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Going With the Flow:

Comprehensive ACS Solutions Get Traffic-Congested Areas Moving Again

Although trends come and go, the developed world's love affair with the automobile never wanes. Earning a driver's license is a right of passage, taking to the open road a sign of freedom. The problem is that those roads are not so open anymore.

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Despite rising fuel costs, people continue to rely on motor vehicles as their primary mode of transportation. More cars are competing for capacity on roadways that simply are not keeping pace with growth. The result? Congestion — a problem with ramifications that extend far beyond drivers' inconvenience.

Traffic congestion slows the transportation of raw materials to manufacturers and finished goods to market, adversely impacting the economy. Employees who arrive late to their offices reduce productivity, costing the U.S. economy alone $4.2 billion in "lost hours."[1] Stop-and-go traffic wastes fuel, pollutes the air and frustrates drivers.

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Yet, even cities with strong public transportation systems fail to persuade a significant percentage of drivers to get off the road.

So, why not just add more capacity? At estimated costs of up to $10 million per mile for a state-of-the-art interstate lane, expansion rarely fits within a municipal budget. Even if funds are available, there's often no physical space to support the growth.

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As a result, more and more transportation officials worldwide are turning to technology to solve their cities' congestion problems — with impressive results.

Before exploring how technology solutions can ease congestion woes, it's important to understand the two distinct types of congestion: recurring and non-recurring. Recurring congestion is the result of having more vehicles than space. Non-recurring congestion is caused by a specific event, such as a weather event, an accident, a construction work zone or other obstacles. Most urban areas calculate their non-recurring congestion at 50 percent, with the remaining 50 percent of the problems caused simply by the sheer number of cars and other vehicles on the road.

[1] David Schrank and Tim Lomax, Texas Transportation Institute Study, 2007.

Technology Takes Its Toll

The technological toolbox for non-recurring congestion is fairly well defined. Cities have spent hundreds of millions of dollars on Intelligent Transportation Systems, which give them a faster way to detect incidents that cause slowdowns as they occur. Using tools like loop sensors to chart rate-of-speed and cameras to detect accidents, these cities not only can dispatch emergency response teams and remove inoperable vehicles more quickly, but they can communicate through the media and with electronic signage to inform travelers of delays and suggest alternate travel routes.

Based on current trends, a medium-sized city should expect its congestion to become as bad, or worse, than that currently experienced by a large city.

To combat recurring congestion, cities are using technology to change drivers' behavior as a means of managing traffic flow. Congestion pricing, powered by Electronic Toll Collection, video surveillance and other technologies control demand for highway space by motivating people to drive at non-peak travel times or take public transportation. This strategy can take a number of different forms.

Cordon, or area, pricing has been used successfully in Europe. Basically, this model charges a fee for certain vehicles to come into a predefined commercial business district as a way to control the amount of traffic that enters. For example, to combat the congestion in central London, the city began charging a standard per-day charge for non-resident vehicles traveling within a specific zone between 7:00 a.m. and 6:30 p.m., Monday through Friday, then used these fees to enhance public transportation. This action resulted in a 15 percent reduction in area traffic and a 30 percent reduction in travel delays. Instead of tollbooths, which are costly and can slow traffic flow, this system uses both fixed and mobile cameras to capture license plate images on cars while they are in motion. The license plate numbers are matched against the vehicle registration numbers of people who have pre-registered for the program. Participants can pay their accounts in a number of ways, including by phone, Internet or at retail stores.

Cordon pricing has also shown success in Stockholm, Sweden. During a six-month trial period, the city realized an immediate 22 percent drop in vehicle trips, a decrease in travel times and a significant shift to public transportation, as well as a 5 percent to 10 percent decrease in auto-related accidents with injuries.

After initiating a fully automated, electronic, variable-charge system, Singapore reduced its traffic by 13 percent, while vehicle speed increased by 22 percent.

HOT Prospects

Other congestion pricing is facility-driven.

Across the U.S., highways sport HOV (high-occupancy vehicle) lanes that are designed to give residents an incentive to carpool or take bus rapid transit. The goal is to move more people, more efficiently, in the same number of lanes, while improving overall air quality by reducing emissions. In many cities, however, because HOV lanes are often underutilized particularly in comparison to the adjacent general-use lanes, transportation officials are changing these HOV lanes into HOT (high-occupancy toll) lanes that are powered by Electronic Toll Collection technology solutions.

Basically, the HOT lane enables a single driver to choose to pay a premium to travel in a less congested lane. Rates can be set in advance or change dynamically, depending on traffic patterns each day. The variable rates provide a reliable level of service for HOVs, bus rapid transit vehicles and for single occupant vehicles even during rush hour.

Again, the idea revolves around technology, reading electronic transponders/tags on vehicle windshields, at highway speeds and capturing license plate information for enforcement. These tags are read through a radio signal that is transmitted by roadside or overhead antennae. All transactions go to a sophisticated back-office operation, where vehicles are identified, transactions are posted against customers' accounts and monies are collected. If the jurisdiction wants to set rates based on actual traffic conditions, overhead or in-ground traffic-monitoring technology can be added to the solution.

Construction costs for adding lanes in urban areas average $10 million per lane-mile.

Houston, Texas, has been so successful with its program that the city is converting all HOV lanes into HOT lanes. San Diego's variable rate HOT lane program on I-15 generates over $2 million annually, 50 percent of which is used to support its bus rapid transit system. In other areas, funds collected are used to finance highway improvements. The state of Virginia is using the money it collects to build more toll lanes, in essence financing its own expansion.

ACS processes 50 percent of all Electronic Toll Collection transactions in the United States, accounting for $3 billion in toll revenue collected each year. ACS supports all aspects of electronic toll collection, including installation and integration of the lane capture system as well as the account maintenance, transponder distribution and replacement, customer services, and violations processing operations required for an integrated collection system.

Keeping Mass Transit Moving Forward

Making mass transit a more viable option means making it more convenient for riders and more cost-effective for operators, while increasing fare collection for transit operators. ACS solutions streamline the process by integrating automated ticket-vending machines, validators, inspector terminals and access gates. Customers buy “smart cards,” which they “load” with credit. Instead of going through ticket-taker booths, they pass their cards through readers that electronically transmit and deduct their fares.

ACS systems and services support more than 50 million passengers and 1,000-plus municipal, regional and national operators every day.

Looking Down the Road

Technology continues to create opportunities for more open roadways. In Germany, a new system that uses Global Positioning Systems (GPS) collects tolls for trucks that use the commercial road system. The technology tracks the vehicles’ positions and the time of day, and it charges accordingly. In the future, this combination of GPS technology and onboard vehicle-reader could replace the current gasoline and diesel taxes that are the primary funding source for funding highway systems. In essence, it would enable taxation based on use. Although this shift in funding is decades away for the U.S., the technology is available now.

In the future, also expect the rise of Universal Transportation Accounts, a way to merge different transportation modes, using the same payment mechanism. Tolls, public transit fees and parking at garages, train stations and airports could be combined into one payment mechanism. Not only would this advance provide convenience to the customer, but it would enable municipalities to initiate transportation incentives.

For example, let’s say a person is living in Houston, Texas, and rides the metro at least four times a week. He or she can use the same card to pay for parking at the metro station, the train fare and the fee for using the HOT lanes when driving. By using one card, that individual’s transportation use could be tracked by the city, which could then offer incentives, like reduced HOT lane fees. This technology is being considered by a number of large metropolitan areas, including Boston, Houston, San Francisco, San Diego and New York.

Revved Up and Ready To Go

Congestion is a global issue that wastes time and fuel and has a negative impact on air quality. ACS helps agencies address these challenges with comprehensive, integrated solutions that provide efficiencies and funding resources. From fare-collection to back-office processing, ACS provides the solutions to help governments solve their congestion problems — and get their citizens to their destinations faster.

Parker F. Williams

Parker F. Williams, Vice President, Electronic Payment Systems within the ACS Transportation Solutions Group, has over 25 years of public and private sector transportation experience. He is currently focused on securing toll system installation and operating contracts in the growing congestion pricing and public-private partnership market. Williams previously served as Administrator of the Maryland State Highway Administration (SHA).

(Source for callouts: The Congestion Problem; published by the U.S. Department of Transportation Federal Highway Administration.)