SCHOOL OF
CIVIL ENGINEERING

INDIANA

DEPARTMENT OF TRANSPORTATION

JOINT HIGHWAY RESEARCH PROJECT

FHWA/IN/JHRP-94/5
Final Report

INSTITUTIONAL ISSUES RELATED TO
THE APPLICATION OF INTELLIGENT
VEHICLE-HIGHWAY SYSTEMS TECH-
NOLOGIES TO COMMERCIAL VEHICLE
OPERATIONS IN INDIANA

James G. Kavalaris
Kumares C. Sinha

PURDUE UNIVERSITY

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Conducted in cooperation with the
Indiana Department of Transportation
and

Federal Highway Administration

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views of policies of the Federal Highway Administration and the Indiana Department of Transportation. This report does not constitute a standard, specification or regulation.

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16. Abstract The study focused on potential barriers and opportunities to implementing Intelligent Vehicle-Highway System (IVHS) technologies to Commercial Vehicle Operations (CVO) in Indiana. Specific concepts included: (1) Automatic payment of tolls while driving at mainline speeds; (2) Pre-Clearance of vehicles and drivers past weigh stations; (3) "One-Stop-Shopping" for licenses, registrations, and permits; and (4) Transparent state borders. The study reviewed existing laws and policies applying to commercial vehicles operating in Indiana; prepared an inventory of the agencies responsible, their existing procedures, their physical facilities, and their human resources used to implement these regulations; itemized present impediments preventing the implementation of IVHS-CVO under current Indiana State Laws; and suggested future phased-in modifications to the present systems for effective IVHS-CVO implementation. The study also included a comprehensive statewide survey examining IVHS-CVO perceptions, needs, and concerns from the perspective of interstate motor carriers based in Indiana. Specific survey issues included how motor carriers perceive IVHS-CVO concepts would affect their current operations; what data items motor carriers are willing to have electronically stored within automatic vehicle identification (AVI) transponders; what type of weigh-station pre-clearance information storage do motor carriers prefer (i.e. centralized database or data stored within a transponder); how willing motor carriers are to participating in a "Gold Card" pre-certification process for weigh-station pre-clearance; what type of automatic toll collection system do motor carriers prefer (i.e. debit system or credit system); how willing motor carriers are to paying additional tolls to help cover costs of building bypass lanes next to existing toll plazas for AVI-equipped vehicles to automatically pay tolls while driving at mainline speeds; and the degree to which motor carriers feel IVHS-CVO implementation will lead to a more or less "level playing field" between motor carriers. Finally, recommendations were made for near-term, mid-term, and long-term courses of action.			
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LIST OF ABBREVIATIONS

AASHTO	American Assoc. of State Highway and Transportation Officials
AVC	Automatic Vehicle Classification
AVI	Automatic Vehicle Identification
CDL	Commercial Driver's License
CVO	Commercial Vehicle Operations
CVSA	Commercial Vehicle Safety Alliance
DOT	Department of Transportation
FHWA	Federal Highway Administration
HELP	Heavy-vehicle Electronic License Plate
IAC	Indiana Administrative Code
IC	Indiana Code
ICC	Interstate Commerce Commission
IFTA	International Fuel Tax Agreement
IRP	International Registration Plan
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
IVHS	Intelligent Vehicle-Highway Systems
LTL	Less Than Truckload
MCIS	Motor Carrier Information System
NARUC	National Association of Regulatory Utility Commissioners
USDOT	United States Department of Transportation
VIN	Vehicle Identification Number
WIM	Weigh-In-Motion

EXECUTIVE SUMMARY

Introduction

Trucking is a key component of Indiana's diverse economy. Whether hauling \$4.93 billion worth of commodities from the state's 65,000 family farms, or transporting 155 million tons of freight into and out of the state each year, truck-dependent industries encompass almost 68,000 Indiana businesses, employ approximately 1.37 million people (65% of Indiana's workers), and utilize over 15,700 miles of state and federal roads that connect the state's economic centers. This study identified institutional barriers that could prevent the implementation of Intelligent Vehicle-Highway Systems (IVHS) technologies to Commercial Vehicle Operations (CVO) in the State of Indiana -- concepts that have the potential to help enhance efficiency, increase productivity, and promote safety.

Methodology

The study reviewed existing laws and policies applying to commercial vehicles operating in Indiana; prepared an inventory of the agencies responsible, their existing procedures, their physical facilities, and human resources used to implement these regulations; itemized present impediments preventing the implementation of IVHS-CVO under current Indiana State Laws; and suggested future phased-in modifications to the present systems for effective IVHS-CVO implementation, including outcomes

of a consensus-building workshop with representatives from a broad range of public and private sector interests regarding future directions for IVHS-CVO. In addition, the study included a comprehensive statewide survey examining IVHS-CVO perceptions, needs, and concerns from the perspective of interstate motor carriers based in Indiana. Finally, recommendations were made for near-term, mid-term, and long-term courses of action. This was all done in the context of:

- (a) Automatic payment of tolls (while still driving at mainline speeds) through the use of Automatic Vehicle Identification (AVI) transponders;
- (b) Pre-Clearance of vehicles and drivers past weigh stations through the use of Automatic Vehicle Identification (AVI) transponders, Weigh-In-Motion (WIM) devices, and pre-qualifying safety inspections;
- (c) "One-Stop-Shopping" for licenses, registrations, and permits through increased cooperation and data-sharing between state agencies; and
- (d) Transparent state borders through increased cooperation and data-sharing between adjoining states.

Particular emphasis was also given to achieving uniformity of Indiana laws with those of surrounding states so that the concept of transparent state borders could be realized.

The Existing System

Commercial vehicle operators must currently satisfy many requirements and secure a number of validation plates, stickers, and/or authorizations before ever picking-up or delivering their initial load of

goods. This includes operating authority from either the Interstate Commerce Commission (ICC) in Washington, D.C. (for inter-state carriers) or from the Indiana Department of Revenue (for intra-state carriers); Motor Carrier Fuel Tax Annual Permits and Compliance Emblems for each of their vehicles from the Indiana Department of Revenue; a license plate for each of their vehicles from the Indiana Bureau of Motor Vehicles; and oversize/overweight trip permits (if necessary) from the Indiana Department of Transportation.

To enforce these many requirements, all carriers must stop at each weigh station they encounter, and be subject to random inspection by a state's motor carrier enforcement section (part of the State Police in Indiana) in order to confirm operating credentials; verify weight, fuel tax payments, and other regulatory compliance; and ensure truck safety, including adherence to any applicable hazardous materials transportation requirements.

Existing Concerns

During the initial agency interviews, many concerns were frequently raised regarding Indiana's existing CVO system relative to both its ability to adapt to IVHS technologies, and to its specific needs for new technologies. As highlighted below, these concerns must be addressed in order for the state to fully utilize the potential of IVHS technologies in its CVO operations. In addition, until these elemental computer concerns and data needs are addressed (i.e. truck-related agency computers being able to electronically communicate with each other, etc.), implementation of "high-tech" IVHS-CVO equipment would be premature, since these technologies would have no system to "plug-into".

Computer Hardware / Communications

Most commonly identified were the lack of computer systems able to share data in real-time among state agencies and capable of easily producing various audit and analysis reports. For example, the State Police Motor Carrier Enforcement Division can only contact the Indiana Department of Revenue, Bureau of Motor Vehicles, or Department of Transportation from 8:00am to 4:30pm on Mondays through Fridays for verification of any suspect operating credentials and/or permits. Similarly, it was noted that the mainframe computer used by the Indiana Department of Revenue's Motor Carrier Tax and Authority Section is primarily meant for keeping lists of carriers, insurance, and docket numbers; but does not perform any data processing for reporting purposes. Furthermore, many of the operating authority and other legal files are handled manually because some of the critical steps needed to complete a process are not computerized.

Computer Software

Much of the software that agencies now use is old with limited capabilities. For example, the mainframe-based software that the Indiana Department of Transportation uses to record oversize/overweight permits lacks needed capabilities to automatically produce regular reports about various permitting activities. Agency personnel must systematically take assorted raw-data summaries from this system and manually re-key them into a PC-based spreadsheet package so that data can be analyzed and/or be readily available for placement into departmental reports.

At the Indiana Department of Revenue, their personnel must process 1700 International Fuel Tax Agreement (IFTA) accounts (and growing) with

modified PC-based software that was originally designed to handle only 500 accounts. In addition, unlike the Indiana Bureau of Motor Vehicle's International Registration Plan (IRP) computer system that automatically calculates the amount due for billing to each IRP account based upon annual motor-carrier mileage reports, motor-carriers filing with IFTA must hand calculate all tax (or refund) amounts and any interest/penalties that are due even though they provide quarterly reports listing both mileage traveled and fuel gallons consumed that could be used for automatic calculation and billing by the IFTA computer (if capabilities existed).

Electronic Funds Transfer Constraints

Even though the Indiana Department of Revenue allows electronic funds transfers for tax payments, it has been the Indiana Bureau of Motor Vehicle's experience that electronic funds transfers are restricted by the Indiana State Board of Accounts for motor-carrier registration payments. Bureaucratic requirements make it extremely difficult to set-up accounts that would enable certain IRP carriers to pay their fees electronically.

Application Process Redundancies

Corroborating these agency data concerns are frequent industry complaints that companies must endure much redundancy, added record-keeping, and delays in getting registrations and permit applications processed because many identical pieces of documentation (i.e. proof of insurance, tax payments, etc.) are required to be shown to each state agency that truckers must deal with even though all state agencies dealing with trucking are located in the same building. In fact, most of the information required to establish, renew, or report mileage for an IFTA

account is very similar to the information needed to establish, renew, or report mileage for an IRP account. Similarly, even though motor-carrier insurance requirements at the Indiana Department of Revenue are higher than what INDOT requires for oversize/weight permits, carriers must still file forms that certify proof of insurance to INDOT when applying for these permits because there is no link between the two reporting systems.

Potential IVHS-CVO Concepts

The electronics revolution is providing many new methods to help eliminate those requirements and enforcement procedures that are different enough to create excessive paperwork and delays between states, but are identical enough to be considered redundant activities that add a disproportionate amount of cost relative to their benefits. Several technologies that are highlighted below can eliminate much of this paperwork while still maintaining the original intent of these regulations so that trucking industry productivity can be greatly increased.

- (a) Weigh-In-Motion (WIM) technologies that enable vehicle weights to be determined without the need for a vehicle to stop physically on a static scale;
- (b) Automatic Vehicle Identification (AVI) technologies that uniquely identify vehicles as they pass specific points on the highway (for automatic toll payments, and/or electronic licensing, etc.) without requiring any action by the driver or an observer; and
- (c) Automatic Vehicle Classification (AVC) technologies that automatically determine vehicle length, height, number of axles, and axle spacings for vehicle classification purposes.

These technologies are currently being demonstrated in the following three major operational field tests:

- (a) H.E.L.P./Crescent (an acronym for Heavy-Vehicle Electronic License Plate), is designing and implementing an integrated IVHS-CVO system along a crescent-shaped corridor in the west and southwest United States that is formed by I-5 and I-10. Using interconnected AVI, AVC, and WIM technologies to process all data by a central computer, the goal is to have a system in which a truck entering the system in British Columbia, can drive through the entire network without having to stop at other weigh stations or ports-of-entry;
- (b) Advantage I-75 is a public/private partnership to facilitate motor-carrier operations by allowing transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 and Canadian Highways 401 and 402 (through Ontario and Quebec) at mainline speeds with minimal stopping at weight/enforcement stations through computerized checking of operating credentials in each jurisdiction and pre-clearance decisions at downstream stations based on truck size and weight measurements taken at upstream locations; and
- (c) On-Board Automated Mileage/Stateline Crossing is a system recently started in Iowa, Minnesota, and Wisconsin to test and evaluate the effectiveness of using a Global Positioning System and first generation on-board computers to record the miles driven within a state for fuel tax allocation purposes in a manner that is acceptable to state auditors.

Future System Concerns

Government Issues

While many state regulatory agencies are starting to embrace IVHS-CVO, there is some concern that IVHS development may disproportionately emphasize motor-carrier efficiency at the expense of enforcement agency abilities to effectively maintain highway safety for the public's well-being. For example, enforcement agencies stress that pre-clearance of vehicles and drivers past weigh stations cannot be based on vehicle weight alone, but must also take into consideration various other factors such as proper operating credentials and hours of service records, etc. In addition, caution must be exercised during the implementation of provisions that establish more base-state type registration procedures so as to not circumvent existing state safeguards in regards to liability insurance requirements.

Industry Issues

Preliminary results from IVHS-CVO development studies indicate that substantial industry benefits can be achieved through paperwork reduction measures and travel time savings. However, motor-carrier operators have voiced several concerns that need to be addressed such as well-defined and attainable system goals and objectives, as well as technological standards that will allow for system compatibility and easy expansion.

National Standards

Trucking firms feel that before they enthusiastically participate, all states must first get together and agree on standards, procedures,

rules, regulations, and other items. Carriers feel that many past "national" programs have not lived up to their initial expectations due to one or more states not participating. Carriers only want one AVI-transponder on their vehicles. Motor-carrier operators that were interviewed in the study indicated that they would rather endure "sixteen different paper methods" to handle a given process, rather than having to purchase and maintain "sixteen different AVI transponders" attached to their vehicle.

Motor Carrier Profitability

Trucking companies do not have any intrinsic biases against new technologies such as IVHS -- only biases against additional costs that do not result in increased profits or driver safety. In fact, the industry representatives indicated that many trucking companies have already been investing in various advanced technologies long before the IVHS program was conceived.

Expandable Open System Architecture

Due to already committed investments by some trucking companies in various advanced technologies, many interviewed industry representatives feel that government-specified transponders should not be mandated. Instead, an expandable open system architecture or specific communications protocol should be developed so that carriers who have already spent much money on their own computer systems can just add features to be compatible with an able to communicate with government roadside computers.

Data Security

One mandate some carriers feel necessary, however, is that all transponders or similar data-transfer devices should include a two-way communications capability so that carriers can know who wants to read their transponder, can give permission to that person, and can record who read what data and when they were read. This is felt necessary to help ensure data security and to allow carriers to have a record (for audit purposes) of what data values a government agency is reading in obtaining information for calculating such items as tolls and taxes.

Level Playing Field

Above all, industry concerns all relate to its long-time demand for fairness: IVHS-CVO must ensure a "level playing field" for all carriers -- both interstate and intrastate. As such, some industry representatives feel that all trucks should be required to have a transponder or similar transponder-compatible data-communications device on-board so that enforcement is not biased towards those carriers who decide to use IVHS technologies. Especially, since some of their comments indicated concerns that those carriers who will voluntarily implement IVHS-CVO will generally be the honest carriers who are already following the rules and paying for fuel taxes, licenses, and permits, and are in essence subsidizing the user fees of illegal truckers.

Avoid Sticker Mentality

The trucking industry representatives also expressed their concerns about the "sticker-mentality" of enforcement agencies who have a tendency to use stickers (electronic or non-electronic) as the predominant factor

in determining if a carrier has or has not paid their taxes and fees, etc. Motor carriers feel that if government-sponsored IVHS is to become a reality, it must first manifest itself as a communications systems to make payment data available to enforcement officials in real-time.

Government/Industry Workshop

Throughout this study, tasks that were focused on identifying potential IVHS-CVO implementation barriers/concerns were also considered to be integral tasks towards finding solutions to these concerns because they initiated significant dialogue that might not normally take place among the various government agencies dealing with commercial vehicle operations, and between these government agencies and the trucking industry. Also, since a working and trusting relationship between government and the trucking industry is necessary to fully realize the many potentials of IVHS-CVO technologies, a day-long consensus-building workshop regarding future directions for IVHS-CVO, was held in Merrillville, Indiana on November 17, 1993. Organized by the Purdue University Joint Highway Research Project in cooperation with other participating organizations, it was attended by over one-hundred representatives from a broad range of public and private sector interests. The workshop program and summary of its proceedings can be found in Appendix C of the full report.

Indiana Implementation Models

In spite of the previously mentioned barriers and potential concerns related to IVHS-CVO that this study has identified, state agency interviews have also revealed the following present Indiana successes that

could be used to help to form the groundwork for developing and implementing various IVHS-CVO concepts:

- (a) The Indiana Toll Road Authority is currently implementing the communications infrastructure necessary to support high-level automatic vehicle identification technologies and other IVHS functions. In addition, since the Toll Road Authority already has the personnel and procedures in place to issue charge accounts, maintain records, and collect balances due on these accounts, it would be relatively easy to implement automated toll collection once the necessary AVI transponders, antennas, and other infrastructure has been decided upon and installed.
- (b) To help eliminate then-frequent temporary weigh-station closures resulting from unacceptably long truck queues extending onto freeway shoulders upstream of weigh-station deceleration lanes, low speed weigh-in-motion devices were installed at five weigh stations in Indiana.
- (c) The Indiana Department of Transportation (INDOT) currently offers pre-approved trucking companies the ability to register oversize/overweight permits over the phone for only one dollar more than the cost of a given permit issued through the mail or in person at INDOT's central office in Indianapolis.
- (d) In a previous study conducted for the Indiana Department of Revenue's Special Fuel Tax Division, a preliminary system architecture has been developed for a Motor Carrier Information System (MCIS) to automate current manual activities and increase the Indiana State Police's effectiveness in enforcing motor carrier regulations by

quickly providing accurate and up-to-date information on carriers (i.e. authority, permits, violations, etc.). However, it has not yet reached the final design stage, and implementation does not appear to be near due to state budget cuts.

Legal Issues

Many of the political, economic, and institutional issues that have previously been mentioned, regardless of their significance, result from state laws in the Indiana Code, and state agency regulations in the Indiana Administrative Code. Irrespective of precesses, procedures, and technologies that may become available to save time, reduce paperwork, and be more cost effective, if a given agency does not have the required jurisdiction and specific authority from the state legislature to address a particular issue, that agency cannot legally do anything about it.

Each individual law and regulation from relevant sections of the Indiana Code and Indiana Administrative Code were reviewed/analyzed in terms of a target list (see partial key-word list below), and categorized as either being a potential barrier or not based on their significance to IVHS-CVO implementation. Targeted items included, for example:

- (a) WRITTEN communication... / ORIGINAL... TYPEWRITTEN copy required...
- (b) Must be CARRIED in truck... / CARRIED with driver...
- (c) PRESCRIBED FORM/CARD must be used/filed/completed...
- (d) Documents must be SIGNED... / Must have a SEAL...
- (e) Non-automated technical/measurement devices specified

Categories of selected potential legal barriers are as follows:

- (a) Must stop at toll booths
- (b) No toll discounts
- (c) Permits required to be on/in vehicle
- (d) No in-vehicle television screens
- (e) Manual records always required
- (f) Signatures required on documents

During this process, a number of potential legal opportunities for implementation were also identified. Categories of selected legal opportunities are as follows:

- (a) I.F.T.A./I.R.P.
- (b) Electronic precedents in the form of some electronic funds transfers allowed and some electronic tax returns are encouraged
- (c) Laws requiring state agency cooperation
- (d) Existing joint registration center

The entire list of potential legal barriers and opportunities, along with excerpts of specific references to the Indiana Code and Indiana Administrative Code can be found in the full report.

Survey of Motor Carriers

Quantitative data regarding trucking industry concerns and perceptions about IVHS-CVO development and implementation was needed in order for unbiased inferences to be made about the entire population of interstate motor carriers based in Indiana. This was especially important because understanding these specific industry viewpoints is vital to the process of getting IVHS-CVO development and implementation to be

acceptable to both government and industry -- a critical element in fully realizing and utilizing the many potentials of IVHS-CVO technologies.

Therefore, a comprehensive statewide survey was conducted to examine IVHS-CVO perceptions, needs, and concerns from the perspective of interstate motor carriers based in Indiana. Specific survey issues included how motor carriers perceive IVHS-CVO concepts would affect their current operations; what data items motor carriers are willing to have electronically stored within automatic vehicle identification (AVI) transponders; what type of weigh-station pre-clearance information storage do motor carriers prefer (i.e. centralized database or data stored within a transponder); how willing motor carriers are to participating in a "Gold Card" pre-certification process for weigh-station pre-clearance; what type of automatic toll collection system do motor carriers prefer (i.e. debit system or credit system); how willing motor carriers are to paying additional tolls to help cover costs of building bypass lanes next to existing toll plazas for AVI-equipped vehicles to automatically pay tolls while driving at mainline speeds; and the degree to which motor carriers feel IVHS-CVO implementation will lead to a more or less "level playing field" between motor carriers.

Highlights of the survey results are as follows:

- (a) 492 surveys returned out of 3,000 mailed (16.4% response rate)
- (b) Lowest response rate: 8.7% by companies with only one truck;
Highest response rate: 33% by companies with 20 or more trucks
- (c) Only 33.9% of responding companies were aware of IVHS prior to receiving the survey
- (d) Each IVHS concept was given the following ratings on a scale of one to seven (7= very helpful; 1= very harmful):

- 1st = "One-Stop-Shopping" (5.9 rating)
 - 2nd = Weigh-station Pre-Clearance (5.7 rating)
 - 3rd = Transparent State Borders (5.5 rating)
 - 4th = Automatic Payment of Tolls (5.0 rating)
- (e) Only six companies out of 492 respondents reported having any vehicles presently equipped with an AVI transponder.

Conclusions

Implementing many of the IVHS-CVO concepts would not require any major organizational change. There are existing agency processes and procedures, such as the Toll Road Authority's charge plate system and the Indiana Department of Transportation's oversize/overweight self-permitting system, which have features adaptable for use in IVHS development. There are also existing new technology implementations, such as the Indiana State Police's low-speed weigh-in-motion systems used for sorting obviously underweight trucks around the static scales at five enforcement-stations. These have enough flexibility such that they can be integrated into national IVHS operational field tests like Advantage I-75. Furthermore, there are existing agency automation studies, such as the Indiana Department of Revenue's preliminary design proposal for an integrated Motor Carrier Information System, which only needs to be taken off the shelf, amended to reflect the developing IVHS national system architecture and other concerns, and given adequate funding for implementation.

In addition, legal barriers do not appear to be insurmountable. If it can be shown that IVHS-CVO technologies can decrease agency operating costs and improve enforcement efficiency while still maintaining original

regulatory intent, then the Indiana legislature can probably be expected to support necessary legal changes. If it can be shown that IVHS-CVO technologies can increase profits, then the trucking industry will probably want to pay their fair-share of implementation expenses and support necessary legislation to see that agency portions of IVHS-CVO are appropriately funded and implemented on a timely basis.

Above all, elemental computer-hardware, computer-software, and data-communication needs/concerns, such as the availability of real-time enforcement information at weigh stations and the implementation of imaging systems for fuel-tax returns processing, are key issues that must be addressed as soon as possible. Items such as these must be in place before any implementation of "higher-tech" IVHS-CVO equipment can even be considered because they would have no system to "plug-into". In addition, it is this type of infrastructure that can help to eliminate application process redundancies such as similar data being maintained on independent systems at multiple agencies.

As IVHS-CVO is developed, it should be emphasized that AVI technologies and their associated communications infrastructure form the backbone for many different IVHS-CVO functional areas. They are essential for automatic toll collection and pre-clearance of vehicles and drivers past weigh stations, and they can play major roles in systems for transparent state borders and "one-shop-shopping" for registrations and permits. As such, any decisions regarding AVI systems must be made in cooperation with those designing systems to realize these above IVHS-CVO functional areas.

Recommendations

Near-Term Recommendations

It is recommended in the near term (1 to 2 years) that efforts be focused on maintaining and expanding existing IVHS-CVO efforts, while also updating the computer systems that handle existing processes, since they form the backbone for many of the IVHS-CVO concepts. Specifically:

- (a) The Indiana Department of Transportation's Toll Road Division should continue to investigate the feasibility of converting their existing manual toll charge system to an AVI-based system. Included, should also be active participation in processes to develop a true North-American AVI transponder standard, irrespective of whether it be developed by de-facto or by decree.
- (b) The Indiana State Police should continue to implement low-speed weigh-in-motion devices at Indiana weigh-stations on an as-needed basis commensurate with increasing volumes of commercial vehicles at those weigh-stations that are currently equipped with static scales.
- (c) The Indiana Department of Transportation and the Indiana State Police should continue to expand their recently initiated relationship with the Advantage I-75 IVHS-CVO field test, such that a weigh-station along I-65 can be incorporated into the field-testing of weigh-station pre-clearance. Included, should also be a single-site pilot project implementing high-speed mainline WIM such that its effects can be evaluated within the context of Indiana motor-carrier safety and enforcement.

- (d) The Indiana Department of Revenue should start work on the second phase of the Motor Carrier Information System Project. System goals and architecture should be revised so that various IVHS-CVO concepts can be easily incorporated into an MCIS framework as they are implemented.
- (e) The Indiana Bureau of Motor Vehicles should develop and implement a strategy to eliminate the current barriers that prevent motor carriers participating in the International Registration Plan from filing electronic reports and transmitting their fees through electronic funds transfers.
- (f) A task force of representatives from each agency dealing with commercial vehicle operations in Indiana should be created to develop substitute language and implementation strategies for eliminating the legislative and administrative barriers to IVHS-CVO that have been inventoried in the study. Efforts should be made to utilize many of the existing opportunities for implementation, also inventoried in the study, so as to minimize necessary legislative and administrative action.

Mid-Term Recommendations

It is recommended in the mid term (3 to 4 years) that efforts be focused on implementing the IVHS-CVO concepts that do not have a significant number of institutional barriers. Specifically:

- (a) The Indiana Department of Transportation's Toll Road Division should implement an AVI system for automatic toll collection in accordance with the developing national IVHS system architecture and North-American AVI transponder standard. If

the standards-setting process lags into the long-term, then transponders compatible with those being used in surrounding states should be adopted, since only a minute proportion of Indiana-based motor-carriers currently have an AVI transponder on-board their vehicles.

- (b) A wide application of weigh-in-motion should be in operation throughout Indiana. This should include implementing high-speed mainline WIM to replace existing low-speed WIM systems when the life-span of existing equipment nears its end.
- (c) The I-65 corridor should be in the process of becoming a primary corridor for integrating existing, but separate, IVHS field tests of various IVHS concepts into a cohesive unit. This is a unique opportunity because I-65 in Indiana forms the link between the commercial vehicle operations field tests of Advantage I-75 to the south and east, and the I-80 Project field tests to the north and east (which connects to the H.E.L.P./crescent project in the western United States). In addition, I-65 is a major origin and destination for traffic on Indiana's Borman freeway, which, in itself is a major test-bed for advanced freeway traffic management systems -- another IVHS concept.
- (d) Since I-65 in northern Indiana crosses a major truck / rail intermodal transfer facility, a program should be developed to automatically transfer necessary shipment data back and forth between a commercial vehicle operations database that could be in use along the I-65 corridor, and databases that are used to track these intermodal shipments while moving along the rails.

Long-Term Recommendations

It is recommended in the long term (5+ years) that efforts be focused on implementing the IVHS-CVO concepts that currently have a significant number of institutional barriers, but that should be prime for widespread implementation if near-term and mid-term efforts are successful in eliminating many of the significant institutional barriers to IVHS-CVO. Specifically:

- (a) All regulatory agencies dealing with commercial vehicle operations in Indiana should be united into a single agency, so that a genuine "One-Stop-Shopping" system can be implemented. This can either be as a new agency or as an existing agency absorbing relevant sections of other agencies, with authority and responsibilities transferred from the existing agencies, as appropriate.
- (b) Agencies dealing with commercial vehicle operations in Indiana should coordinate with their counterparts from all other states such that a more open-border environment yielding a more genuine concept of transparent state borders can be realized. As such, plans should be made to incorporate features of private vehicle registration and taxation such that not only would credentials from one state be valid in all states, but it would be accomplished without the current needs for money and related information to be transferred from state to state -- a bureaucracy that does not exist for operators of private vehicles.

Closing Thoughts

Indiana government and industry must now commit itself towards expediting any necessary legislative and administrative law changes required to eliminate institutional barriers preventing the implementation of IVHS-CVO solutions that have been identified through the above process, agreed to through ongoing processes, and have the potential to increase motor carrier efficiency, decrease costs, and enhance the competitiveness of American-made products in the world market -- including Indiana agriculture. These actions are needed to prevent commercial gridlock on our highway systems, administrative gridlock in our compliance systems, and a further blunting of the economic edge that helped to build this nation into a world leader.

Through genuine cooperation and a commitment to essential financial backing, Indiana's public, private, and academic sectors can form a synergistic partnership based on communication, cooperation, and confidence in each others' ability to produce innovations and to propose any necessary legislation or administrative rules that will allow for efficient, effective, and equitable implementation of these technologies into a nationally-integrated IVHS-CVO network with transparent borders between the states. With this preparation, all parties can continue to participate in a technological movement that may truly have lasting effects on the positive growth and development of this nation -- the United States of America.

CHAPTER 1

INTRODUCTION

1.1 Background Information

Trucking is a key component of Indiana's diverse economy. Whether hauling \$4.93 billion worth of commodities from the state's 65,000 family farms, or transporting 155 million tons of freight into and out of the state each year, truck-dependent industries encompass almost 68,000 Indiana businesses, employ approximately 1.37 million people (65% of Indiana's workers), and utilize over 15,700 miles of state and federal roads that connect the state's economic centers (1)¹.

In addition to these home-based operations, Indiana's location makes it a key component of the United States' trucking industry. Containing 1,140 miles of both rural and urban Interstates, Indiana is a major through-travel state for operations along the north-south I-65 and I-69 corridors, and the east-west I-64, I-70, I-74, I-80, I-90, and I-94 corridors; including the 157-mile Indiana Toll Road (I-80/I-90) that is often called the "Main Street of the Midwest" due to its connections with the Ohio Turnpike for points east, and both the Chicago Skyway and Borman Expressway for points west (2).

¹For source information, please refer to the corresponding number in the List of References.

With this operational magnitude, Indiana actions that benefit trucking efficiency, while still maintaining trucking safety, can potentially yield significant benefits to both the state and national economies -- especially to those areas with companies operating on the "just-in-time" (JIT) philosophy that has effectively turned many roads into moving warehouses for industry. Seeing this potential, the Joint Highway Research Project at Purdue University initiated a contract with the Federal Highway Administration (FHWA) to identify institutional barriers affecting the implementation of Intelligent Vehicle-Highway System (IVHS) technologies to commercial vehicle operations (CVO) in the State of Indiana. Specifically, research was focused on the potential for:

- (a) Automatic payment of tolls (while still driving at mainline speeds) through the use of Automatic Vehicle Identification (AVI) transponders;
- (b) Pre-Clearance of vehicles and drivers past weigh stations through the use of Automatic Vehicle Identification (AVI) transponders, Weigh-In-Motion (WIM) devices, and pre-qualifying safety inspections;
- (c) "One-Stop-Shopping" for licenses, registrations, and permits through increased cooperation and data-sharing between state agencies; and
- (d) Transparent state borders through increased cooperation and data-sharing between adjoining states.

In addition, actions were coordinated with a similar study for the State of Illinois (conducted by the University of Illinois at Urbana-Champaign) as part of an FHWA initiative to designate I-80 as a "test bed

for the next generation of highway safety improvements" due to its natural "link between existing IVHS operational tests in the east (Advantage I-75) and in the west (HELP/Crescent)" (3).

1.2 Study Methodology

New technologies, when introduced into a process, are most successful when initiated with a clearly defined purpose that addresses a specific need expressed by those at the grass-roots level of a given process. It was therefore deemed critical to first identify existing areas of high operating/compliance costs for motor carriers, and high administrative/regulatory costs for government, where IVHS technologies have the potential to help enhance efficiency and reduce barriers to more cost-effective operations. With these needs identified, optimal solutions can then be implemented from a wide array of potential technological and non-technological solutions. This avoids the "have technology -- need application" syndrome that can often lead to non-optimal solutions yielding increased costs and excess equipment, including technologies introduced exclusively for the sake of either having something new to look good within an office (even though it would probably sit unused in the corner of that office), or to get publicity for some undisclosed goal -- unrelated to the specific technology itself.

To achieve this goal in an efficient manner, research was divided into the following six tasks:

- (1) Identify regulations, policies, laws, etc., which affect commercial vehicle operations by causing delays, increased costs, or other inefficiencies, including a listing of agencies which have regulations governing commercial vehicle

operations; the specific regulations causing inefficiencies; and the basis for these regulations, policies, laws, etc.

- (2) Describe the processes and procedures by which the regulations, policies, laws, etc., are implemented (i.e. licensing, permitting, inspections, fee collection, and other processes), including a description of the physical facilities and equipment used in these processes.
- (3) Identify the types of institutional (organizational, legislative, regulatory, or administrative) issues that would impede or prevent the application of IVHS technologies and what institutional changes would need to be made to resolve these issues.
- (4) Prepare a draft report outlining the results of the above three tasks, and solicit comments from a broad group of private and public sector interests.
- (5) Organize a workshop reporting on the findings and seeking input on future directions addressing both in-state and interstate issues.
- (6) Prepare a final report describing phased actions that can be undertaken for effective adaption and subsequent implementation of appropriate IVHS technologies to commercial vehicle operations in Indiana.

To maintain inter-organizational communication and to provide an efficient means for researchers to develop field interview contacts with key staff and "front-line" personnel in the agencies and organizations to be involved in this process, study oversight was divided into the following two committees:

- (1) An Indiana advisory committee consisting of policy level members from the Indiana Department of Transportation (including the Toll Road Authority), Department of Revenue, Bureau of Motor Vehicles, and State Police; the FHWA Indiana Division's Planning and Research Engineer; and, as research progresses, members of the FHWA Office of Motor Carriers, and Indiana Department of Revenue's Motor Carrier Advisory Committee -- an existing committee with representation of relevant agencies, organizations, and motor truck operators of various types (i.e. intrastate, interstate, large, medium, and small operators, etc).
- (2) A bi-state steering committee consisting of three representatives from each state, two university principal investigators as ex-officio members, and one FHWA representative from the regional office.

CHAPTER 2

THE EXISTING SYSTEM

2.1 Introduction

To best understand Indiana's existing CVO procedures and to gain insight into potential system improvements, state agency site visitations were held, including one-on-one interviews with personnel involved in the day-to-day operations of Indiana's regulatory, permitting, and enforcement processes for CVO (see Appendix F).

2.2 Definitions

There are slight variations in Indiana's definition of a commercial vehicle depending on the subject (i.e. fuel taxes, vehicle registrations, haz-mat regulations, etc.). For purposes of this study, the International Registration Plan's (IRP) definition has been used. It is "any vehicle that is used for the transportation of persons for-hire or is designed, used, or maintained primarily for the transportation of property, and:

- (a) is a power unit having three or more axles regardless of weight;
- (b) is a power unit having a gross weight in excess of 26,000 pounds; or
- (c) is a vehicle used in combination when the gross weight of the combination exceeds 26,000 pounds" (4).

2.3 Regulatory Procedures

Commercial vehicle operators must currently satisfy many requirements and secure a number of validation plates, stickers, and/or authorizations before ever picking-up or delivering their initial load of goods. Table 2.1 summarizes contact information for the various agency areas of responsibility for commercial vehicle operations in Indiana.

Table 2.1: Agencies responsible for various areas of commercial vehicle operations in the State of Indiana

COMMERCIAL DRIVER'S LICENSE	INTERNATIONAL FUEL TAX AGREEMENT
Indiana Bureau of Motor Vehicles Office of Commercial Driver's License 100 North Senate Ave., Room N-406 Indianapolis, IN 46204 (800) 562-4591 (317) 232-7295	Indiana Department of Revenue Motor Carrier Tax and Authority Section 100 North Senate Ave., Room N-240 Indianapolis, IN 46204 (800) 635-7496 (317) 232-1845
INTERNATIONAL REGISTRATION PLAN	OVERSIZE / OVERWEIGHT PERMITS
Indiana Bureau of Motor Vehicles IRP Division 100 North Senate Ave., Room N-403 Indianapolis, IN 46204 (317) 232-4406	Indiana Dept. of Transportation Division of Technical Services 100 N. Senate Ave., Room N-855 Indianapolis, IN 46204-2217 (317) 232-5553
OPERATING AUTHORITY REGISTRATION	STATE POLICE
Indiana Department of Revenue Motor Carrier Tax and Authority Section 100 North Senate Ave., Room N-240 Indianapolis, IN 46204 (800) 635-7496 (317) 232-2727	Indiana State Police Motor Carrier Enforcement Division 100 North Senate Ave., Room N-340 Indianapolis, IN 46204-2259 (317) 233-6018
TOLL ROAD CHARGE PLATES & PERMITS	INTERSTATE OPERATING AUTHORITY
Indiana Dept. of Transportation Toll Road Division 52551 Ash Road, P.O. Box 1 Granger, IN 46530-0001 (219) 674-8836	Interstate Commerce Commission Everett McKinley Dirksen Building 219 South Dearborn, Room 1304 Chicago, IL 60604 (312) 353-6204

2.3.1 Operating Authority

All new for-hire motor carriers must first acquire operating authority (permission to haul goods in a specified state) from either the Interstate Commerce Commission (ICC) in Washington, D.C. (for inter-state carriers) or from the state they plan to do business in (for intra-state carriers). This authority, along with both proof of insurance and either a minimum rate schedule (for contract carriers)¹ or a tariff (for common carriers)², must then be registered with the proper agency in each state they plan on driving through (the Department of Revenue in Indiana). This requirement may be met in two different ways, depending on a carrier's principal place of business, and whether or not the states traveled through participate in the Single State Registration System (SSRS)³.

The first registration method, restricted to inter-state vehicles traveling in at least two SSRS states, allows motor-carriers to register their ICC operating authority and pay insurance registration fees for all SSRS states by simply registering with the proper agency in the state housing their principal place of business (the Department of Revenue in Indiana). Motor carriers are then annually issued one registration receipt, which may be copied for all vehicles registered. This will allow

¹"A contract carrier operates under individual contracts with specific shippers and either dedicates vehicles to specific shippers or provides a distinct service for individual customers" (4).

²"A common carrier holds itself out to the general public to transport property or passengers within the scope of its operating authority" (4).

³SSRS is a base-state operating authority registration system mandated by the Intermodal Surface Transportation Efficiency Act to replace the system of individual states issuing "bingo stamps". Current SSRS members are: Alabama, Arkansas, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Washington, and Wisconsin (22).

the registrant to operate under its ICC certification or permit in all jurisdictions indicated on the registration receipt (22).

The second operating authority registration method, required for both non-SSRS participants and those SSRS participants that plan on driving in any non-SSRS states, requires motor carriers to purchase both an annual cab card (validation certificate to be kept in the vehicle) from either the National Association of Regulatory Utility Commissioners in Washington, D.C. (for inter-state carriers) or from their base state (for intra-state carriers), and an annual "bingo stamp" (validation sticker to be placed on the cab card) from the proper agency in each state they plan to drive in (the Department of Revenue in Indiana).

2.3.2 Fuel Taxes

All motor-carriers subject to the fuel tax requirements must also register for and purchase Motor Carrier Fuel Tax Annual Permits and Compliance Emblems for each of their vehicles. This requirement may be met in two different ways, depending on where a vehicle travels and whether or not the states traveled through participate in the International Fuel Tax Agreement (IFTA)⁴.

The first registration method, restricted to inter-state vehicles traveling in at least two IFTA states, allows motor-carriers to complete fuel-tax requirements for all IFTA states by simply registering with the proper agency in their base-state (the Department of Revenue in Indiana). Motor carriers are then annually issued one license (a sticker to be

⁴IFTA is a base-state fuel tax agreement based on miles traveled in each state. Detailed information can be found in Appendix B. ISTEA '91 requires all states to participate in IFTA or RFTA (the Regional Fuel Tax Agreement for Maine, New Hampshire, and Vermont) by September 30, 1996.

affixed to the vehicle), and one set of credentials (to be kept in the vehicle) which allow travel through all IFTA member jurisdictions. In addition, participating motor-carriers only need to file one quarterly report which reflects the net tax or refund due for all IFTA member jurisdictions, and be subject to one audit, performed by the base jurisdiction (in most circumstances) (4).

The second fuel-tax registration method, required for both non-IFTA participants and those IFTA participants that plan on driving in any non-IFTA states, requires motor carriers to purchase a separate Annual Permit/Cab Card (validation certificate to be kept in the vehicle), and a separate annual Compliance Emblem (sticker to be affixed to the vehicle) from either the proper agency in each non-IFTA state they plan on driving in (for inter-state carriers) or from the proper agency (the Department of Revenue in Indiana) in their base state (for intra-state carriers). Motor-carriers in this category must file separate quarterly reports to each jurisdiction they have registered with, and are also subject to separate audits by each of these jurisdictions (4).

2.3.3 Vehicle Registration

Similarly, all motor carriers must register for and purchase a license plate for each of their vehicles. This requirement also may be met in two different ways, depending on where a vehicle travels, and whether or not the states traveled through participate in the International Registration Plan (IRP)⁵.

⁵IRP is an apportioned base-state vehicle registration agreement based on miles traveled in each state. Detailed information can be found in Appendix A. ISTEA '91 requires all states to participate in IRP by September 30, 1996.

The first registration method, restricted to inter-state vehicles traveling in at least two IRP states, allows motor-carriers to complete vehicle-registration requirements for all IRP states by simply registering with the proper agency in their base-state (the Bureau of Motor Vehicles in Indiana), and including proof of insurance and payment of the Federal Heavy Vehicle Use Tax (required "for all highway vehicles having a gross or combined gross weight of 55,000 pounds or more" (4)). Motor carriers are then annually issued one license plate bearing the word "apportioned", and one cab card (to be kept in the vehicle), listing the IRP jurisdictions in which the unit is registered and the registered weight for legal travel in each of those jurisdictions (5).

The second vehicle registration method, required for both non-IRP participants and those IRP participants that plan on driving in any non-IRP states, requires motor carriers to annually purchase a separate license plate (to be attached to the vehicle), and a separate cab card listing the vehicle's registered weight (to be kept in the vehicle) from either the proper agency in each non-IRP state they plan on driving in (for inter-state carriers) or from the proper agency (the Bureau of Motor Vehicles in Indiana) in their base state (for intra-state carriers) (4).

2.3.4 Special Permitting

Finally, if any vehicles need to be either overweight or oversize during a specific trip, then special permission must be obtained by purchasing an oversize/overweight trip permit from the proper agency in each state that a vehicle needs to travel through while either oversize or overweight (the Department of Transportation in Indiana) (6).

2.3.5 Enforcement

To enforce these many requirements, all carriers must stop at each weigh station they encounter (see Table 2.2 and Figure 2.1 for locations in Indiana), and be subject to random inspection by a state's motor carrier enforcement section (part of the State Police in Indiana) in order to confirm operating credentials; verify weight, fuel tax payments, and other regulatory compliance; and ensure truck safety, including adherence to any applicable hazardous materials transportation requirements. The Commercial Vehicle Safety Alliance (CVSA) categorizes these inspections into the following four "levels":

Level 1: NORTH AMERICAN STANDARD -- "This is a thorough 'get down and get under' driver/vehicle inspection. It includes examination of: driver's license, medical examiner's certificate and waiver if applicable, driver's record of duty status as required, hours of service, seat belt, vehicle inspection report, brake system, steering mechanism, wheels and rims, tires, coupling devices, suspension, frame, fuel and exhaust systems, windshield glazing and wipers, lighting devices, cargo securement, and hazardous materials requirements as applicable. A CVSA decal will be applied to each vehicle that passes this inspection" (21). Such a decal generally allows the vehicle to avoid being reinspected for the remainder of that month plus the following two months.

Level 2: WALKAROUND INSPECTION -- "This inspection also covers the driver and includes a vehicle walkaround 'audible & visual' check of the following key vehicle components:

Table 2.2: Locations and characteristics of Indiana weigh-stations

NAME & [MAP CODE ON FIGURE 2.1] / SPECIFIC LOCATION / COUNTY	HIGHWAY	DIRECTION	LOW-SPEED WEIGH-IN- MOTION?
BREMEN [1] 0.5 miles west of US-33 Kosciusko	US-6	EAST/ WEST (center)	no
CHESTERTON [2] 2.0 miles east of SR-49 Porter	I-94	EAST	YES
	I-94	WEST	YES
LOWELL [3] 0.5 miles north of SR-2 Lake	I-65	NORTH	no
	I-65	SOUTH	YES
RICHMOND [4] 1.0 mile west of US-35 Wayne	I-70	EAST	no
	I-70	WEST	YES
SEYMOUR [5] 1.0 mile north of US-50 Jackson	I-65	NORTH	no
	I-65	SOUTH	no
VEEDERSBURG [6] 2.5 miles east of US-41 Fountain	I-74	EAST	no
	I-74	WEST	no
WARREN [7] 2.0 miles north of SR-5 Huntington	I-69	NORTH	no
	I-69	SOUTH	no
WEST HARRISON [8] 0.5 miles west of Harrison Ave. Dearborn	I-74	WEST	YES

fire extinguisher, warning devices for stopped vehicles, head lamps, turn signals, stop lamps, windshield and wipers, wheels, tires, fuel systems, exhaust systems, visible brake components, coupling devices, cargo securement, visible suspension components, and low air warning device. Compliance with hazardous materials regulations will be checked if applicable" (21).

Figure 2.1: Indiana weigh-station locations from Table 2.2 as coded to a map of Indiana routes on the National Highway System

Level 3: DRIVER ONLY -- "This inspection covers the driver and its purpose is to insure that vehicle operators are properly licensed, medically qualified and observing statutory hours of service requirements. The inspector will also check seat belt installation and use, and the vehicle inspection report" (21).

Level 4: SPECIAL ROAD INSPECTIONS -- "These inspections include a one-time examination of a particular item and are normally made in support of a study or to verify or refute a suspected trend" (21).

2.4 Existing Concerns

During the initial agency interviews, many concerns were frequently raised regarding Indiana's existing CVO system relative to both its ability to adapt to IVHS technologies, and to its specific needs for new technologies. As discussed below, these concerns must be addressed in order for the state to fully utilize the potential of IVHS technologies in its CVO operations.

2.4.1 Computer Hardware / Communications

Most commonly identified were the lack of computer systems able to share data in real-time among state agencies and capable of easily producing various audit and analysis reports. For example, the State Police Motor Carrier Enforcement Division can only contact the Indiana Department of Revenue, Bureau of Motor Vehicles, or Department of Transportation from 8:00am to 4:30pm on Mondays through Fridays for verification of any suspect operating credentials and/or permits. Since

there is no confirmation ability at other times due to no permitting agency personnel available to answer weigh-station radio calls, it is felt that illegal trucks could be capitalizing on this situation at night and on weekends when enforcement tools are limited.

Hardware needs are also prevalent at the Indiana Department of Revenue's Motor Carrier Tax and Authority Section. It was noted that the mainframe computer used by this unit is primarily meant for keeping lists of carriers, insurance, and docket numbers; but does not perform any data processing for reporting purposes. For example, when carriers file updated insurance policies (a frequent occurrence at approximately 1,000 per week due to carriers trying to minimize premiums), insurance details must be manually updated in thick files by matching a carrier's uniform identification number with forms that insurance companies mail directly to the department (a requirement so as to prevent the chance of carriers making alterations to the forms). Similarly, many of the operating authority and other legal files are handled manually because some of the critical steps needed to complete a process are not computerized. The paper files have to be checked anyway because there is no capability to list electronically a carrier's scope of authority.

The Department of Revenue's most urgent data-services needs include: (1) a scanner/imaging system with optical character recognition (OCR) to automate insurance filings, and (2) the implementation of a new returns processing system with on-line correction capabilities so as to eliminate the current system of "error tabulation" batch reports that require human math calculations and the manual checking of various forms -- an iterative procedure between their main office in downtown Indianapolis, and an auxiliary data processing office in the Park Fletcher business center near

the Indianapolis International Airport. Currently, this new system is reported to be suffering from ongoing budget constraints as it maneuvers through the agency's procurement process -- one that gives highest priority to areas relating to individual and corporate tax returns.

2.4.2 Computer Software

Much of the software that agencies now use is old with limited capabilities. For example, the mainframe-based software that the Indiana Department of Transportation uses to record oversize/overweight permits lacks needed capabilities to automatically produce regular reports about various permitting activities. Agency personnel must systematically take assorted raw-data summaries from this system and manually re-key it into a PC-based spreadsheet package so that data can be analyzed and/or be readily available for placement into departmental reports, etc.

An even more critical software situation currently exists at the Indiana Department of Revenue. Their personnel must process 1700 IFTA accounts (and growing) with modified PC-based software that was originally designed to handle only 500 accounts. In addition, unlike the Indiana Bureau of Motor Vehicle's IRP computer system that automatically calculates the amount due for billing to each IRP account based upon annual motor-carrier mileage reports, motor-carriers filing with IFTA must hand calculate all tax (or refund) amounts and any interest/penalties that are due even though they provide quarterly reports listing both mileage traveled and fuel gallons consumed that could be used for automatic calculation and billing by the IFTA computer (if capabilities existed). With the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA '91) requiring all states to participate in IFTA by September 30, 1996 (more

than doubling the number of participants), the department's software will be hard-pressed to handle this increased load unless system updates are implemented.

2.4.3 Electronic Funds Transfer Constraints

Even though the Indiana Department of Revenue allows electronic funds transfers for tax payments (it is required for people with tax liabilities greater than \$20,000 per month), the opposite situation exists for motor-carrier registration payments at the Indiana Bureau of Motor Vehicles. It has been the Bureau's experience that electronic funds transfers are restricted by the Indiana State Board of Accounts. According to IRP personnel that were interviewed, bureaucratic requirements make it extremely difficult to set-up accounts that would enable certain IRP carriers to pay their fees electronically. This policy towards manual payment processes was also apparent when it was noted that the Bureau must retain five-years worth of old paperwork such as transmittals and receipts from other states. Currently, this fills-up enough boxes such that they need to be stored off-site at a warehouse.

2.4.4 Application Process Redundancies

Corroborating these agency data concerns are frequent industry complaints that companies must endure much redundancy, added record-keeping, and delays in getting registrations and permit applications processed because many identical pieces of documentation (i.e. proof of insurance, tax payments, etc.) are required to be shown to each state agency that truckers must deal with even though all state agencies dealing with trucking are located in the same building. In fact, most of the

information required to establish, renew, or report mileage for an IFTA account is very similar to the information needed to establish, renew, or report mileage for an IRP account (see Table 2.3). Similarly, even though motor-carrier insurance requirements at the Indiana Department of Revenue are higher than what INDOT requires for oversize/overweight permits, carriers must still file forms that certify proof of insurance to INDOT when applying for these permits because there is no link between the two reporting systems.

It would seem that until these elemental computer concerns and data needs are addressed (i.e. truck-related agency computers being able to electronically communicate with each other, etc.), implementation of "high-tech" IVHS-CVO equipment would be premature since these technologies would have no system to "plug-into".

Table 2.3: Comparison of information required to establish, renew, and report mileage for IFTA and IRP accounts (5)(18)

DATA ITEM REQUIRED	IFTA	IRP
NAME OF APPLICANT	X	X
APPLICANT'S SOCIAL SECURITY NUMBER OR FEDERAL IDENTIFICATION NUMBER	X	X
INDIANA TAXPAYER IDENTIFICATION NUMBER	X	
INDIANA NOT-FOR-PROFIT NUMBER	X	
BUSINESS NAME	X	
BUSINESS STREET ADDRESS (to be shown on cab card)	X	X
CITY (where business address is located)	X	X
COUNTY (where business address is located)	X	X
STATE (where business address is located)	X	X
ZIP CODE (where business address is located)	X	X
TOWNSHIP (where business address is located)	X	
TAX DISTRICT NUMBER (where business address is located)	X	
TELEPHONE NUMBER (where business address is located)	X	X
MAILING STREET ADDRESS (where credentials should be sent and correspondence directed)	X	X
CITY (where mailing address is located)	X	X
COUNTY (where mailing address is located)	X	X
STATE (where mailing address is located)	X	X
ZIP CODE (where mailing address is located)	X	X
ACCOUNT NUMBER (assigned by Indiana I.R.P. Division of Bureau of Motor Vehicles)		X
FLEET NUMBER (if more than one fleet is submitted under the same company name)		X
LICENSE YEAR		X
PAGE OF (if additional sheets of same form schedule are submitted at the same time)		X
PERSON TO CONTACT REGARDING APPLICATION	X	X
MAILING STREET ADDRESS (where tax return forms are to be sent)	X	

Table 2.3, continued

DATA ITEM REQUIRED	IFTA	IRP
CITY (where contact person is located)		X
STATE (where contact person is located)		X
ZIP CODE (where tax return forms are to be sent)	X	
TELEPHONE NUMBER (where contact person is located)	X	X
BASE JURISDICTION FOR THIS FLEET OF VEHICLES (must be Indiana)		X
VEHICLE OPERATION SCHEDULE (mark jurisdictions in which planning to operate "Qualified Motor Vehicles")	X	X
BULK FUEL STORAGE SCHEDULE (mark jurisdictions in which planning to maintain bulk storage of fuel)	X	
I.R.P. FLEET REGISTRATION SCHEDULE (mark jurisdictions in which have I.R.P. fleets registered)	X	X
REGISTRATION WEIGHT SCHEDULE (weight desired in each member I.R.P. jurisdiction for all vehicles listed on this form schedule)		X
OWNER'S EQUIPMENT (UNIT) NUMBER		X
MODEL YEAR OF VEHICLE		X
MAKE OF VEHICLE		X
VEHICLE IDENTIFICATION NUMBER (complete V.I.N. from vehicle's certificate of title)		X
TYPE OF VEHICLE (i.e. truck tractor, tractor, single truck, semi-trailer, full trailer, bus, converter gear, double bottom)		X
NUMBER OF AXLES		X
MODEL NUMBER (from vehicle's certificate of title)		X
UNLADEN WEIGHT (actual weight of vehicle including the cab, body, and all accessories excluding the weight of any load)		X
FUEL TYPE USED (i.e. diesel, gasoline, gasohol, natural gas, propane, other)	X	X
DECLARED GROSS WEIGHT (individual vehicle gross weight including heaviest load to be transported)		X
DECLARED COMBINED GROSS WEIGHT		X
PURCHASE PRICE OF VEHICLE (including accessories)		X

Table 2.3, continued

DATA ITEM REQUIRED	IFTA	IRP
FACTORY PRICE OF VEHICLE (100% of manufacturer's list price, when new, including all improvements and modifications)		X
DATE OF PURCHASE (month and year when vehicle was purchased by the current owner)		X
OWNER OPERATOR (LESSOR) OR SERVICE REPRESENTATIVES (name of titled owner if vehicle listed is not owned by the applicant)		X
TITLE OR CONTROL NUMBER (current Indiana title number)		X
NUMBER OF POWER VEHICLES IN FLEET		X
NUMBER OF TRAILERS IN FLEET		X
NUMBER OF AUXILIARY AXLES IN FLEET		X
TOTAL NUMBER OF VEHICLES IN FLEET		X
NUMBER OF QUALIFIED MOTOR VEHICLES REQUIRING I.F.T.A. DECALS	X	
NUMBER OF LEASED "QUALIFIED MOTOR VEHICLES" OPERATED IN INDIANA THIS QUARTER	X	
NUMBER OF OWNED "QUALIFIED MOTOR VEHICLES" OPERATED IN INDIANA THIS QUARTER	X	
IS APPLICATION AN ORIGINAL OR A SUPPLEMENTAL?		X
IF MILES ARE ESTIMATED... (new or expanded operation?)		X
TOTAL FLEET ALL FUEL MILES TRAVELED IN ALL JURISDICTIONS (total of actual and estimated mileage traveled irrespective of fuel used)	X	X
TOTAL FLEET ALL FUEL GALLONS CONSUMED IN ALL JURISDICTIONS (including I.F.T.A. and non-I.F.T.A. jurisdictions)	X	
I.R.P. EACH JURISDICTION MILEAGE SCHEDULE (total miles operated by the fleet in each member and non-member jurisdiction that has been traveled in)		X
I.R.P. EACH JURISDICTION PERCENTAGE SCHEDULE (agency-calculated percentage of miles the fleet has traveled or expects to travel in each member and non-member jurisdiction relative to the total miles the fleet has traveled or expects to travel)		X

Table 2.3, continued

DATA ITEM REQUIRED	IFTA	IRP
I.F.T.A. ALL JURISDICTIONS BY FUEL TYPE MILEAGE SCHEDULE (total fleet miles traveled in all I.F.T.A. and non-I.F.T.A. jurisdictions by fuel type)	X	
I.F.T.A. ALL JURISDICTIONS BY FUEL TYPE GALLONS CONSUMED SCHEDULE (total fleet gallons consumed in all I.F.T.A. and non-I.F.T.A. jurisdictions by fuel type)	X	
I.F.T.A. ALL JURISDICTIONS BY FUEL TYPE AVERAGE MILES PER GALLON SCHEDULE (calculated "I.F.T.A. All Jurisdictions By Fuel Type Mileage Schedule" divided by "I.F.T.A. All Jurisdictions By Fuel Type Gallons Consumed Schedule")	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE MILEAGE SCHEDULE (total miles traveled in each jurisdiction by fuel type)	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE TAXABLE MILEAGE SCHEDULE (taxable miles traveled in each jurisdiction by fuel type)	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE TAXABLE GALLONS CONSUMED SCHEDULE (calculated "I.F.T.A. Each Jurisdiction By Fuel Type Taxable Mileage Schedule" divided by "I.F.T.A. All Jurisdictions By Fuel Type Miles Per Gallon Schedule")	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE TAX PAID GALLONS SCHEDULE (tax paid gallons purchased and consumed in qualified motor vehicles in each jurisdiction by fuel type)	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE NET TAXABLE (REFUND GALLONS) SCHEDULE (calculated difference between "I.F.T.A. Each Jurisdiction By Fuel Type Taxable Gallons Consumed Schedule" and "I.F.T.A. Each Jurisdiction By Fuel Type Tax Paid Gallons Schedule")	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE TAX (OR REFUND) DUE SCHEDULE (calculated product of "I.F.T.A. Each Jurisdiction By Fuel Type Net Taxable (Refund Gallons) Schedule" and the per gallon tax rate in each jurisdiction)	X	
I.F.T.A. EACH JURISDICTION BY FUEL TYPE INTEREST/PENALTY DUE SCHEDULE	X	
STATE OF INCORPORATION (if applicant is a corporation)	X	X
DATE OF INCORPORATION (if applicant is a corporation)	X	

Table 2.3, continued

DATA ITEM REQUIRED	IFTA	IRP
STATE OF COMMERCIAL DOMICILE	X	
DATE AUTHORIZED TO DO BUSINESS IN INDIANA (if not an Indiana corporation)	X	
ACCOUNTING PERIOD/YEAR ENDING DATE	X	
TYPE OF ORGANIZATION (i.e. sole owner, partnership, corporation, government, other entity)	X	
NAME(s) (of all owners, partners, and officers)	X	
TITLE(s) (of all owners, partners, and officers)	X	
STREET ADDRESS(s) (of all owners, partners, and officers)	X	
CITY(s) (of all owners, partners, and officers)	X	
STATE(s) (of all owners, partners, and officers)	X	
ZIP CODE(s) (of all owners, partners, and officers)	X	
SOCIAL SECURITY NUMBER(s) (of all owners, partners, and officers)	X	
CANADIAN PROVINCIAL OPERATING AUTHORITY (if operating in Alberta, Canada)		X
PUBLIC SERVICE COMMISSION INTRASTATE NUMBER		X
U.S.D.O.T. NUMBER	X	X
I.C.C. AUTHORITY NUMBER(s)	X	X
INDIANA MOTOR CARRIER AUTHORITY NUMBER(s) (i.e. I.M.C.A. -- Indiana Department of Revenue, P.S.C.I. -- Public Service Commission of Indiana, I.U.R.C. -- Indiana Utility Regulatory Commission)	X	X
INDIANA MOTOR CARRIER FUEL TAX ANNUAL PERMIT NUMBER	X	X
TYPE OF CARRIER (i.e. private; household goods; exempt commodity -- livestock, produce, grain, logs, ore; rental company -- leased to private, for-hire; contract; common carrier)	X	X
PRIMARY STANDARD INDUSTRIAL CODE (reflecting type of business operation)	X	
SECONDARY STANDARD INDUSTRIAL CODE (reflecting type of business operation)	X	

Table 2.3, continued

DATA ITEM REQUIRED	IFTA	IRP
FULL NAME OF INSURANCE COMPANY LICENSE IN INDIANA (not agency or group)		X
INSURANCE POLICY NUMBER (or name of Agent Binding Coverage if policy is not insured)		X
SIGNATURE ON APPLICATION	X	X
TITLE OF PERSON SIGNING APPLICATION	X	X
DATE (month, day, and year this application is filed)	X	X
ORIGINAL OR SUPPLEMENT NUMBER (if deleting a vehicle, original number assigned to it)		X
APPORTIONED LICENSE NUMBER (actual plate number appointed by the IRP office)	X	X
REPLACEMENT EQUIPMENT (UNIT) NUMBER (if deleting a vehicle, number that replaces Owner's Equipment (Unit) Number)		X
REASON FOR DELETING VEHICLE FROM FLEET		X
NUMBER OF POWER UNITS ADDED		X
NUMBER OF POWER UNITS DELETED		X
NUMBER OF TRAILERS ADDED		X
NUMBER OF TRAILERS DELETED		X
NUMBER OF AUXILIARY AXLES ADDED		X
NUMBER OF AUXILIARY AXLES DELETED		X
HAVE YOU EVER BEEN ISSUED AN IFTA LICENSE BY ANOTHER JURISDICTION? (list jurisdictions)	X	
HAS YOUR IFTA LICENSE EVER BEEN SUSPENDED OR REVOKED? (list jurisdictions)	X	
DO YOU MAINTAIN SPECIAL FUEL STORAGE (i.e. diesel, #1 fuel oil, #2 fuel oil, etc.) IN INDIANA? (list special fuel license number or agreement number)	X	
NEW I.F.T.A. BASE JURISDICTION (if operations have moved and Indiana I.F.T.A. license is to be canceled)	X	
TELEPHONE NUMBER AT NEW LOCATION (if operations have moved and Indiana I.F.T.A. license is to be canceled)	X	

CHAPTER 3

POTENTIAL IVHS-CVO CONCEPTS

3.1 Introduction

In the early days of regulated commercial vehicle operations, requiring trucks to stop at every weigh station might have been the only feasible enforcement method. However, the electronics revolution is providing many new methods to achieve these goals in an efficient, effective, and equitable manner relative to all parties involved. Nevertheless, interstate truckers must still comply with a multitude of requirements and enforcement procedures that are different enough to create excessive paperwork and delays between states, but are identical enough to be considered redundant activities that add a disproportionate amount of cost relative to their benefits.

Several technologies can eliminate much of this paperwork while still maintaining the original intent of these regulation so that trucking industry productivity can be greatly increased. Electronic insurance filings, electronic license-plates, automatic mileage recording and trip-logs, site-specific highway warning systems, pre-clearance of vehicles and drivers past weigh stations, and automatic transfer of funds for toll and tax payments are just some of the examples of what is technologically possible today. These technologies and their applications are discussed in the following paragraphs.

3.2 Available Technologies

3.2.1 Weigh-In-Motion (WIM)

Weigh-In-Motion refers to various technologies that enable vehicle weights to be determined without the need for a vehicle to stop physically on a static scale. The three basic WIM operating scenarios are:

- (a) 20 mph WIM with legal and non-complying vehicles sorted off the mainline (see Section 3.5.2 regarding current installations at five Indiana weigh-stations);
- (b) 40 mph WIM with legal and non-complying vehicles sorted off the mainline; and
- (c) 65 mph WIM with mainline sorting and pre-clearance allowing total enforcement station bypass for legal vehicles (7).

In spite of their potential for increased operational capabilities, however, most high-speed WIM systems are still controversial, with present accuracy to within only 20% of a vehicle's static weight¹ (8). Still, it should be added that some enforcement personnel feel that this is indicative that legal load limits should be switched from the existing static-weight system to a system based on dynamic weights since it may better represent the actual interaction between a vehicle and the roadway. For example, it is argued that a statically underweight vehicle with a bad suspension system could do more damage to roads than a slightly overweight

¹This wide variation in accuracy is mainly due to a truck's natural bouncing motion while traveling down a road (i.e. trucks passing over a WIM device while on the downward portion of this bounce can have a heavier than static weight recorded; likewise, trucks passing over a WIM device while on the upward portion of this bounce can have a less than static weight recorded). This is similar to present experiences of large weight variations being recorded on static scales during the first few moments of weighing liquid container trucks due to the sloshing around of their contents when stopping at the scales.

truck with a very good suspension system. Since one of a weigh-station's ultimate purposes is to help ensure the integrity of highway pavements and structures via truck traffic monitoring, proponents of this change feel that legal limits based on dynamic weights should be adopted because they are consistent with and could directly enhance this ultimate goal.

3.2.2 Automatic Vehicle Identification (AVI)

Automatic Vehicle Identification refers to assorted technologies that uniquely identify vehicles as they pass specific points on the highway (for automatic toll payments, and/or electronic licensing, etc.), without requiring any action by the driver or an observer. This is accomplished via a vehicle-mounted transponder or tag; a roadside reader unit, with its associated antennas; and a central computer system for data processing and storage (9).

Automatic Vehicle Identification (AVI) transponders ("tags") are generally categorized into the following three types with increasing capabilities:

Type I: This tag is "Read-Only" and contains a unique number that can be used to identify the truck, driver, or trailer. This tag is not capable of storing information or communicating with devices found on the truck. This tag is primarily used for automatic toll collection and vehicle tracking functions.

Type II: This tag is "Read-Write" and has the same attributes as the Type 1 tag, but also has the capability to store information. This tag can be used to store permits, inspections, CDL, and other information. This tag is

primarily used for automatic toll collection, weigh station pre-clearance, and other functions.

Type III: This tag is "Read-Write" and has the same attributes as the Type 1 and Type 2 tags, but is also capable of communicating with an external device such as an on-board fleet-management computer. This device is capable of transferring a great deal of information from the vehicle to the roadside for weigh station pre-clearance, dynamic vehicle inspections, automatic permit issuance, and future operations.

However, as there are no national standards for these devices, equipment from one vendor is incompatible with equipment from another vendor -- even if they are functionally the same "type" of tag (transponder). All vendors are presently fighting for a significant market share so that they may become a de-facto standard.

3.2.3 Automatic Vehicle Classification (AVC)

Automatic Vehicle Classification refers to various technologies that automatically determine vehicle length, height, number of axles, and axle spacings for vehicle classification purposes. It is typically integrated with WIM systems. Currently, AVC equipment is used extensively by the toll industry and will play a major role in the implementation of AVI on the Indiana Toll Road.

3.3 Current Operational Field Tests

There are currently three major operational field tests in the United States to demonstrate IVHS-CVO technologies.

3.3.1 H.E.L.P./Crescent

The first field test, H.E.L.P. / Crescent (an acronym for Heavy-vehicle Electronic License Plate), is a project to design and implement an integrated IVHS-CVO system along a crescent-shaped corridor formed by I-5 and I-10 through the states of Texas, New Mexico, Arizona, California, Oregon, Washington, and the Canadian Province of British Columbia. Using interconnected AVI, AVC, and WIM technologies such that all data are processed by a central computer for use by both government and the trucking industry for regulatory, weight enforcement, and fleet-management purposes, the goal of this project is to have a system in which a truck, entering the system in British Columbia, can drive through the entire network without having to stop at other weigh stations or ports-of-entry (10). There are presently 25,000 transponder-equipped trucks (17) and 40 equipped enforcement stations participating in this program. A detailed system evaluation is currently underway.

3.3.2 Advantage I-75

The second major IVHS-CVO operational field test, Advantage I-75, is a public / private partnership to facilitate motor-carrier operations by allowing transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 in Florida, Georgia, Kentucky, Tennessee, Ohio, and Michigan; and Canadian Highways 401 and 402 (Windsor, Ontario through Quebec City, Quebec) at mainline speeds with minimal stopping at weight / enforcement stations. Pre-clearance decisions at downstream stations are to be based on truck size and weight measurements taken upstream and on computerized checking of operating credentials in each jurisdiction (10). Emphasis is on utilizing off-the-shelf

technologies configured for decentralized control so that each state or province may retain its constitutional and statutory authority relative to motor carrier operations. A system design has been completed, with initial implementation currently underway (10).

3.3.3 On-Board Automated Mileage / Stateline Crossing

A third IVHS-CVO operational field test was recently started in Iowa, Minnesota, and Wisconsin. Currently called On-Board Automated Mileage / Stateline Crossing, this project is testing and evaluating the effectiveness of using a Global Positioning System and first generation on-board computers to record the miles driven within a state for fuel tax allocation purposes in a manner that is acceptable to state auditors (19).

3.4 Future System Concerns

During agency interviews and meetings with representatives of the motor carrier industry, many concerns were frequently raised regarding the various types of IVHS-CVO technologies that might be implemented, the methods by which they would actually be implemented, and the extent to which these technologies may enter day-to-day operating procedures. As discussed below, these concerns must be addressed in order that IVHS-CVO development and implementation is acceptable to both government and industry stakeholders. This partnering is a critical element in helping to fully realize and utilize the many potentials of IVHS-CVO technologies.

3.4.1 Government Issues

While many state regulatory agencies are starting to embrace IVHS-CVO, there is some concern that IVHS development may disproportionately

emphasize motor-carrier efficiency at the expense of enforcement agency abilities to effectively maintain highway safety for the public's well-being.

3.4.1.1 Weigh Station Pre-Clearance

Enforcement agencies stress that pre-clearance of vehicles and drivers past weigh stations cannot be based on vehicle weight alone, but must also take into consideration various other factors. For example, the Michigan State Police has required answers to the following questions:

- (a) Has a North American Standard (NAS) inspection been performed?
- (b) Has the vehicle been issued a Commercial Vehicle Safety Alliance (CVSA) decal?
- (c) Have any of the above inspections ordered the vehicle Out-of-Service?
- (d) Does the driver possess a valid medical certificate?
- (e) What is the driver's name and are there any outstanding civil or criminal warrants against that driver?
- (f) Does the driver possess a valid Commercial Driver's License (CDL) along with the proper endorsement or other state recognized license substitutes?
- (g) Does the driver possess an Hours of Service record that includes a notation as to the amount of "driving" and "on duty" time remaining as of the time when pre-clearance is requested?
- (h) Are enforcement personnel satisfied that the driver, at the time of the pre-clearance request, is not under the influence of alcohol or drugs?

3.4.1.2 Operating Authority Registrations

Even though ISTEA '91 provisions establishing transparent state borders required all states to participate in a base-state operating authority registration system by January 1, 1994 (now known as the Single State Registration System -- SSRS), caution must be exercised during system implementation so that existing state safeguards are not circumvented. For example, the Interstate Commerce Commission (ICC) regularly issues carriers "General Commodities" operating authority, a classification for which most states only require \$750,000 of insurance if the requesting carrier says that they have "no intent" to carry hazardous materials. However, since "General Commodities" carriers may technically still transport hazardous materials, Indiana registers operating authority based on specific cargo types and requires \$5 million of insurance to be available unless carriers sign-away their authority to carry hazardous materials.

3.4.2 Industry Issues

Preliminary results from IVHS-CVO development studies have indicated that substantial industry benefits can be achieved through paperwork reduction measures and travel time savings (7) (15). Nevertheless, motor-carrier operators have voiced several concerns that need to be addressed by evaluating specific benefits against expected industry investments necessary in using these technologies. This evaluation should include well-defined and attainable system goals and objectives, as well as technological standards that will allow for system compatibility and easy expansion.

3.4.2.1 National Standards

Trucking firms feel that before they enthusiastically participate, all states must first get together and agree on standards, procedures, rules, regulations, and other items. Carriers feel that many past "national" programs have not lived up to their initial expectations due to one or more states not participating (i.e. at one time 80,000 lb. trucks were legal in all states but Illinois; California still has trailer exemptions; and CVSA stickers from one state are not always honored by other states).

Motor-carrier operators that were interviewed in the study indicated that they would rather endure "sixteen different paper methods" to handle a given process, rather than having to purchase and maintain "sixteen different AVI transponders". To use an analogy from the video-tape industry before format standards were established, motor carriers do not want to invest in "Beta" system transponders, only to later find out that they are worthless and that they must re-invest in "VHS" transponders.

As revealed by the Florida Study for Advantage I-75, a frequent trucker perception expressing this uncertainty is that "under the current rules, trucks will still be required to register with each state traveled. If anything, it would seem that additional paperwork would be required to establish IVHS registration and to establish and make advance payments to an IVHS account" (7). This motor-carrier concern towards IVHS-CVO is such that the Advantage I-75 Policy Committee recently agreed to not charge motor-carriers for the transponders needed to participate in the Advantage I-75 program, and have instead included these costs in the government funded portion of the project.

3.4.2.2 Motor Carrier Profitability

As many in the trucking industry have noted, trucking companies do not have any intrinsic biases against new technologies such as IVHS -- only biases against additional costs that do not result in increased profits or driver safety. In fact, the industry representatives indicated that many trucking companies have already been investing in various advanced technologies, such as satellite tracking to automatically calculate the number of miles traveled in each state for fuel-tax and apportioned registration payments, long before the IVHS program was conceived. Companies such as United Parcel Service (UPS), who are installing on-board computers to link their trucks to corporate fleet-management systems, have shown that trucking companies will logically embrace change at their own expense, if technological innovations can increase their profits.

3.4.2.3 Expandable Open System Architecture

Due to already committed investments by some trucking companies in various advanced technologies, many interviewed industry representatives feel that government-specified transponders should not be mandated. Instead, an expandable open system architecture or specific communications protocol should be developed so that carriers who have already spent much money on their own computer systems can just add features to be compatible with and able to communicate with government roadside computers.

3.4.2.4 Data Security

One mandate some carriers feel necessary, however, is that all transponders or similar data-transfer devices should include a two-way

communications capability so that carriers can know who wants to read their transponder, can give permission to that person, and can record who read what data and when they were read. This is felt necessary to help ensure data security and to allow carriers to have a record (for audit purposes) of what data values a government agency is reading in obtaining information for calculating such items as tolls and taxes. For example, the trucking industry is concerned that a roadside computer might malfunction during mainline-speed data-transmission and record 5,000 miles traveled for a given truck in a given state, when the truck's transponder or on-board computer might have only recorded 4,000 miles. In addition, there is concern that confidentiality might be breached and that data stored on transponders could be read by competitors while they are driving down a highway or parked at a truck-stop, etc.

It has even been suggested by some motor carriers that one way to assure data security is to develop a national system whereby roadside computers connected to mainline Weigh-In-Motion (WIM) and Automatic Vehicle Classification (AVC) systems could electronically write all relevant taxing, enforcement, and weight/classification information to an on-board secure "black box" (like commercial airliners have) that was configured such that it could not be read while the vehicle was in motion. These vehicles could then automatically bypass weigh stations as long as periodic government audits of the "black box", to be conducted for billing and other verification purposes, did not uncover any past-due tax payments or other fees owed to government, any significant oversize/overweight violation rates, or any other detectable improprieties that the equipped vehicle or its affiliated trucking company was involved with.

3.4.2.5 Level Playing Field

Above all, industry concerns all relate to its long-time demand for fairness: IVHS-CVO must ensure a "level playing field" for all carriers -- both interstate and intrastate. As such, some industry representatives feel that all trucks should be required to have a transponder or similar transponder-compatible data-communications device on-board so that enforcement is not biased towards those carriers who decide to use IVHS technologies.

Some of their comments indicated concerns that those carriers who will voluntarily implement IVHS-CVO will generally be the honest carriers who are already following the rules and paying for fuel taxes, licenses, and permits. Consequently, they in essence will be subsidizing the user fees of illegal truckers. The carriers feel that IVHS implementation should be an opportunity for enforcement agencies to put more trust and confidence in honest motor carriers, whose performance records demonstrate consistently safe and legal operations. They believe that enforcement agencies should instead focus their limited resources on identifying and taking action against those illegal trucks and motor carriers who willfully and habitually avoid the scales by either travelling predominately at night, by waiting at a particular truck stop until they hear a CB-radio message that the scales at an upcoming weigh station have closed for that day, or by using parallel routes to travel around weigh stations that are known to be open.

Industry representatives advocating that all trucks be required to install an on-board transponder or similar transponder-compatible communications device believe that this is a good way to a "level playing field" since transponders could provide more accurate and verifiable

travel mileages than are currently possible with existing manual methods. They contend that this would first help the states to recover millions of dollars of revenue that are lost each year when illegal motor carriers fix their apportionment calculations by slightly increasing reported travel-miles / percentages in cheap tax states, while subtracting travel-miles / percentages from expensive tax states. This would then help to "level the playing field" for honest motor carriers since illegal truckers could no longer afford to continue offering shippers extra-low fees and tariffs, which had only been possible because the illegals' regulatory and tax non-compliance resulted in their unfairly having lower overhead and operating costs.

3.4.2.6 Avoid Sticker Mentality

The trucking industry representatives also expressed their concerns about the "sticker-mentality" of enforcement agencies who have a tendency to use stickers (electronic or non-electronic) as the predominant factor in determining if a carrier has or has not paid their taxes and fees, etc. Motor carriers feel that if government-sponsored IVHS is to become a reality, it must first manifest itself as a communications system to make payment data available to enforcement officials in real-time. For example, it has been known that some disreputable carriers will reuse oversize/overweight single-trip permits and/or use unauthorized self-permits by filling-out a tag with a fictitious permit number that is close to the sequential permit numbers that are known to be issued for that particular day/week based-upon recently-issued valid permit numbers. This gets back to the "level-playing-field" issue discussed previously in Section 3.4.2.5. In this case, because enforcement personnel see what

looks to be a good permit/"sticker", they allow the movement to proceed without incident. However, this adversely affects honest carriers who, in the long run, will probably see their special permit fees increased in order to cover for lost government revenue from those who are not playing by the rules.

This "sticker mentality" also frequently affects carriers who were at one time past-due on their fuel-tax payments and were thus included on "pick-up" lists that the Indiana Department of Revenue issues periodically to weigh-station personnel. Even if a motor-carrier on this list has since paid-up their account balance and can prove with an official receipt that they are no longer out of compliance, many are still unnecessarily hassled or given a citation because of the "sticker mentality" that says that they are "still on the list" until the next list is issued -- whenever that might happen (as stated by industry representatives). This gets back to the "Computer Hardware / Communications" issue discussed previously in Section 2.4.1.

3.4.3 Government/Industry Workshop

Throughout this study, tasks that were focused on identifying potential IVHS-CVO implementation barriers/concerns were also considered to be integral tasks towards finding solutions to these concerns because they initiated significant dialogue that might not normally take place among the various government agencies dealing with commercial vehicle operations, and between these government agencies and the trucking industry. Also, since a working and trusting relationship between government and the trucking industry is necessary to fully realize the many potentials of IVHS-CVO technologies, it was felt that the first steps

towards achieving this partnership and generating solutions to stated concerns could be best realized in an open forum whereby interested IVHS-CVO stakeholders could express their concerns and hear and exchange comments directly with the decision makers who would be most involved in various aspects of IVHS-CVO development and implementation.

This goal was realized at a day-long consensus-building workshop regarding future directions for IVHS-CVO, which was held in Merrillville, Indiana on November 17, 1993. Organized by Purdue University in cooperation with other participating organizations, it was attended by over one-hundred representatives from a broad range of public and private sector interests. Participants included motor-carriers, their industry-associations, the above sponsors, and various state agencies from both Indiana and Illinois; including the Department of Revenue, the Department of Transportation, the Bureau of Motor Vehicles, and the State Police. Highlighting the workshop were the following three concurrent break-out sessions that featured much open discussion moderated by panels consisting of high-level state-agency and industry-association representatives from both Indiana and Illinois:

- (1) Automated Vehicle Identification (AVI) / Electronic Toll Collection (ETC)
- (2) Weigh-In-Motion (WIM) and Electronic Vehicle and Driver Credential Checking (Safety and Enforcement)
- (3) One Stop Shopping (Fuel Taxes, Registration and Permits)

The official workshop summary/minutes, as compiled by the University of Illinois at Urbana-Champaign, and the entire workshop program can be found in Appendix C.

3.5 Indiana Implementation Models

In spite of the previously mentioned barriers and potential concerns related to IVHS-CVO that this study has identified, state agency interviews have also revealed present Indiana successes that could be used to help to form the groundwork for developing and implementing various IVHS-CVO concepts.

3.5.1 Toll Road Authority Charge Plates

The Indiana Toll Road Authority is currently implementing the communications infrastructure necessary to support high-level automatic vehicle identification technologies and other IVHS functions. Transition to electronic toll collection would be a natural extension of the existing manual system whereby pre-approved commercial vehicle operators who meet certain criteria and have posted either a bond or a letter of credit equal to their estimated tolls for three months may open a charge account.

Under the existing system, involving 33,000 charge plates in 640 accounts, truckers with Toll Road issued charge plates (a magnetic-stripped credit card) hand their charge plate, instead of cash, to a toll booth attendant for validation and payment. Then, on a monthly basis, the Toll Road Authority sends each account holder an itemized bill listing the location, amount, and date of all tolls for each charge plate, including point of entry, exit, and miles traveled (11).

Since the Toll Road Authority already has the personnel and procedures in place to issue charge accounts, maintain records, and collect balances due on these accounts, it would be relatively easy to implement automated toll collection once the necessary AVI transponders, antennas, and other infrastructure has been decided upon and installed.

The only change to their existing system would be that instead of a toll attendant physically swiping a charge card through a toll booth machine, the process would start with a mainline AVI reader electronically "swiping" the "charge plate" (e.g. AVI transponder). From the Toll Road Authority's perspective, record keeping, billing, account bonding, and auditing could all stay the same.

3.5.2 Low-Speed W.I.M. for Vehicle Sorting

To help eliminate then-frequent temporary weigh-station closures resulting from unacceptably long truck queues extending onto freeway shoulders upstream of weigh-station deceleration lanes, low speed weigh-in-motion devices were installed at five weigh stations in Indiana (see Table 2.2). Located on the entrance ramps of weigh-stations in Chesterton (eastbound and westbound I-94), Lowell (southbound I-65), Richmond (westbound I-70), and West Harrison (westbound I-74), they pre-sort vehicles and automatically direct them to either enter the static-scales or to take an exclusive bypass-lane back to the freeway. As observed by the Indiana State Police, these devices have nearly eliminated unacceptable truck queues and have significantly reduced the number of accidents involving conflicts between mainline-speed passenger cars and trucks that were slowing to enter queues that had overflowed onto the freeway shoulder. This was especially apparent at locations where a weigh-station deceleration lane was located just beyond the crest of a hill.

In fact, there have already been some discussions between the Indiana Department of Transportation and the State of Kentucky's Transportation Cabinet towards integrating one of Indiana's WIM-equipped

enforcement-stations along I-65 with equipment developed for use in Kentucky on the Advantage I-75 project in order to field test certain types of pre-clearance between the two states.

3.5.3 Oversize/Overweight "Self-Permitting"

The Indiana Department of Transportation (INDOT) currently offers pre-approved trucking companies the ability to register oversize/overweight permits over the phone for only one dollar more than the cost of a given permit issued through the mail or in person at INDOT's central office in Indianapolis. For pre-approval, trucking companies are required to sign a Certificate of Responsibility that outlines insurance requirements and method of fees payment (i.e. pre-signed checks on file with the Permit Section, ComData checks, a permit service account, or Visa/Mastercard).

Under the existing system, applicants prepare the permit form and call a WATS line to the INDOT Permit Department. During a recorded conversation, the applicant states a Company Number (issued by INDOT) and reads the data on the permit form over the telephone to a State Highway Permit Clerk. The Permit Clerk then verifies that the stated size and weight parameters are within limits that allow the load to safely maneuver the chosen route. If permissible, the clerk states the permit number, mileage, fee, expiration date, and any special provisions pertaining to the movement. The applicant must then place all information received over the telephone onto the permit form, have the driver review all provisions and sign the form, and then place the form in the vehicle as necessary proof of compliance. Finally, the applicant must prepare a tag displaying the permit number and expiration date, and mount this to the left rear of

the movement² (6). As an operational success, this system could be adapted for use by other regulatory agencies developing "one-stop-shopping" for their permits.

3.5.4 Proposed Motor Carrier Information System (MCIS)

In a previous study conducted for the Indiana Department of Revenue's Special Fuel Tax Division, a preliminary system architecture has been developed for a Motor Carrier Information System (MCIS). The objectives of this system are (12):

- (a) Automate the Indiana Department of Revenue's current manual activities that deal with motor carrier authority requirements and vehicle registration ID stamps;
- (b) Replace the current information system which processes motor carrier authorities, vehicle registrations to authorities, insurance filings, and tracking of motor carrier agents;
- (c) Increase the Indiana State Police's effectiveness in enforcing motor carrier regulations by quickly providing accurate and up-to-date information on carriers (i.e. authority, permits, violations, etc.); and,
- (d) Reduce filing activities and improve the regulation of Indiana State Departments which implement motor carrier regulations by providing a central store of pertinent information to authorized users.

²This requirement to "...attach the oversize/overweight tag to the left rear of the movement" (6) is in the process of being eliminated, and is no longer enforced by the Indiana State Police. However, as of this writing, it is still technically a law.

The MCIS Project focuses on paper handling factors -- for both the State and motor carriers, compliance with all relevant regulations, record-keeping duplication in state departments, and weigh station inspection routines. It has not yet reached the final design stage, and implementation does not appear to be near due to state budget cuts. In addition, some agency representatives, mostly from the Bureau of Motor Vehicles, are concerned that the MCIS in its present form may not provide for true inter-agency data integration, but will only let one agency tap into another agency's computer to see if a given carrier is in good standing or not.

They argue that efforts should be made instead on consolidating Indiana's trucking-related agencies and creating a central database that will allow data already input for one purpose (i.e. vehicle registrations) to be used for other purposes (i.e. fuel tax permitting), thus minimizing the additional data needed each time a carrier files for and/or renews various permits, etc. Their concern is that the MCIS Project would spend several million dollars on a computer system that would further entrench an administrative, regulatory, and organizational structure that has led to multiple agencies maintaining separate databases containing essentially the same information.

It has even been suggested that motor carriers with computerized fleet management systems capable of electronic data transfers be allowed to access their accounts via a modem so that they may upload all necessary data from their company database directly into a consolidated agency database, thus minimizing agency data entry work and shortening the time carriers must presently wait to get their proper permits. Irrespective of the final MCIS philosophy chosen, it would seem prudent to direct IVHS-CVO

planning efforts to refine and implement an expanded MCIS, thus maximizing previous efforts and allowing an easy transfer to future IVHS-CVO projects.

CHAPTER 4

LEGAL ISSUES

4.1 Introduction

Many of the political, economic, and institutional issues that have previously been mentioned, regardless of their significance, result from state laws in the Indiana Code, and state agency regulations in the Indiana Administrative Code. Irrespective of processes, procedures, and new technologies that may become available to save time, reduce paperwork, and be more cost effective, if a given agency does not have the required jurisdiction and specific authority from the state legislature to address a particular issue, that agency cannot legally do anything about it.

Specifically, these requirements come in two forms:

- (1) Legislation that describes exactly how a state agency must handle a given issue, including highly descriptive language as to specific procedures that must be followed, specific forms that must be completed, and specific persons and/or positions who are responsible for ensuring that these requirements are carried-out in a timely manner; and
- (2) Legislation that gives a state agency general instructions and broad powers to manage processes and address issues deemed important by the state legislature and its constituents.

State agencies create regulations, compiled in the Indiana Administrative Code, to eliminate procedural ambiguities, prescribe required forms, and assign responsible chains-of-command so that the legislature's intent can be carried-out in an efficient and effective manner. Since these regulations have the flexibility of being created by the same agencies that implement each particular regulation, when new technologies and procedures become available to increase productivity, agencies can make changes through the relatively dynamic administrative process, rather than having to go through the generally time-consuming legislative process.

On the other hand, state laws in the Indiana Code may not have the flexibility of responding to the changing needs created by new technologies. In these instances, agencies cannot make any changes to their procedures without having to first go back to the legislature for new laws.

Since any required changes in state laws have the potential to be very time-consuming and complex institutional barriers that could prevent timely IVHS-CVO implementation or limit the potential benefits to its users, the present study focused on identifying existing laws and administrative rules and regulations that might restrict state agencies from implementing IVHS-CVO innovations. These innovations include four specific concepts:

- (1) Automatic payment of tolls while traveling at mainline speeds;
- (2) Pre-clearance of vehicles and drivers past weigh stations;
- (3) "One-stop-shopping" for licenses, registrations, and permits;
and
- (4) Transparent state borders for unimpeded truck travel.

4.2 Identification Strategy

The Indiana Code and Indiana Administrative Code were reviewed for various Titles, Articles, and Chapters that appeared to be related to trucking in Indiana. These were then compiled and sent for review to each agency dealing with trucking in Indiana so that appropriate additions and deletions could be made to the list. Once these relevant sections of the Indiana Code (see Appendix D) and Indiana Administrative Code (see Appendix E) were identified and verified, an index of key words and phrases applicable to IVHS-CVO institutional issues were compiled into a target list to help identify specific laws and regulations that might be potential barriers (see Table 4.1). Each individual law and regulation from relevant sections of the Indiana Code and Indiana Administrative Code were then analyzed in terms of the target list, and categorized as either being a potential barrier or not based on their significance to IVHS-CVO implementation.

4.3 Potential Legal Barriers

In the following lists, references to Indiana laws and regulations are made as standard legal citations. For example, "IC 9-18-2-17" refers to Title 9, Article 18, Chapter 2, Section 17 of the Indiana Code. Similarly, "135 IAC 2-3-12" refers to Title 135, Article 2, Rule 3, Section 12 of the Indiana Administrative Code.

It should be noted that all underlining appearing in excerpts from the Indiana Code or Indiana Administrative Code have been added by the authors of this report to highlight relevance to barriers being discussed. They do not appear as such in the original laws and regulations.

Table 4.1: Key words and phrases used to identify laws and regulations that are potential institutional barriers

WRITTEN communication REQUIRED... / Data processing...
ORIGINAL copy... / TYPEWRITTEN copy... / Computations...
CARRIED in truck... / CARRIED with driver...
PRESCRIBED FORM/CARD must be used/filed/completed...
Documents must be SIGNED... / Must have a seal...
Items must be MAILED... / Items must be POSTMARKED...
CONFIDENTIALITY for WRITTEN records/information...
Non-automated technical/measurement devices specified
Procedure / Qualification / Provide / Assist / Report
Telephone / Telegraph / Fax / Facsimile / Automatic
Placarding / Notarized Statement / Plates / Display
Pen / Ink / Write / Writing / Duplicate / Triplicate
Paper / Certificate / Certified / Seal / Sign / Signature
Tags / Sticker / Distinguishing / Identification / Decal
Attached / Prepare / Cab / Display / On vehicles / Panel
Document / Title / Evidence / Log book / Trip Sheet
Disclose / Release / Destroy / Report / Records / Invoice
File forms / Prescribed / Space provided / In person
Shall apply / Required / Obtain / Purchase / Prorate
Serial number / Bearing / Supporting / Odometer / Mobile
Application / Original / Reproduce / Microfilm
Statement / Accompanied / Sent / Envelope / Necessary
Retain / Submit / Claim / Notify / Keep / Preserve
Scale / Platform / Static / Electronic / Weighers / False
Eligible / Issued / Furnished / Enforcement / Compliance
Approved / Authorized / Assigned / Supplemental / Special
Registration / Plates / Permit / Cab Card / Manifest
Bond / Insurance / Tax / Payment / Receipts / Fee / Check
Adopt / Reciprocity / Agreement / Annual / Temporary

4.3.1 Barriers to Electronic Toll Collection

4.3.1.1 Must Stop at Toll Booths

135 IAC 2-2-12 states that "The operator of a vehicle shall make a complete stop at toll collection facilities when entering and exiting the toll road, if the procurement of a ticket or the payment of a toll is required". This could prevent mainline speed automatic toll collection from being implemented.

4.3.1.2 No Toll Discounts

IC 8-15-2-14.5 states that "No reduced rate of toll shall be allowed ... except through the use of commutation or other tickets or privileges based upon frequency or volume of use". This could prevent discounts from being given to motor carriers who use AVI for toll collection -- a request from some industry representatives who feel that a discount should be warranted because the toll road authority would not have to pay salaries and provide benefits to as many employees as are presently needed to staff toll booths.

4.3.2 Barriers to Weigh-Station Pre-Clearance

4.3.2.1 Permits Required to be On/In Vehicle

The following requirements could prevent AVI transponders or similar electronic devices from replacing the present system of stickers, cab cards, and other vehicle markings and/or items that are required to be carried in or on each vehicle:

IC 9-18-2-19 (b) states that "A distinctive cab card ... (2) must be carried in the vehicle".

IC 9-18-2-26 (a) states that "License plates shall be displayed ... upon the rear of the vehicle".

IC 9-20-6-11 (a) states that "A permit issued under this chapter shall: (1) be carried in or on the vehicle or other object to which the permit refers".

IC 9-18-7-3 (c) states that "The document must be carried in the vehicle for which the document is issued".

45 IAC 16-1-10 (a) states "...shall be displayed on both sides of each vehicle.... (b) ...shall be in letters and figures not less than one and three-fourths (1 3/4) of an inch in height.... (d) ...shall be displayed on each motor vehicle such identification of carrier name and operating authority...".

105 IAC 10-1-3 states "...shall display ... a legible permit number and expiration date on a five (5) inches by twelve (12) inches white background.... The position for displaying the tag shall be on the left rear of the vehicle or vehicle combination".

IC 9-18-2-21 (b) states that "A certificate of registration or a legible reproduction of the certificate of registration must be carried: (1) in the vehicle to which the registration refers; or (2) by the person driving or in control of the vehicle, who shall display the registration upon the demand of a police officer. (c) ...The valid stamp must be legible on the reproduced copy".

IC 6-6-4.1-19 (a) states that "The department or the state police department may impound a carrier's commercial motor vehicle if ... (2) there is not an emblem displayed on the vehicle as required by section 12 of this chapter...".

IC 9-18-2-43 (b) states that "a law enforcement officer authorized to enforce motor vehicle laws who discovers a vehicle required to be registered under this article that does not have the proper certificate of registration or license plate: (1) shall take the vehicle into the officer's custody...".

IC 6-6-2.1-205 (a) states that "The owner ... shall affix the alternative fuel decal to the lower left side of the front windshield of the motor vehicle for which it was issued".

45 IAC 16-1-11 (b) states that "Upon receipt of an annual vehicle registration identification stamp for a motor vehicle, the carrier shall complete and execute a uniform identification cab card for such vehicle.... Each uniform identification cab card shall be typed or printed in indelible ink and maintained in the cab of the motor vehicle for which prepared.... (c) ...the carrier executing said cab card shall affix permanently thereon by use of the glue on the back of the identification stamp the proper annual vehicle registration identification stamp, which stamp may not thereafter be removed from said cab card.... (f) ...shall affix the Uniform Form D Cab Card or Uniform Form D-1 Cab Card prepared for the substitute vehicle to the front of the Cab Card prepared for the discontinued vehicle, by permanently attaching the upper left-hand corners of both cards together in such a manner as to permit

inspection of the contents of both cards.... (h) ...shall, when traversing the state of Indiana, display the Uniform Form D (Interstate) Cab Card ... shall type or print in indelible ink the Indiana P.S.C.I. number issued to such carrier in the square bearing the name of the state of Indiana on the back of said Uniform Form D Cab Card. Said Uniform Form D Cab Card shall be carried on the vehicle, to be exhibited by the driver, upon demand...".

135 IAC 2-7-19 states that "...an identification number issued by the department [of highways, toll road division] shall be stenciled at a designated location on that truck-tractor".

135 IAC 2-7-19 states that "Such certificate shall be suitably protected and carried in the cab of the truck-tractor in a place where it shall be readily available for inspection".

IC 6-6-4.1-12 (d) states that "...a carrier shall display on each commercial motor vehicle an emblem when the vehicle is being operated by the carrier in Indiana. The carrier shall affix the emblem to the vehicle The carrier shall display in each vehicle the cab card issued by the department [of revenue]. The carrier shall retain the original annual permit at the address shown on the annual permit".

IC 8-2.1-18-44 (d) states that "Common and contract motor carriers shall execute and display the uniform identification cab cards in accordance with the rules of the department [of revenue]. (e) ...shall affix the prescribed identification stamp to the uniform identification cab card in accordance with the rules of the department [of revenue]. (f) ...shall be affixed to

the cab card in accordance with the rules of the department [of revenue]. (k) ...shall display the Indiana identification number issued to the carrier in the manner prescribed by the rules of the department [of revenue]".

IC 8-15-3-27 states that "The driver of the vehicle must have a copy [of the special hauling permit] to present to the toll attendant on duty at the point of entry to the tollway".

135 IAC 2-4-4 states that "...the driver of the vehicle shall have a copy of the permit to present to the toll attendant upon entry".

45 IAC 13-11-1 (e) states that "A carrier shall keep a reproduced copy of the carrier's annual permit in each commercial motor vehicle that is operated by the carrier in Indiana".

45 IAC 13-3-4 states that "a lessor shall display in each leased commercial motor vehicle a reproduced copy of the Indiana motor carrier fuel tax annual permit...".

45 IAC 15-3-3 (a) states that "All reprints and reproductions must be facsimiles and must be on paper of substantially the same color, weight (not less than 16 lbs), size, and texture, and of a quality as good as that used on the original form".

It should be noted, however, that in some instances, reference to decals or proof being carried in the vehicle, or specifications as to their required locations are sufficiently vague so as to seem to allow electronic validations to be stored in AVI transponders at to be determined locations. For example:

IC 6-6-4.1-19 (a) states that "The department or the state police may impound a carrier's commercial motor vehicle if ... the

driver does not have proof in the vehicle that the annual permit has been obtained...".

IC 8-2.1-17-3 states that a "'Certificate' means: ...(2) the acknowledgement issued by the department [of revenue] to an interstate common carrier".

IC 8-2.1-17-12 states that a "'Permit' means: ...(2) the acknowledgment issued by the department [of revenue] to an interstate contract carrier as evidence of the registration of the contract carrier's interstate contract authority".

IC 8-2.1-18-9 (a) states "...until the carrier has: ...(3) been issued an acknowledgment by the department [of revenue]...".

IC 8-2.1-18-43 states that "An intrastate motor carrier shall display identification, in the method prescribed by rules of the department, on each motor vehicle the carrier operates".

IC 9-20-14-2 (a) states that "A decal or tag furnished for use with the permit must be appropriately displayed as prescribed by the Indiana department of transportation".

IC 9-20-15 (a) also states that "A decal or tag furnished for use with the permit must be appropriately displayed as prescribed by the Indiana department of transportation".

105 IAC 10-2-7 also states that "Any decal or tag furnished for use with the permit shall be appropriately displayed as may be prescribed by the department [of transportation]".

IC 8-2.1-18-39 (a) states that "All applications ... shall be made on forms prescribed by the department [of revenue]".

45 IAC 15-3-3 (a) states that "taxes must be submitted on forms furnished by the department [of revenue]".

4.3.2.2 Financing Restraints

IC 9-20-17-4 (b) states that "The cost of scales and equipment described under subsection (a) shall be charged to the maintenance of the highway on which the scale or equipment is used". This could prevent WIM and other IVHS equipment from being paid by creative financing techniques.

4.3.2.3 Minimum Number of Weight Checks

IC 9-20-17-1 states that "The state police department shall make at least an average of twenty-five (25) weight checks per week for each patrolman of the department". Depending on how this is interpreted, it could require some vehicles who would have otherwise been pre-cleared based upon being obviously underweight via weigh-in-motion devices, to instead be pulled into a weigh-station in order to be exactly weighed on a static scale.

4.3.2.4 Weigh-Stations Must Be Staffed

IC 9-20-17-2 states that "To the degree possible, all permanent weigh stations must be staffed during the hours of heavy commercial truck traffic. Enforcement crews shall operate portable scales frequently enough to discourage heavy truck traffic on Indiana secondary highways". This could prevent fully automated weight-enforcement stations from being operated twenty-four hours per day unless they are staffed at various peak times during the day.

4.3.2.5 No In-Vehicle Television Screens

IC 9-19-17-1 states that "A person may not: (1) own a motor vehicle; or (2) operate upon a highway a motor vehicle; that has a television set

installed so that the screen of the television set can be seen by a person sitting in the driver's seat". This could prevent the use of some IVHS technologies that use in-dash computer screens to give various information to the driver, including messages indicating whether or not that vehicle is pre-cleared to bypass the weigh station or must enter for inspection.

4.3.3 Barriers to One-Stop-Shopping

4.3.3.1 Manual Records Always Required

IC 9-18-2-17 states that the Bureau of Motor Vehicles shall "...keep a record of the application on suitable index cards under a distinctive registration number assigned to the vehicle and in any other manner the bureau considers desirable for the convenience of the bureau". This could require manual records and procedures to be maintained for each account, even if secure electronic methods are implemented for certain accounts.

105 IAC 10-2-3 states that "The transporting company shall maintain a log sheet, provided by the department, of all movements when paying by calendar quarter. The log sheet will be submitted at the end of the quarter with total payment due the department [of transportation]".

140 IAC 2-1-7 (a) states that "'Proof' that the Excise tax has been paid shall consist of the owner's current year's Certificate of Registration for that vehicle, and no other proof shall be accepted by the Bureau of Motor Vehicles".

4.3.3.2 Old Decals Need to be Returned

Depending on how electronic tags/permits are interpreted, the following laws could prevent a specific transponder from being re-used,

rather than just be re-programmed with new permit information and/or validations, etc.:

IC 6-6-2.1-205 (b) states that "Upon receipt of the new decal ... the owner shall return to the administrator: (1) the old decal...".

IC 6-6-4.1-12 (c) states that "The annual permit, each cab card, and each emblem issued to a carrier remain the property of this state...".

4.3.3.3 Signatures Required on Documents

The following signature requirements could prevent reports from being filed electronically, unless various types of software-secured electronic signatures were allowed for use such as can found in certain electronic forms packages¹:

IC 6-8.1-10-6 (b) states that "...the filing of a substantially blank or unsigned return does not constitute a return".

45 IAC 13-9-1 (c) also states that "The filing of a substantially blank or an unsigned report does not constitute the filing of a report...".

45 IAC 15-5-7 (f) states that "An unsigned return is one which does not have the original hand written signature of the individual taxpayer or corporate officer or their authorized designee".

¹One example of this feature can be found in the electronic forms software package called WordPerfect Informs for Windows. Its documentation refers to "signing on the dotted line electronically" by stating that "...for forms that require an authorized signature for approval, WP InForms includes RSA Digital Signatures. Digital signatures protect your forms from unauthorized changes. There's also a WordPerfect TamperSeal that will detect any tampering with protected information" (20).

IC 9-18-2-21 (a) states that "A person who registers a vehicle, except a person who registers a vehicle under the International Registration Plan, shall sign the person's copy of the certificate of registration in ink in the space provided".

IC 9-25-5-6 states that "A certificate of compliance ... must be signed".

IC 9-18-2-16 (a) states that "A person who owns a vehicle must sign an application in ink to register the vehicle".

45 IAC 15-3-3 (c) states that "Although reproduced returns may be filed, they must contain the original signatures. Reproduced signatures will not be accepted".

4.3.3.4 No Electronic Tariffs or Schedules

45 IAC 16-3-3 states that "All tariffs and supplements thereto shall be in book, pamphlet, or loose-leaf form of size either 8 x 11 inches or 8 1/2 x 11 inches, ...shall be plainly printed, planographed, stereotyped, or prepared by other similar durable process on paper of good quality.... The type used shall be ... not less than 8 point bold or full face...".

45 IAC 16-3-30 states that "A schedule shall be filed in a book, loose-leaf or pamphlet form. It shall be plainly printed, mimeographed, planographed, stereotyped, or reproduced by other durable process on paper of good quality. ...[and] shall be either 8 x 11 inches or 8 1/2 x 11 inches...".

It should be noted, however, that the above are administrative rules. More flexibility can be found in the following language from the actual laws regarding tariffs and schedules:

IC 8-2.1-18-20 states that "The department [of revenue] may prescribe the form and manner in which such tariffs shall be published...".

IC 8-2.1-18-21 also states with more flexible language "...to file with the department [of revenue], ...in the form and manner prescribed by the department [of revenue], schedules...".

4.3.3.5 Agency Responsibilities and Inter-Agency Notification Requirements

Depending on how a "One-Stop-Shopping" system is organized (e.g. existing agencies with interconnected computers, existing single agency taking-on additional responsibilities, new centralized agency created, etc.), the following references could limit implementation flexibility or the creation of a new centralized agency to handle motor-carrier affairs:

IC 6-6-2.1-204 (a) states that "The administrator [of the department of revenue] shall issue an alternative fuel decal...".

IC 6-6-4.1-12 (b) states that "The department [of revenue] shall issue: (1) an annual permit; and (2) a cab card and an emblem for each commercial motor vehicle that will be operated by the carrier upon the highways in Indiana".

IC 6-6-4.1-15 states that "The commissioner [of the Bureau of Motor Vehicles] shall enforce this chapter. The state police department shall assist the commissioner [of the Bureau of Motor Vehicles] in the enforcement of this chapter".

IC 6-6-4.1-25 states that "The bureau of motor vehicles may not register or license a motor bus, truck, tractor, trailer, or semitrailer used or intended to be used by the owner for transportation of property until the owner furnishes the

- bureau of motor vehicles with reasonable proof that the owner has a permit or license issued by the department" of revenue.
- IC 6-6-5-6 (a) states that "...such excise tax shall be paid to the bureau [of motor vehicles] at the time the vehicle is registered.... [However] (b) A voucher from the department of state revenue showing payment of the excise tax imposed by this chapter may be accepted by the bureau [of motor vehicles] in lieu of a payment under subsection (a)".
- IC 6-8.1-4-4 (b) states that "The joint registration center is under the supervision of the department [of revenue] through the special tax division".
- IC 6-8.1-3-4 states that "The department [of revenue] has the sole authority to furnish forms used in the administration and collection of the listed taxes".
- IC 9-14-2-4 states that "The bureau [of motor vehicles] shall prescribe and provide all forms necessary to carry out any laws administered and enforced by the bureau".
- IC 8-2.1-18-38 refers to "A registration stamp issued by the department [of revenue] and the cab card to which it is affixed...".
- IC 8-2.1-18-44 (a) states that "The department [of revenue] shall prescribe and furnish the annual registration 'identification stamp' for each motor vehicle ... (b) shall be furnished by the department [of revenue] such number of identification stamps ... (c) the department [of revenue] ... shall supply in blank, to common and contract motor carriers a sufficient supply of a self-executing uniform identification cab card...".

IC 8-2.1-19-1 states that "The bureau of motor vehicles may not register or license a motor bus, truck tractor, trailer, or semitrailer ... whenever the law requires the owner to obtain a permit or certificate of convenience and necessity from the department [of revenue] until the department [of revenue] furnishes the bureau of motor vehicles with an instrument".

IC 8-2.1-19-2 explains this by stating that "The instrument must certify that the owner ... has complied with the law and the rules of the department...".

IC 9-18-2-19 states that "A person who owns or leases a vehicle required to be registered under the International Registration Plan shall receive an apportioned plate and cab card as determined by the bureau [of motor vehicles]".

IC 9-18-2-20 (a) states that "The bureau [of motor vehicles] ...shall issue a certificate of registration".

IC 9-18-2-30 states that "The bureau [of motor vehicles] shall issue to the owner of each vehicle subject to registration one (1) license plate upon the registration of the vehicle".

IC 9-18-9-3 states that "The bureau [of motor vehicles] shall issue to a person who owns a trailer a distinctive registration card and license plate for each trailer registered".

IC 9-20-5-8 states that "The Indiana department of transportation may not issue a permit under this chapter for the operation of a vehicle if ... (3) the owner or operator of the vehicle has not registered the vehicle with the bureau [of motor vehicles], if the vehicle is required to be registered under IC 9-18".

IC 9-20-6-12 also states that "The Indiana department of transportation may not issue a permit under this chapter for the operation of a vehicle if ... (3) the owner or operator of the vehicle has not registered the vehicle with the bureau [of motor vehicles], if the vehicle is required to be registered under IC 9-18".

IC 9-25-7-5 states that "The bureau [of motor vehicles] shall report to the department of state revenue a failure, a refusal, or the neglect of a common carrier of persons or property by motor vehicle to file a certificate of proof of financial responsibility when requested".

45 IAC 13-12-1 (c) states that "The department [of revenue] will notify the Indiana state police when a suspension or revocation has occurred, or when it has been lifted".

45 IAC 16-1-6 (c) states that "The third copy of the application shall be stamped (approved for filing) and forwarded by the [Public Service] Commission to the Indiana State Police".

45 IAC 16-1-11 (a) states that "...the operating carrier having first obtained a valid annual vehicle registration identification stamp issued by the [public service] commission for the motor vehicle. ... (e) ...a registration stamp issued by this [public service] commission...".

135 IAC 2-7-21 states that "upon approval by the department [of transportation, toll road division], an identification card bearing a permit number will be issued to the driver".

135 IAC 2-8-1 states that "Michigan trains may operate on the toll road only under a Michigan train single trip permit issued by

the department [of transportation, toll road division] and subject to compliance by the permittee with 135 IAC 2-8".

4.3.4 Barriers to Transparent State Borders

4.3.4.1 Permits Issued by Indiana Agencies Are Required

IC 6-6-2.1-203 (a) states that "The owner ... shall obtain an alternative fuel decal...".

IC 6-6-4.1-12 (a) states that "Except as authorized under section 13 of this chapter, a carrier may operate a commercial motor vehicle upon the highways in Indiana only if the carrier has been issued an annual permit, cab card, and emblem under this section".

IC 8-2.1-18-8 states that "A common carrier ... may not operate motor vehicles upon any Indiana public highway ... until after there has been obtained from the department [of revenue] a certificate under this chapter".

IC 8-2.1-18-14 states that "A person may not operate motor vehicles as a contract carrier over the public highways for compensation without first having obtained from the department [of revenue] a contract carrier permit...".

IC 8-2.1-18-38 states that "Each motor vehicle to be continued in service must be registered annually".

45 IAC 13-11-1 (a) "Except as provided in regulations 6-6-4.1-13 ... a motor carrier may only operate a commercial motor vehicle in Indiana if the carrier has been issued an annual permit.

4.3.4.2 Must File with Indiana Agencies

135 IAC 2-7-19 states "Application for permission to operate trailer combinations on the toll road shall be filed with the department [of highways, toll road division] on forms provided".

IC 8-15-3-27 states "...must apply to the department [of transportation, toll road division] in writing".

135 IAC 2-4-4 states "...shall apply to the General Manager of the Department [of transportation, toll road division] ... in writing, for an application for special hauling permit".

105 IAC 10-2-5 states that "A certificate of insurance shall be on file with the department [of transportation] showing insurance in full effect for the duration of any single trip special weight permits or trip authorization permits".

135 IAC 2-4-2 states that "The operator or operators of any vehicle exceeding any of the dimensions set forth in 135 IAC 2-4-1, except where permits are required under 135 IAC 2-4-4, 135 IAC 2-7, or 135 IAC 2-8, shall, upon entering the toll road, state to the toll attendant on duty the facts relative to any excessive dimension or dimensions. The toll attendant, so advised, may at that time permit the vehicle to travel on the toll road...".

4.4 Potential Legal Opportunities

During this identification process, a number of laws and regulations also became apparent as being potential opportunities for IVHS-CVO implementation because of provisions that could enable the introduction of certain aspects of IVHS-CVO without having to go through the process of passing new laws or revising agency regulations.

4.4.1 I.F.T.A. Opportunities

IC 6-8.1-3-14 (b) provides for the Indiana Department of Revenue to "enter into and become a member of the Base State Fuel Tax Agreement or any other fuel tax agreement plan developed by the National Governor's Association". Since the State of Indiana has joined IFTA, the following subsection, IC 6-8.1-3-14 (d), becomes pertinent:

"If the department enters into the Base State Fuel Tax Agreement or into any other agreement under this section, and if the provisions set forth in that agreement or other agreements are different from provisions prescribed by an Indiana statute, then the agreement provisions prevail".

Furthermore, IC 6-8.1-3-14 (e) states that "this section constitutes complete authority for the imposition of motor fuel taxes upon an apportionment or allocation basis without reference to or application of any other statutes of this state".

Thus, Indiana representatives could negotiate with other IFTA member jurisdictions regarding actions necessary to implement various IVHS-CVO concepts without having the excess burden of needing to satisfy all State of Indiana laws and regulations.

In addition, regarding all types of tax administration, IC 6-8.1-1-6 states that "...if a provision of this article conflicts with a provision of the law relating to any of the listed taxes, the provision of the law relating to the listed tax controls for purposes of imposing, collecting, or administering that listed tax".

4.4.2 I.R.P. Opportunities

IC 9-28-4-6 (b) provides for the Indiana Bureau of Motor Vehicles to "enter into and become a member of the International Registration Plan or

other designation that may be given to a reciprocity plan developed by the American Association of Motor Vehicle Administrators". Since the State of Indiana has joined IRP, the following subsection, IC 9-28-4-6 (d), becomes pertinent:

"If the state enters into the International Registration Plan or into any other agreement under this chapter, and if the provisions set forth in the plan or other agreements are different from provisions prescribed by law, then the agreement provisions prevail".

Furthermore, IC 9-28-4-6 (e) states that "this chapter constitutes complete authority for the registration of vehicles, including the registration of fleet vehicles, upon an apportionment or allocation basis without reference to or application of any other Indiana law".

Thus, Indiana representatives could negotiate with other IRP member jurisdictions regarding actions necessary to implement various IVHS-CVO concepts without having the excess burden of needing to satisfy all State of Indiana laws and regulations.

4.4.3 Electronic Precedents

4.4.3.1 Electronic Funds Transfers Allowed

IC 6-6-5-9 states that "The bureau [of motor vehicles] may contract with a bank card or credit card vendor for acceptance of bank or credit cards".

IC 6-8.1-8-1 states that "A person may make a tax payment ... by credit card, debit card, charge card, or similar method; or if approved by the department, by an electronic fund transfer".

IC 4-8.1-2-7 (e) defines an "electronic funds transfer" as "any transfer of funds, other than a transaction originated by check, draft, or similar paper instrument, that is initiated through an electronic terminal, telephone, or computer or magnetic tape for the purpose of ordering, instructing, or authorizing a financial institution to debit or credit an account".

4.4.3.2 Electronic Tax Returns Encouraged

45 IAC 15-3-3 (e) states that "The department [of revenue] encourages the filing of information returns on magnetic media. Procedures and specifications for magnetic media reporting are available from the department [of revenue]. (f) Any machine readable form (including magnetic ink) must be submitted to the department [of revenue] for prior approval".

4.4.3.3 Computer Printouts Are Acceptable

45 IAC 13-6-4 allows a "computer print out" as "proof of payment of taxes" for purposes of qualification for refund. This could be a precedent for allowing various other types of computer-generated validations to be acceptable.

4.4.3.4 Electronic License Plates Might Be Allowed

IC 9-18-2-8 (b) states that "A person who owns a vehicle shall receive a license plate, renewal tag, or other indicia upon registration of the vehicle. The bureau [of motor vehicles] may determine the device required to be displayed.... (h) The bureau [of motor vehicles] shall issue a semipermanent plate ... or ... (2) other indicia; to be affixed on

the semipermanent plate". An electronic validation might be allowed as "other indicia", and in this instance if consistent logic applies, the semipermanent plate could be interpreted as an AVI transponder.

IC 9-18-2-25 (a) states in regards to a "metal shortage" or other regulation that "If the bureau [of motor vehicles] is not able to comply with the provisions of this title relating to the furnishing of license plates ... the bureau may provide the type and number of license plates ... that will be furnished and displayed and the manner in which the plates ... must be displayed". This provision for non-metal license plates in certain instances could be a sufficient precedent to allow an AVI transponder and its stored data to be an acceptable license plate.

4.4.4 Reciprocity Authority and Cooperation

The following are codified powers that various state agencies have for interacting with agencies from other states and the Federal government. These can be used as authority and precedent for further cooperation towards developing and implementing IVHS-CVO concepts -- especially "Transparent State Borders".

4.4.4.1 Uniform Standards Are Desired

IC 8-2.1-18-6 (h) states the following in regards to the Indiana Department of Revenue, "In the furtherance of uniformity in the regulation of motor carriers the department may by order or rule adopt orders, standards, or regulations of the Interstate Commerce Commission, any other appropriate agency of the federal government, or another state as they affect motor carriers, whether or not specifically referred to under any other provision of this chapter".

Furthermore, IC 8-2.1-18-6 (i) adds that "The department may cooperate with other state agencies in adopting combined uniform procedures and forms when in the judgment of the affected agencies the action would be in the interest of the state, the citizens, and any other person subject to this chapter and other related Indiana laws".

4.4.4.2 Cooperative Audits Are Acceptable

IC 6-6-4.1-16 states that the Indiana Department of Revenue "may enter into agreements for the cooperative audit of the reports and returns of carriers with the appropriate authorities of any other state or jurisdiction that imposes a tax similar to the tax imposed under this chapter.... A cooperative audit conducted under an agreement made under this section has the same effect as an audit conducted by the department".

4.4.4.3 Participation in Multi-State Technology Tests Are Acceptable

IC 8-23-9-57 allows the Indiana Department of Transportation to "cooperate with the governing officials of state highway agencies and systems in one (1) or more other states or the Federal Highway Administration in research in conducting tests and experiments designed to develop the best methods of constructing, improving, and maintaining the highways in Indiana. In so cooperating ... the department may expend the funds appropriated to its use".

4.4.4.4 Indiana Bureau of Motor Vehicles Reciprocity Powers

IC 9-28-4-2 states that "The bureau [of motor vehicles] may enter into reciprocal contracts and agreements for the state with the proper authorities of any state, commonwealth, and the District of Columbia....

If the other state, commonwealth, or the District of Columbia has no commission or official authorized to enter into reciprocal agreement, but does have a law that contains a reciprocal provision for the benefit of the citizens of Indiana, the bureau [of motor vehicles] may consent to the provisions of the reciprocal law or statute and notify the proper authority of the other state, commonwealth, or the District of Columbia of the bureau's consent".

4.4.4.5 Indiana Department of Revenue Reciprocity Powers

IC 6-8.1-3-7 states that "the department [of revenue] may enter into reciprocal agreements with the taxing officials of the United States government or with the taxing officials of other state governments to furnish and receive information relevant to the administration and enforcement of the listed taxes".

In addition, IC 6-6-4.1-14 (a) states that "the commissioner [of the department of revenue] or, with his approval, the reciprocity commission created by IC 9-28-4 may enter into a reciprocal agreement with the appropriate official or officials from any other state or jurisdiction under which all or any part of the requirements of this chapter are waived with respect to motor carriers that use in Indiana motor fuel upon which tax has been paid to the other state or jurisdiction".

Furthermore, IC 6-6-4.1-14 (b) expands this so that "the commissioner [of the department of revenue] or, with his approval, the reciprocity commission created by IC 9-28-4 may enter into a reciprocal agreement with the appropriate official or officials of any other state or jurisdiction to exempt commercial motor vehicles licensed in the other state or jurisdiction from any of the requirements that would otherwise be

imposed by this chapter, including the requirements for trip permits, temporary authorizations, annual permits, and the payment of fees for trip permits and annual permits".

4.4.4.6 Indiana Department of Transportation Reciprocity Powers

IC 8-23-2-5 allows "entering into agreements with other states, regional agencies created in other states, and municipalities in other states for the purpose of improving public transportation service to the citizens...".

IC 8-15-2-1 allows the Indiana Department of Transportation, Toll Road Division to "exercise these powers in participation with any governmental entity or with any individual partnership, limited liability company, or corporation".

4.4.4.7 Governor's Multi-State Cooperative Powers

In regards to Federal traffic safety programs, IC 9-27-1-8 states that the "governor may cooperate with any agency or person, public or private, state or federal, and any political subdivision in the administration of the federal act".

4.4.5 Laws Requiring State Agency Cooperation

The following are codified relationships between various state agencies in Indiana that can be used as precedent for further cooperation towards developing and implementing IVHS-CVO concepts -- especially "One-Stop-Shopping".

4.4.5.1 General Information Sharing

IC 6-6-4.1-27 states that "the department [of revenue], the bureau of motor vehicles, and the Indiana department of transportation shall share the information regarding motor carriers and motor vehicles that is reasonably necessary for the effective administration and enforcement of IC 6-6-4.1 [Motor Carrier Fuel Tax], IC 8-2.1 [Motor Carrier Regulation], and IC 9 [Motor Vehicles].

4.4.5.2 Taxation Enforcement

IC 6-8.1-3-7 (b) states that "All agencies of the state of Indiana shall cooperate with the department [of revenue] in the administration of the listed taxes and shall furnish to the department [of revenue] any information relevant to the administration and collection of the listed taxes that the department requests".

45 IAC 15-4-1 states that "The division of audit [of Indiana Department of Revenue] may have full and prompt access to all official state and local records and to any information from government and private sources that is useful in performing its functions".

4.4.5.3 Size and Weight Enforcement

IC 9-20-18-15 states that "The Indiana state police board, the state police department, and the Indiana department of transportation shall cooperate in enforcement of Indiana laws relating to the height, width, length, gross weights, and load weights of vehicles or combinations of vehicles, with or without motive power, being operated, drawn, driven, moved, or transported on or over Indiana highways".

4.4.5.4 Traffic Safety Cooperation

IC 9-27-1-9 states that "State officers and agencies shall cooperate with the governor, or the governor's request, to further the purposes of this chapter [Federal Traffic Safety Programs]".

IC 9-27-2-8 states that "The head of each Indiana department, division, bureau, commission, and agency shall cooperate with the office [of state traffic safety programs] and provide full information on all plans, operations, activities, and programs of the respective agency or department that are directly related to traffic control or traffic accident prevention. The governor may direct that assistance be given to the office, in the performance of the duties of the office, by any officer, employee, or agent of the state. At the request of the office and with the approval of the governor, the head of a state agency or department shall assign temporarily to the office the technicians or other employees needed to carry out this chapter".

4.4.5.5 Lease Financing Authority Cooperation

If lease financing is used for transportation systems, their administrative authorities "may exercise any powers provided under this article in participation or cooperation with any governmental entity, including the [Indiana] department [of transportation], and enter into any contracts to facilitate that participation or cooperation without compliance with any other statute."

4.4.5.6 Weigh-Station Staffing Flexibilities

The following laws could ease weigh-station staffing constraints by enabling non-state police personnel and officers to staff weigh-stations:

IC 9-20-17-1 states that "The [state police] department may utilize the services of civilian employees in accomplishing the weight checks".

IC 9-20-18-10 (a) states that "The department of transportation may deputize and appoint the department's regularly employed maintenance personnel to assist in the enforcement of this article [regarding weight checks]. (d) An employee described under this section may not receive additional salary or wages due to the employee's services under this section".

IC 10-1-1-25 (a) states that "The superintendent [of the state police] may assign qualified persons who are not state police offers to supervise or operate permanent or portable weigh stations. A person assigned under this section may stop, inspect, and issue citations ... for violations of the following...".

4.4.5.7 Joint Rules Hearings

IC 4-22-2-18 (a) states that "If more than one (1) agency is required by statute to adopt the same rule, the agencies may publish a joint notice of a public hearing and conduct a joint public hearing". This could ease the implementation of certain aspects of "One-Stop-Shopping".

4.4.5.8 Existing Joint Registration Center

IC 6-8.1-4-4 states that "(a) The department [of revenue] in cooperation with the bureau of motor vehicles, shall establish a joint registration center to service owners of commercial motor vehicles.... (c)

An owner or operator of a commercial motor vehicle may apply to the joint registration center for the following: (1) Vehicle registration (IC 9-18). (2) Motor carrier fuel tax annual permit. (3) Certificate of operating authority. (d) The department [of revenue] shall recommend to the general assembly other functions that the joint registration center may perform".

4.5 Further Analysis of Legal Requirements

This chapter provided lists representing potential legal impediments and opportunities based upon current conceptual definitions of IVHS-CVO implementation. As these concepts move closer towards reality and are more clearly defined with specific system features, a supplementary study might be required to analyze the legal intricacies of these IVHS-CVO implementation needs based upon what will actually be implemented for daily system operation. Such a study should:

- (1) Identify and analyze specific language in both the Indiana Code and the Indiana Administrative Code that could prevent specific IVHS technologies from replacing existing manual methods relative to commercial vehicle operations in the State of Indiana -- especially those methods affected by specific modifications to existing regulatory, permitting, and enforcement processes;
- (2) Propose substitute language to alleviate any potential legal barriers identified, including any potential liability concerns; and
- (3) Develop an effective implementation strategy so that this substitute language may be passed through Indiana's legislative/administrative bodies as efficiently as possible.

CHAPTER 5

SURVEY OF MOTOR CARRIERS

5.1 Introduction

Throughout the previous chapters, trucking industry concerns and perceptions about IVHS-CVO development and implementation have been of a qualitative nature due to their basis on interviews and workshop-type meetings with motor-carriers. However, quantitative data about these issues were still needed in order for unbiased inferences to be made about the entire population of interstate motor carriers based in Indiana. This was especially important because understanding these specific industry viewpoints is vital to the process of getting IVHS-CVO development and implementation to be acceptable to both government and industry -- a critical element in fully realizing and utilizing the many potentials of IVHS-CVO technologies.

With these goals, a comprehensive statewide survey was conducted to examine IVHS-CVO perceptions, needs, and concerns from the perspective of interstate motor carriers based in Indiana. Specific survey issues included how motor carriers perceive IVHS-CVO concepts would affect their current operations; what data items motor carriers are willing to have electronically stored within automatic vehicle identification (AVI) transponders; what type of weigh-station pre-clearance information storage do motor carriers prefer (i.e. centralized database or data stored within

a transponder); how willing motor carriers are to participating in a "Gold Card" pre-certification process for weigh-station pre-clearance; what type of automatic toll collection system do motor carriers prefer (i.e. debit system or credit system); how willing motor carriers are to paying additional tolls to help cover costs of building bypass lanes next to existing toll plazas for AVI-equipped vehicles to automatically pay tolls while driving at mainline speeds; and the degree to which motor carriers feel IVHS-CVO implementation will lead to a more or less "level playing field" of competition between motor carriers.

5.2 Survey Development

The questionnaire that was used for this survey (see Appendix G) evolved from government and industry comments on two previous questionnaires that were developed for this survey, including critiques from the pre-testing of a version given to about thirty persons attending a government / industry IVHS-CVO seminar on June 17, 1993. This seminar was sponsored by the FHWA's Office of Motor Carriers in Indianapolis.

The survey mailing list was based on an International Registration Plan (IRP) registration list provided by the Indiana Bureau of Motor Vehicles. It was decided that this list would be used because of its comprehensive nature, and because it provided necessary data for conducting random, and statistically significant stratified sampling of the 7,136 Indiana-based interstate motor carriers who had vehicles registered with IRP on August 27, 1993. The list included each company's name, address, the number of power units registered in each of their fleets, and the name of their designated IRP contact person.

5.3 Sampling Method

Since it was desired to get responses from a cross-section of motor-carriers, both large and small, the IRP list was first stratified into five groups based on the number of power units in each company's fleet -- a surrogate measurement for company size and volume of their shipments. This was especially important for balanced opinions because trucking in Indiana tends to follow the motor-carrier industry's general rule of thumb regarding the dominance of large carriers (i.e. approximately 80% of the companies have less than twenty trucks, however, the 20% of the companies that have more than twenty trucks transport approximately 80% of the goods). Thus, if survey responses were weighted only by the number of power units in a company's fleet (e.g. without stratification), rather than first grouping carrier responses by size, the many voices of smaller carriers whom Indiana's farmers are especially dependent on would be muffled by the relatively few number of larger carriers. However, it must be pointed-out that when implementation policy is determined, these concerns of the smaller carriers will have to be balanced with those of the larger carriers who in fact control the vast majority of interstate vehicles based in Indiana. Indiana's version of this phenomenon, along with a summary of the population of the Indiana-based interstate motor-vehicles that sampling was conducted from can be seen in Figure 5.1 and Figure 5.2, respectively.

5.4 Implementation / Response Rates

The first step of the survey process was mailing an announcement postcard (see Figure 5.3) to the 3,000 companies who were randomly selected to be in the survey sample. This was to let each recipient know

Figure 5.1: Total number of power units under the control of various categories of company fleet size (based on all Indiana-based IRP registrants)

Figure 5.2: Total number of companies having fleets of size that fall into various categories of company fleet size (based on all Indiana-based IRP registrants)

Figure 5.3: Announcement postcard mailed one week before the survey form

that they would be receiving a questionnaire, and that they should be expecting it in about one week. It was hoped that this would help to increase the response rate by familiarizing each recipient with the survey, and by distinguishing it from other unsolicited (and presumably unread) mail that these companies receive every day. One week later, on November 12, 1993, the actual survey was mailed to 3,000 companies.

Responses, amounting to a 16.4% overall response rate, were received through mid-January (see Table 5.1). Response rates ranged from a low of 8.7% by carriers with only one truck, to a high of 32.6% by carriers with twenty or more trucks. It should be noted, however, that due to the high

Table 5.1: Summary, grouped by fleet size, of surveys sent and received

COMPANY SIZE CATEGORY	NUMBER OF SURVEYS SENT	NUMBER OF SURVEYS RETURNED	RESPONSE RATE
1 Truck	1,000	87	8.7%
2-3 Trucks	600	95	15.8%
4-7 Trucks	460	88	19.1%
8-19 Trucks	560	90	16.1%
20+ Trucks	380	124	32.6%
TOTAL	3,000	492*	16.4%
* The total number of responses includes eight surveys that were returned without any indication of their company's fleet size.			

response rate of the large carriers, the survey can describe IVHS concerns for a total of 19,657 trucks -- 37.3% coverage relative to the 52,702 power-units in the survey sample, and 32.4% coverage relative to the 60,730 Indiana-based IRP-registered power-units.

5.5 Statistical Analysis Methods

All survey response data were entered into the SAS statistical software package for analysis (24). Preliminary examination of the data indicated that responses were not distributed in a normal manner. In addition, many of the distributions were discrete. Therefore, it was deemed appropriate to use non-parametric tests when trying to determine if statistically significant differences existed when data were stratified into various classes. These types of tests were especially appropriate because of the robustness that they have against data with significant departures from normality.

The Chi-Squared non-parametric test (25) helps to discern differences in the frequency of responses between various classes of cross-tabulated data. Such a test was utilized to determine if stratifying companies into various classes produced any statistically significant differences in the proportion of those companies who indicated that they were aware of IVHS prior to receiving this survey. The Kruskal-Wallis non-parametric one-way test (26), on the other hand, helps to discern differences in the mean value of a variable when stratified into various classes. Such a test was utilized to determine if there were statistically significant differences in the mean ratings of each IVHS-CVO concept when companies were stratified into various classes. Finally, when calculating confidence intervals around various sample means in order to bound the population proportion for that variable at a given level of significance (25), the large sample assumption was applied. Thus, the estimator of the population variance was $[p*(1-p)]/(n-1)$; where, p = the proportion of respondents choosing a given response, and n = the total number of respondents to the question being analyzed.

5.6 Survey Results

5.6.1 Company Characteristics

Figure 5.4 summarizes the types of truck operations that categorize the responding companies. Private carriers are the most frequent type, representing 42% of the responses. For-hire less-than-truckload carriers are the least frequent type, representing only 5% of the responses.

Figure 5.5 summarizes the driver payment methods used by the responding companies. Both per-hour wage and percentage of load revenue

Figure 5.4: Total number of responding companies in various categories of trucking operations

Figure 5.5: Total number of responding companies using various methods to pay their drivers

are the most frequent methods, each representing 32% of the responses. Annual salary is the least frequent method, representing only 6% of the responses.

Figure 5.6 summarizes the percentage categories of time-sensitive fleet trips that must be made within a two hour or less time frame by responding companies. 1% to 50% "Just-In-Time" trips is the most frequent category, representing 26% of the responses. 85% to 99% "Just-In-Time" trips is the least frequent category, representing only 11% of the responses.

5.6.2 IVHS Awareness

Only 33.9% of the responding companies were aware of IVHS prior to receiving this survey. This aggregate statistic of prior IVHS awareness

Figure 5.6: Total number of responding companies having various percentages of "Just-In-Time" trips where delivery is scheduled within a two-hour or less time frame

can be considered as a basis for targeting future IVHS education programs to industry representatives so that they and government representatives may communicate with a common terminology -- thus increasing the potential for effective cooperation during IVHS development and implementation. It should be noted, however, that even though current awareness of the term "IVHS" is low, based-upon company comments and the general pattern of survey responses, there does seem to be an understanding of concepts such as automatic payment of tolls, pre-clearance of vehicles and drivers past weigh stations, transparent state borders, and one-stop-shopping -- even if they did not know of them collectively as "IVHS".

Figure 5.7 summarizes prior IVHS awareness as stratified by the average number of vehicles in each company's daily operating fleet. The largest mean awareness is 44.3% by companies with twenty or more trucks. The smallest mean awareness is 27.7% by companies with two to three trucks. Using the Chi-Squared test, prior IVHS awareness between these strata is statistically different at a 90% level of significance.

Figure 5.8 summarizes prior IVHS awareness as stratified by type of trucking operation. The largest mean awareness is 50.0% by for-hire less-than-truckload carriers. The smallest mean awareness is 24.6% by private carriers. Using the Chi-Squared test, prior IVHS awareness between these strata is statistically different at a 95% level of significance.

Figure 5.9 summarizes prior IVHS awareness as stratified by method of driver payment. The largest mean awareness is 48.2% by companies that pay their drivers a per-mile wage. The smallest mean awareness is 16.7% by companies that pay their drivers an annual salary. Using the Chi-Squared test, prior IVHS awareness between these strata is statistically different at a 95% level of significance.

Figure 5.7: IVHS awareness prior to receiving the survey, stratified by the average number of vehicles in a company's daily operating fleet

Figure 5.8: IVHS awareness prior to receiving the survey, stratified by categories of trucking operation

Figure 5.10 summarizes prior IVHS awareness as stratified by the percentage of trips that are categorized as "Just-In-Time" with delivery scheduled within a two hour or less time frame. The largest mean awareness is 39.6% by companies with 85-99 percent time-sensitive trips. The smallest mean awareness is 24.1% by companies with zero percent time-sensitive trips. Using the Chi-Squared test, prior IVHS awareness between these strata is statistically different at an 85% level of significance.

5.6.3 Overall Ratings of IVHS-CVO Concepts

Companies were presented with a brief description of the four main IVHS-CVO concept areas so that they could express their expectations of how the implementation of each of these innovations would possibly affect their current operations. The ratings were to be given on a scale of one ("very harmful") to seven ("very beneficial").

Of these four concepts, "One-Stop-Shopping" received the highest mean rating at 5.9, with 54.6% of the companies rating it very beneficial, and only 3.5% rating it in one of the "harmful" categories (see Figure 5.11). "Pre-clearance of vehicles and drivers past weigh stations" received the second highest mean rating at 5.7, with 48.7% of the companies rating it very beneficial, and only 6.8% rating it in one of the "harmful" categories (see Figure 5.12). "Transparent state borders" received the third highest mean rating at 5.5, with 40.1% of the companies rating it very beneficial, and only 5.6% rating it in one of the "harmful" categories (see Figure 5.13). "Automatic payment of tolls while driving at mainline speeds" received the fourth highest mean rating at 5.0, with 27.3% of the companies rating it very beneficial, and only 7.8% rating it in one of the "harmful" categories (see Figure 5.14).

Figure 5.9: IVHS awareness prior to receiving the survey, stratified by methods by which companies pay their drivers

Figure 5.10: IVHS awareness prior to receiving the survey, stratified by percentage of "Just-In-Time" trips where delivery is scheduled within a two-hour or less time frame

Figure 5.11: Distribution of ratings for the concept of "One-Stop-Shopping" (mean rating = 5.91)

Figure 5.12: Distribution of ratings for the concept of "pre-clearance of vehicles and drivers past weigh stations" (mean rating = 5.74)

Figure 5.13: Distribution of ratings for the concept of "transparent state borders" (mean rating = 5.46)

Figure 5.14: Distribution of ratings for the concept of "automatic payment of tolls while driving at mainline speeds" (mean rating = 5.04)

Table 5.2 summarizes these ratings as stratified by company size, type of carrier, method of driver payment, percent of time-sensitive deliveries, and prior IVHS awareness. For "automatic payment of tolls while driving at mainline speeds", the Kruskal-Wallis test found statistically different mean ratings within each stratum at a 95% level of significance when respondents were stratified by company size, type of carrier, method of driver payment, percent of time-sensitive deliveries, and prior IVHS awareness. For "pre-clearance of vehicles and drivers past weigh stations", the Kruskal-Wallis test found statistically different mean ratings within each stratum at a 95% level of significance when respondents were stratified by type of carrier, method of driver payment, and percent of time-sensitive deliveries. For "transparent state borders", the Kruskal-Wallis test found statistically different mean ratings within each stratum at a 95% level of significance when respondents were stratified by type of carrier, method of driver payment, percent of time-sensitive deliveries, and prior IVHS awareness. For "One-Stop-Shopping", the Kruskal-Wallis test found statistically different mean ratings within each stratum at a 95% level of significance when respondents were stratified by company size, type of carrier, percent of time-sensitive deliveries.

5.6.4 Automatic Toll Collection Details

5.6.4.1 Type of System Preferred

After a brief description of the two primary ways that automatic toll collection systems can be implemented, respondents were asked to indicate which type of automatic toll collection system that their company

Table 5.2: Summary of ratings of IVHS-CVO concepts

STRATIFIED BY	AUTOMATIC TOLLS		PRE-CLEAR WEIGH STN		TRANSPRNT BORDERS		ONE-STOP SHOPPING	
	MEAN	STD	MEAN	STD	MEAN	STD	MEAN	STD
COMPANY SIZE	p= 0.0042		p= 0.0516		p= 0.6360		p= 0.0075	
1 Truck	5.15	1.66	5.76	1.76	5.61	1.64	6.11	1.50
2-3 Trucks	4.81	1.49	5.46	1.60	5.35	1.53	5.55	1.56
4-7 Trucks	5.23	1.52	5.76	1.63	5.52	1.58	6.01	1.33
8-19 Trucks	4.66	1.53	5.70	1.51	5.33	1.65	5.64	1.69
20+ Trucks	5.31	1.50	6.02	1.41	5.53	1.47	6.20	1.12
TYPE OF CARRIER	p= 0.0457		p= 0.0178		p= 0.0324		p= 0.0091	
For-Hire L.T.L.	5.74	1.29	6.22	1.01	6.12	0.99	6.30	1.03
Truckload	5.12	1.57	5.96	1.53	5.66	1.51	6.15	1.29
Contract	4.94	1.79	5.62	1.95	5.23	1.83	5.79	1.89
Private	4.95	1.44	5.60	1.45	5.36	1.50	5.74	1.35
DRIVER PAY METHOD	p= 0.0137		p= 0.0004		p= 0.0190		p= 0.1020	
Annual Salary	4.70	1.53	5.37	1.50	5.40	1.63	5.90	1.54
Per-Hour Wage	4.90	1.39	5.55	1.39	5.27	1.43	5.79	1.33
Per-Mile Wage	5.32	1.53	6.06	1.52	5.72	1.58	6.06	1.30
Per-Trip Flat Fee	4.52	1.66	5.57	1.99	5.05	1.81	5.48	1.89
Pct. of Load \$	5.23	1.62	5.90	1.67	5.60	1.61	6.01	1.54
PCT. J.I.T. TRIPS	p= 0.0014		p= 0.0003		p= 0.0008		p= 0.0018	
0%	4.66	1.55	5.23	1.79	4.97	1.67	5.38	1.74
1% - 50%	5.03	1.46	5.82	1.52	5.60	1.51	6.11	1.27
51% - 84%	5.47	1.51	6.29	1.15	5.87	1.43	6.16	1.32
85% - 99%	5.43	1.56	5.91	1.48	5.71	1.39	6.15	1.28
100%	4.89	1.65	5.67	1.72	5.42	1.59	5.99	1.43
IVHS AWARENESS	p= 0.0219		p= 0.0952		p= 0.0004		p= 0.1080	
Yes	5.26	1.46	5.94	1.41	5.84	1.36	6.09	1.31
No	4.93	1.59	5.64	1.65	5.28	1.63	5.81	1.54

NOTE: p-values < 0.05 indicate that when the concept being rated is stratified in the manner listed, mean ratings are statistically different at a 95% level of significance (based on the Kruskal-Wallis non-parametric one-way test).

would favor (see Figure 5.15). Most preferred was a credit system with monthly billing. This was chosen by a mean of 55.3% of the companies. Least preferred was a debit system from a pre-paid account. This was chosen by a mean of 3.5% of the companies. 19.8% of the companies did not favor automatic toll collection. However, of these respondents, 79.6% were not aware of IVHS prior to receiving this survey -- a level higher than the average of 66.1% of the companies not being aware of IVHS prior to receiving this survey.

Figure 5.15: Distribution of preferences for various types of automatic toll collection systems

5.6.4.2 Willingness To Pay Extra Tolls

24.5% of the companies answering this question were willing to pay additional tolls to help pay for constructing, equipping, and maintaining

specially-equipped bypass lanes next to existing toll plazas for use by AVI-equipped vehicles only. Figure 5.16 summarizes this willingness as stratified by the number of toll road and toll bridge agencies that companies must currently pay tolls to. The largest mean willingness is 34.2% by companies that are currently paying to between four and five toll agencies. The smallest mean willingness is 3.4% by companies that are not currently paying any tolls. Companies currently pay tolls to a median of two toll agencies, and a mean of between four and five toll agencies.

Of the companies with this willingness, 27.7% were willing to pay less than \$0.05 per toll plaza, 26.7% were willing to pay \$0.06 to \$0.15 per toll plaza, 20.8% were willing to pay \$0.16 to \$0.25 per toll plaza, and 24.7% were willing to pay amounts in various categories of extra tolls that were greater than \$0.25 per toll plaza. However, the 90th percentile category of extra tolls is \$0.56 to \$0.70 per toll plaza.

5.6.5 Weigh-Station Pre-Clearance Details

5.6.5.1 Type of System Preferred

After a brief description of the two primary ways that systems for pre-clearing vehicles and drivers past weigh-stations can be implemented, companies were asked to indicate which type of weigh-station pre-clearance their company would favor (see Figure 5.17). Most preferred was the category "no preference". This was chosen by a mean of 43.6% of the companies. 17.5% of the companies did not prefer weigh-station pre-clearance. However, of these respondents, 80.0% were not aware of IVHS prior to receiving this survey -- a level higher than the average of 66.1% of the companies not being aware of IVHS prior to receiving this survey.

Figure 5.16: Willingness to pay additional tolls to help pay for bypass lanes next to existing toll plazas, stratified by the average number of toll agencies that a company's vehicles must currently pay tolls to

Figure 5.17: Distribution of preferences for various types of weigh-station pre-clearance systems

5.6.5.2 Information Within An AVI Transponder

Respondents were asked to check-off on a list all of the data items that they would be willing to have electronically stored within an AVI-transponder. Results, summarized below, include 95% confidence intervals around each data item's mean proportion as appropriate for each category.

By a two-thirds majority (at a 95% level of significance), responding companies expressed their willingness to store "proof of liability insurance" within an on-board AVI-transponder (67%-75% YES). By a simple majority (at a 95% level of significance), responding companies expressed their willingness to store the following data items within an on-board AVI-transponder:

a. Type of authority issued by the I.C.C.	(58%-67% YES)
b. Operating authority registration number	(58%-66% YES)
c. Type of carrier (i.e. For-hire, Contract)	(58%-66% YES)
d. Name of driver	(55%-64% YES)
e. Commercial Driver's License (CDL) number	(61%-70% YES)
f. I.C.C. number	(61%-69% YES)
g. D.O.T. number	(63%-71% YES)
h. Fuel-tax cab-card number	(64%-72% YES)
i. I.F.T.A. number	(61%-69% YES)
j. Vehicle registration cab-card number	(60%-69% YES)
k. I.R.P. number	(61%-70% YES)
l. Registered gross vehicle weight	(56%-64% YES)
m. Vehicle Identification Number (VIN)	(63%-71% YES)

By no clear statistical majority (at a 95% level of significance), responding companies may or may not be willing to store the following data items within an on-board AVI-transponder:

a. Proof of financial responsibility (48%-57% YES)

b. Medical certificate validation (48%-57% YES)

By a simple majority (at a 95% level of significance) responding companies are not willing to store the following data items within an on-board AVI-transponder:

a. Fleet limitation certificate validation (64%-72% NO)

b. Haz-mat training certificate validation (61%-70% NO)

c. C.V.S.A. number and expiration (64%-72% NO)

d. Axle spacings (65%-73% NO)

e. Bill of lading (60%-69% NO)

f. Commodity shipped (60%-69% NO)

By a two-thirds majority (at a 95% level of significance), responding companies are not willing to store the following data items within an on-board AVI-transponder:

a. Amount of "driving" and "on-duty" time remaining (74%-82% NO)

b. Haz-Mat product identification number (72%-79% NO)

c. Oversize/overweight load permit number (67%-75% NO)

d. Date/Time vehicle last entered a weigh-station (72%-79% NO)

e. Location of last weigh-station vehicle entered (72%-80% NO)

f. Location of vehicle's Port-of-Entry into state (69%-77% NO)

5.6.5.3 "Gold Card" Pre-Clearance Concept

Companies were given a short description of the concept of issuing a "Gold Card" to consistently safe motor carriers who are in compliance with all safety, registration, permitting, and tax requirements. The "Gold Card" carriers would be allowed to bypass all weigh-stations until their next inspection or until a random inspection found violations that

would cancel the card. When asked if they would be willing to have their fleet be subject to more frequently scheduled safety and compliance checks for "Gold Card" certification and weigh-station pre-clearance based on weigh-in-motion weights only, 58.5% answered in the affirmative.

5.6.5.4 Effect of Pre-Clearance on Trucking Safety

Companies were asked to indicate their feelings about the future level of trucking safety as compared to today's level, if certain vehicles and drivers are pre-cleared past weigh-stations based on pre-certification and weigh-in-motion weights only. As summarized in Figure 5.18, 46.7% of the companies stated that trucking would be either "much safer" or "somewhat safer". Only 9.5% of the companies stated that trucking would be either "somewhat more dangerous" or "much more dangerous".

Figure 5.18: Distribution of perceived future amount of trucking safety as compared to today's level if "Gold-Card" pre-clearance is implemented

5.6.6 Automatic Vehicle Identification Transponder Details

5.6.6.1 Current AVI Use by Indiana-Based Interstate Motor Carriers

Of the companies surveyed, only 6 companies out of 492 respondents reported having vehicles presently equipped with an AVI transponder. Of those companies, installation is on an average of 50.9% of their vehicles. The make of AVI transponders used in those installations are as follows: 90.9% from Lockheed IMS (750 power-units in one company), 8.1% from Amtech (67 power-units over 4 companies), and 1% from Qualcomm (8 power-units in one company). No other makes were reported in use.

5.6.6.2 Effects of AVI Transponders on Enforcement and Level Competition

Companies were also asked how having an AVI transponder or similar data-transfer device on company vehicles would affect (or presently affects) the concept of a "level playing field" and their exposure to regulatory enforcement (see Figure 5.19 and Figure 5.20, respectively). Regarding the degree to which there would be (is) a "level playing field" of competition between carriers with or without AVI transponders on-board their vehicles, 31.9% of the companies stated that there would be either "much more" or "somewhat more" of a level playing field. Alternatively, 28.5% of the companies stated that there would be either "much less" or "somewhat less" of a level playing field. Regarding the perceived level of enforcement that vehicles in their company's fleet would be (are) subject to for registration, permitting, and tax requirements, 40.2% of the companies stated that there would be either "much more" or "somewhat more" enforcement. Alternatively, only 4.5% of the companies stated that there would be either "much less" or "somewhat less" enforcement.

Figure 5.19: Distribution of perceived amount of a "level playing field" between carriers with AVI transponders on-board their vehicles vs. those without AVI transponders

Figure 5.20: Distribution of perceived amount of enforcement efforts that vehicles with AVI would be subject to vs. those without AVI

5.6.6.3 Amount of Mandatory IVHS-CVO Participation Preferred

70.3% of the companies expressed that IVHS should be a voluntary program if it included law enforcement's ability to read electronically a truck's AVI transponder while it was moving down a roadway in order to check for motor-carrier fuel-tax payments and compliance with other requirements. When asked what type of motor carriers should be required to purchase and maintain an on-board AVI transponder for each of the vehicles in their fleet if this above system scenario was mandatory, a mean of 61.1% of the companies stated that it should be mandatory for all motor carriers traveling in Indiana. Only 4.2% stated that it should be mandatory for Indiana-based interstate carriers only.

5.6.6.4 Value of AVI Transponders

After a brief description of the capabilities of each of the three primary "types"/models of AVI transponders (see Section 3.2.2), companies were asked how much money per truck their company would be willing to pay (or have paid) for each type of transponder and its associated installation costs. These results are summarized in Table 5.3.

As a reference point, companies that presently have transponders on their vehicles indicated a mean value of \$166 for each Type-I transponder (with a standard deviation of \$355), a mean value of \$255 for each Type-II transponder (with a standard deviation of \$529), and a mean value of \$383 for each Type-III transponder (with a standard deviation of \$793).

5.7 Implications of Results

Survey results have quantitatively confirmed many of the trucking industry's concerns and perceptions about IVHS-CVO that were previously

Table 5.3: Summary of amount of money companies are willing to pay (or have paid) for Type-I, Type-II, and Type-III transponders, including transponder costs and their associated installation costs

STATISTIC BEING REPORTED	REPORTED VALUE OF EACH TRANSPONDER TYPE BASED ON THOSE WILLING TO SPEND MONEY FOR AN A.V.I. TRANSPONDER		
	TYPE-I TRANSPONDER	TYPE-II TRANSPONDER	TYPE-III TRANSPONDER
MEAN VALUE	\$177	\$266	\$537
STANDARD DEVIATION	231	318	918
95th PERCENTILE VALUE	\$750	\$1000	\$2000
MEDIAN VALUE	\$100	\$150	\$250
% NOT WILLING TO SPEND ANY MONEY ON EACH TYPE OF A.V.I. TRANSPONDERS	52.7%	48.7%	54.3%

only known in a qualitative manner through interviews or case studies of limited scope. In addition, a comprehensive database is now available for further investigations of significant data relationships regarding potential CVO users. This new knowledge, in conjunction with results from the full IVHS-CVO institutional issues study that this survey was but one part of, will enable decision-makers to be more confident that their actions are commensurate with CVO user / stakeholder needs and desires. Furthermore, it enables them to minimize the risks of making costly errors that can sometimes appear when new programs are placed on a fast track. Most certainly, a major benefit during these times of fiscal constraints in government and narrow profit margins in the trucking industry, which have often forced new initiatives to the back burner for lack of funds or confidence that anticipated benefits of a desired magnitude will actually become reality.

CHAPTER 6

ESTIMATED BENEFITS AND COSTS

6.1 Benefits

6.1.1 Industry Travel Time Savings

A recent study (7) related to the Advantage I-75 program determined that IVHS-CVO could save the trucking industry \$1.59 per reduced weigh station stop (considering "reduced wear and tear on the vehicle plus the driver's time involved in braking the vehicle"); could save \$0.864 per reduced minute idling (considering "driver time and vehicle wear-and-tear"), and could capture lost motor-carrier revenue at a rate of \$0.882 per reduced minute of delay (based upon an industry average 5% gross profit margin with 100% time-sensitive truck loads). It was also estimated that 65 mph mainline WIM systems could save 4.5 times the number of truck-hours that could be expected to be saved through the use of non-mainline systems using 20 mph WIM devices to sort vehicles. Considering estimates that the 6.05 billion annual truck-miles traveled in Indiana (8) result in 62.4 million annual truck passes through Indiana weigh stations, expected travel time cost savings for these trucks can be estimated as detailed in Table 6.1 (assuming 100% participation of the motor-carrier industry).

Table 6.1: Estimated travel time cost savings in the State of Indiana due to IVHS-CVO with 100% participation by the motor-carrier industry

Future WIM Operating Scenario	Stopping Costs	Idling Costs	Potential Lost Revenue Captured	TOTAL SAVINGS
65 mph w/ Mainline By-pass	\$99.2 million	\$83.4 million	\$85.2 million	\$267.8 million
40 mph w/ off-line sorting	\$99.2 million	\$65.3 million	\$66.7 million	\$231.2 million
20 mph w/ off-line sorting	\$99.2 million	\$18.8 million	\$19.2 million	\$137.2 million

6.1.2 Safety Enhancement

To quantify a baseline for comparisons of potential enforcement-related safety enhancements, the Florida Advantage I-75 Study "analyze[d] data for truck accidents occurring within a 1/2-mile radius of the diverge and merge ramp junctions at weigh stations along the 1,760-mile I-75 corridor and 501-mile Canadian Highway 401-420 for the three-year period 1987 through 1990" (7). It was determined that the "median truck accident rate at all the weigh stations ... [was] 92.25 accidents per 100 million truck-miles of travel -- ...significantly lower than the national average of 219. In addition, according to selected weigh station personnel ... the damage done to the vehicles involved in these accidents was generally minor and did not affect traffic flow" (7).

Therefore, the potential maximum annual safety savings from improvements due to IVHS-CVO implementation (e.g. reduced congestion and

weaving movements by exiting and entering trucks in the vicinity of enforcement stations) must be the dollar value of the above-described enforcement-related accident rates. Assuming an even more conservative 42.1 accident rate per 100 million truck-miles of travel (based on the Bridgeport, Michigan weigh station in order to better normalize for Midwestern drivers and weather conditions) and an average cost of a truck accident at \$3,100 for property damage only (according to a 1988 report by the Institute of Transportation Studies at the University of California, Irvine) (7), these values can be multiplied by an estimated 2.91 billion truck-miles of travel along Interstate routes in the State of Indiana (8) to estimate a potential maximum annual safety savings of approximately \$3.8 million in the State of Indiana.

6.1.3 Paperwork Reduction

As part of an institutional barriers study relative to commercial vehicle operations in the State of Iowa, the Midwest Transportation Center prepared a rough assessment of potential benefits from uniformity in compliance requirements. Based on information from National Cooperative Highway Research Program Report #303, typical state benefits of \$3.6 million (10% AVI participation) to \$5.5 million (30% AVI participation), and typical motor carrier benefits of \$17.7 million (10% AVI participation) to \$53.0 million (30% AVI participation) could be realized (15). In addition, the Indiana Department of Revenue estimates that computerizing their procedures, including electronic insurance filing capabilities, could free their auditors to focus on audits, rather than constantly helping to keep back-logged paperwork from becoming unmanageable.

6.1.4 Level Playing Field / Increased Enforcement Revenues

The Florida Advantage I-75 Study estimates a one percent violation rate for monitored truck traffic along weigh station routes, and that as much as one-third of the annual trips in these areas could be unmonitored due to both peak-time wave-by around the scales whenever vehicles back-up onto the mainline roadway, and during off-peak times when the weigh stations are closed (7). IVHS-CVO technologies could help to eliminate these violations by providing for increased weigh station capacities and 24-hour truck monitoring under certain configurations. It can be calculated with the above rates (including a \$250 average amount per violation) that if these existing unmonitored trips could be monitored (estimated at approximately 8.85 million truck-trips per year in Indiana), then the State could gain \$22.1 million each year from additional violation citations. Similarly, as already described in Section 3.4.2.5, honest motor-carriers can also benefit by this increased enforcement due to the "leveling of the playing field" by cracking-down on those disreputable motor-carriers who try to circumvent the law and do not pay their fair share of taxes and other fees, etc.

In fact, previous State of Indiana enforcement efforts confirm this effect of increased revenues (including the "leveling of the playing field" by additional voluntary tax contributions) from the monitoring of previously unmonitored truck traffic. As described by the Indiana State Police, "For example, in 1988 approximately sixty-one additional motor carrier inspectors were hired to enforce motor carrier laws with a specific emphasis on improving motor fuel tax enforcement. In 1990, the Department of Revenue reported to the State Police that 'voluntary tax contributions' had increased by ten million dollars in just one year

because of the improved enforcement (i.e. the weigh stations were opened more, thereby providing for stronger enforcement effort). This resulted in three times the amount of money collected as was used to hire and maintain those additional personnel."

6.1.5 Other Benefits

In addition to the above quantifiable benefits, other potential benefits of IVHS-CVO include (7) (15):

- (a) Lower prices to the general public due to reduced shipment delays that result in a more efficient movement of goods;
- (b) Increased data collection and information sharing for planning, registration/permitting, emergency response, enforcement, and revenue collection;
- (c) Improved carrier fleet-management information and two-way communications between states/provinces and carriers; and
- (d) Real-time travel condition monitoring to improve trip-making for all motorists in IVHS-CVO equipped corridors.

6.2 Motor-Carrier Baseline Costs

Existing baseline costs for the motor carrier industry were estimated so that the relative magnitude of any potential benefits could be evaluated as to whether or not any potential benefits are significant enough to warrant system implementation. The American Trucking Association determined that out of a total of \$1.077 per mile truck operating costs (representing tractor and trailer depreciation, interest payments, license plate and fuel tax permits, federal highway use taxes, insurance, in-frame overhaul costs, down payments for vehicle

replacements, preventive maintenance programs, tires, repairs, fuel, tolls, driver food/lodging, and driver salaries), only \$0.05 per mile was related to regulatory costs (i.e. fuel tax and operating license registrations, operation authority permitting, and other use tax permits) (7). When multiplied by an estimated 6.05 billion annual truck-miles traveled in the State of Indiana (8), it can be estimated that baseline interstate motor-carrier costs in the State of Indiana are approximately \$6.52 billion, with \$0.30 billion of that related to the above regulatory costs.

6.3 Magnitude of Time Savings vs. Baseline Costs

Travel time savings due to IVHS-CVO implementation represents a 2.1% to 4.1% reduction in total baseline trucking costs in the State of Indiana (\$6.52 billion). Though seemingly small, when these savings are compared to the five percent national average gross operating margin for motor-carriers (\$326 million for operations in the State of Indiana), estimated travel time savings could alone represent between 42.1% and 82.1% of motor-carrier profit. For many motor-carriers, this could potentially be the difference between bankruptcy and continued operation.

6.4 Financing

In addition to state and local funds, and private contributions in the form of both cash and donated services and/or equipment, the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA '91) authorizes \$660 million over six-years to promote compatible standards and protocols for widespread use of IVHS technologies, including the development of specific corridors which meet certain transportation and environmental

criteria (to be funded with 80% Federal dollars (16)). Furthermore, ISTEA '91 includes specific provisions for planning grants to State and local governments for feasibility studies on IVHS development and implementation (16).

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Implementing many of the IVHS-CVO concepts would not require any major organizational change. There are existing agency processes and procedures, such as the Toll Road Authority's charge plate system and the Indiana Department of Transportation's oversize/overweight self-permitting system, which have features adaptable for use in IVHS development. There are also existing new technology implementations, such as the Indiana State Police's low-speed weigh-in-motion systems used for sorting obviously underweight trucks around the static scales at five enforcement-stations. These have enough flexibility such that they can be integrated into national IVHS operational field tests like Advantage I-75. Furthermore, there are existing agency automation studies, such as the Indiana Department of Revenue's preliminary design proposal for an integrated Motor Carrier Information System, which only needs to be taken off the shelf, amended to reflect the developing IVHS national system architecture and other concerns, and given adequate funding for implementation.

In addition, legal barriers do not appear to be insurmountable. If it can be shown that IVHS-CVO technologies can decrease agency operating costs and improve enforcement efficiency while still maintaining original

regulatory intent, then the Indiana legislature can probably be expected to support necessary legal changes. If it can be shown that IVHS-CVO technologies can increase profits, then the trucking industry will probably want to pay their fair-share of implementation expenses and support necessary legislation to see that agency portions of IVHS-CVO are appropriately funded and implemented on a timely basis.

Above all, elemental computer-hardware, computer-software, and data-communication needs/concerns, such as the availability of real-time enforcement information at weigh stations and the implementation of imaging systems for fuel-tax returns processing, are key issues that must be addressed as soon as possible. Items such as these must be in place before any implementation of "higher-tech" IVHS-CVO equipment can even be considered because they would have no system to "plug-into". In addition, it is this type of infrastructure that can help to eliminate application process redundancies such as similar data being maintained on independent systems at multiple agencies.

As IVHS-CVO is developed, it should be emphasized that AVI technologies and their associated communications infrastructure form the backbone for many different IVHS-CVO functional areas. They are essential for automatic toll collection and pre-clearance of vehicles and drivers past weigh stations, and they can play major roles in systems for transparent state borders and "one-shop-shopping" for registrations and permits. As such, any decisions regarding AVI systems must be made in cooperation with those designing systems to realize these above IVHS-CVO functional areas.

7.2 Recommendations

7.2.1 Near-Term Recommendations

It is recommended in the near term (1 to 2 years) that efforts be focused on maintaining and expanding existing IVHS-CVO efforts, while also updating the computer systems that handle existing processes, since they form the backbone for many of the IVHS-CVO concepts. Specifically:

- (a) The Indiana Department of Transportation's Toll Road Division should continue to investigate the feasibility of converting their existing manual toll charge system to an AVI-based system. Included, should also be active participation in processes to develop a true North-American AVI transponder standard, irrespective of whether it be developed by de-facto or by decree.
- (b) The Indiana State Police should continue to implement low-speed weigh-in-motion devices at Indiana weigh-stations on an as-needed basis commensurate with increasing volumes of commercial vehicles at those weigh-stations that are currently equipped with static scales.
- (c) The Indiana Department of Transportation and the Indiana State Police should continue to expand their recently initiated relationship with the Advantage I-75 IVHS-CVO field test, such that a weigh-station along I-65 can be incorporated into the field-testing of weigh-station pre-clearance. Included, should also be a single-site pilot project implementing high-speed mainline WIM such that its effects can be evaluated within the context of Indiana motor-carrier safety and enforcement.

- (d) The Indiana Department of Revenue should start work on the second phase of the Motor Carrier Information System Project. System goals and architecture should be revised so that various IVHS-CVO concepts can be easily incorporated into an MCIS framework as they are implemented.
- (e) The Indiana Bureau of Motor Vehicles should develop and implement a strategy to eliminate the current barriers that prevent motor carriers participating in the International Registration Plan from filing electronic reports and transmitting their fees through the use of electronic funds transfers.
- (f) A task force of representatives from each agency dealing with commercial vehicle operations in Indiana should be created to develop substitute language and implementation strategies for eliminating the legislative and administrative barriers to IVHS-CVO that have been inventoried in chapter four of this study. Efforts should be made to utilize many of the existing opportunities for implementation, also inventoried in chapter four of this study, so as to minimize necessary legislative and administrative action.

7.2.2 Mid-Term Recommendations

It is recommended in the mid term (3 to 4 years) that efforts be focused on implementing the IVHS-CVO concepts that do not have a significant number of institutional barriers. Specifically:

- (a) The Indiana Department of Transportation's Toll Road Division should implement an AVI system for automatic toll collection

in accordance with the developing national IVHS system architecture and North-American AVI transponder standard. If the standards-setting process lags into the long-term, then transponders compatible with those being used in surrounding states should be adopted, since only a minute proportion of Indiana-based motor-carriers currently have an AVI transponder on-board their vehicles.

- (b) A wide application of weigh-in-motion should be in operation throughout Indiana. This should include the implementation of high-speed mainline WIM to replace existing low-speed WIM systems when the life-span of existing equipment nears its end.
- (c) The I-65 corridor should be in the process of becoming a primary corridor for integrating existing, but separate, IVHS field tests of various IVHS concepts into a cohesive unit. This is a unique opportunity because I-65 in Indiana forms the link between the commercial vehicle operations field tests of Advantage I-75 to the south and east, and the I-80 Project field tests to the north and east (which connects to the H.E.L.P./crescent project in the western United States). In addition, I-65 is a major origin and destination for traffic on Indiana's Borman freeway, which, in itself is a major test-bed for advanced freeway traffic management systems -- another IVHS concept.
- (d) Since I-65 in northern Indiana crosses a major truck / rail intermodal transfer facility, a program should be developed to automatically transfer necessary shipment data back and forth

between a commercial vehicle operations database that could be in use along the I-65 corridor, and databases that are used to track these intermodal shipments while moving along the rails.

7.2.3 Long-Term Recommendations

It is recommended in the long term (5+ years) that efforts be focused on implementing the IVHS-CVO concepts that currently have a significant number of institutional barriers, but that should be prime for widespread implementation if near-term and mid-term efforts are successful in eliminating many of the significant institutional barriers to IVHS-CVO. Specifically:

- (a) All regulatory agencies dealing with commercial vehicle operations in Indiana should be united into a single agency, so that a genuine "One-Stop-Shopping" system can be implemented. This can either be as a new agency or as an existing agency absorbing relevant sections of other agencies, with authority and responsibilities transferred from the existing agencies, as appropriate.
- (b) Agencies dealing with commercial vehicle operations in Indiana should coordinate with their counterparts from all other states such that a more open-border environment yielding a more genuine concept of transparent state borders can be realized. As such, plans should be made to incorporate features of private vehicle registration and taxation such that not only would credentials from one state be valid in all states, but it would be accomplished without the current needs for money and related information to be transferred from state

to state -- a bureaucracy that does not exist for operators of private vehicles.

7.3 Closing Thoughts

Indiana government and industry must now commit itself towards expediting any necessary legislative and administrative law changes required to eliminate institutional barriers preventing the implementation of IVHS-CVO solutions that have been identified through the above process, agreed to through ongoing processes, and have the potential to increase motor carrier efficiency, decrease costs, and enhance the competitiveness of American-made products in the world market -- including Indiana agriculture. These actions are needed to prevent commercial gridlock on our highway systems, administrative gridlock in our compliance systems, and a further blunting of the economic edge that helped to build this nation into a world leader.

Through genuine cooperation and a commitment to essential financial backing, Indiana's public, private, and academic sectors can form a synergistic partnership based on communication, cooperation, and confidence in each others' ability to produce innovations and to propose any necessary legislation or administrative rules that will allow for efficient, effective, and equitable implementation of these technologies into a nationally-integrated IVHS-CVO network with transparent borders between the states. With this preparation, all parties can continue to participate in a technological movement that may truly have lasting effects on the positive growth and development of this nation -- the United States of America.

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APPENDICES

Appendix A: International Registration Plan (IRP) Program Overview

CONTACT: Indiana Bureau of Motor Vehicles,
IRP Division
509 State Office Building
100 North Senate Avenue
Indianapolis, IN 46204
(317) 232-4406

PURPOSE: "To promote and encourage the fullest possible use of the highway system by authorizing the proportional registration of fleets of vehicles and the recognition of vehicles proportionally registered in other jurisdictions."

CONCEPT: "To issue one registration plate and one cab card to each vehicle such that these credentials allow the vehicle to make both interstate and intrastate movements within the states listed on the cab card. The cab card indicated IRP jurisdictions in which the unit is registered and the registered weight for each jurisdiction."

PARTICIPANTS: Alberta (Canada); Alabama; Arizona; Arkansas; California; Colorado; Connecticut; Florida; Georgia; Idaho; Illinois; Indiana; Iowa; Kansas; Kentucky; Louisiana; Maine; Maryland; Massachusetts; Michigan; Minnesota; Mississippi; Missouri; Montana; Nebraska; Nevada; New Hampshire; New Mexico; New York; North Carolina; North Dakota; Ohio; Oklahoma; Oregon; Pennsylvania; Saskatchewan (Canada); South Carolina; South Dakota; Tennessee; Texas; Utah; Vermont; Virginia; Washington; West Virginia; Wisconsin; and Wyoming.

VEHICLES REQUIRED TO BE REGISTERED WITH IRP:

Any vehicle that travels in two or more IRP member jurisdictions and is used for the transportation of persons for-hire or is designed, used, or maintained primarily for the transportation of property, and:

- a. is a power unit having three or more axles regardless of weight;
- b. is a power unit having a gross weight in excess of 26,000 pounds; or
- c. is a vehicle used in combination when the gross weight of the combination exceeds 26,000 pounds.

EXEMPT VEHICLES:

Recreational vehicles; commercial vehicles displaying restricted plates (e.g. commodity, area, or mileage restrictions); city pick-up and delivery vehicles; chartered buses; government-owned vehicles; and farm-registered vehicles that are used by their owner to transport property purchased by their owner for use on their farm, or agricultural products produced by their farm for use by others.

NON-QUALIFYING VEHICLES:

"Trucks having a gross weight of 7000, 9000, and 11,000 pounds do not have the option of apportionment with the State of Indiana."

REGISTRATION PROCEDURE:

Provide the following to the IRP Division of the Indiana Department of Motor Vehicles (see also Table 2.3):

- a. Proof of Ownership (Title);
- b. Proof of financial responsibility;
- c. Proof of an established place of business in Indiana;
- d. Registrant's Social Security Number or Federal identification Number;
- e. Completed Schedules A and B must be on file; and
- f. Any additional requirements applicable within the following categories:
 1. Vehicles with a gross weight of 55,000 pounds or more:
 - (a) Proof of payment of the federal Heavy Vehicle Use Tax (FHVUT); or
 - (b) A Bill of Sale indicating that the vehicle was purchased within the preceding sixty (60) days. (NOTE: The registrant has 60 days from the date of purchase in order to present the IRP office with proof of payment of the FHVUT).
 2. If registrant is someone other than the owner of the vehicle:
 - (a) Statement of existing lease.

NOTE: "Indiana requires each vehicle to be registered at the maximum gross weight according to vehicle type within the appropriate weight category."

WHAT WILL BE ISSUED:

- a. A license plate bearing the word "apportioned"; and
- b. A registration (cab card) which will indicate:
 - 1. The IRP member jurisdictions in which the vehicle is registered;
 - 2. The registered weight for each jurisdiction; and
 - 3. Other general registration information.

NOTE: Indiana issues apportioned power unit plates. Apportioned trailer plates will only be issued to those vehicles traveling in California. In addition, converter gears may be issued apportioned trailer plates if traveling in or through California.

ENFORCEMENT:

Identification credentials must be maintained or displayed as follows:

- a. License plates must be displayed on the front of tractors and truck-tractors; and on the rear of trucks, trailers, buses, and converter gears.
- b. The original cab card must be carried in the vehicle for which it is issued. Photocopies are not acceptable.

"New plates and cab cards may be displayed prior to April 1 of the new registration year only when accompanied by the current year cab card. They must, however, be displayed by 12:00 AM, April 1 of the new registration year."

"Vehicles not displaying the current license plate and cab card, a valid trip permit, or temporary registration in lieu of credentials, will be in violation, and the driver will be subject to enforcement action."

FEE CALCULATIONS:

IRP registration fees are calculated on the proportion of miles traveled in each IRP jurisdiction from July 1 through June 30 of the year immediately preceding the new calendar registration year. (NOTE: New operations are based upon estimates of annual mileage in each IRP jurisdiction).

"Each in-jurisdiction mileage figure is divided by the total fleet mileage figure to obtain a percentage (computed to the nearest thousandth). This percentage (in effect for all supplemental applications filed during the registration year) is then multiplied by that jurisdiction's full fee to determine the total fee due for that jurisdiction.

For example: An 80,000 lb. Indiana-based tractor operating in Indiana, Illinois, and Missouri:

If the tractor's preceding year mileage totals were 45,000 miles in Indiana, 30,000 miles in Illinois, and 25,000 miles in Missouri; and

If Indiana's full year fees were \$1350, Illinois' were \$2200, and Missouri's were \$1260, apportioned fees would be calculated as:

Indiana's portion:	$(45,000/100,000) \times \1350	
	=	\$ 607.50

Illinois' portion:	$(30,000/100,000) \times \2200	
	=	\$ 660.00

Missouri's portion:	$(25,000/100,000) \times \1260	
	=	\$ 315.00

Yielding a total apportioned fee	-----
due to Indiana equal to:	\$1,582.50

...which will then automatically be distributed in these above proportions to the appropriate agencies in Indiana, Illinois, and Missouri.

Appendix B: International Fuel Tax Agreement (IFTA) Program Overview

- CONTACT: Indiana Department of Revenue,
Motor Carrier Tax and Authority Section
204 State Office Building
100 North Senate Avenue
Indianapolis, IN 46204
(800) 635-7496 or (317) 232-1845
- PURPOSE: "To promote and encourage the fullest and most efficient possible use of the highway system by making uniform the administration of motor carrier fuels use taxation laws with respect to motor vehicles operated interstate."
- CONCEPT: "One license, one set of credentials which allows travel through all IFTA member jurisdictions, one quarterly tax report which reflects the net tax or refund due for all IFTA member jurisdictions, and one audit, in most circumstances, performed by the base jurisdiction."
- PARTICIPANTS: Alberta (Canada); Arizona; Arkansas; Colorado; Florida; Idaho; Indiana; Illinois; Iowa; Kansas; Louisiana; Minnesota; Mississippi; Missouri; Montana; Nebraska; Nevada; North Carolina; North Dakota; Oklahoma; South Dakota; Tennessee; Utah; Washington; Wisconsin; and Wyoming.
- VEHICLES QUALIFIED TO RECEIVE AN IFTA LICENSE:
- Any vehicle that operates in two or more member jurisdictions and is used, designed, or maintained for the transportation of persons or property and:
- a. has two axles and a gross vehicle weight or registered gross vehicle weight exceeding 26,000 pounds or 12,000 kilograms;
 - b. has three or more axles regardless of weight; or
 - c. is used in combination when the weight of such combination exceeds 26,000 pounds or 12,000 kilograms gross vehicle weight or registered gross vehicle weight.
- NON-QUALIFYING VEHICLES:
- "Recreational vehicles such as motor homes, pickup trucks with attached campers, and buses when used exclusively for personal pleasure by an individual and not in connection with any business endeavor".

REGISTRATION PROCEDURE:

"Submit an IFTA License Application, requesting basic information about the carrier and the operations of the carrier (see Table 2.3), to the Indiana Department of Revenue (Indianapolis Central Office).

"The Department may require an IFTA licensee to post a bond when a licensee has failed to file timely reports, when tax has not been remitted, or when an audit indicates problems severe enough that, in the Department's discretion, a bond is required to protect the interests of all member jurisdictions".

WHAT WILL BE ISSUED:

- a. A license card for each qualified motor vehicle operated by the IFTA licensee.
- b. Two decals for each qualified motor vehicle operated by the IFTA licensee.
- c. An IFTA account identification number, "created by using the prefix designated for Indiana (IN) followed by the licensee's nine-digit Federal Employer Identification Number (FEIN) issued by the Internal Revenue Service. If a FEIN is not available, a licensee will submit a Social Security Number (SSN) which will be used as the licensee's account number.

ENFORCEMENT:

Identification credentials must be maintained or displayed as follows:

- a. A license card or a photocopy of a license card must be maintained in the cab of each qualified motor vehicle.
- b. One decal must be placed on the passenger's side and one decal on the "lower rear exterior portion of the driver's side" of each power-unit.

"The IFTA license is valid for the calendar year January 1 through December 31."

"IFTA decals are valid for the calendar year January 1 through December 31 and may be displayed one month prior to the effective date. If the licensee chooses to display renewal credentials prior to January 1, the current year license card should also remain in the qualified motor vehicle until January 1."

"An IFTA license may be suspended and/or revoked for any failure to comply with the provisions of the IFTA agreement, such as:

1. failure to file an IFTA quarterly tax report;
 2. failure to remit all taxes due all member jurisdictions;
- and

3. failure to pay and/or protest an audit assessment within the established time period."

FEE CALCULATIONS:

IFTA fees are not apportioned. Fees are calculated based on the number of taxable gallons used in each IFTA jurisdiction, and at each jurisdiction's tax rate.

"The amount of motor fuel consumed on Indiana highways is the total amount of motor fuel consumed by all of the carrier's commercial motor vehicles which are subject to the motor carrier fuel tax, in operations within and without Indiana, multiplied by a fraction. The numerator of that fraction is the total miles traveled on highways in Indiana by vehicles which are subject to the motor carrier fuel tax. The denominator of the fraction is the total miles traveled, within and without Indiana, by all of the carrier's commercial motor vehicles which are subject to the tax."

For example: A company with two Indiana-based tractors operating in Indiana, Illinois, and Kentucky:

If the company's first tractor consumed 28,000 gallons of fuel and traveled 45,000 miles in Indiana, 30,000 miles in Illinois, and 25,000 miles in Missouri during the previous year; and

If the company's second tractor consumed 22,000 gallons of fuel and traveled 35,000 miles in Indiana, 15,000 miles in Illinois, and 40,000 miles in Missouri during the previous year; and

If Indiana's full motor carrier fuel-tax rate was \$0.16 per gallon, Illinois' was \$0.20 per gallon, and Missouri's was \$0.11 per gallon, taxes due would be calculated as:

Indiana's amount: $(45,000 + 35,000 / 190,000) \times 50,000 \text{ gal.} \times \$.16$
 $= \$ 3,368.42$

Illinois' amount: $(30,000 + 15,000 / 190,000) \times 50,000 \text{ gal.} \times \$.20$
 $= \$ 2,368.42$

Missouri's amt.: $(25,000 + 40,000 / 190,000) \times 50,000 \text{ gal.} \times \1.11
 $= \$1,881.58$

Yielding total motor-carrier fuel	-----
taxes due to Indiana equal to:	\$ 7,618.42

...which will then automatically be distributed in these above amounts to the appropriate agencies in Indiana, Illinois, and Missouri.

Appendix C: Official Minutes of Government/Industry IVHS-CVO Workshop
held in Merrillville, IN

SYNOPSIS OF ILLINOIS-INDIANA IVHS CVO WORKSHOP
WEDNESDAY, NOVEMBER 17, 1993
RADISSON HOTEL AT STAR PLAZA, MERRILLVILLE, INDIANA

Registration for the workshop took place from 9:00 - 9:30 AM.

John Bellinger of INDOT gave an introduction to the workshop and introduced the list of representatives of the various state agencies who were present at the workshop. He explained the main tasks of the workshop and talked about the structure of the workshop, emphasizing the importance of input from the participants. The morning portion was to be used to explain what work the two universities had accomplished up to this point. The afternoon session was to be reserved for comments and suggestions from participants about the studies and about IVHS-CVO. A copy of the agenda is attached. The workshop is designed to examine the IVHS-CVO opportunities which can be implemented throughout the two states.

Kathy Davis of INDOT provided the opening remarks. Ms. Davis explained how IVHS technologies may be implemented in Indiana to manage flow and decrease congestion. She explained that using IVHS technologies would reduce delay and improve efficiency for all motorists. There may be potential for additional improvement for the trucking industry. She indicated that barriers to implementation of the technologies and management of information need to be overcome.

Martin Monahan of the Federal Highway Administration (FHWA) gave a summary of the national perspective for IVHS-CVO. The goal is the creation of a National Commercial Vehicle Program. He summarized the total IVHS actions for FY 1993, which covered a budget of \$156 million. One of the FY 1994 program draft initiatives is the completion of a system design framework for CVO systems. Of an estimated \$203 million IVHS budget for FY 1994, approximately \$14 million will be earmarked for CVO. He explained how the FHWA is moving away from the six functional areas of IVHS to 27 distinct IVHS User Services. Six of these service areas are directly related to CVO. These include preclearance, administrative processes, automated roadside safety inspections, on-board safety monitoring, commercial fleet management, and hazmat incident notification.

Mr. Monahan went on to explain the approach to developing CVO programs. This includes the creation of a CVO working group. This working group shall have 4 committees: credentials, safety, size and weight, and international border preclearance. A graph of activities and milestones was presented. He indicated that CVO is significant to IVHS and its benefits include improved safety, increased productivity, enhanced mobility, reduced congestion, and fuel savings. He stressed that institutional studies such as this are significant to IVHS implementation to CVO.

Arnold T. Johnsen of the FHWA-Office of Motor Carriers stated that the goals of IVHS-CVO are safer highways and increased competitiveness. Last year, 1.6 million inspections were

performed. If each lasted 30 minutes, 800,000 hours were wasted. IVHS technologies can reduce this wasted time. There are many ways to make improvements. For example, a "premier carrier" program may be created. Inspections may be automatically recorded into SAFETYNET. He mentioned the need for cooperation of everyone involved.

Representatives from Purdue University and the University of Illinois at Urbana-Champaign discussed the approach, individual tasks and operational problems identified in their respective studies.

Dr. Kumares Sinha of Purdue University reiterated the importance of input from people attending the workshop. He introduced his graduate student **James Kavalaris**. Mr. Kavalaris gave a brief introduction to the Indiana study being performed by Purdue. He stated the importance of trucking to the economy in Indiana and outlined the research goals. The action plan taken by Purdue was to identify existing laws, describe the existing permitting/enforcement procedures, and reveal barriers to IVHS. A survey is currently being conducted to collect data regarding motor carrier concerns and perceptions associated with IVHS and CVO. Mr. Kavalaris outlined the roles of the four agencies in Indiana which deal with CVO: Indiana Department of Revenue, Indiana Bureau of Motor Vehicles, Indiana Department of Transportation, and Indiana State Police. He pointed out how difficult obtaining credentials can be with the current system. Some of the existing system concerns include computer hardware (lack of data sharing), computer software (limited capabilities), and redundancies in the application process. A review of the Indiana Code and Administrative Code is being performed to identify specific wording of laws which must be changed. He gave rough estimates of the magnitude of savings which IVHS may bring. Based on studies by other states, a 2-4% potential savings relative to total baseline costs was expected. Taken relative to an approximate 5% gross profit margin, this would translate to a 40-80% potential savings. He said that the next step in the study is a development of a partnership to accomplish the desired goals.

Dr. Rahim (Ray) F. Benekohal of the University of Illinois at Urbana-Champaign then talked about the Illinois study. **Charles Wienrank** was recognized as the graduate student working with the study. The six tasks composing the study approach were briefly discussed by Dr. Benekohal. He then described the specific steps which were taken to complete the six tasks. These included a literature review, identifying agencies which govern CVO, obtaining and summarizing information regarding each agency's laws, visiting a trucking company, making a site visit to a weigh station, surveying interest groups, conducting personal interviews, and writing a draft report. Many institutional issues were identified, and changes to resolve these issues are being developed throughout the course of the research. Dr. Benekohal presented eleven agencies which deal with some aspect of CVO in Illinois and described what each agency is responsible for.

He then described some of the operational problems encountered by commercial vehicle operators in Illinois. These include delays at weigh stations, complexity of laws, variation of laws from state to state, the number of agencies which have CVO responsibilities, redundancy of information, and lack of a computer network linking regulatory agencies. Also mentioned

were delays in obtaining credentials and the amount of paperwork which must be maintained for compliance.

Possible actions to improve CVO operations were then described:

- Industry and/or government should provide updates, summary reports, etc. to keep carriers (especially small ones) informed about IVHS opportunities in CVO.
- Ideally, one agency in each state should be in charge of CVO tasks. If not feasible, then a very efficient one-stop-shopping system should be used.
- Multi-state and national agreements should be used for all CVO tasks to simplify the acquisition of credentials.
- Efforts should be made to gradually phase in the use of IVHS technologies.
- Toll collection should, eventually, be automated to a level other than stop and go to reduce delays.
- Databases of the various agencies should be made compatible and accessible to law enforcement 24 hrs./day. (A unique ID could be used to allow cross-referencing.)
- Increase the use of available technologies to improve data processing in each organization.
- Computerize any operations that are not computerized currently to improve efficiency.
- Overcome the mind set that is resistant to technology.
- Secure funding necessary to upgrade equipment or to purchase a more automated system.
- Standardize systems to make them compatible across the states.
- Address the privacy issues among government agencies and with industry
- Weigh-in-motion should be considered for all weigh stations.
- The incremental benefits of mainline vs. low speed WIM should be examined.
- Enforcement issues need to be studied.
- Issues related to operation and maintenance of mainline WIM need to be studied.

During the next portion of the morning session, a joint university presentation was made on potential IVHS-CVO remedies and institutional barriers that would serve as impediments to implementing these remedies.

Dr. Sinha began with an introduction for this session. He outlined the three specific technologies (possible remedies to current operational problems) which would be discussed:

- A) Automated Vehicle Identification (AVI)/Electronic Toll Collection (ETC)
- B) Weigh-In-Motion (WIM) and Electronic Vehicle and Driver Credential Checking (Safety and Enforcement)
- C) One Stop Shopping (Fuel Taxes, Registration and Permits)

Mr. Kavalakis gave the a presentation on Automated Vehicle Identification (AVI)/Electronic Toll Collection (ETC). He explained the three types of AVI/ETC technology which may be used. These are: Type I - read only, Type II - read-write (stores info.), and Type III - read-write (also communicates with external devices). There are currently many vendors

manufacturing equipment. Standards and system compatibility are needed.

Several institutional issues were presented. There is a need to have an expandable open system architecture and use what companies already have. Transponders should be compatible for all systems. Systems should be easily upgradable. Data security must be addressed. A level playing field and universal requirements are needed.

Mr. Kavalaris gave an update on current activities on the toll roads in both Indiana and Illinois. The Indiana toll road has charge plates in place now. Charges are billed monthly, including a report of locations, amounts, and dates of all tolls including point of entry, exit, and miles traveled. Illinois is currently testing read-write transponder technology on I-355 for automated toll collection. Currently it is not on-the-fly due to statutory requirement that all vehicles come to a full stop at toll plazas.

Dr. Benekohal presented the other two technologies. He began by describing WIM. He explained the two types of WIM, low-speed and mainline (high speed). He then described the benefits of WIM, which include reduced delay, better data for planning and enforcement, and reduction in accidents. He then presented some of the issues related to WIM. These include accuracy, operation and maintenance, enforcement, and costs/benefits.

The focus then switched to credential checking. Dr. Benekohal gave a brief description of the concept of electronic credential checking and gave a list of some of the things which may be checked electronically. He then explained some issues related to credential checking. These include a need for equipment standards, privacy concerns, cost-effectiveness, and adequacy of the system.

Dr. Benekohal then discussed one-stop shopping. He defined the current methodology where many agencies handle CVO and issue credentials. One-stop shopping would allow for all credentials to be purchased at/from one location. Issues related to one-stop shopping encompass cooperation of governmental agencies and industry, changes in laws, procurement of a facility and funding, and need for a central computer system. In closing, he posed some questions to be addressed in the afternoon sessions.

The workshop adjourned for lunch at 12:00 PM. Three breakout sessions were held from 1:00 - 2:00 PM. The topics for these smaller group discussions were:

- A) Automated Vehicle Identification (AVI)/Electronic Toll Collection (ETC)
- B) Weigh-In-Motion (WIM) and Electronic Vehicle and Driver Credential Checking (Safety and Enforcement)
- C) One Stop Shopping (Fuel Taxes, Registration and Permits)

Session A) Automated Vehicle Identification and Electronic Toll Collection

Joe Ligas of IDOT was the facilitator of this session. Jeff Hochmuth of the Illinois State Toll

Highway Authority and **Jim Doyle** of the Indiana Department of Transportation - Toll Road Division were panel members. Each gave a brief account of what AVI tests are going on in each state. Comments were then made by several of the participants. Following are some of the key points brought up in this session.

- ETC is useful, if it saves time. Some corridors have too many toll booths.
- Fly-by system is best. Roll-by would also be better than stop-and-go.
- Strong desire for national or regional standards.
- Uncertainty about fail-safe characteristics.
- Strong concern about privacy issue. No need for commercial vehicles to reveal information that other industries or transportation modes don't have to.
- Capability of average truckers to use the technology.
- A "land plan" similar to flight plan in aviation industry may be method of monitoring movements.

Session B) Weigh-In-Motion and Electronic Vehicle and Driver Credential Checking

Martin Monahan of FHWA was the facilitator of this session. The discussion panel included **Tom Gornall** (Indiana Bureau of Motor Vehicles), **Joe Hill** (IDOT), **John Hill** (Indiana State Police), **Cindi Haan** (K.A.T. Inc.), and **Niels Hansen** (UPS). Each of the panel members gave their general opinion on WIM and credential checking. Comments from other participants and general discussion followed. Following are the points brought up.

- Need a national standard before investments in transponders can be made.
- Should balance need for innovation with need for standards; is the technology mature?
- How to handle "black market" transponders?
- Should checks happen at a weigh station or at a carrier's yard?
- Need to shift enforcement focus away from historically safe carriers.
- Need to maintain spot-checks.
- Need an agency or organization to take charge and "champion" the system.
- One-stop shopping would reduce paperwork.
- Electronic Data Interchange (EDI) between corporate computers and agencies would be helpful.
- Preclearance past weigh stations is more of a secondary focus - benefits unclear at this point.
- Concern for any "pay for pass" system or use of any weight-distance tax system.

Session C) One-Stop Shopping

John Bellinger of INDOT was the facilitator of this session. Panel members were **Stan Paulis** (IDOT), **Don Kerber** (Illinois Secretary of State's office), **Roland Marr** (Illinois Department of Revenue), **Martin Aubrey** (Corey Steel), **Bill Jaegle** (Jaegle Trucking), **Paul Hazelwood** (Indiana Bureau of Motor Vehicles), **Tom Sullivan** (Indiana Department of Revenue), and **Dave Belford** (INDOT). Five questions were raised during the discussion. Here are the questions

which were asked and comments associated with them.

1. What is your general opinion about one-stop shopping, and would one-stop shopping improve compliance?
2. What changes would you like to see in the way in which government handles the CVO tasks?
3. Would you like to be able to obtain (issue) operating credentials through computer communications?
4. What are some of the concerns you have about data sharing between government agencies?
5. Do you think IVHS technologies would benefit larger carriers more than small carriers?

Comments

- Need a place to call and get correct information on what to do. This would eliminate the current frustration by truckers.
- Compliance may or may not increase with one-stop shopping. A majority seemed to feel that it would increase to some extent.
- Trucking industry would like to write one check to get all credentials.
- One-stop shopping would be convenient for truckers and data sharing among government agencies would be possible.
- One-stop shopping would improve communication between agencies, but certain information by law cannot be shared.
- The idea of having one agency in charge of all CVO tasks should be pursued further.
- Clearinghouse idea may not work because law are complex (misinformation).
- Partnership and exchange between government and industry.
- Electronic issuance of credentials is favored.
- System should be user friendly. Trucking industry must become computer literate.
- Data sharing among agencies is a concern. Who owns the data is a concern.
- Small carriers were concerned that large carriers may benefit more from IVHS.

After a short break, the participants met again as a large group. Summaries of the results of each of the breakout sessions were given. **Dr. Sinha** gave the results of the AVI/ETC session. **Dr. Benekohal** summarized the results of the One-Stop Shopping session. **Mr. Kavalakis** gave an account of the WIM breakout session.

Representatives of the trucking associations present at the workshop were then asked to give their opinions on IVHS-CVO. **Richard Reeves** of the Indiana Motor Truck Association expressed excitement, but apprehensiveness at the same time. Cost reduction to industry is necessary for participation. A reduction in personnel and overall costs for states is also a benefit. An improvement in driver efficiency is desired, if it is balanced with privacy. It seems that truck drivers are being singled out for enforcement. There is already a shortage of drivers, and excessive enforcement may deter prospective drivers. Ownership of data needs to be determined. There must be a level playing field for both interstate and intrastate carriers. He

mentioned that immediate benefits include WIM and toll cards. Carriers would like to have control over toll cards, similar to fuel cards. He mentioned that cheating will not go away with technology and no system is foolproof. He indicated that a cultural change must take place for IVHS to work; government and industry must cooperate. They must break down barriers. There is a need for further simplification of regulations such as is happening now with the International Fuel Tax Agreement (IFTA) and the International Registration Plan (IRP).

Burness E. Melton of the Illinois Transportation Association was the next to speak. Mr. Melton saw many benefits to IVHS, especially one-stop shopping. It can be helpful to both Illinois and out-of-state carriers. He also saw benefits associated with WIM and the elimination of backups on interstates. He expressed a concern for privacy and releasing of too much information. Carriers cannot reveal traffic patterns and identity of customers to competitors.

Donald Schaefer of the Midwest Truckers Association was the final trucking association representative to speak. His association represents mostly small and medium-sized companies. He stated that it was good to see more people from the industry involved in these types of meetings. Mr. Schaefer indicated the need to have proof of increased efficiency and other benefits to justify the cost. He was unsure if benefits will be there for smaller carriers as much as for larger carriers. He indicated that companies need to become more computer literate and many smaller companies fear technology. Equipment must be compatible.

In conclusion, a general discussion was held, moderated by **Joe Ligas** of IDOT. Some of the comments were:

- Random alcohol and drug testing of drivers is being proposed. IVHS could not take the place of stopping and examining the sobriety of drivers. Therefore, would trucks continue to be stopped even after IVHS?
- Standardization of equipment must take place before industry will participate.
- National standards should be set for weight limits and equipment configurations.
- Competition with rail and others has to be looked at. (Truckers may be placed at a competitive disadvantage.)
- Fear of IVHS as a mechanism for possible weight-distance tax.
- Seems that a certain group of highway users is being unfairly targeted.

Mr. Ligas thanked the participants for their attendance and indicated that the minutes of this session would be available in January. He also indicated that this was the first step in a process which would require additional input prior to implementation.

The meeting adjourned at 3:20 PM.

Minutes are prepared by
C. Wienrank and R. Benekohal
of University of Illinois.

**ILLINOIS - INDIANA IVHS CVO WORKSHOP
PROGRAM**

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**Wednesday November 17, 1993
Radisson Hotel at Star Plaza, Merrillville, Indiana**

9:00 - 9:30am

Registration and coffee

9:30 - 9:40am

Welcome, opening remarks and introduction

Kathy Davis

Deputy Commissioner

Office of Planning and Intermodal Transportation
Indiana Department of Transportation

John Bellinger

Project Manager

IVHS/CVO Institutional Issues Study
Indiana Department of Transportation

9:40 - 10:10am

Summary of the national perspective
for IVHS CVO

Martin Monahan

Urban Transportation Specialist
Federal Highway Administration

Arnold T. Johnsen

State Director

Office of Motor Carriers
Federal Highway Administration

10:10 - 10:35am

Approach, individual tasks and operational problems identified in CVO study

Dr. Kumares Sinha

Professor and Head

Transportation and Urban Engineering
School of Civil Engineering
Purdue University

Jim Kavalakis

Graduate Student

School of Civil Engineering
Purdue University

10:35 - 10:50am

Break

10:50 - 11:15am

Approach, individual tasks and operational problems identified in CVO study

Dr. Rahim F. Benekohal

Associate Professor

Civil Engineering
University of Illinois at Urbana-Champaign

Charles Wienrank

Graduate Student

School of Civil Engineering
University of Illinois at Urbana-Champaign

11:15 - Noon

Joint University presentation on potential IVHS CVO remedies and
institutional barriers that would serve as impediments to implementing these remedies

Noon - 1:00pm

Lunch

1:00 - 2:00pm

Three concurrent breakout sessions

- A) Automated Vehicle Identification (AVI)/Electronic Toll Collection (ETC)**
- B) Weigh-In-Motion (WIM) and Electronic Vehicle and Driver Credential Checking (Safety and Enforcement)**
- C) One Stop Shopping (Fuel Taxes, Registration and Permits)**

2:00 - 2:15pm

Break

2:15 - 2:45pm

Summary of breakout session results

2:45 - 2:55pm

General Comments from Indiana Motor Truck Association

Richard Reeves

Director

Fleet Registration

North American Van Lines, Inc.

2:55 - 3:05pm

General Comments from Illinois Trucking Industry

Burness E. Melton

Director

Government Affairs

Illinois Transportation Association

Donald Schaefer

Associate Director

Mid-West Truckers Association

3:05 - 3:30pm

General Discussion

Joseph Ligas

IVHS Program Manager

Illinois Department of Transportation

John Bellinger

Project Manager

**IVHS/CVO Institutional Issues Study
Indiana Department of Transportation**

3:30 - 3:45pm

Concluding remarks

Joseph Ligas

IVHS Program Manager

Illinois Department of Transportation

Appendix D: Indiana Code of Laws Excerpts Related To Trucking

TITLE 4 STATE OFFICES AND ADMINISTRATION

ARTICLE 21.5 ADMINISTRATIVE ORDERS AND PROCEDURES

Chapter 1	Definitions
Chapter 2	Application
Chapter 3	Adjudicative Proceedings
Chapter 4	Special Proceedings; Emergency and other Temporary Orders
Chapter 5	Judicial Review
Chapter 6	Civil Enforcement

ARTICLE 22 ADMINISTRATIVE RULES AND PROCEDURES

Chapter 2	Adoption of Administrative Rules
Chapter 3	Open Public Hearings
Chapter 5	State Tax Board Hearings

TITLE 6 TAXATION

ARTICLE 6 MOTOR FUEL AND VEHICLE TAX

Chapter 1.1	Gasoline Tax
Chapter 2.5	Special Fuel Tax
Chapter 4.1	Motor Carrier Fuel Tax
Chapter 8	Petroleum Severance Tax

ARTICLE 8.1 DEPARTMENT OF REVENUE, TAX ADMINISTRATION

Chapter 1	Definitions and Applicability
Chapter 2	Department Organization
Chapter 3	Duties, Powers, and Responsibilities
Chapter 4	Divisions of the Department
Chapter 7	Confidentiality
Chapter 8	Collection
Chapter 9.5	Set Off of Refunds
Chapter 10	Penalties and Interest
Chapter 12	Taxpayers Education and Information Program
Chapter 14	Annual Public Hearing and Department Report

TITLE 8 UTILITIES AND TRANSPORTATION

ARTICLE 2.1 MOTOR CARRIER REGULATION

Chapter 17	Definitions
Chapter 18	Transportation of Property
Chapter 19	For-Hire Vehicle Registration
Chapter 20	Interstate Motor Carriers
Chapter 23	Motor Carrier Regulation Fund

ARTICLE 9.5 TRANSPORTATION AGENCIES

Chapter 8	Indiana Toll Finance Authority
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ARTICLE 14 HIGHWAY FINANCES

Chapter 1	Motor Vehicle Highway Account Act
Chapter 2	Special Highway User Tax Accounts
Chapter 3	Appropriations to Department of Highways
Chapter 6	Appropriation of Dedicated Highway Funds
Chapter 10	State Highway Road Construction Improvement Fund

ARTICLE 14.5 LEASE FINANCING FOR TRANSPORTATION SYSTEMS

Chapter 1	Legislative Findings of Fact and Construction
Chapter 2	Definitions
Chapter 3	General Provisions
Chapter 4	Contracts with the Department
Chapter 5	Leases with the Department
Chapter 6	Issuance of Bonds and Notes

ARTICLE 15 TOLL ROADS

Chapter 1	Authorization to Purchase Toll Road Bonds
Chapter 2	Operation and Financing of Toll Roads
Chapter 3	Tollways

ARTICLE 23 INDIANA DEPARTMENT OF TRANSPORTATION

Chapter 1	Definitions
Chapter 2	Indiana Department of Transportation
Chapter 3	Federal Transportation Funds
Chapter 4	General Highway, Road, and Street Provisions
Chapter 5	State Highways
Chapter 6	State Highways in Municipalities
Chapter 8	Limited Access Facilities
Chapter 9	State Highway Contracts; General Powers
Chapter 10	Qualification of Bidders for Contracts
Chapter 13	Annual Inventory of Equipment
Chapter 14	Rental of Highway Equipment
Chapter 16	Legal Defense for Employees
Chapter 21	Maintenance of County Roads Used as State Highway Detours
Chapter 23	Miscellaneous Provisions
Chapter 26	Utility Relocation

TITLE 9 MOTOR VEHICLES

ARTICLE 13 GENERAL PROVISIONS AND DEFINITIONS

ARTICLE 14 BUREAU OF MOTOR VEHICLES

Chapter 1	Creation and Organization of Bureau of Motor Vehicles
Chapter 2	Powers and Duties of Bureau and Commissioners
Chapter 3	Records

ARTICLE 15 BUREAU OF MOTOR VEHICLES COMMISSION

- Chapter 1 Establishment of Bureau of Motor Vehicles Commission
- Chapter 2 Powers and Duties of Commission

ARTICLE 16 LICENSE BRANCHES

ARTICLE 17 CERTIFICATES OF TITLE

- Chapter 7 Trailers

ARTICLE 18 MOTOR VEHICLE REGISTRATION AND LICENSE PLATES

- Chapter 1 Application
- Chapter 2 General Procedures for Registering Motor Vehicles and Obtaining License Plates
- Chapter 4 Vehicle Registration By Mail
- Chapter 6 Expiration, Replacement, and Transfer of Registrations and License Plates
- Chapter 7 Temporary Registration and Trip Permits
- Chapter 8 Identification Numbers
- Chapter 9 Trailers
- Chapter 10 Semi Trailers
- Chapter 11 Intercity Buses
- Chapter 28 Rental Vehicles and Common Carriers

ARTICLE 19 MOTOR VEHICLE EQUIPMENT

ARTICLE 20 SIZE AND WEIGHT REGULATION

- Chapter 1 General
- Chapter 2 Exemptions
- Chapter 3 General Size Restrictions
- Chapter 4 General Weight Restrictions
- Chapter 5 Heavy Duty Highways and Extra Heavy Duty Highways
- Chapter 6 Special and Emergency Permits
- Chapter 7 Special Restrictions Concerning Bridges, Causeways, and Viaducts
- Chapter 9 Special Restrictions Concerning Combined Vehicles and Towing Permits
- Chapter 13 Special Restrictions Concerning Semi Trailers
- Chapter 14 Special Restrictions Concerning Tractor-Mobile Home Rigs and Required Permits
- Chapter 15 Special Restrictions Concerning Special Tractor-Mobile Home Rigs and Required Permits
- Chapter 17 Weigh Stations and Weight Checks
- Chapter 18 Penalties and Enforcement

ARTICLE 21 TRAFFIC REGULATION

ARTICLE 24 DRIVER'S LICENSES

- Chapter 1 Individuals Required to Obtain a License or Permit
- Chapter 6 Commercial Driver's License
- Chapter 9 Application for License or Permit

ARTICLE 25 FINANCIAL RESPONSIBILITY

Chapter 1	Applicability
Chapter 2	Definitions
Chapter 3	General Provisions
Chapter 4	Financial Responsibility
Chapter 5	Proof of Financial Responsibility
Chapter 7	Miscellaneous Provisions
Chapter 8	Penalties

ARTICLE 27 TRAFFIC SAFETY AND DRIVER EDUCATION PROGRAMS

Chapter 1	Federal Traffic Safety Programs
Chapter 2	State Traffic Safety Programs
Chapter 3	Local Traffic Safety Programs
Chapter 4	Commercial Driver Training Schools

ARTICLE 28 INTERSTATE COMPACTS AND AGREEMENTS

Chapter 1	Driver License Compact
Chapter 2	Non-resident Violator Agreements
Chapter 3	Adoption of Interstate Traffic Safety Compact
Chapter 4	Reciprocity Commission
Chapter 6	Vehicle Equipment Safety Compact

ARTICLE 29 FEES

ARTICLE 30 GENERAL PENALTY PROVISIONS

TITLE 10 STATE POLICE, CIVIL DEFENSE AND MILITARY AFFAIRS

ARTICLE 1 STATE POLICE

Chapter 1	Indiana State Police Department
Chapter 1.5	Enforcement of the Motor Carrier Laws

Appendix E: Indiana Administrative Code Excerpts Related To Trucking

TITLE 45 INDIANA DEPARTMENT OF REVENUE

ARTICLE 10 SPECIAL FUEL TAX

- Rule 1 Definitions
- Rule 2 Imposition of Tax
- Rule 3 Exemptions
- Rule 4 Licenses
- Rule 5 Monthly Reports; Payment of Tax
- Rule 6 Refund of Tax
- Rule 9 Intentional Violation of Rules
- Rule 10 Delivery Reports; Collection of Tax

ARTICLE 12 GASOLINE TAX

- Rule 1 Definitions
- Rule 2 Imposition of Tax
- Rule 3 Exemptions
- Rule 5 Monthly Reports
- Rule 7 Exempt Gasoline
- Rule 8 Refund for Tax Paid on Gasoline
- Rule 9 Statement of Tax Rate
- Rule 10 Evasion of Tax; Penalties

ARTICLE 13 MOTOR CARRIER FUEL TAX

- Rule 1 Definitions
- Rule 2 Applicability
- Rule 3 Leased Motor Vehicles
- Rule 4 Imposition of Tax
- Rule 5 Credit Against Tax
- Rule 6 Credit Application; Refund; Interest
- Rule 7 Bonds
- Rule 8 Presumption of Consumption Rate
- Rule 8.5 Surcharge Tax; Commercial Motor Vehicles
- Rule 9 Quarterly Reports
- Rule 10 Joint Reports
- Rule 11 Annual and Trip Permits
- Rule 12 Suspension or Revocation; Permits, Temporary Authorization
- Rule 13 Violations

ARTICLE 15 TAX ADMINISTRATION; GENERAL PROVISIONS

- Rule 1 Definitions; Applicability
- Rule 2 Department Organization
- Rule 3 Duties; Powers; Responsibilities
- Rule 4 Division of Audit
- Rule 5 Assessment
- Rule 6 Filing and Due Dates
- Rule 7 Confidentiality
- Rule 8 Collection
- Rule 9 Refunds

Rule 10 Set Off of Refunds
Rule 11 Penalties and Interest

ARTICLE 16 MOTOR CARRIERS

Rule 1 Motor Carrier Department
Rule 1.5 Motor Carrier Practice and Procedure Before the
 Commission
Rule 3 Motor Carrier Freight Tariffs and Classifications

TITLE 105 INDIANA DEPARTMENT OF TRANSPORTATION

ARTICLE 1 PROCEDURAL REQUIREMENTS

ARTICLE 6 GENERAL PROVISIONS FOR HIGHWAYS

ARTICLE 7 PERMITS FOR HIGHWAYS

ARTICLE 9 TRAFFIC CONTROL DEVICES FOR HIGHWAYS

ARTICLE 10 OVERSIZE/OVERWEIGHT VEHICULAR PERMITS FOR HIGHWAYS

Rule 1 Display of Tag
Rule 2 Special Weight Permit

TITLE 135 INDIANA TRANSPORTATION FINANCE AUTHORITY

ARTICLE 2 GENERAL PROVISIONS

Rule 1 Definitions
Rule 2 Operation of Vehicles on the Toll Road
Rule 3 Limitation of Use of the Toll Road
Rule 4 Dimension and Weight Limitations; Special Hauling
 Permits
Rule 5 Vehicle Classification and Related Toll Rules
Rule 6 Protection of Property
Rule 7 Trailer Combination Operations
Rule 8 Michigan Train Operations
Rule 9 Indiana Motor Vehicle Laws
Rule 10 Penalties; Severability; Savings

ARTICLE 3 TOLL BRIDGES

Rule 1 Definitions
Rule 2 Payment of Toll

TITLE 140 BUREAU OF MOTOR VEHICLES

ARTICLE 1 SAFETY RESPONSIBILITY DIVISION

Rule 1 Administrative Hearing Procedure

- Rule 2 Proof of Financial Responsibility; Filing Requirements
- Rule 3 Proof of Financial Responsibility; Methods of Proof
- Rule 5 Procedures for Implementation and Conduct of Indiana's Pre-Motor Vehicle Registration Financial Responsibility Requirements
- Rule 6 Procedures for Implementation and Conduct of Indiana's Post-Motor Vehicle Registration Financial Responsibility Requirements
- Rule 7 Self-Insurance

ARTICLE 2 EXCISE TAX AND REGISTRATION DIVISION

- Rule 1 Administration of Motor Vehicle Excise Tax

ARTICLE 3 SPECIAL SALES DIVISION

- Rule 1 Vehicle Weight Identification Tag Numbers

ARTICLE 7 DRIVER'S LICENSE DIVISION

- Rule 3 Commercial Driver's Licensing

ARTICLE 8 LICENSE BRANCHES

- Rule 2 Procurement
- Rule 3 Service Fees

TITLE 145 RECIPROCITY COMMISSION OF INDIANA

ARTICLE 1 LIMITED PERMITS; INTERNATIONAL REGISTRATION PLAN

- Rule 1 Limited Permits; Fee Calculations; Documentation of Mileage

TITLE 240 INDIANA STATE POLICE

ARTICLE 5 COMMUNICATION SYSTEMS

ARTICLE 6 CRIMINAL HISTORY RECORD INFORMATION

Appendix F: Questions Developed To Help Guide State-Agency Interviews

- (1) What tasks related to motor carrier operations are this area's specialty?
- (2) What are the most efficient / successful areas of this operation?
- (3) How many personnel handle motor carrier tasks in this area?
- (4) Is there an area organizational chart available listing the positions in this area and their Civil Service classifications?
- (5) Are the job descriptions available for each of the above identified positions?
- (6) Are there any vacant positions and/or freezes in staffing levels?
- (7) What percentage of time do personnel spend on the various motor carrier tasks in this area?
- (8) What are the hours of operation for the various aspects of this area (both direct customer service and support staff)?
- (9) How many units (per hour, day, week, year, etc.) does this area process for each task?
- (10) Are there periodic reports (monthly, quarterly, semi-annually, annually, etc.) that contain statistical data regarding this area's volume processed (applications, collections, etc.)?
- (11) What data is needed from customers to carry-out this area's tasks?
- (12) What data is needed from other agencies to carry out this area's tasks?
- (13) Are copies of all the forms that this area uses to carry-out its tasks available?
- (14) What is the output data generated by this area's activities?
- (15) Where (if anywhere) is the output of this area's activities sent to for further processing?
- (16) Is there a personnel training program, and do they know the specific legal regulations that apply to their tasks, and how to interpret and apply these regulations?
- (17) What are the fee schedules for tasks in this area?
- (18) How do these fee schedules relate to the actual cost of processing and providing these services?

- (19) What is the annual budget for this area?
- (20) What changes need to be made in this area's fee schedule / cost structure to raise more revenues for improved operations?
- (21) What are some of the typical complaints this area receives from its customers?
- (22) What changes would you make to improve operations to better serve customers and be more cost-effective?
- (23) What legislative changes does this area need for more flexibility and freedom to better serve its customers?
- (24) What type of computers and how many does this area presently use?
- (25) What type and titles of computer software does this area presently use?
- (26) What additional operations could be computerized to cut costs?
- (27) What automation technologies are you aware of that are available to increase efficiency and customer service?
- (28) What has prevented the implementation of these technologies so far?
- (29) Are there any sensitive issues facing IVHS-CVO implementation relative to this area's operations?
- (30) Are there other people in this area that the researchers should be meeting with (name, phone, specialty)?
- (31) What type of data and/or recommendation areas would you like to see addressed in this report?
- (32) Is there anything that has yet to be discussed that should be known by the researchers?

Appendix G: Survey Cover Letter and Questionnaire Form

PURDUE UNIVERSITY

JOINT HIGHWAY RESEARCH PROJECT

November 12, 1993

Dear Member of the Trucking Industry:

Indiana policy-makers are considering implementing systems to enable automated payment of tolls; pre-clearance of vehicles and drivers past weigh stations; transparent state borders; and "one-stop-shopping" for registrations and permits. Known as Intelligent Vehicle-Highway Systems (IVHS), they are being proposed as part of a national network using computer technologies such as Automatic Vehicle Identification (AVI) transponders and Weigh-In-Motion (WIM) devices to achieve increased motor-carrier efficiency through reduced congestion, decreased costs, and enhanced safety.

So that these systems can be helpful to industry, a random sample of Indiana-based interstate motor carriers who have vehicles registered with the International Registration Plan (IRP) are being asked to share their concerns and perceptions about these systems. Your company is one of a small number of these randomly selected motor carriers who are being asked to give their opinion on these matters. In order that the results will truly represent the thinking of Indiana-based interstate motor carriers, both large and small, it is important that the enclosed questionnaire be completed and returned to us within one week.

You may be assured of complete confidentiality. The questionnaire has no identification marks, and your name will never be placed on it.

The results of this research will be integrated into an IVHS institutional issues study and will be made available to officials and representatives in our state's government, the Federal Highway Administration, and all interested citizens.

I would be most happy to answer any questions you might have. Please write or call. The telephone number is (317) 494-2206.

Thank you for your assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "James G. Kavalakis".

James G. Kavalakis
Project Coordinator

MOTOR CARRIER CONCERNS & PERCEPTIONS:

A STATEWIDE SURVEY REGARDING INTELLIGENT VEHICLE-HIGHWAY SYSTEMS

(IVHS)

The purpose of this survey is to examine, from a motor carrier's perspective, concerns and perceptions relative to applying Intelligent Vehicle-Highway Systems (IVHS) technologies to Commercial Vehicle Operations (CVO) in the State of Indiana. Be assured that all responses will be kept strictly confidential.

Thank you for your help.

**Joint Highway Research Project
3154 Civil Engineering Bldg.
PURDUE UNIVERSITY
West Lafayette, IN 47907-1284**

DIRECTIONS: Please indicate your answers on this survey form by marking the appropriate box or number next to each question.

Q-1 Before receiving this survey, was your company aware of Intelligent Vehicle-Highway Systems (IVHS)?

YES ☐

NO ☐

Intelligent Vehicle-Highway Systems (IVHS) use technologies such as Automatic Vehicle Identification (AVI) transponders (e.g. an electronic sticker) and Weigh-In-Motion (WIM) scales to enable automated toll payments; pre-clearance of vehicles and drivers past weigh stations; transparent borders; & One-Stop-Shopping for registrations & permits.

Questions 2-5

Please rate these IVHS-CVO concepts as to how their implementation would affect your company's current operations. (Circle a number on the scale of 1-7)

7 = VERY
BENEFICIAL

4 = NO
EFFECT

1 = VERY
HARMFUL

Q-2 Automatic payment of tolls (while driving at mainline speeds).

7 6 5 4 3 2 1

Q-3 Pre-clearance of vehicles and drivers past weigh stations.

7 6 5 4 3 2 1

Q-4 Transparent state borders

7 6 5 4 3 2 1

Q-5 "One-Stop-Shopping"

7 6 5 4 3 2 1

Automatic toll collection proposals envision specially-equipped bypass lanes next to toll plazas for use by AVI-equipped vehicles only. While driving at mainline speeds, tolls could be paid (via coded radio signals) by either having a toll deducted from a pre-paid value (like a debit card) or by having a toll charged to a pre-opened credit account.

Q-6 Which type of automatic toll collection system would your company favor?

- DEBIT SYSTEM FROM A PRE-PAID ACCOUNT ☐
- CREDIT SYSTEM WITH MONTHLY BILLING ☐
- NO PREFERENCE ☐
- DO NOT FAVOR AUTOMATIC TOLL COLLECTION ☐
- (Please go to Question #9)

Q-7 Would your company be willing to pay an additional toll to help pay for constructing, equipping, and maintaining specially-equipped bypass lanes next to existing toll plazas for use by AVI-equipped vehicles only?

- YES ☐ (Please go to Question #8)
- NO ☐ (Please go to Question #9)

Q-8 What is the average amount of money per toll plaza your company would be willing to pay as a premium each time an AVI-equipped vehicle from your fleet paid its tolls via an automatic toll collection system?

- LESS THAN 5¢ PER TOLL PLAZA ☐
- 6¢ TO 15¢ ☐
- 16¢ TO 25¢ ☐
- 26¢ TO 35¢ ☐
- 36¢ TO 45¢ ☐
- 46¢ TO 55¢ ☐
- 56¢ TO 70¢ ☐
- 71¢ TO 85¢ ☐
- 86¢ TO \$1.00 ☐
- GREATER THAN \$1.00 ☐

Q-9 What is the average number of toll road or toll bridge agencies that each vehicle in your company's fleet must pay tolls to?

_____ AGENCIES

Data needed to pre-clear AVI-equipped vehicles & their drivers past weigh stations can either be stored in a central database for access when a vehicle nears a weigh-station, or it can be stored in a truck's AVI transponder for validation upon approach to a weigh-station.

Q-10 Which type of weigh-station pre-clearance would your company favor?

- CENTRALIZED DATABASE ☐
- DATA STORED ON AVI-TRANSPONDERS ☐
- NO PREFERENCE ☐
- DO NOT FAVOR WEIGH-STATION PRE-CLEARANCE ☐

Q-11 Which data item(s) would your company be willing to have electronically stored within an AVI-transponder? (check all that apply)

- CARRIER:
- Type of authority issued by the I.C.C. ☐
 - Operating authority registration number ☐
 - Proof of liability insurance ☐
 - Proof of financial responsibility ☐
 - Fleet limitation certificate validation ☐
 - Type of carrier (i.e. For-Hire, Contract) ☐

- DRIVER:
- Name of driver ☐
 - Medical certificate validation ☐
 - Amount of "driving" & "on-duty" time remaining ☐
 - Commercial Driver's License (CDL) number ☐
 - Haz-Mat training certificate validation ☐

- VEHICLE:
- I.C.C. number ☐
 - D.O.T. number ☐
 - Fuel-tax cab-card number ☐
 - I.F.T.A. number ☐
 - Vehicle registration cab-card number ☐
 - I.R.P. number ☐
 - C.V.S.A. number & expiration ☐
 - Axle spacings ☐
 - Registered gross vehicle weight ☐
 - Vehicle Identification Number (VIN) ☐

- TRIP:
- Bill of lading ☐
 - Commodity shipped ☐
 - Haz-Mat product identification number ☐
 - Oversize/overweight load permit number ☐
 - Date/Time vehicle last entered a weigh station ☐
 - Location of last weigh-station vehicle entered ☐
 - Location of vehicle's Port-of-Entry into a state ☐

Other weigh-station pre-clearance proposals involve issuing a "Gold Card" to consistently safe motor carriers who are in compliance with all safety, registration, permitting, & tax requirements. Vehicles would be allowed to bypass all weigh-stations until their next inspection or until a random inspection found violations that would cancel the card.

Q-12 Is your company willing to have its fleet be subject to more frequently scheduled safety and compliance checks for "Gold Card" certification and weigh-station pre-clearance based on Weigh-In-Motion weights only?

YES ☐

NO ☐

Q-13 As compared to today's level of trucking safety, what would be the future level of trucking safety if certain vehicles & drivers are pre-cleared past weigh-stations based on pre-certification & Weigh-In-Motion weights only.

MUCH SAFER ☐

SOMEWHAT SAFER ☐

NO CHANGE ☐

SOMEWHAT MORE DANGEROUS ☐

MUCH MORE DANGEROUS ☐

Implementing automatic toll collection and/or pre-clearance of vehicles and drivers past weigh-stations will require each *participating* truck to have an AVI transponder or similar data-transfer device on-board.

Q-14 Are any vehicles in your company's fleet presently equipped with an Automatic Vehicle Identification (AVI) transponder?

YES ☐ (Please go to Question #15)

NO ☐ (Please go to Question #17)

Q-15 What percentage of the vehicles in your company's fleet are presently equipped with an AVI transponder?

_____ PERCENT

Q-16 What make of AVI transponder are the vehicles in your company's fleet presently equipped with?

AMTECH ☐
 AT/COMM ☐
 AT&T ☐
 HUGHES ☐
 MARK IV ☐
 VAPOR ☐
 OTHER ☐ _____

Questions 17-18

Please describe how having an AVI transponder or similar data-transfer device on your company's vehicles would affect (or presently affects) the following:

Q-17 The perceived level of enforcement that vehicles in your company's fleet would be (are) subject to for registration, permitting, & tax requirements.

MUCH MORE ENFORCEMENT ☐
 SOMEWHAT MORE ENFORCEMENT ☐
 NO CHANGE ☐
 SOMEWHAT LESS ENFORCEMENT ☐
 MUCH LESS ENFORCEMENT ☐

Q-18 The degree to which there would be (is) a "level playing field" between carriers with or without AVI transponders on-board their vehicles.

MUCH MORE OF A LEVEL PLAYING FIELD ☐
 SOMEWHAT MORE OF A LEVEL PLAYING FIELD ☐
 NO CHANGE ☐
 SOMEWHAT LESS OF A LEVEL PLAYING FIELD ☐
 MUCH LESS OF A LEVEL PLAYING FIELD ☐

Q-19 If an IVHS program included law enforcement's ability to electronically read a truck's AVI transponder while it was still moving down a roadway in order to check for motor-carrier fuel-tax payments & compliance with other requirements, what type of IVHS program should it be?

MANDATORY PROGRAM ☐
 VOLUNTARY PROGRAM ☐

Q-20 If the IVHS system scenario in Question #19 was mandatory, what type of motor carriers should be required to purchase & maintain an on-board AVI transponder for each of the vehicles in their fleet?

- INTRA-STATE CARRIERS ONLY ☐
 INDIANA-BASED INTERSTATE CARRIERS ONLY ☐
 ALL INTERSTATE CARRIERS TRAVELING IN INDIANA ☐
 INTRA-STATE & INDIANA-BASED INTERSTATE CARRIERS ☐
 ALL MOTOR CARRIERS TRAVELING IN INDIANA ☐

AVI transponders are available in 3 models of increasing capabilities:

TYPE I tags can transmit a unique number to a roadside computer for vehicle, driver, or trailer identification.

TYPE II tags add features for storing limited information, enabling automatic toll collection & weigh-station pre-clearance.

TYPE III tags add communications with an external device (i.e. an on-board fleet-management computer), enabling more uses such as dynamic truck inspections & automatic permit issuance.

Questions 21-23

Please indicate how much money per truck your company would be willing to pay (or have paid) for each type of AVI transponder & its associated installation costs.

Q-21 TYPE I Transponder: \$ _____ EACH

Q-22 TYPE II Transponder: \$ _____ EACH

Q-23 TYPE III Transponder: \$ _____ EACH

For statistical purposes only, please provide the following additional information. All responses will be kept strictly confidential.

Q-24 What percentage of your fleet's trips are time sensitive (i.e. "Just-In-Time" or scheduled delivery within a two hour or less time frame)?

_____ PERCENT

Q-25 What is your company's primary type of truck operation? (check one only)

- FOR-HIRE LESS-THAN TRUCKLOAD MOTOR CARRIER ☐
FOR-HIRE TRUCKLOAD MOTOR CARRIER ☐
CONTRACT MOTOR CARRIER ☐
PRIVATE MOTOR CARRIER ☐

Q-26 What is the primary method your company pays its drivers?

- ANNUAL SALARY ☐
PER-HOUR WAGE ☐
PER-MILE WAGE ☐
PER-TRIP FLAT-FEE ☐
PERCENTAGE OF LOAD REVENUE ☐

Q-27 What is the average number of vehicles in your company's daily operating fleet? (include all single-unit vehicles, & combination units)

_____ VEHICLES

Q-28 Of the vehicles listed in Question #27, how many are owner-operators?

_____ OWNER-OPERATORS

Your contribution to this effort is very greatly appreciated. If your company would be interested in participating in a government / industry partnership to develop and implement Intelligent Vehicle-Highway Systems (IVHS) technologies for Commercial Vehicle Operations (CVO) in the State of Indiana, please provide a contact person by printing their name, address, and phone number on the back of the enclosed return envelope (NOT on this response form). We will see to it that it gets to the appropriate IVHS-CVO implementation team.

COVER DESIGN BY ALDO GIORGINI