Research and Technology Review

NEVADA DOT

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Jim Gibbons, Governor

Susan Martinovich, P.E., Director

Contents:

Feasibility of using Video Cameras for Automated Enforcement on Red Light Running and Managed Lanes

By Zong Tian, Principal Investigator

Transportation systems in the State of Nevada continue to face many challenges in dealing with traffic safety and traffic congestion. There are two areas that Nevada Department of Transportation (NDOT) has been focusing on: reducing traffic crashes at signalized intersections by installing red light running cameras; and reducing freeway congestion by implementing managed lane strategies such as High-Occupancy Vehicle (HOV) lanes. Several critical issues must be addressed before NDOT can make strategic decisions on possible application of video cameras for enforcement purposes. Therefore, the overall objective of this study is to evaluate the feasibility, effectiveness, legality, and public acceptance aspects of automated enforcement on red light running and HOV occupancy requirements using video cameras in Nevada.

A comprehensive literature review showed that a preponderance of evidence confirms that the use of camera enforcement is highly effective in reducing red light violations and right-angle injury crashes related to red light running, while red light camera enforcement might result in an increase of rear end crashes. The technical feasibility indicated that there were proven technologies to ensure reliable results in the red light camera enforcement. However, none of the research to-date has identified a system that is effective and reliable enough to be implemented as a primary HOV occupancy enforcement strategy due to inherent difficulties.

Public polls of Nevada residents indicated that most of the 1,833 respondents (approximately 63%) polled would support the automated enforcement cameras in Nevada, while a smaller percentage of the respondents (21%) would oppose it. Forty-three percent of 1,163 respondents on average indicated that they would support the photo HOV occupancy enforcement; while 28% of the respondents would oppose it. Most agencies from the agency survey indicated that key steps for gaining success in red light camera enforcement include several issues, such as public education, media campaign, accident statistics, revenue sharing, selecting intersections, selecting technologies and vendors.

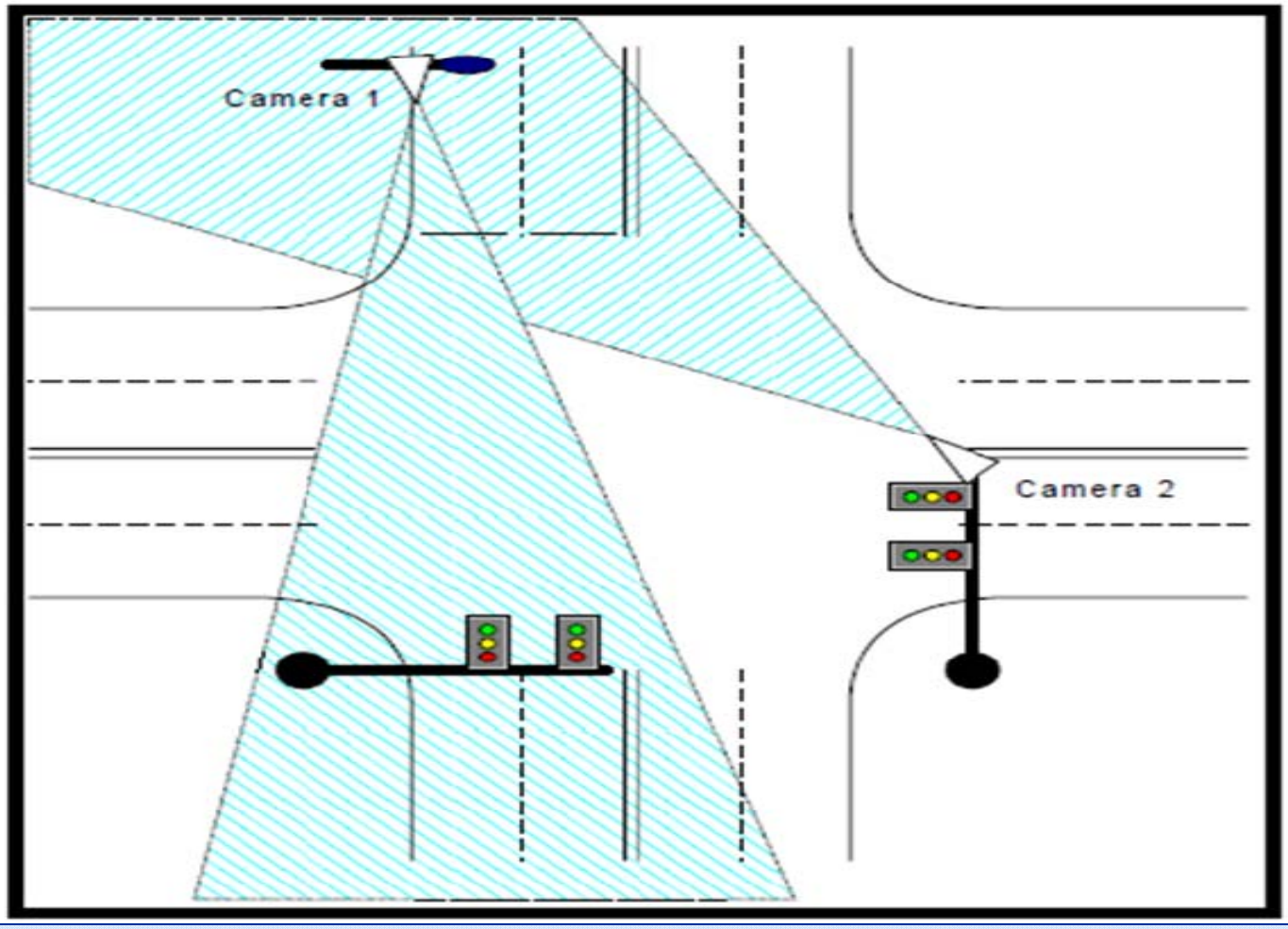
(Continued on page 2)

(Continued From page 1)

On average, the violation rates in the northbound HOV lane on I-95 in Las Vegas were 34 % during the AM peak hours and 53 % during the PM peak hours. The violation rates in the southbound HOV lane were 28 % during the AM peak hours and 24 % during the PM peak hours. The violation rates in both HOV lanes were much higher than the national average of approximately 12 %.

Three-year traffic accident data (between 2005 and 2008) acquired from NDOT revealed that, for the 52 high crash locations in the Reno-Sparks area, red-light running related accidents account for about 22% of all crashes. For the 284 high crash intersections in Clark County, red-light running related accidents are about 26%.

Based on the overwhelming success of other states and good support from Nevada's residents, pilot installations and tests of red light running camera systems are recommended at selected intersections where high violations and high right-angle crashes exist. Considering inherent difficulty of photo HOV occupancy enforcement technology, and the relatively low support from Nevada's residents, video camera systems are recommended as supplemental measures for reducing HOV occupancy violations if HOV lanes are used.



Typical positions of cameras for enforcing red-light running

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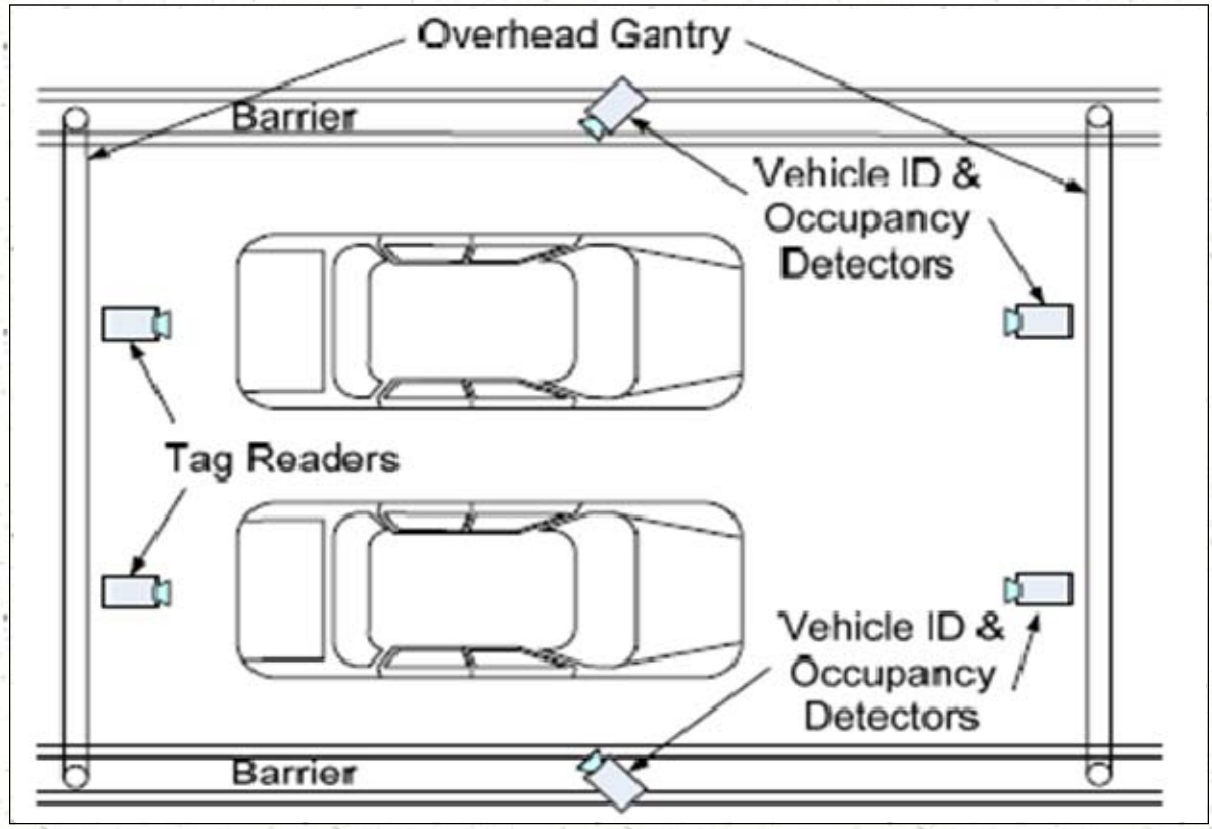

Fully automated vehicle occupancy detection system

New Face in Research

Amanda Swaim

Amanda recently joined the research division of NDOT as a construction aid to assist in the different programs in the section for the coming six months. Amanda grew up in Reno, NV and attended TMCC in the Graphic Communications Department. She also attended IATD in Henderson, NV for Fashion Design. Amanda has experience in retail business and customer service. Amanda spends most of her free time with family and enjoys many outdoor activities. Amanda believes in working hard and to do her best in duties assigned to her. We are pleased to welcome Amanda to our team.

Historical Snapshot:
A Glance into Nevada Roads Past

Pictures speak for themselves. They bridge the past, the present and the future. The following pictures exemplify past roads of Nevada, showing where we were. Such pictures allow us to remember the past as we plan for the future.

1. Top left; Unknown Nevada road, date circa 1850. 2. Top right; Welcome to Nevada sign, date unknown. 3. Right; Cave Rock Nevada, 1930. 4. Bottom left; Historic Road in Washoe Valley, date unknown. 5. Bottom middle; Truck on unknown Nevada road, 1919. 6. Bottom right; State of Nevada Department of Highways Safety Division billboard, 1938.

NDOT's Research Library Catalog (EOS Web.Express)

Registration for NDOT Employees

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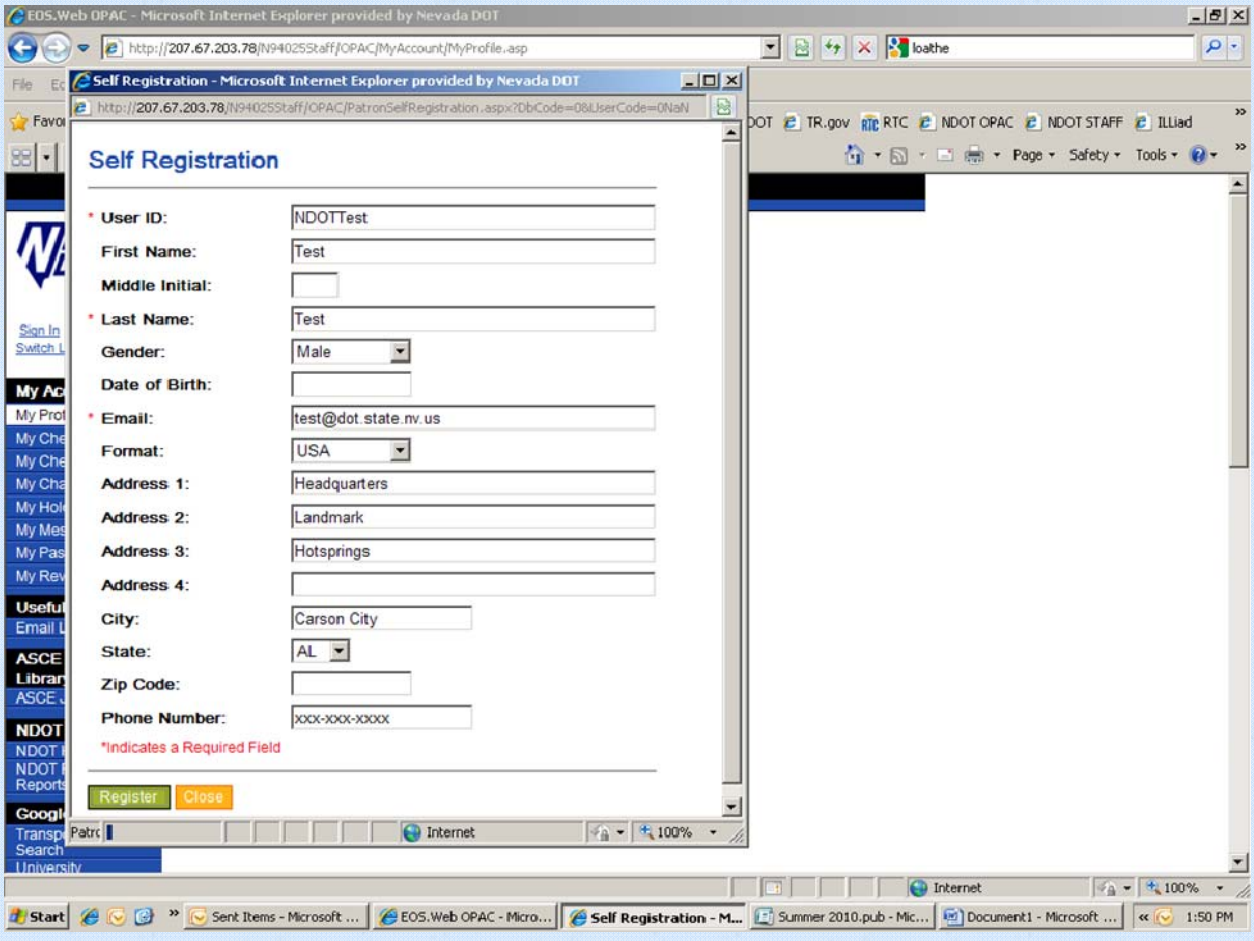
Note: If you have used the library to check out an item in the last 2 months you are probably already registered in the new catalog. You should try logging on with your work email (example: sloyd@dot.state.nv.us) as your user ID and password. If this does not work proceed to Register Now.

Register Now:

Once you click on register now, a self registration box should appear. Here you will want to create a User ID that you will remember and for now your password will also be your User ID (As per the example below, the User ID is NDOTTest and the Password is NDOTTest). You will also need to fill in your last name (and preferably your first name), email address and phone number. Please also change the state to NV. Once the information you wish to include has been entered, please click on the green Register button. You should then see a message that the registration is complete and your profile will appear.

Congratulations, you will now be able to search the NDOT Research Library catalog and place items you would like on hold directly from your workstation. If you would like help registering, placing holds or searching the catalog , please contact Sena Loyd, Research Librarian, @ 775-888-7895, or sloyd@dot.state.nv.us.



!!!IMPORTANT!!!: Approving Products and Field Testing Products during Contracts

NDOT has a policy for approving products and/or field testing products during contracts. Research encourages the policy be followed and that the activities and results are communicated to the Product Evaluation Coordinator at (775) 888-7894 or rclewell@dot.state.nv.us. This ensures uniformity and avoids redundancy in evaluation activities.

PRODUCT EVALUATION COMMITTEE MEETING

By Roma Clewell

The Product Evaluation Committee (PEC) met on June 1, 2010. The meeting covered the following information:

Emergency Vehicle Optical Detector System

The PEC voted to remove Qualified Products List (QPL) category 623.02.29 Emergency Vehicle Optical Detector System from the QPL because only two product options are available. The options require specific software and hardware, so it was suggested that these products be called-out through the Special Provisions option.

Aggregate

The PEC voted to remove Manufacturer Mineral Company's aggregate from the QPL category 496.02.01 Aggregates because the aggregate source changed and the aggregate no longer meets the minimum qualifications. An alternate aggregate source has been located, but the testing criteria will take approximately a year before qualification can be determined.

Concrete Stain and Concrete Paint

The PEC voted to create two QPL categories: one category will be 502.02.04 Concrete Stain and the other category (number still to be determined) will be for Concrete Paint. This will assist the Nevada Department of Transportation (NDOT) to ensure that product is placed that is the most cost effective and relevant to the structure. Concrete Paint is primarily used for large structures and where graffiti may occur and the treatment would require re-painting of the structure. Concrete Stain is most often used in conjunction with a permanent treatment and/or in conjunction with anti-graffiti treatments.

Changeable Message Signs and Intelligent Changeable Message Signs

The PEC voted to create two QPL categories: one category will be 625.02.03a Changeable Message Signs and the other category is 625.02.03b Intelligent Changeable Message Signs. NDOT is moving toward the Intelligent Changeable Message Signs, but there are still instances where a static system is more appropriate. The Intelligent Changeable Message Signs will also have remote access capabilities that make the set-up of the systems more efficient. Some of these systems can even be programmed to adjust messages according to traffic flows and accident data.

CHANGEABLE MESSAGE SIGNS

Changeable Message Systems (CMS), also called dynamic or variable message signs, were developed to convey timely and important information to the traveling public. Only a limited amount of information can be displayed safely and effectively; therefore the message displayed must be readable and understandable by motorists in the short amount of time the changeable message can be viewed.

How and when were changeable message systems developed? During the 1920s, Triangle Motion Sign Company used fourteen slow moving louvered sections to display three different messages. This innovative idea was discarded due to maintenance difficulties. Thirty years later the concept was revived through the use of changeable message billboards (Continued to Page

(Continued from Page 6) .

As the changeable message billboards idea caught on, the first federal law was enacted in 1958 establishing voluntary controls for signs along the Interstate Highway Systems. To sweeten the deal, “bonus agreements” were provided to a state in the amount of one-half of one percent of the highway construction costs in exchange for controlling the number and types of signs used along freeways. This was followed by the Highway Beautification Act (HBA) of 1965 subjecting states not complying with mandatory outdoor advertising controls to a 10% reduction in their federal-aid highway apportionment. This act was amended in 1978 specifically allowing on-premise signs to be changed at reasonable intervals.

In the early 1970’s Victorian CRB or “Vic Roads” on the South Eastern Freeway, used a changeable message sign made from neon tubes and provided three message choices: Freeway Closed, Accident on Freeway, and Road works on Freeway and was controlled at the sign. If the message was not needed, the sign was left blank.

Ten years later Wink-O-Matic formally developed a changeable message sign using small 25w, 110v light globes and a large diesel engine to operate the sign. These units were expensive and the high maintenance of the signage still had not been addressed. Another company, Addco, used Fultron flip dots where one side was black and the other side was florescent green. The flip dots were activated by an electromagnetic device filed to flip the dots. Eight characters and three lines, lit at night by ultra violet fluorescence tubes, provided nighttime messaging options.

Further changes by such companies as Precision Solar Controls who developed an all LED changeable message sign, or PSC’s manufactured special frensal lens provided more messaging options, character developments, and better lighting designs. States have recognized that the changeable message signs can provide weather information, traffic data, alternate detours and route directions, identify road hazards and changes in speed limits, and more. Real-time information, such as American Signal Company offers, suggests responses for motorist who are commuting to work or traveling through work zones.

Engineers have options other than static sign technology and can control the changing information through a central system controller via roadside remote stations and wireless communication technology. The central system controller processes the traffic condition information, formulates the proper response(s), transmits, via the wireless subsystem, the condition and response information to the appropriate upstream display. By providing real-time, time-stamped, credible motorist information, the system successfully reroutes and/or slows traffic as the traffic approaches work zone congestion and delay areas. Thus accidents and travel stress is reduced.

Continued studies are being conducted to determine the best font, font height, message colors/contrasts, site distance and more to most effectively communicate with drivers in the safest manner.

Changeable message signs will continue to play a significant role in communicating valuable information to the commuting public.

Library Corner:

ASCE Journal Publications Electronic Access

After giving me your glorious input, we have decided to try online access for all ASCE Publications. This library of journals will be accessible at each of your workstations authenticated by IP Address (NDOT employees only). This means that by accessing this URL (http://www.ascelibrary.org/) you will have access to approximately 73,000 papers. If you have any trouble accessing or finding the specific information you are seeking, feel free to contact Sena Loyd, NDOT Librarian, at 775-888-7895 or sloyd@dot.state.nv.us.

Construction / Materials
- Composites for Construction
- Construction Engineering and Management
- Materials in Civil Engineering

Engineering Mechanics
- Engineering Mechanics
- Nanomechanics and Micromechanics

Environment and Water Resources
- Environmental Engineering
- Hazardous, Toxic, and Radioactive Waste Management
- Hydraulic Engineering
- Hydrologic Engineering
- Irrigation and Drainage Engineering
- Water Resources Planning and Management

Geotechnical Engineering
- Geomechanics
- Geotechnical and Geoenvironmental Engineering

Management / Professional Issues / Legal Affairs
- Leadership and Management in Engineering
- Legal Affairs and Dispute Resolution in Engineering and Construction
- Management in Engineering
- Professional Issues in Engineering Education and Practice

Structural Engineering
- Bridge Engineering
- Structural Design and Construction
- Structural Engineering

Transportation and Urban Development
- Infrastructure Systems
- Transportation Engineering
- Urban Planning and Development

Waterway, Ports, Coasts, and Oceans
- Waterway, Port, Coastal, and Ocean Engineering

Other Technical Areas
- Aerospace Engineering
- Architectural Engineering
- Cold Regions Engineering
- Computing in Civil Engineering
- Energy Engineering
- Natural Hazards Review
- Performance of Constructed Facilities
- Pipeline Systems Engineering and Practice
- Surveying Engineering

About NDOT's R&T Review

The NDOT Research Section administers the Department's research, development and technology transfer program and serves as the "clearing-house" for product evaluations.

Research and Technology Review is published quarterly by the NDOT Research Section. Its purpose is to provide the latest information on the NDOT research activities including product information and other pertinent research topics.

If you have comments or need additional information regarding any of the topics discussed in this issue, please contact the Research Section.

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