
Automated Speed Enforcement Implementation and Lessons Learned

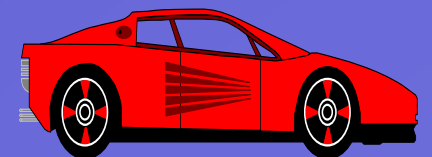
Captain Tom Didone
Montgomery County (MD)
Department of Police

Be Careful What You Wish For !



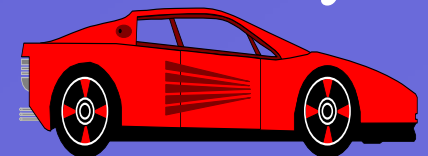
Historical Perspective

- ◆ Door step community for Washington, DC
- ◆ Law passed over Governor's veto
- ◆ Existing Photo-Red-light program
- ◆ Anticipated three month implementation
- ◆ Actually over a year to go live
- ◆ Lots of lessons learned (learning)



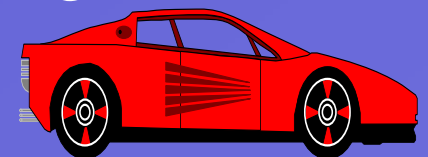
Legislation

- ◆ Residential Roads and/or School Zones
- ◆ Maximum posted speed limit of 35 MPH
- ◆ Violations begin at 11MPH above limit
- ◆ Fixed or Mobile speed monitoring system
- ◆ Rear photography (owner presumed operator)
- ◆ Civil penalty (fine) not to exceed \$40.00
- ◆ Revenues dedicated to Public/Pedestrian Safety



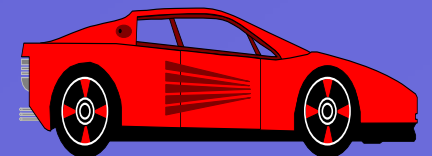
Timeline

- ◆ April 2005 Legislation passed General Assembly
- ◆ May 2005 Governor vetoes legislation
- ◆ January 2006 G/A overrides veto
- ◆ August 2006 RFP issued
- ◆ February 2007 Contract awarded
- ◆ May 2007 Cameras go-live
- ◆ December 2007 became self-sustaining



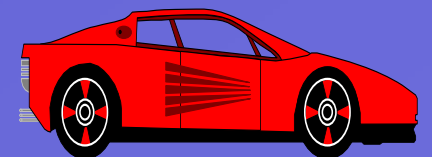
Implementing Programs

- ◆ Traffic Safety Initiative
- ◆ Manage Public and Political expectations
- ◆ Law Enforcement Agencies MUST Manage the Program
- ◆ Understand effective programs will change behavior and need constant review
- ◆ Self-sustaining



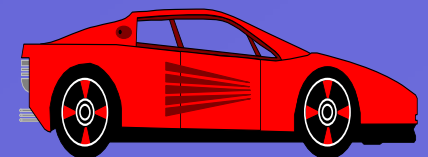
Politics & Public Opinion

- ◆ Programs need to be insulated from political will and revenue concerns thus being solely focused on changing behavior.
- ◆ Understand that public opinion will always challenge the integrity and focus of the program so plan on operating in the spotlight.



NHTSA

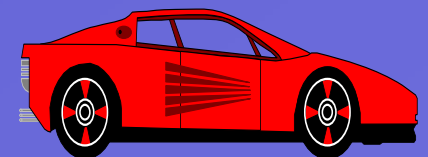
- ◆ Model Community Speed Control Program
 - Developed to maximize the impact of speed enforcement and gain widespread community support.
- ◆ Four Major Phases
 - Crash and Speed Assessment
 - Community Awareness
 - Systematic Speed Enforcement
 - Program Evaluation



Assessment

◆ **Crash and Speed Assessment**

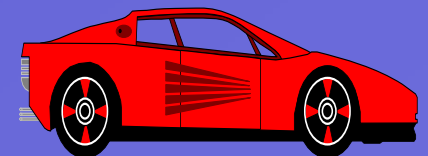
- Analysis of Crash Data
- Review of Speed Limits
- Collecting baseline traffic data utilizing stealth pads or other non-obvious technology
- Citizens prior requests



Assessment

◆ Site Selection Criteria

- Primary Residential or School Zone
- Traffic Safety Factors
 - Speed Endangerment
 - Accident Endangerment
 - Pedestrian Proximity
 - Traffic Volume
 - Roadway Design
 - Operational Factors

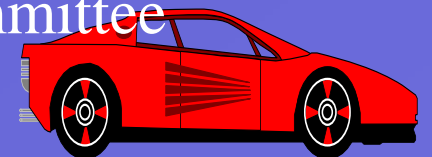


Awareness

◆ Community Speed Problem

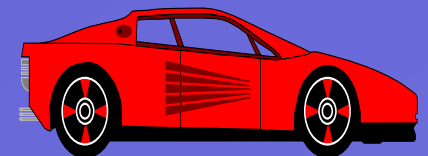
■ Utilization of Advisory Boards

- Community
- School
- Traffic Supervisors
- Government & Non-Profit Traffic Organizations
- Law Enforcement Executive Steering Committee



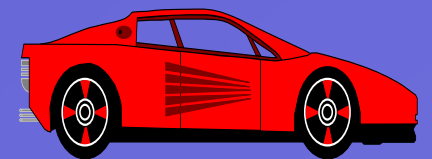
Awareness

- ◆ **Community Speed Problem**
 - Public Awareness Campaign
 - Educate and Inspire Community
 - Seek Voluntary Compliance
 - Demonstrate a Fair and Equitable Program
 - Include Police Officers and Unions



Enforcement

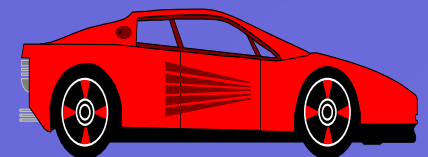
- ◆ **Systematic Speed Enforcement**
 - Combination Mobile and Fixed Operations
 - Prioritized Locations
 - Slow Grown and Sustained Efforts
 - Traditional Enforcement Enhances Effectiveness



Evaluation

◆ Program Evaluation

- Speed Assessment
- Crash Data
- Public Awareness
- Independent Evaluation



Operations

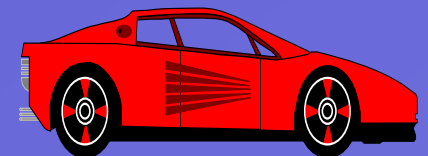
- ◆ Employees

 - 28 total employees including: technicians, approvers, supervisors, a manager and an accountant

- ◆ 30 fixed poles and 6 mobile vans working day/evening shift

- ◆ 88 active enforcement sites

- ◆ Self sustaining in 7 months



Warfield Rd @ Goshen Elementary

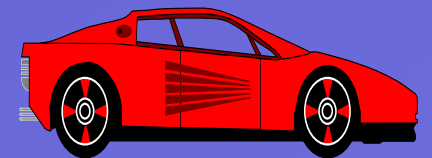
Primary Residential, Posted 30 mph, One Lane per Direction, School Zone (Goshen Elementary)



East Bound from Goshen Elementary

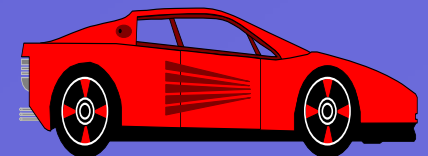


West Bound from Goshen Elementary



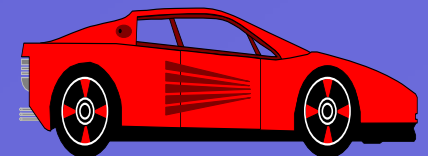
Facilities

- Office space for back office operations
- Computer connectivity – fiber
- Customer service
- Garage space for field operations
- Technical - electrical needs
- Roll call – meeting - downloads



Marketing

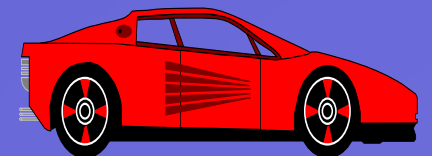
- ◆ Goal: to heighten public awareness and seek voluntary compliance
 - Tell people early and often
 - Utilize a PR firm when possible
 - Various means of advertising
 - Internet Electronic
 - Print Bus – Subway
 - News Community forum
- ◆ Vendor supported financing



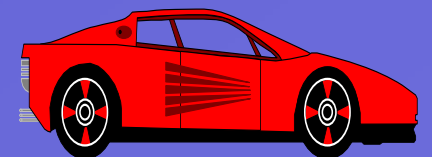
Working with Government Agencies

Get involved early and establish buy-in

- ◆ Motor Vehicle Administration
- ◆ Court
- ◆ State Highway Administration
- ◆ Elected Officials

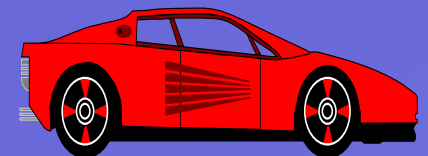


Working with Vendors



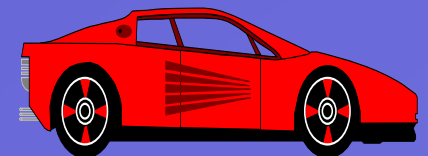
Working With Vendors

- ◆ Service Provider Only
- ◆ Define deliverables (in detail)
 - Equipment (turn key vs. owned assets)
 - Schedules (Phase Management)
 - Pricing (fixed fee vs. per paid citation)
 - Compliance (incentives vs. liquidated damages)
- ◆ Plan for Today & the Future



Interviewing Automated Enforcement Companies

- ◆ Years in Operation
- ◆ Outsource any operations Full Service Provider
- ◆ PI & E (Marketing)
- ◆ Impact to Roadways/Construction
- ◆ Additional Costs – Hidden Costs
- ◆ Contracts locally/nationally
- ◆ Reputation in the industry
- ◆ Fee Structure (Is it in accordance to law)
- ◆ Technology/Flash
- ◆ Payments



and God said,

$$E = hf = hc/\lambda, \quad eV_0 = hf - W, \quad E = mc^2, \quad E^2 = P^2c^2 + m^2c^4, \quad \Psi(x, t) = \int_{-\infty}^{\infty} A(k) e^{i(kx - \omega t)} dk,$$

$$p = h/\lambda, \quad \Psi(x, t) = e^{i(kx - \omega t)} \int_{-\infty}^{\infty} A(k) e^{i(kx - \omega t) - (kx - \omega t)} dk, \quad v = \left(\frac{d\omega}{dk} \right)_x, \quad E = p^2/2m,$$

$$\Psi(x, t) = e^{i(kx - \omega t)} \int_{-\infty}^{\infty} A(k) e^{i(kx - \omega t) - (kx - \omega t)} dk, \quad v = \left(\frac{d\omega}{dk} \right)_x, \quad \hbar \omega e^{i(kx - \omega t)} = \frac{\hbar^2 k^2}{2m} e^{i(kx - \omega t)}$$

$$E = \hbar^2 k^2 / 2m, \quad E = \hbar \omega = \hbar^2 k^2 / 2m, \quad m_{rel} = \frac{m}{\sqrt{1 - v^2/c^2}}, \quad \frac{\hbar^2}{2m} \frac{\partial^2 \Psi}{\partial x^2} = \hbar \frac{\partial \Psi}{\partial t}$$

$$\frac{\partial^2 \psi}{\partial x^2} + \frac{2m(E - V)}{\hbar^2} \psi = 0, \quad k^2 = \frac{2m(E - V)}{\hbar^2}, \quad \lambda = \frac{h}{\sqrt{2m(E - V)}}, \quad E = \frac{1}{2} \hbar^2 k^2$$

$$E\psi = -\frac{\hbar}{2m} \left(\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} \right) - \frac{2e^2}{4\pi\epsilon_0 r} \psi, \quad J = \nabla \times H, \quad \frac{d^2 x}{dt^2} + \frac{k}{x} x = 0$$

$$J = \frac{1}{r \sin \theta} \left[\frac{\partial H_\phi \sin \theta}{\partial \theta} - \frac{\partial H_\theta}{\partial \phi} \right] \bar{a}_r + \frac{1}{r} \left[\frac{1}{\sin \theta} \frac{\partial H_r}{\partial \phi} - \frac{\partial (r H_\phi)}{\partial r} \right] \bar{a}_\theta + \frac{1}{r} \left[\frac{\partial (r H_\theta)}{\partial r} - \frac{\partial H_r}{\partial \theta} \right] \bar{a}_\phi$$

$$-\frac{\hbar^2}{2m} \left(\frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2} \right) + V\psi = E\psi, \quad V = -\frac{e^2}{4\pi\epsilon_0 r} = \frac{e^2}{4\pi\epsilon_0} \frac{1}{\sqrt{x^2 + y^2 + z^2}}$$

$$\nabla^2 V = \frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial V}{\partial r} \right) + \frac{1}{r^2 \sin \theta} \frac{\partial}{\partial \theta} \left(\sin \theta \frac{\partial V}{\partial \theta} \right) + \frac{1}{r^2 \sin^2 \theta} \frac{\partial^2 V}{\partial \phi^2}, \quad J = \lim_{\Delta S \rightarrow 0} \frac{\oint H \cdot d\vec{l}}{\Delta S_z}$$

$$\nabla \cdot D = \frac{1}{\hbar_1 \hbar_2 \hbar_3} \left[\frac{\partial}{\partial u} (\hbar_2 \hbar_3 D_u) + \frac{\partial}{\partial v} (\hbar_3 \hbar_1 D_v) + \frac{\partial}{\partial w} (\hbar_1 \hbar_2 D_w) \right]$$

$$P_\theta = \int_{\omega} \frac{1}{\sigma^2} J_\theta dV = \int_0^a \int_0^{2\pi} \int_0^\pi \frac{4\sigma V_0}{\left[r \ln \left(\frac{b}{a} \right) \right]^2} \sin^2 \beta z \sin^2 \omega t r^2 \sin \theta dr d\theta dz = \frac{4\pi\sigma V_0^2}{\ln^2 \left(\frac{b}{a} \right)} \left(1 - \frac{\sin 2\beta l}{2\beta} \right) \sin^2 \omega t$$

$$J_n(z) = \sum_{m=0}^{\infty} \frac{(-1)^m z^{m+\nu}}{m! \Gamma(m+\nu+1) 2^{-m+\nu}}, \quad J_{-n}(z) = \sum_{m=0}^{\infty} \frac{(-1)^m z^{-m+\nu}}{m! \Gamma(m-\nu+1) 2^{-m+\nu}}$$

$$\oint E \cdot d\vec{l} = emf = -\int \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}, \quad \oint H \cdot d\vec{l} = I = \int \left(J_r + \frac{\partial \vec{D}}{\partial t} \right) \cdot d\vec{s}, \quad \oint \vec{D} \cdot d\vec{S} = Q = \int \nabla \cdot \vec{D} dV$$

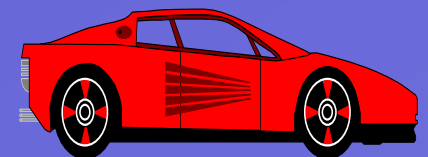
$$E_r = \frac{J_0 e^{-\nu}}{4\pi} \left(\sqrt{\frac{\mu}{\epsilon}} \frac{2}{r^2} + \frac{2}{j\omega \sigma^2} \right) \cos \theta, \quad E_\theta = \frac{J_0 e^{-\nu}}{4\pi} \left(\frac{j\omega \mu}{r} + \sqrt{\frac{\mu}{\epsilon}} \frac{1}{r^2} + \frac{1}{j\omega \sigma^2} \right) \sin \theta$$

$$E(r, \theta, t) = \frac{-\omega \mu J_0}{4\pi r} \sin \theta \sin(\omega t - \omega r \sqrt{\mu\epsilon}) \bar{a}_\theta, \quad H(r, \theta, t) = \sqrt{\frac{\epsilon}{\mu}} E \bar{a}_\phi, \quad \gamma = j\omega \sqrt{\mu\epsilon} \dots$$

and there was light.

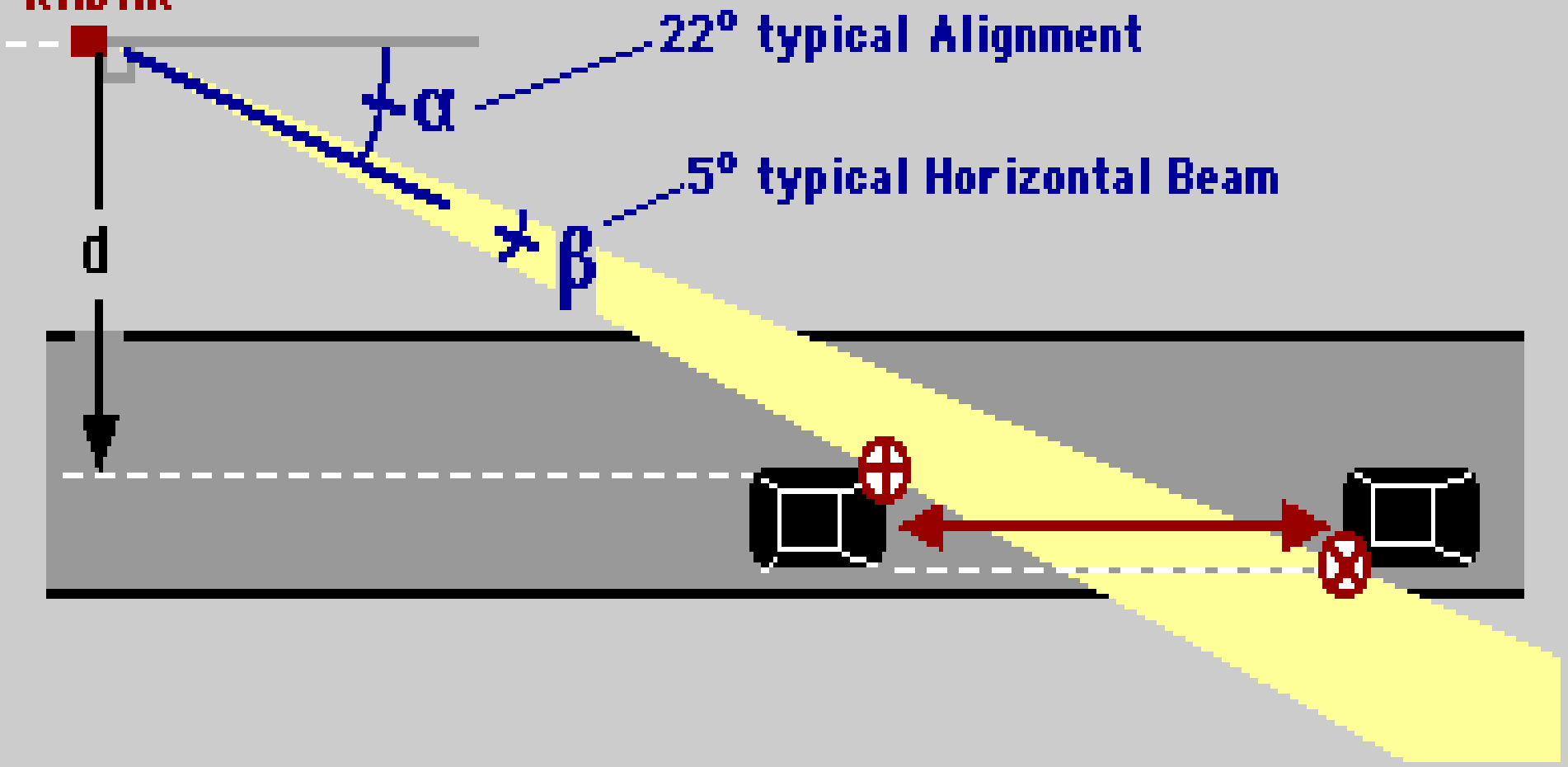
Front End System

- ◆ Effectiveness
- ◆ Accuracy – Fairness
- ◆ Ease of use
- ◆ Image format
- ◆ Evidence trail
- ◆ Turn key operation



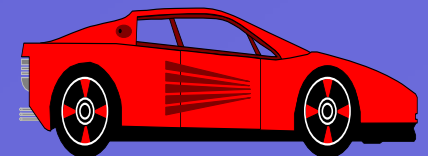
Across the Road Photo Radar

RADAR



Across the Road Photo Radar

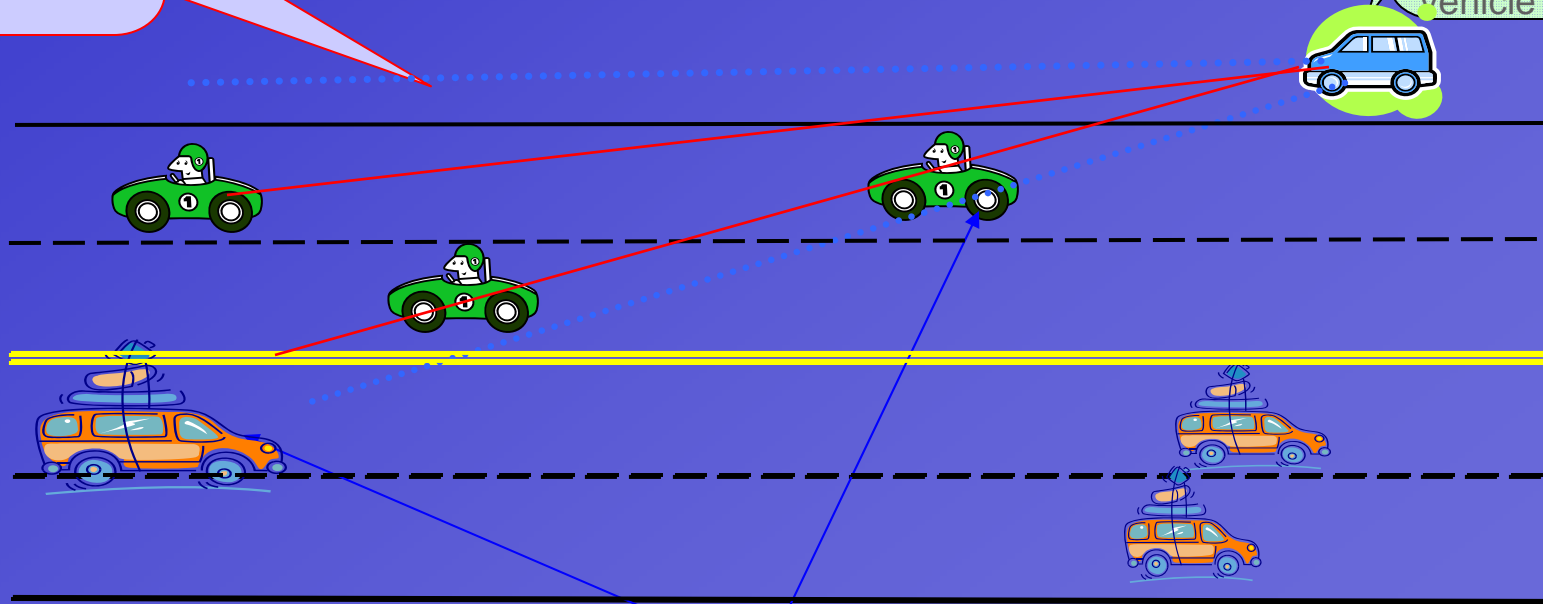
- ◆ **ACROSS THE ROAD** (photo or safety) radars are designed to point a narrow beam (typically 5 degrees) across the road at an angle -- instead of down the road. The beam cannot cross the road at anything close to 90 degrees but something much less (typically about 22 degrees). The main beam of the radar paints only a small portion of the road. These systems, if designed properly, account for the Cosine Effect angle (based on alignment angle and beam width) and adjust (upward 6% to 9% for a 5° beam aligned at 22°) measured target speed.



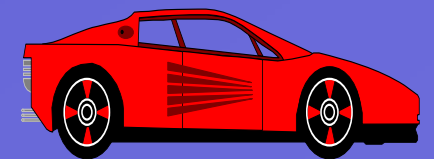
Radar Automated Speed Detection (Which Vehicle is Targeted?)

Radar capture used to target vehicle's speed

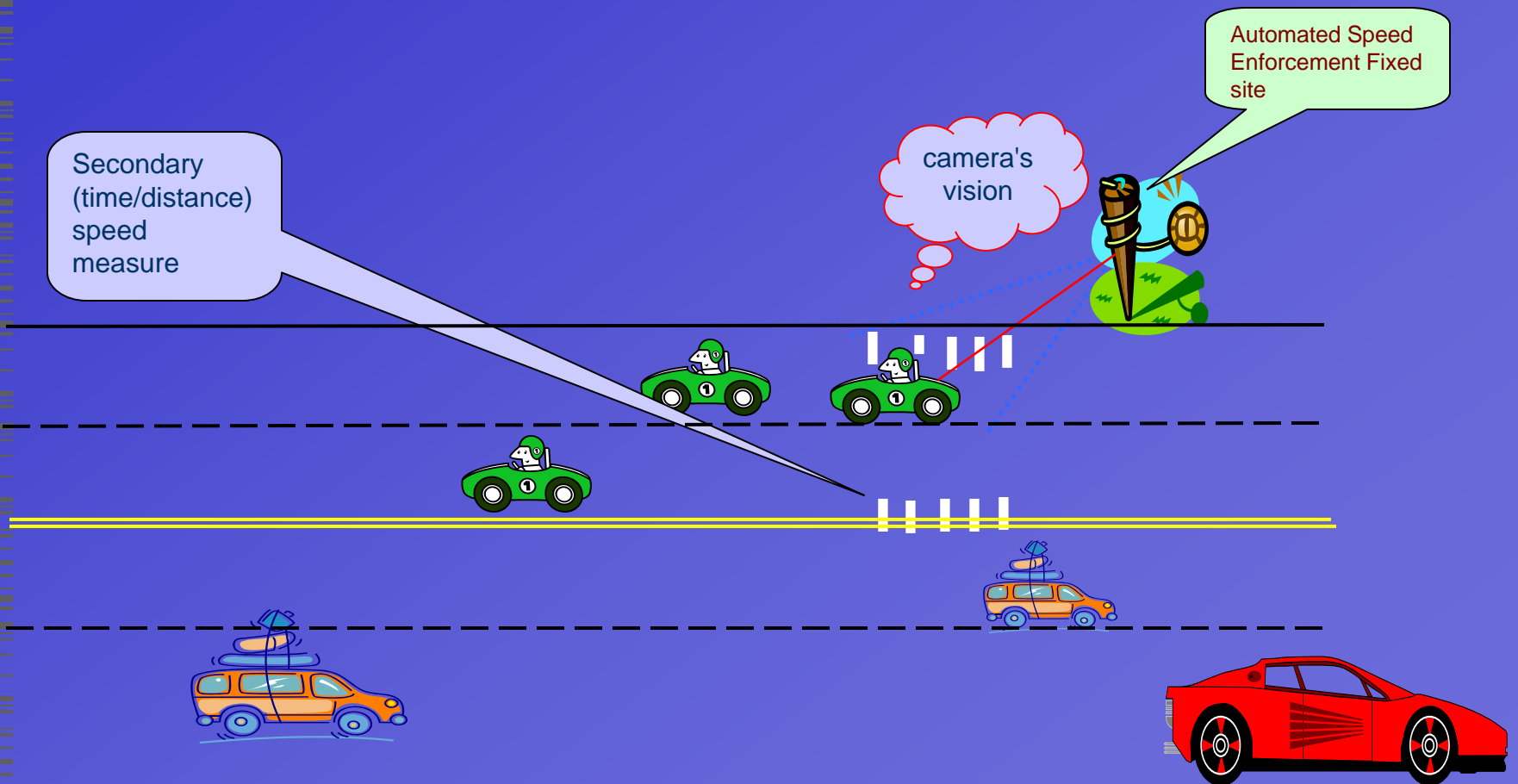
Automated Speed Enforcement vehicle



Vehicles in detection zone

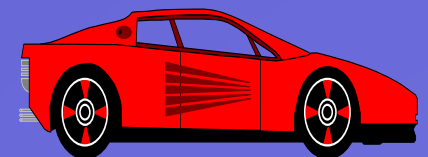


Laser Automated Speed Detection (Stationary or "Fixed" Units)



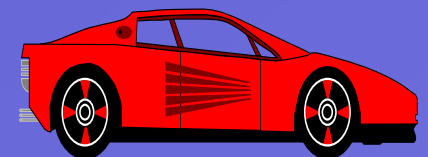
Back Office Systems

- ◆ User friendly
- ◆ Web based
- ◆ Robust data system
- ◆ Audit trail
- ◆ Share data with existing systems
- ◆ Supports online payment and customer service



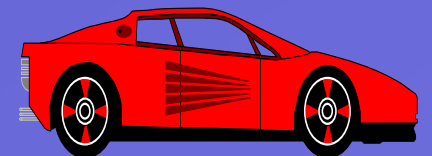
Lessons Learned

- ◆ Do not reinvent the wheel
- ◆ Establish realistic timelines but streamline RFP process as much as possible
- ◆ Only consider IACP approved vendors
- ◆ Insist on a demonstration as part of the selection process
- ◆ Expect Union/officer resistance



Summary

- ◆ Automated enforcement can effectively change behavior [decrease speeding] which will ultimately decrease collisions and improve the quality of life in communities.
- ◆ Traffic Safety must serve as the cornerstone of any Photo-Speed program.
- ◆ Effective program management is necessary for a successful initiative.



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