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HELP: A PUBLIC/PRIVATE PARTNERSHIP

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LOCKHEED MARTIN, INC.

Heavy Vehicle Electronic License Plate, Inc. (HELP) is a self-supporting, non-profit corporation funded from revenues generated from the services it offers to motor carriers. Incorporated in Arizona as a 501 (c) 3 organization, HELP's structure reflects the public-private nature of the organization.

Governance: HELP is managed by a volunteer Board of Directors, comprised of one public and one private sector representative from each member state. HELP contracts with the private sector to develop, operate, and maintain each of the services offered.

Responsibilities: Each of the four partners plays an important role in making HELP's **vision** a reality:

- State Government: Authorizes HELP's services and works with private sector system operator to ensure safety and regulatory compliance is not jeopardized.
- Motor Carrier Industry: Serves on HELP Board and participates in selection of service offerings, system operators and fee structures. Motor Carriers voluntarily subscribe to services and pay user fees.
- Private Sector: Develops, maintains and operates the system in accordance with HELP's direction. The system operator also provides the venture capital needed to deploy the system.
- HELP: HELP identifies potential service offerings, develops service standards and monitors the **performance** of the system operator. HELP's staff also perform the organizational and administrative services needed to run the organization, including enrolling state members.

Partnership Benefits: In this era of government downsizing, the public-private **partnership** insures prompt deployment of proven, but cutting-edge technologies, financed by private capital which is recouped by a fee for service from those motor carriers who chose to participate **and** benefit from the commercial vehicle services.

ADVANTAGE I-75 A NEW USE FOR MAINLINE WEIGH-IN-MOTION

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ADVANTAGE I-75

A New Use For Mainline Weigh-in-Motion

What is ADVANTAGE I-75?

ADVANTAGE I-75 is a partnership of public and private interests along the I-75/Canadian Route 401 corridor whose goal is to reduce congestion, increase efficiency, and enhance the safety of motorists and other users of I-75 and Route 401 in Canada using advanced vehicle and highway technologies. These technologies are usually referred to as Intelligent Transportation Systems (ITS). The ADVANTAGE I-75 partnership has applied ITS technologies to quickly achieve immediate benefits.

The ADVANTAGE I-75 partnership had its beginnings in June 1990, when a concept conference was held in Lexington, Kentucky, to discuss the feasibility of conducting an ITS project for commercial vehicle operations on I-75. Conference participants endorsed the concept and formed a Policy Committee to guide development of the project.

Project partners include the Federal Highway Administration, the six I-75 states (Florida, Georgia, Tennessee, Kentucky, Ohio, and Michigan), the province of Ontario, the Canadian Ministry of Transport, U.S. and Canadian trucking associations, and various trucking companies. The lead agency for the partnership is the Kentucky Transportation Cabinet. The University of Kentucky's Transportation Center provides project staff and manages the operations center. The system design was performed by JHK & Associates. Science Applications International Corporation (SAIC) of San Diego is the System Manager, Hughes Transportation Management Systems (HTMS) of Fullerton, California has provided the Automatic Vehicle Identification technology, and the Iowa Transportation Center is serving as the independent project evaluator.

ADVANTAGE I-75 is currently in the operational test phase. The objective of MACS (Mainline Automatic Clearance System) is to allow transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 and Highway 401 in Canada with no more than a single stop at an inspection station.

How Does MACS Work?

MACS is based on the use of Automatic Vehicle Identification (AVI) technology to electronically identify and process a truck while it is on the mainline. The AVI sub-system consists of truck-mounted transponders and roadside readers. Each participating truck has a transponder installed in the cab that is capable of two-way communication with the

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roadside readers. Each weigh station has a reader installed about 0.8 km in advance of the station, and an additional two or three readers in the weigh station complex (depending on the weigh station configuration). The transponders and readers communicate with each other via radio frequency transmissions in the 915-megahertz band, using a time division multiple access (TDMA) protocol, also referred to as “slotted aloha”. The protocol has been placed in the public domain by Hughes.

The basic operation of MACS is simple. When a truck begins a trip on the I-7340 1 corridor and is processed through a weigh station, specific information about the truck and the transaction (e.g., date, time, location, weight data, axle data) is collected and stored electronically in the truck’s transponder. As the truck continues its trip and approaches a subsequent weigh station, the information in the transponder is read by the roadside reader in advance of the station. The reader’s computer processes the information, makes a clearance decision, and communicates this decision to the transponder. The transponder has built-in communication functions (red and green lights and audible tones) that signal the driver to either bypass or pull in.

One enhancement to the basic concept that is already being implemented is the use of high-speed, weigh-in-motion (WIM) equipment on the I-75 mainline. When a truck begins a trip **on** I-75 and the first weigh station encountered has mainline WIM, even the first weigh station stop can be eliminated.

MACS is being installed at every weigh station on the I-75/Highway 401 corridor from Miami, FL, to Belleville, Ontario. This is a total of 30 weigh stations; 22 in the United States and eight in Ontario.

Each weigh station has a host computer that controls the system and provides an interface to the system for enforcement personnel. Another computer, located at the project’s operations center at the University of Kentucky, provides a central location for the enrollment of carriers, system monitoring and diagnostics data collection, and report generation. The operations center also provides a help desk and a toll-free hotline for project partners.

The project has purchased 4,500 transponders for installation on participating trucks. It is likely that the demand for the transponders will exceed 4,500. Should this happen, the trucking companies will have to purchase the additional transponders. We expect that the number of participating trucks will continue to grow throughout the two-year operational test.

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Benefits

During the operational test, a significant amount of effort will be directed toward system evaluation. A major focus of the evaluation will be to identify and quantify the benefits of the system.

The primary benefit of MACS is expected to be increased productivity for trucking. A reduction in the amount of time spent waiting for processing at weigh stations will translate directly into cost savings; increased productivity; and more reliable, on-time delivery of goods. Increased trucking productivity will, in turn, reduce transportation costs and thus reduce the costs of goods for the consumer. In addition, reducing the number of times a truck must decelerate and accelerate, as well as reducing idling time, will result in improved fuel economy and reduced exhaust emissions.

The enforcement community should also benefit from ADVANTAGE I-75. By allowing those carriers with the best safety and compliance records to bypass weigh stations on the mainline, enforcement personnel will be able to concentrate their efforts on the more problematic carriers. By eliminating repeated checking of the same vehicle, we will improve enforcement efficiency, allowing more effective allocation of scarce resources.

The data collected by MACS also has significant value. Every transaction between a roadside reader and a transponder is logged in the weigh station host computer and periodically uploaded to the central computer at the operations center. Information of this type is of great value to trucking companies, shippers, or customers who wish to track their shipments. Enforcement agencies will also have access to valuable data on motor carrier operations within their respective jurisdictions.

Of course, the benefits described here represent only the tip of the iceberg compared to the potential benefits if the ADVANTAGE I-75 concept is expanded and enhanced.

Mainline WIM Enhancement

The original concept of ADVANTAGE I-75 was that a truck would be cleared at the first weigh station encountered and then be automatically cleared at subsequent weigh stations as long as the time window was not exceeded or the enforcement officer did a random pull-in. There was an early suggestion that transponders be only put on trucks belonging to companies with good records, weight be ignored and any transponder-equipped truck cleared as long as there were no other “red-flags”. That suggestion was not accepted, as weight could not be ignored, but a seed was planted for no-stop clearance.

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At the same time these ADVANTAGE I-75 concept discussions were underway, the Kentucky Transportation Cabinet's Division of Transportation Planning was evaluating several makes and types of mainline WIM's. This Division saw a need to install some type of mainline WIM other than a piezo strip in certain areas for SHRP and pavement design purposes. I-75 near Lexington was one of these areas.

In the late '80's, the Tennessee Department of Transportation began experiencing unacceptable long queues of trucks at its I-401 I-75 weigh stations in Knox County. Several times each day, the stations would have to be temporarily closed to keep the queues from backing up on the mainline. TNDOT knew that a large percentage of trucks being processed were local delivery trucks that came into the weigh stations on a regular basis. TNDOT needed a solution to this major safety problem. Relocation or reconstruction of the stations were not viable alternatives.

Similarly, the Ohio and Michigan Departments of Transportation were looking strongly at installing load cell WIM's in-the mainline of several Interstate routes to collect more accurate data on a continuous basis for pavement design and planning purposes.

The above situations within ADVANTAGE I-75 and the four State DOT's created an atmosphere that would make any WIM salesman's mouth water. Also, about the same time, Jim Schmidt of JHK (the firm preparing the ADVANTAGE I-75 preliminary design) began preaching the gospel of "no-stop shopping" with a mainline WIM at every ADVANTAGE I-75 weigh station. Thus, ADVANTAGE I-75 became a probable solution to several problems in these four States that were related to weigh-in-motion in addition to the purpose of the project itself. The other three States/Province, Florida, Georgia and Ontario, had other reasons for entering into the ADVANTAGE I-75 partnership that were not related to weigh-in-motion.

The first weigh-in-motion domino fell when Kentucky decided to install a bending plate WIM in the Northbound lane of I-75 at its Scott County weigh station, about 15 miles North of Lexington. A project to widen I-75 to six lanes and re-construct the pavement was underway and the installation was added to the construction project by Change Order. The Contractor purchased a bending plate, with installation to take place when the pavement was complete. It was recognized that an interface between the WIM and the AVI equipment for ADVANTAGE I-75 would be needed but could not be purchased until the AVI equipment was available.

About that same time, ODOT programmed funds for several load cell mainline WIM's including their two I-75 stations, one in Wood County and one in Hancock County.

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Largely as a result of Jim Schmidt's efforts, the ADVANTAGE I-75 Policy Committee in 1993 approved a proposal to seek IVHS (now ITS) funding for four mainline WIM's in the Northbound lanes for weigh stations at Knox County, TN; Laurel County, KY; Wood County, OH; and Monroe County, MI. These four locations and the Scott County, KY, site would provide continuous mainline WIMs at five consecutive weigh stations over a distance of about 460 miles. A proposal was submitted to FHWA for IVHS funding even though FHWA advised that weigh-in-motion was not new technology and not eligible for IVHS funds. However, after some high-level discussions, a decision was made to approve IVHS funds for TN, KY and MI. Ohio was not included as "funds were already programmed". Further, the States were required to demonstrate a commitment to use the mainline WIM's to pre-clear ADVANTAGE I-75 trucks and to evaluate the usage. The commitment was demonstrated by the three States receiving IVHS funds by agreeing to install mainline WIM's at the Southbound counterpart stations. Kentucky also agreed to install a mainline WIM at its Kenton County SB station (counterpart of the Scott County station). ODOT had already programmed funds for its Hancock County SB station. These actions resulted in ten weigh stations (five NB and five SB) with mainline WIM's.

Each State used its own procurement process to obtain their WIMs. As Kentucky already had a bending plate at the Scott County weigh station, approval was obtained for a sole source purchase of three additional bending plate units from the same firm. The other States acquired their units through bids. The end result was six bending plates in Tennessee and Kentucky and four load cells in Ohio and Michigan.

A separate purchase of the WIM-AVI interface for the Scott County weigh station was made by Kentucky and installed in late 1993. On December 2, 1993, the ADVANTAGE I-75 Policy Committee met in Lexington and traveled to the Scott County station where trucks were checked and cleared for the first time. The interface was included in the bid specifications for the other units.

Ontario has since installed a bending plate in the mainline of Route 40 I at its Putnam weigh station and is evaluating whether it will install mainline WIMs at its other seven stations which are a part of the ADVANTAGE I-75 project.

The other two States in the ADVANTAGE I-75 partnership, Florida and Georgia, have not installed mainline WIMs for various reasons, primarily due to having ramp sorters and bypass lanes in their weigh stations.

When Kentucky purchased its four bending plate units, the equipment included a land-line telephone modem so that remote diagnostics and down-loading could occur. However, due to distances to existing telephone service; cellular modems were obtained to replace the land-line modems. The six units in the other states all utilize land-line modems for remote

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diagnostics and down-loading data..

Kentucky's primary purpose in using the mainline WIM's on I-75 is to clear trucks on the mainline so that they do not have to enter the weigh station at all. Our Division of Transportation Planning does down-load data from time-to-time to supplement their on-going HPMS, SHRP and other planning efforts. We recognize that our bending plates are not as accurate as Ohio and Michigan's load cells, however, the accuracy is sufficient for ADVANTAGE I-75 purposes. For instance, we would rather pre-clear an 82,000 pound truck-trailer combination believing it to be 80,000 pounds than to bring it into the weigh station, weighing it statically, writing a citation and then have a judge dismiss the case in the same manner as he would a speeding ticket for a vehicle that was five mph over the speed limit.

The queuing problem in Tennessee has worsened and Tennessee now allows all trucks to bypass the Knox County stations when the ramps are full. TNDOT has plans to lengthen the deceleration lanes and provide additional storage. There have been some discussions about "gold-carding" local delivery trucks with a transponder. Should the latter actions be taken, their mainline WIM's will prove valuable in identifying any local, "gold-carded" trucks that might be over-weight. Both strategies along with the regular ADVANTAGE I-75 clearance procedures should greatly relieve this dangerous situation.

Ohio and Michigan are now in position to collect more accurate data for pavement design and other purposes while at the same time decreasing the volume of trucks entering their weigh stations.

The ADVANTAGE I-75 partners are now preparing a "Business Plan" to determine the future course of the project. Options being looked at include expansion to other routes and States. I, for one, believe that any expansion has to include mainline WIM as a part of the equipment.