluates lighting at an intersection to ensure that there is adequate illumination for nighttime violation recording. NTS custom-designs and provides a lighting solution to meet an individual intersection's requirements and constraints. All CrossingGuard light solutions are built around constant level illumination, thus avoiding the use of "flash" lighting that can create distractions to motorists. When supplementary illumination is required, NTS employs either natural light or infrared illuminators.

2.G.1.g CROSSINGGUARD SERVER WORKSTATIONS

A CrossingGuard Server Workstation (or a LAN-based network of workstations) can be installed at multiple client facilities (e.g., police department, traffic operations center, etc.) to provide access to the data and functions appropriate for the facility. For example, a workstation can be installed at a police department to provide access to citation data, program management information and live video from any of the CrossingGuard equipped intersections. Additionally, in the near future, one or more workstations can be installed at a traffic operations center to provide traffic engineers with access to such optional CrossingGuard features as live intersection video surveillance, traffic monitoring statistics and automatic incident detection.

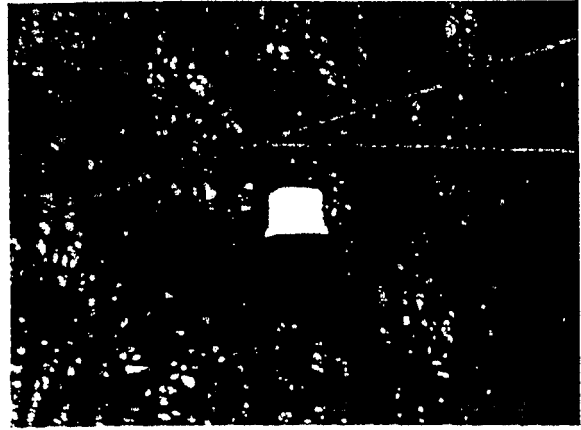


Figure 13 CrossingGuard Camera Installed at Intersection in Vienna, VA

Workstations installed at a client's facilities communicate over the NCN to any of the CrossingGuard RoadSide Stations installed at client intersections as well as to CrossingGuard Server stations operating at NTS remote or local facilities.

The Server Workstations are Intel-based PC's running Microsoft Windows NT and NTS' CrossingGuard Windows-based CitationManager software.

CitationManager also provides violation database support functions for violation data review, citation preparation, citation review, electronic citation authorization and citation printing. Additional functions are included to generate management reports for program performance monitoring. Security is handled through WindowsNT functions and the CrossingGuard application itself to prevent access by unauthorized users and to set user privilege levels so that authorized users can have access only to functions for which they have prior clearance.

2.G.1.h COMMUNICATIONS

At each intersection, NTS installs the appropriate communications interface to link the CrossingGuard RoadSide Station to the Nestor Communications Network. High transmission (equivalent to T1 speed) land-based phone lines or wireless LAN's connect each CrossingGuard-equipped intersection to the NCN.

CrossingGuard workstations installed at the client police department(s) or traffic management center(s)

can be equipped with optional Internet-based access to the NCN. The Internet pathway is protected by third party firewall and hardware/software encryption devices, creating an "encryption tunnel" through which the CrossingGuard workstation can securely access violation video and data.

2.G.2 INSTALLATION

2.G.2.a INSTALLATION PROCESS

Table 5 identifies the principal tasks that are performed at the intersection to install and setup CrossingGuard cameras and the RoadSide Station. Depending upon the needs of the particular intersection, there may be tasks related to installation of poles (for cameras), an auxiliary traffic controller cabinet (for the RoadSide Station) and additional lighting. Power and communications (as desired) are installed, and the RoadSide Station is interfaced to the traffic controller to enable signal phase detection and the collision avoidance pre-empt functions. Local testing of the RoadSide Station and cameras can be performed once power, communications, and the traffic controller interface have been installed.

Once this hardware and software is in place at the intersection, additional setup tasks are done remotely from the central facility to bring the intersection "online" (See Table 6) Remote communication to the

system vehicle detection functions are performing accurately. Sample violations are captured and reviewed for image clarity. Any problems can be addressed through a combination of camera pre-set adjustments (done at the central facility) and, if necessary, lighting adjustments (done at the intersection). Additional tests ensure that the equipment can properly restart and recover after a power interruption.

2.G.2.b TYPICAL CAMERA CONFIGURATION

A CrossingGuard installation can require as few as two cameras for intersection monitoring. Other configurations employing two to four cameras may be used depending on the number of directions to be monitored simultaneously, the violation views to be recorded, the size of the intersection and the ability to mount cameras to provide suitable views of the traffic.

Figure 14, shows a CrossingGuard installation that provides for violation detection, collision avoidance and violation recording for one approach direction at an intersection. The Tracking Camera (Camera 1 in the figure) is mounted just beyond the intersection, looking back toward oncoming traffic. A Violation

EQUIPMENT INSTALLATION TASKS AT INTERSECTION

Construction Tasks

Install poles, mast arms and controller cabinet (as needed)

Install power and communications

INSTALL & CONNECT CROSSINGGUARD

HARDWARE COMPONENTS

Install cameras and cabling, additional lighting; install Roadside Station; install signal phase sensing interface to traffic controller; install red phase pre-emption interface to controller

Table 5 CrossingGuard Installation Tasks at the Intersection

intersection is established and tested, enabling remote computer/camera control. For each camera, pre-set fields of view are defined for violation capture. Field tests are performed to ensure that the

INTERSECTION SETUP TASKS FOR REMOTE CONTROL

Basic intersection remote setup and test

Remote power on/restart

Install intersection monitoring functions

Test communications from Server to intersection PC; test live video & remote control of intersection cameras

Set up & test intersection enforcement functions

Setup violation capture camera pre-shots; field test to calibrate equipment vehicle speed measurement; capture sample violations; test CitationManager operations for violation review/image selection; adjust camera pre-shots/configuration for image clarity

Set up and test intersection-reporting functions

Generate sample violation tracking reports

Set up and test collision avoidance function

Review/modify/test clearance intervals as needed; enable red extension pre-empt function; field test of collision avoidance

Final Intersection Test

Table 6 Intersection Setup Tasks at Central Facility

Close-up Camera (Camera 2) is mounted 20-40 feet beyond the end of the intersection. Both cameras are lofted out over the roadway on mast arms. The Tracking Camera begins recording video of the violation even before the vehicle enters the intersection. For states with front and rear license plates (or a need to capture driver images), the fast-moving PTZ Violation Close-up Camera first captures close-ups of the front of the vehicle and driver (as it approaches the camera), and then automatically repositions to capture close-ups of the rear of the vehicle as it departs the intersection area. For states with only rear-mounted license plates, the camera can be located and configured to track and zoom in on the vehicle from the rear only.

With proper mounting, the tracking camera can accurately detect vehicles approaching an intersection in as many as 6 lanes of travel. However, monitoring more than three lanes for violations will require additional Violation Close-up Cameras.

If a view of the intersection is required showing the traffic signal as the driver sees it, then a camera is required to be mounted "upstream" from the intersection to capture a view of the traffic signal and

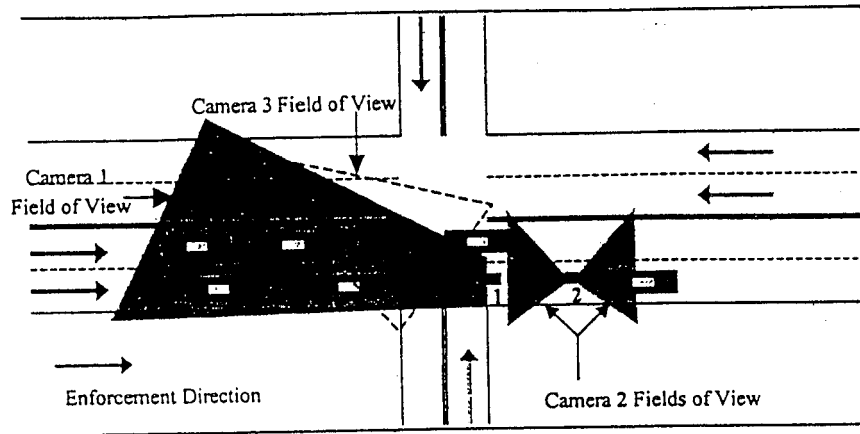


Figure 14 CrossingGuard Camera Configuration Monitoring a Single Direction of Travel
Camera locations shown at positions 1, 2 and 3.

a rear view of the vehicle. (During installation planning, traffic signal heads are inspected to ensure that they have proper lenses and bulb wattage to afford adequate visibility in the video image.) Although there are several possibilities for locating this "Signal View" camera, Figure 14 shows the camera (denoted as Camera 3) located across the road and looking toward the intersection with a rear view of traffic in the approach direction.

Figure 15, shows that the same intersection can be equipped for two directional monitoring by adding a single camera. What makes this possible is a CrossingGuard feature that allows it use cameras as flexible resources to which it can dynamically assign different monitoring tasks.

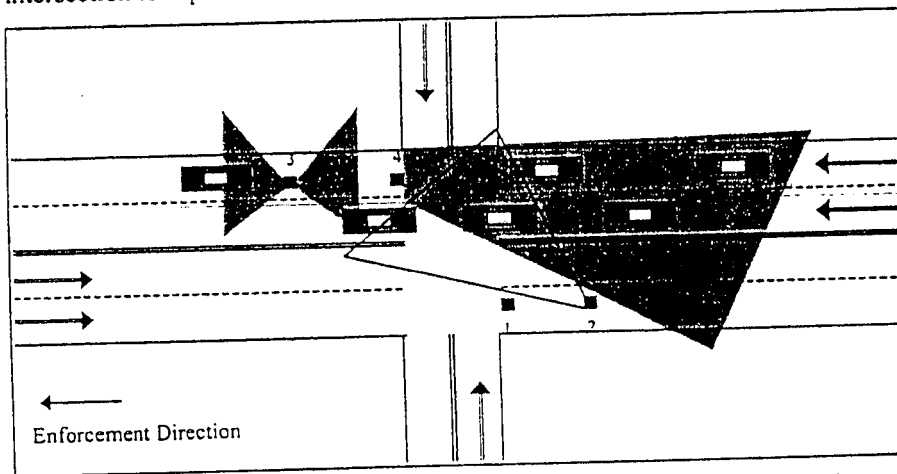


Figure 15 Four Cameras Monitoring Two Directions Providing Front, Rear and Close-up Views
Cameras 2 and 3 automatically adjust fields of view depending on the direction of travel being monitored for enforcement. Monitoring direction determined by software scheduling program.

Here's how it works. As Figure 15, shows, the "bi-directional" CrossingGuard installation monitors violations in the labeled enforcement direction by using camera 1 as the Tracking Camera, camera 2 as the Violation Close-up Camera, and camera 3 as the traffic Signal View Camera, looking across the road to provide a view of the violating vehicle and traffic signal head in the enforcement direction as the driver sees it. To monitor travel in the