In an effort to cut pollution in the Los Angeles area, the South Coast Air Quality Management District (SCAQMD) is teaming up with Siemens to open an eHighway for trucks. Siemens has been testing the technology overseas, but this will be its first electric truck venture in the U.S.

Plans call for Siemens to open a two-mile eHighway next summer near the ports of Los Angeles and Long Beach and run up to four eHighway trucks along the route each day. The eHighway system provides electricity to selected traffic lanes using an overhead cable system, and the specially-equipped trucks will be supplied with electricity in the same way as trams.

The overhead cable infrastructure that is being installed will run in two directions along Alameda Street in the city of Carson. Since trucks traveling the route will be powered by electricity from the overhead cables, they will produce no emissions when operating in the local area. Siemens explains that when the trucks move onto roads without overhead cables, they will use a hybrid drive system that can be powered by diesel, compressed natural gas, on-board batteries or other energy sources.

Switching from one power source to another is not expected to be a problem. The company says the current collector enables the vehicles to overtake and automatically connect and disconnect at speeds of up to 55 miles per hour. No lane guidance system is necessary, so the truck has full flexibility.

The overhead contact line is the key to the system. Siemens says power is transmitted from the overhead wires into the vehicle at an optimal efficiency level of around 80 percent. Braking and accelerating trucks can exchange energy with one another via the contact line. Trucks traveling uphill and downhill can exchange energy, too. Vehicles can feed braking energy back into the grid in the form of electricity.

Siemens says rail and tram operations that rely on overhead power systems have shown they can have a long lifespan and relatively low maintenance and servicing costs. The company adds that the technology can be easily integrated into existing traffic systems and poses no obstacles to other vehicles. From an environmental and economic point of view, Siemens says eHighway systems are particularly effective on heavily used routes, such as between ports, industrial estates, freight transport centers and central transshipment terminals.

New California Law to Make Traffic Signal Synchronization Programs Eligible for Environmental Program Funds

Legislation Could Ease Traffic Congestion and Cut Air Pollution at No New Cost

California will soon make it easier for communities across the state to synchronize their traffic signals.

After sailing through the state Senate and Assembly with wide bipartisan support, Governor Jerry Brown has signed into law a measure that makes local traffic synchronization projects eligible for state funding through an environmental program designed to cut air pollution. The new law takes effect January 1.

Assemblymember Marie Waldron (R-Escondido), who sponsored Assembly Bill 1447, says traffic synchronization programs have been very successful in “reducing millions of metric tons of greenhouse gas emissions.” She calls the new measure a “win-win” because it will both cut air pollution and reduce commute times for Californians.

Waldron notes that when Orange County implemented its traffic light synchronization program, it helped ease...
MIT RoadRunner System Being Tested in Effort to Improve Travel Times

Wireless System Works Without Costly Roadside Infrastructure

The cartoon roadrunner had his share of problems with obstacles in his path, but a new wireless system dubbed RoadRunner has been designed to help drivers avoid congested roadways. It uses a “token” system and GPS-style turn-by-turn directions to help drivers stay away from traffic backups and speed them on their way.

RoadRunner was designed by Jason Gao, a graduate student at the Massachusetts Institute of Technology, along with Li-Shiuan Peh, a professor of electrical engineering and computer science. Last month, the pair received a best-paper award for the system at the Intelligent Transportation Systems World Congress.

Gao says the main advantage of RoadRunner over existing free-flow tolling and congestion control systems is “you don’t need physical roadside infrastructure like tollbooths, gantries, transponders, cameras, or other such structures. This also means that congestion-controlled regions can be dynamically redefined and updated on-the-fly, at high granularity within city.”

Since the system is currently a university research project, it’s not being marketed to any cities, and Gao has no estimate of what it might cost if applied commercially. However, the system has been undergoing testing in Singapore’s crowded city streets that show its promise.

In Singapore, the researchers ran simulations with data supplied by Singapore’s Land Transit Authority. They compared their system to one currently in use in Singapore that charges drivers with dashboard-mounted transponders a toll for entering congested areas. The Singapore system uses radio transmitters mounted on dozens of gantries across the city to gauge the location of drivers. RoadRunner used only handheld devices clipped to car dashboards. In the simulations, it yielded an eight percent increase in average car speed during periods of peak congestion.

For purposes of comparison in the testing, the MIT researchers used the same road-access patterns in effect through Singapore’s existing toll system. They say the results may have been more dramatic if they had allowed themselves to modify those patterns.

The Singapore toll system uses gantries at congestion-prone spots. Because drivers are charged a fluctuating fee throughout the day to enter the areas, they have an incentive to avoid them. Gao and Peh take a different approach. They assign each region a maximum number of cars, and any car entering the region has to acquire a virtual authorization the researchers call a “token.” If no token is available, cars are routed around the area with turn-by-turn voice prompts.

Gao and Peh also tested their system on a much smaller scale with 10 cars in Cambridge, Massachusetts. The research helped them test the feasibility of the wireless standard called 802.11p that was used for transmissions. They explain that 802.11p is a variation on Wi-Fi that uses a narrower slice of the electromagnetic spectrum but is licensed for higher-power transmissions, giving it a much larger broadcast range.

The researchers used cellphones to control commercial 802.11 radios that are similar in size to typical dashboard-mounted electronic toll transponders. However, they note that in the future, it might be possible to embed those radios directly into cellphones.

Extensive Survey Finds Travel Time, Reliability, and Cost Are the Most Important Factors When Deciding to Use Transit

Conducted by TransitCenter Based in New York City; Nearly 12,000 Surveyed

What will it take to get Americans to use public transportation in greater numbers? A study from TransitCenter indicates transportation agencies can encourage riders by providing shorter travel times, greater reliability, lower costs compared to the alternatives and stations closer to where people live and work.

The study, “Who’s on Board: The 2014 Mobility Attitudes Survey,” found a high demand for quality transportation across the nation, but it also found that public transportation infrastructure is often missing in the places people live. “Traditional cities,” such as Boston, New York, Washington, D.C., Philadelphia and Chicago had by far the greatest share of transit users and commuters, followed by West Coast cities. While the study found no “cultural bias” against public transportation in other parts of the country, it did find that the top predictor of whether or not people use transit is the type of neighborhood in which they live.

TransitCenter’s study suggests there is a “huge mismatch” between where Americans live and where they want to live. Fifty-eight percent of survey respondents said their ideal neighborhood would have a mix of housing, offices and retail, but only 39 live in that type of neighborhood. According to the report, suburbs are the most “over-supplied” type of neighborhood. Though 30 percent of the respondents lived in suburban areas, only 16 percent said that was their ideal neighborhood type.

TransitCenter, a philanthropy committed to improving transit through innovation, says its report is the first to compare rider and non-rider attitudes by age, income, education, family status and ethnicity and to examine both cities and suburban areas in various regions of the United States. It sampled nearly 12,000 people from 46 metro areas including a mix of what it deemed “transit progressive” and “transit deficient” cities to produce its report.

Among those responding to the survey, the key transit priorities cited were improved travel time, greater service reliability, lower costs and transit proximity. Vehicles cleanliness, station safety and different mode choices were listed as the next most important improvements. Other desires cited by passengers included Wi-Fi, increased station parking, increased hours of operation and more comfortable seats.

Beyond the transit wish lists, age turned out to be a big factor in whether people ultimately chose to use public transit. Respondents under 30 were 2.3 times more likely to take transit than those ages 30-60. Those under 30 were 7.2 times more likely to take transit than respondents over the age of 60.

Rosemary Scanlon, Chair of TransitCenter and Divisional Dean of New York University’s Schack Institute of Real Estate, notes that “as millennials begin to take center stage in American life and the Baby Boom generation confronts retirement, both the transit industry and the real estate industry will need to adjust.” The “Who’s on Board” study is designed to offer insights to professionals in both fields.

The survey revealed that wealth and education are not key factors in transit use, but employers can impact transit decisions. In transit-rich traditional cities, people with an income of $150,000 or more were just as likely to ride public transportation as those with a $30,000 yearly salary. Americans with a bachelor’s or graduate degree were found to be no more or less likely to use transit than those who had not finished college, when controlling for other variables. People offered pre-tax transit commuting benefits from their employers were found to be over five times as likely to take transit regularly as employed people who were not given benefits.

According to the study, people with children are just as likely to use transit as those without kids, when the authors accounted for factors such as place of residence and age. So, they suggest that communities that want to use transit to attract young people should not worry that transit will lose its appeal when those younger residents start having families.

David Bragdon, Executive Director of TransitCenter, says the large demand for transit that was found across the country “is largely going unmet, to the detriment of many local economies.” His message to those involved in planning: “To serve – and attract – residents and workforces today and in the future, cities need to unite land use and transit planning to form comprehensive, innovative infrastructure that can support this demand.”

For more information, visit: http://transitcenter.org/ourwork/mobility-attitudes-survey/.
UDOT Tracking Traffic Signal Performance Measures Throughout Utah

Nearly Two-thirds of the State’s Traffic Signals Provide Real-time Performance Measures Around the Clock

The Utah Department of Transportation (UDOT) is using a statewide traffic signal network to help it improve mobility for the state’s growing population at far less than the cost of building new roads. Approximately 1,250 of the state’s 1,900 traffic signals are feeding back signal performance measures (SPM’s) in near real-time about every 10 minutes of the day, every day of the year.

Back in 2011, UDOT senior leaders challenged the traffic signal program to become “World Class” because of the large return on investment it expected from improved signal operations. Performance measurement was identified as a stumbling block to a world class signal operation because of the historically labor intensive and cost prohibitive means of gathering data.

So, UDOT came up with its own automated, in-house solution in 2013, building on concepts developed by Indiana’s DOT and Purdue University. UDOT now uses existing field equipment to collect data from traffic signals in real-time, providing instantaneous feedback to help it improve the quality of traffic signal operations—everything from identifying malfunctioning equipment to modifying signal timing.

UDOT signal engineer Mark Taylor notes that the SPM’s are completely independent of traffic signal management systems, which are used to adjust the traffic signals as needed. He says, “SPM’s show real-time and historical functionality at signalized intersections. This allows traffic engineers to directly measure what previously could only be estimated and modeled. Once collected, the data files are translated into a database, where they can be interpreted manually or with an automated graph, analyzed visually or with an optimization algorithm, and archived for comparative analysis.”

If SPM’s suggest that changes need to be made to signal timing, traffic engineers use a separate traffic signal management system to download the necessary changes. The SPM’s can help with those adjustments by recording automated traffic volume counts, the percentage of vehicles arriving on green and red, how various approaches terminate when the light changes from green to yellow and how much green time is used for each approach. They can also be used to determine whether detectors are working properly. If not, the program generates daily emails about the problematic locations so technicians can fix them before the public complains.

In addition, Taylor says SPM’s can provide insight into program-wide signal performance and trends, which helps to answer questions such as: “Are signal operations getting better, staying the same or getting worse and by how much? How does an agency most effectively prioritize resources and workload? What are our areas of most need?”

Taylor says UDOT believes the SPM’s have enabled the state “to do more with less, focus our resources on the areas of most need and to more effectively prioritize resources and workload.” He cites a recent signal retiming project in Salt Lake City where UDOT was able to increase the number of vehicles arriving on green at an intersection by 19 percent. Probe data showed a southbound travel time improvement of 1.1 minutes and an improvement in travel time reliability of 52 percent. In addition, during one nine-month period, UDOT was able to proactively identify and repair detection malfunctions at 245 intersections.

There are some disadvantages. Taylor notes that “obtaining SPM’s requires resources to set up and calibrate the various performance measures, additional server storage is needed to archive the data, and additional records are created, thus causing data that can potentially be subjected to subpoenas.”

Still, he calls the costs involved “very little” for agencies that have a modern traffic signal controller that is capable of running the hi-definition Indiana data logger enumerations. For large agencies, he estimates that the cost of a deluxe server with a few dozen terabytes of data could cost $25,000.

UDOT is willing to donate the software and source code free to other agencies, and it has an Automated Traffic Signal Performance Measures website that is fully accessible at: http://udottraffic.utah.gov/signalperformanceometrics/.

For more information, visit: http://udottraffic.utah.gov/signalperformanceometrics/ or contact Mark Taylor at marktaylor@utah.gov.
**New Facility to Be Used to Develop and Test Vehicle to Vehicle Advances**

A simulated city is coming to life at the University of Michigan that will be used by both the public and private sectors to advance research in the field of connected vehicles.

The 32-acre Mobility Transformation Facility (MTF) under construction at the university’s North Campus Research Complex will feature four lane-miles of roads with intersections, roadway markings, traffic signs and signals, sidewalks, benches, simulated buildings, streetlights, parked cars, pedestrians and obstacles such as construction barriers to test vehicle to vehicle (V2V) technology. A variety of roadway types will be used in the test area, including concrete, asphalt, brick and dirt. There will also be a variety of curve radii and ramps, a round-about and “tunnels,” and sculpted dirt and grassy areas.

Slated to open in the spring of 2015, the testing area is being designed and constructed in partnership with the Michigan Department of Transportation. The goal is to have a working connected vehicle system in Ann Arbor by 2021.

Last month, the university announced that a select group of companies would become founding partners in its Mobility Transformation Center (MTC) and work together at the testing area to “revolutionize the movement of people and goods in society.” The MTC’s Leadership Circle brings companies from the auto manufacturing, supply, ITS, insurance, telecommunications, data management and mobility services sectors together with government and academic partners “to lay the foundations for a commercially viable system of connected and automated vehicles.”

Peter Sweatman, director of the MTC, says connected vehicle technology puts the world “on the threshold of a transformation in mobility” that hasn’t been seen “since the introduction of the automobile a century ago.” He says the Founding Leadership Circle “provides a unique nucleus for collaboration, deployment, and rapid learning.”

The founding members of the Leadership Circle are: Delphi Automotive, DENSO Corporation, Econolite, Ford, General Motors, Honda, Iteris, Nissan, Robert Bosch, State Farm, Toyota, Verizon and Xerox. Xerox, which plans to focus on information-based systems in areas such as tolling, smart parking, fleet performance monitoring and vehicle passenger detection, says connected vehicle technology holds the promise of “providing citizens with a safer, more efficient ride and seamless experience.”

Founding members of the Leadership Circle have pledged to spend a total of $1 million over three years to support the MTC. A broader range of companies will participate as Affiliates in the research and development program.

The University of Michigan is no stranger to connected vehicle technology. V2V has undergone extensive testing on approximately 3,000 vehicles at the university’s Transportation Research Institute (UMTRI) as part of the U.S. Department of Transportation’s Safety Pilot Model Deployment in Ann Arbor. Data gathered in the testing was used to support the Advance Notice of Proposed Rulemaking recently announced by the National Highway Traffic Safety Administration (NHTSA). The MTC will be working with the Michigan Economic Development Corporation to build on that research to create a major V2V deployment of 9,000 vehicles in Ann Arbor.

In addition to its testing of V2V technology, the center will be working with the Michigan Department of Transportation and industrial partners to enhance vehicle to infrastructure (V2I) technology in southeastern Michigan. The goal is to provide enough V2I infrastructure to support 20,000 connected vehicles.

The university is hopeful that one day when enough vehicles are able to communicate with each other and with the surrounding infrastructure, the majority of serious crashes may be avoided.

For more information, visit: [http://www.umtri.umich.edu/who-we-are/research-groups/mobility-transformation-center](http://www.umtri.umich.edu/who-we-are/research-groups/mobility-transformation-center).
Product and Industry News

**LCD Screens Embedded in Transit Vehicle Windows Can Display Real Time Transit Information, Maps, and Advertisements**

Oran Safety Glass (OSG) is promoting a new product that will allow transit maps, real-time transit information, infotainment or commercial advertisements to be embedded in glass windows or partitions in transit vehicles.

The new LCD screen goes by the name of ScreeneX, and OSG gave transit operators a chance to see how it works at its display this month at the American Public Transport Association meeting in Houston. Daniel Cohen, CEO of OSG, says he is confident that as more and more transit operators see this technology, they will be “bowled over by the possibilities it creates.”

OSG says the ScreeneX digital LCD screen can be embedded in a double-glazed window or in an interior glass partition in a train or bus. How it is used is up to the transit agency.

Because the LCD sign is embedded in the glass, it takes up no cabin space, and OSG notes that can increase both vehicle capacity and passenger comfort. Signs can be changed at any time. Text and graphics are fed from dedicated hardware and software, so ScreeneX can be used to display timetables and destinations, safety alerts and announcements, location-sensitive advertisements, or entertainment content.

Cohen says OSG decided to bring two different ScreeneX models to Houston so operators could see how the screens could be used to both generate advertising revenues and enhance the ride for passengers.

OSG is headquartered in Israel, but it has a production facility in Emporia, Virginia, to help accommodate the “Buy American” requirements faced by many U.S. vehicle manufacturers. Cohen says, “We believe those measures, designed to help U.S. manufacturing, are important, and we support them.”

For more information, visit: [http://www.osg.co.il/](http://www.osg.co.il/).

**GM to Market a Cadillac with Vehicle to Vehicle Technology in Two Years; “Super Cruise” Automated Driving Technology Will Also Debut in 2017 Model**

General Motors has become the first automaker to set a date for marketing a car in the U.S. that will be equipped with vehicle to vehicle (V2V) technology, but the automaker says the full benefits of V2V will only be felt when other carmakers “jump on the bandwagon.”

At the Intelligent Transport System World Congress in Detroit, GM unveiled plans to equip its 2017 model Cadillac CTS with V2V radio transponders. Spokesman Daniel Flores says the cars will be able to broadcast to each other on a frequency of 5.9 ghz. The industry has agreed upon that standard so that all V2V cars will be able to “talk” to each other, no matter the make or model. GM’s V2V Cadillacs will be able to broadcast their
speed, direction and GPS location at 10 times per second and receive that same information from other V2V cars.

Flores admits those first cars might be “really lonely early on,” but he says that as the technology proliferates, customers will begin to “truly experience the benefits.” In his words, “when cars can talk to cars, good things can happen.”

For example, he says the driver of a car traveling behind a much larger vehicle, such as a garbage truck, doesn’t get much information about what’s on the road ahead because the driver can’t see past the big truck. However, if another V2V vehicle is in front of that truck, it can signal to the car in the rear when road or traffic conditions change. If it suddenly has to brake, a chime or some other warning device can alert the driver of the car in the rear that traffic’s about to come to a halt.

Flores makes it clear that what happens next is up to the driver. The V2V vehicles will simply offer the driver a warning of some sort, such as a chime, blinking light or other display to signal there is hard braking ahead. In initial applications, the V2V systems will not automatically slow or stop the car for the driver.

GM is still working out the details of how the warnings will be given, and it has not put a price tag on the technology. However, Flores says studies from the National Highway Traffic and Safety Administration estimate the costs of equipping a vehicle with V2V technology at around $200 to $400.

This V2V technology is just one part of the growing movement toward connected driving. Flores says work is also being done in what’s being called V2X, where “X” can represent infrastructure or even pedestrians, opening up limitless possibilities of connectedness.

As GM prepares to roll out its V2V cars in 2017, it’s also working on an enhanced cruise control system for another as yet unnamed Cadillac model. This “Super Cruise” system will allow for semi-autonomous driving under certain ideal highway conditions. It will use a full speed range adapted cruise control that can automatically keep the car at a safe distance from the vehicle ahead. Its lane-keeping technology will use a camera mounted on the rear view mirror to look for painted lane markings and other vehicles, and use GPS tracking and other sensors to maintain lane position.

Flores admits those first cars might be “really lonely early on,” but he says that as the technology proliferates, customers will begin to “truly experience the benefits.” In his words, “when cars can talk to cars, good things can happen.”

For example, he says the driver of a car traveling behind a much larger vehicle, such as a garbage truck, doesn’t get much information about what’s on the road ahead because the driver can’t see past the big truck. However, if another V2V vehicle is in front of that truck, it can signal to the car in the rear when road or traffic conditions change. If it suddenly has to brake, a chime or some other warning device can alert the driver of the car in the rear that traffic’s about to come to a halt.

Flores makes it clear that what happens next is up to the driver. The V2V vehicles will simply offer the driver a warning of some sort, such as a chime, blinking light or other display to signal there is hard braking ahead. In initial applications, the V2V systems will not automatically slow or stop the car for the driver.

GM is still working out the details of how the warnings will be given, and it has not put a price tag on the technology. However, Flores says studies from the National Highway Traffic and Safety Administration estimate the costs of equipping a vehicle with V2V technology at around $200 to $400.

This V2V technology is just one part of the growing movement toward connected driving. Flores says work is also being done in what’s being called V2X, where “X” can represent infrastructure or even pedestrians, opening up limitless possibilities of connectedness.

As GM prepares to roll out its V2V cars in 2017, it’s also working on an enhanced cruise control system for another as yet unnamed Cadillac model. This “Super Cruise” system will allow for semi-autonomous driving under certain ideal highway conditions. It will use a full speed range adapted cruise control that can automatically keep the car at a safe distance from the vehicle ahead. Its lane-keeping technology will use a camera mounted on the rear view mirror to look for painted lane markings and other vehicles, and use GPS tracking and other sensors to maintain lane position.

Under the new law, traffic synchronization programs will be eligible to receive funding through the existing Greenhouse Gas Emission Fund to help to expand synchronization programs more broadly throughout the state. In sponsoring the legislation, Waldron emphasized no additional revenues would be needed and no taxes would be raised. In recognition of their ability to help cut pollution, traffic synchronization projects will simply become eligible to access funding that already exists for cleaning up the environment.

Los Angeles recently synchronized its traffic signals in an effort to reduce gridlock and pollutants. Waldron says experts estimate this new system “will allow Los Angeles motorists to drive with less delay, and consume less fuel.” In addition, she notes that accidents are expected to be “significantly reduced.”

AB1447 was supported by the California Trucking Association, the Automobile Club of California, numerous California cities and a variety of other groups.

Dangerous Debris on Freeway: New Mexico Court of Appeals Clarifies Issues of Constructive Notice

In October 2004 a motorist was killed on Interstate 25 in the Santa Fe district of New Mexico. At the time and location of the accident, the roadway was straight and level, the weather clear, the pavement dry, and the center and edge lines were clearly marked. From evidence at the accident site, the motorist must have encountered pieces of semi-truck tire debris on the roadway and either struck the debris or swerved to avoid it. In so doing, she lost control of her vehicle, which flipped and ejected her. She died at the scene.

A plaintiff alleged the New Mexico Department of Transport (DOT) was negligent in failing to identify debris on the highway in a timely manner and that it’s inspection protocols were unreasonably lax and not complied with. She brought a wrongful death action against the DOT under the roadway maintenance exception of the Tort Claims Act.

The DOT moved for summary judgment, asserting that the undisputed material facts demonstrated that it had no actual notice of the tire debris. Further, it had no constructive notice of the debris because Plaintiff was unable to pinpoint how long the debris had been on the road where the accident took place. It insisted that because the tire debris could have been deposited “mere seconds” before the accident, no reasonable juror could find that its negligence caused the accident. It provided documentary evidence that an inmate crew had carried out litter pickup in the area the day before the accident and had not reported any tire litter.

The District Court of Santa Fe County entered summary judgment in favor of the DOT on the grounds that it had neither actual nor constructive notice of the tire debris and that plaintiff’s argument that the DOT’s failure to have a stronger or more consistent policy for debris removal was too speculative to prove proximate cause; plaintiff appealed.

The Court of Appeals reversed the lower court’s ruling, holding that:

- The DOT had a duty to inspect, identify, and remove dangerous debris from roadway;
- genuine issues of fact existed, for a jury to determine, whether the DOT had constructive notice of debris and whether it had breached its duty to the motorist; and
- genuine issues of fact existed whether the DOT’s alleged failure to remove timely the debris from the highway proximately caused the accident.

First, the Court of Appeals noted that courts view summary judgment with disfavor, preferring a trial on the merits.

On the issue of the DOT’s duty, the Court of Appeals held that foreseeability is not a factor for courts to consider when determining whether a duty exists, and when there is a duty on the part of a owner to inspect a premises, evidence showing that there was a failure to inspect within a reasonable period of time under the circumstances is evidence that the dangerous condition would have been discovered had a timely inspection been undertaken.

It concluded that the DOT’s duty in this case was “settled” as “the government has ‘the duty to maintain roadways in a safe condition for the benefit of the public.’” This includes the duty to conduct reasonable inspections of roadways, with the “necessary corollaries” of identification and removal of dangerous debris.

Regarding breach, it rejected the DOT’s argument that because it had no actual or constructive knowledge of the presence of debris at the particular time and location of the accident, it did not owe the Decedent a duty to clear the debris.

The Court found that although it was undisputed that the DOT had no actual notice of the debris at issue, the DOT had not argued that it was unaware of the general risk to motorists that roadway debris creates. Indeed, the DOT had acknowledged that its maintenance responsibilities included identifying and removing hazardous litter from roadways. Thus, the Court found that the issue before it was whether the DOT could be charged with constructive notice of the tire debris.

It ruled that depositions from the DOT employees responsible for maintaining the stretch of road where the accident occurred were sufficient to determine whether summary judgment was properly granted to the DOT. The officials were the local maintenance supervisor, reporting to the area maintenance supervisor, who reported to the maintenance engineer who reported to the District Engineer.

The Court found that the local mainte-
nance supervisor, responsible at the site level, had received no training regarding litter removal procedures; nor was there any specification in the Highway Maintenance Management System (HMMS) Handbook regarding how often “litter pick-up” should be conducted. Finally, although he realized that debris on a highway with high traffic volumes (such as I-25) had a greater chance of causing an accident than one with less traffic, he had not drawn up a set schedule for picking up litter. Before the accident, he was not required to travel on I–25 where the accident occurred to survey the roadway for debris that might present a danger.

At the time of the accident, the means of identifying road debris consisted of road patrols by DOT personnel going to work sites, and notification by members of the public or the police. Signs were placed on the highway with a 1–800 number to call to alert the DOT, but that District Engineer did not know where they were placed.

The Court concluded that the evidence raised issues of fact for a jury to decide as to whether the DOT had constructive notice of the tire debris and breached its duty to the Decedent to timely identify it and remove it. These issues included whether the DOT failed to:

- provide its employees with adequate training to remove litter or debris from the highway;
- patrol the highway with sufficient frequency to locate and remove dangerous debris;
- comply with its own standards on how often the highway should be patrolled;
- locate and remove the tire debris in a timely manner;
- implement an adequate system by which it could be notified of debris on the highway.

The Court also upheld a finding in a previous case that, “Where a condition has existed for such a length of time that the public entity might have known of the condition by the exercise of reasonable care and diligence, constructive notice exists.”

It therefore did not require plaintiff to supply evidence demonstrating precisely how long the tire debris was on the highway to overcome summary judgment.

However, the Court emphasized that the length of time which must pass before constructive notice may be found varied with each specific situation, and the fact that a dangerous condition existed was not sufficient, by itself, to conclude that a duty to inspect was breached.

It ruled that a jury should decide whether the DOT’s system for identifying and removing specific pieces of debris imputed notice of this particular debris on the DOT, or if the DOT’s actions were reasonable under the circumstances.

Finally, regarding proximate cause, it found that this too was a question of fact for a jury, not a matter of law.

Continued from Page 1

eHighway to Allow Zero-Emission Truck Travel in Los Angeles Area

The ports of Los Angeles and Long Beach are experimenting with the eHighway in an attempt to find a zero-emission solution for a section of I-710. Approximately 30,000 shuttle truck journeys are recorded in the area each day, and that number is expected to grow to 100,000 trips by 2035. The eventual goal is to set up a zero-emission corridor for shuttle traffic between the two sea ports and inland rail transshipment centers about 18 miles away.

Barry Wallerstine, SCAQMD’s executive officer, says the project “will help us evaluate the feasibility of a zero-emission cargo movement system using catenary.” He notes that the region’s air pollution is so severe that it needs to find “zero- and near-zero emission goods movement technologies to achieve clean air standards.”

Siemens and the Volvo Group, via its Mack Trucks subsidiary, are developing the demonstration vehicle for the California project. Test results are expected to be available in the summer of 2016.

For more information, visit: http://www.siemens.com/entry/cc/en/.

Details of the pantograph-type mechanism on the truck to allow receiving power from the overhead cables. (Photo: Courtesy of Siemens)
Brookings Institution Analysis Finds Age a Big Factor in Commuting Style

Baby Boomers Holding Tight to Car Keys While Youngest Workers Look for Alternate Ways to Commute

There’s more evidence that how you feel about your car has a lot to do with your age. A new analysis of Census data from the Brookings Institution adds to a growing body of research that finds younger Americans are far more likely to consider alternative means of transportation than their parents or grandparents.

Researchers Joseph Kane and Adie Tomer examined data from the 2013 American Community Survey and found, “By and large, millennials (workers younger than 34 years old) and Generation X (workers younger than 50 years old) generally are leading the charge toward a range of alternate modes, including public transportation and walking, while baby boomers continue to use their cars at high levels.”

The youngest workers, those ages 16 to 24, are commuting the least by car compared to all other age groups and are continuing a trend toward alternate modes of travel. Their car commuting rate of 82.4 percent reflects a drop of nearly 1.3 percentage points in large metro areas since 2007. The researchers found that same age group drove at an 86.1 percent rate over three decades ago, according to a 1983 survey. These youngest workers also are the most likely to take public transportation or walk to work. The analysis found that 5.8 percent use public transit and 6.6 percent get to their jobs on foot. In the Census report, walking was found to have grown in popularity in university-centric cities such as Syracuse, New Haven and Austin, and Tucson topped the nation in transit growth among the young workers.

Slightly older Americans are loosening their grip on their car keys, too. The Brookings analysis found older millennials and Generation X commuters shifting away from private vehicles in nearly equal numbers. The driving rate among workers ages 25 to 54 dipped by 0.9 percentage points between 2007 and 2013, which equates to about 750,000 drivers switching from their cars to other modes of travel. Kane and Tomer say the drops are “quite widespread.” They note that “about two-thirds of the country’s largest metros saw their Generation X cohort drive less, including Portland, Oregon (-3.5 percentage points), Honolulu (-3.3) and Philadelphia (-2.9).”

Baby boomers are bucking the trend. The analysis found that those aged 55 or older were “the only commuters to consistently drive more since 2007.” However, the authors note that as the number of older Americans surges in coming years, these aging drivers will start facing a host of driving challenges that may force them to consider other travel options.

The numbers provide a snapshot of how today’s commuters view their cars, but the analysts note the numbers don’t necessarily provide a guide to the future. They say the results lead to questions such as: “Will millennials continue to drive less as they advance their careers and grow their families? For Generation X, will denser development patterns and school improvements in urban cores lead to continued driving declines?”

Kane and Tomer conclude, “Metropolitan leaders have to closely monitor their region’s commuting demands to begin answering these questions in years to come.”

For more information, visit: http://www.brookings.edu/blogs/the-avenue/posts/2014/10/07-millennials-generation-x-commuting-trends-kane-tomer.

---

Madrid Increasing Vehicle Restrictions in City Center

Additional Areas Limited to Vehicle Trips by Residents

Madrid is expanding its war on pollution, traffic congestion and parking problems in the city by increasing the number of areas in which vehicles are not welcome – unless they belong to a resident.

The city’s EL PAIS newspaper is reporting that starting on January 1, vehicles that don’t belong to residents of the Priority Residential Area (APR) will only be allowed to travel along the zone’s main thoroughfares. Drivers who enter other parts of the zone and do not have access to the 13 parking lots in the APR will be hit with a fine of $115. Twenty-two cameras will be used to monitor vehicles in the area and record the license plates of those who fail to park.

Motorcycles are an exception to the rule. They will have free access to the APR from 7 a.m. to 10 p.m. daily. Vans making local deliveries will be allowed to enter the zone from 10 a.m. to 1 p.m. on weekdays.

According to the publication’s municipal government sources, the restrictions will apply to a 190-hectare (470 acre) area encompassing the capital city’s Sol and Palacio neighborhoods. Added to the restrictions already in place in the Cortes and Embajadores districts, the exclusion zone will grow to 352 hectares (870 acres).

A city hall official is quoted as saying, “The main aim is to reduce traffic passing through the neighborhoods and the upheaval of looking for a parking space, at the same time as it increases the number of parking spaces for residents.” EL PAIS reports that the city hall estimates the new measure will cost around $650,000 a year to operate but should reduce traffic in the affected area by over a third.

Mayor Ana Botella has been the driving force behind the restrictions, and EL PAIS notes that she wants to expand the no-driving zones to two more neighborhoods before she leaves office next May.

Madrid has taken a number of other steps to help ease congestion and bring its pollution in line with limits imposed by the European Union (EU). EL PAIS notes that parking prices have been increased for vehicles that pollute the most and speed limits have been cut along entry routes into the most congested parts of the city. The city faces possible fines in the millions of Euros if it doesn’t comply with EU pollution standards.
This Month’s Survey Results (Survey 1)

Smartphone Transit Fare Ticketing

Last month, *The Urban Transportation Monitor* conducted a survey on Smartphone Transit Fare Ticketing programs. Altogether eleven transit agencies were identified to have implemented or are planning Smartphone Transit Fare Ticketing. Questionnaires were sent to these transit agencies. Replies were received from five transit agencies. The results of the survey are published here.

## Smartphone Transit Fare Ticketing Contacts

<table>
<thead>
<tr>
<th>NAME OF TRANSIT AGENCY</th>
<th>CONTACT PERSON</th>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dallas Area Rapid Transit</td>
<td>David Leininger</td>
<td><a href="mailto:dleininger@dart.org">dleininger@dart.org</a></td>
</tr>
<tr>
<td>NICE Bus / Transdev</td>
<td>Jack Khzouz</td>
<td><a href="mailto:jack.khzouz@transdev.com">jack.khzouz@transdev.com</a></td>
</tr>
<tr>
<td>TriMet</td>
<td>Chris Tucker</td>
<td><a href="mailto:tuckerc@trimet.org">tuckerc@trimet.org</a></td>
</tr>
<tr>
<td>NJ Transit</td>
<td>William Smith</td>
<td><a href="mailto:wsmith@njtransit.com">wsmith@njtransit.com</a></td>
</tr>
<tr>
<td>Southeastern Pennsylvania Transportation Authority</td>
<td>Kevin O'Brien</td>
<td><a href="mailto:kobrien@septa.org">kobrien@septa.org</a></td>
</tr>
<tr>
<td>Question</td>
<td>Dallas Area Rapid Transit</td>
<td>NICE Bus / Transdev</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>What is your agency's situation regarding smartphone ticketing?</td>
<td>Implemented a full program</td>
<td>Implemented a full program</td>
</tr>
<tr>
<td>If you implemented (pilot or full program) smartphone ticketing, when did this became operational at your agency?</td>
<td>September, 2013</td>
<td>June, 2014</td>
</tr>
<tr>
<td>What is the name of the vendor your agency is using or plan to use to implement transit fare ticketing?</td>
<td>Unwire</td>
<td>Massabi</td>
</tr>
<tr>
<td>What is the name of your smartphone ticketing app?</td>
<td>GoPass</td>
<td>NICE Bus GoMobile</td>
</tr>
<tr>
<td>Has your agency applied contactless ticket reader infrastructure, and if so, will this be able to be used by passengers using a smartphone ticketing app?</td>
<td>We are relying on visual validation at this juncture. We will be installing electronic validators that can scan barcode and accept wireless but this will not occur until 2016.</td>
<td>In the beta phase now.</td>
</tr>
<tr>
<td>Is your agency planning to have or are smartphone tickets available in a human readable format in addition to a barcode?</td>
<td>Yes. The ticket is displayed as a visual ticket and incorporates a barcode.</td>
<td>Yes.</td>
</tr>
<tr>
<td>What are the fraud prevention features associated with your planned or existing smartphone ticketing?</td>
<td>The visual display is animated, has a clock displaying elapsed time, changes colors as the ticket is shifted from purchased but not activated, to activated, to expired. The barcode is displayed on a second screen and requires the initial screen to be tapped, thus confirming for the inspector the screen is not a screenshot of a movie or a picture.</td>
<td>Pulsating screen, color rotation and code word. Additionally, screen can be verified if required.</td>
</tr>
<tr>
<td>What are the estimated costs associated with the application of a smartphone ticketing system?</td>
<td>Total investment to date, including training and marketing costs, are approximately $750,000.</td>
<td>All costs are rolled into a percentage per transaction.</td>
</tr>
<tr>
<td>How many passengers have downloaded your smartphone ticketing app? What percentage of your agency's daily ridership does this represent?</td>
<td>There have been over 215,000 downloads to date. Daily ridership use is 8-10%.</td>
<td>Roughly 14,000. 1.4% per day.</td>
</tr>
<tr>
<td>What do you consider to be the main advantages of smartphone ticketing?</td>
<td>Customer views main advantage is ability to purchase ticket in advance of the time of use, followed by simplicity of use. For the agency, the main advantages are reduction in the use of TVMs and fareboxes, thus less cash handling, flexibility the mobile option provides for addressing high volume special events and the customer satisfaction with the product.</td>
<td>Faster boarding, reduced cash handling, reduction of mag stripe dependacy, but more important is enhancing the customer experience. Customers love the new app and find it very simple to download and use.</td>
</tr>
<tr>
<td>What do you consider to be the main disadvantages of smartphone ticketing?</td>
<td>No real disadvantages have emerged to date.</td>
<td>The need to market intensively to secure adoption.</td>
</tr>
<tr>
<td>What advice do you have for agencies starting to look at the potential application of smartphone ticketing?</td>
<td>Mobile ticketing is an excellent solution for a transit agency selling prepaid pass products. The agency does not need to install validation devices to deploy this payment method. The agency should work closely with the bus operators, fare enforcement officers and customer service staffs. They will be the most effective sales force. Allow for ample functional acceptance testing and customer beta testing prior to revenue service.</td>
<td>Need for extensive marketing resources.</td>
</tr>
<tr>
<td>Any further comments</td>
<td>Mobile ticketing has been well received wherever it has been introduced. It lends itself well to multi-modal systems that are ungated and where smartcards have not been introduced. The agency needs to carefully understand the way credit and debit card charges are going to be levied, as well as gateway and interbank network fees.</td>
<td>None</td>
</tr>
</tbody>
</table>
### Smartphone Transit Fare Ticketing

<table>
<thead>
<tr>
<th>Transit Agency</th>
<th>TriMet</th>
<th>Southeastern Pennsylvania Transportation Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/Metropolitan Area</td>
<td>Portland, OR</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>Which is your agency's situation regarding smartphone ticketing?</td>
<td>Implemented a full program</td>
<td>In planning stage</td>
</tr>
<tr>
<td>If you implemented (pilot or full program) smartphone ticketing, when did this become operational at your agency?</td>
<td>Sept 2013</td>
<td>N/A</td>
</tr>
<tr>
<td>What is the name of the vendor your agency is using or plan to use to implement transit fare ticketing?</td>
<td>GlobeSherpa</td>
<td>Xerox</td>
</tr>
<tr>
<td>What is the name of your smartphone ticketing app?</td>
<td>TriMet Tickets App</td>
<td>N/A</td>
</tr>
<tr>
<td>Has your agency applied contactless ticket reader infrastructure, and if so, will this be able to be used by passengers using a smartphone ticketing app?</td>
<td>Not yet.</td>
<td>Yes - developing infrastructure to read NFC cards or NFC cell phones; can load transit products via mobile link to web site.</td>
</tr>
<tr>
<td>Is your agency planning to have or are smartphone tickets available in a human readable format in addition to a barcode?</td>
<td>Our app is a flash pass mobile app -- the bar code is only for random fare inspection.</td>
<td>NFC format; not barcode; not human readable.</td>
</tr>
<tr>
<td>What are the fraud prevention features associated with the application of a smartphone ticketing system?</td>
<td>Barcode for random fare inspection. Day Code that changes every day, and only Operations staff know it ticket animation. Interactive feature (touch the phone and it lights up the bus).</td>
<td>Payment Industry fraud prevention standards; PCI compliance.</td>
</tr>
<tr>
<td>How many passengers have downloaded your smartphone ticketing app? What percentage of your agency's daily ridership does this represent?</td>
<td>Approx 130,000. Mobile sales are around 7% of total fare revenue. We average around 325,000 weekday rides systemwide.</td>
<td>N/A</td>
</tr>
<tr>
<td>What do you consider to be the main advantages of smartphone ticketing?</td>
<td>Customers love it, can buy anytime, anywhere. No equipment maintenance. No ticket/pass fulfillment.</td>
<td>Benefits of NFC-based system: customer convenience, improved revenue control, ridership data, fraud prevention.</td>
</tr>
<tr>
<td>What do you consider to be the main disadvantages of smartphone ticketing?</td>
<td>Customers can lose tickets if they delete their app, lose their phone, etc.</td>
<td>Customer must have a smart phone; battery life of reader; rapidly changing technology; time to get App up and running to process fare.</td>
</tr>
<tr>
<td>What advice do you have for agencies starting to look at the potential application of smartphone ticketing?</td>
<td>Do your research. Make sure you pick the right system/approach for your agency (offline vs online capabilities, barcode vs flashpass, iOS and Android for sure but may want Window and/or Blackberry OS). Call all the agencies that have rolled out mobile apps and make sure you understand all the pros and cons to pick the best approach.</td>
<td>Need 3rd party expertise; requires a strong communications infrastructure.</td>
</tr>
<tr>
<td>Any further comments</td>
<td>The mobile app has been a huge success in Portland. The benefits far outweigh the costs.</td>
<td>None</td>
</tr>
</tbody>
</table>
### Smartphone Transit Fare Ticketing (continued)

<table>
<thead>
<tr>
<th>Transit Agency</th>
<th>NJ Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City/Metropolitan Area</strong></td>
<td>Newark, NJ</td>
</tr>
<tr>
<td>Which is your agency's situation regarding smartphone ticketing?</td>
<td>Implemented a full program</td>
</tr>
<tr>
<td>If you implemented (pilot or full program) smartphone ticketing, when did this become operational at your agency?</td>
<td>April 2013</td>
</tr>
<tr>
<td>What is the name of the vendor your agency is using or plan to use to implement transit fare ticketing?</td>
<td>N/A</td>
</tr>
<tr>
<td>What is the name of your smartphone ticketing app?</td>
<td>MyTix</td>
</tr>
<tr>
<td>Has your agency applied contactless ticket reader infrastructure, and if so, will this be able to be used by passengers using a smartphone ticketing app?</td>
<td>No</td>
</tr>
<tr>
<td>Is your agency planning to have or are smartphone tickets available in a human readable format in addition to a barcode?</td>
<td>Yes</td>
</tr>
<tr>
<td>What are the estimated costs associated with the application of a smartphone ticketing system?</td>
<td>Development of the app cost approximately $300,000. The first phase was $300,000, however, for full rail rollout and Super Bowl, changes it was approximately $400,000, totaling $700,000.</td>
</tr>
<tr>
<td>How many passengers have downloaded your smartphone ticketing app? What percentage of your agency's daily ridership does this represent?</td>
<td>As of the beginning of this month, over 300,000 customers have downloaded the app on their smartphones with 249,000 opening accounts. Over 2.1 million tickets have been sold, including nearly 69,000 monthly passes.</td>
</tr>
<tr>
<td>What do you consider to be the main advantages of smartphone ticketing?</td>
<td>NJ TRANSIT MyTix provides customers the convenience of buying rail tickets and passes securely from a mobile device. Customers can save time, buying tickets in a few taps on their phone rather than waiting in line for a vending machine or ticket window. Additionally, we offer multi-payment options (use of two credit cards), accept commuter benefit cards. We reduced congestion at Ticket offices and TVMs at major locations. Better understanding of customer purchasing habits and travel patterns.</td>
</tr>
<tr>
<td>What do you consider to be the main disadvantages of smartphone ticketing?</td>
<td>With communications required to purchase and activate, available Wi-Fi at our major locations is required. Due to increased volume, we had update servers to handle rush hour load updated app to address customers desire to quick and easily display their tickets.</td>
</tr>
<tr>
<td>What advice do you have for agencies starting to look at the potential application of smartphone ticketing?</td>
<td>Make sure you have customer service available as many customers call in for personal assistance with the app. With every release of a new operating system (iOS/Android), there is significant testing required to ensure app functions.</td>
</tr>
<tr>
<td>Any further comments</td>
<td>None</td>
</tr>
</tbody>
</table>
This Month’s Survey Results (Survey 2)

Urban Transportation Planning Software

Last month, *The Urban Transportation Monitor* sent survey questionnaires to firms that develop, market and support urban transportation (modeling) software. This survey updates a similar survey conducted in 2012.

The results of the survey are published here.

---

Urban Transportation Planning Software Contacts

<table>
<thead>
<tr>
<th>SOFTWARE (VENDOR)</th>
<th>CONTACT PERSON</th>
<th>TELEPHONE NO.</th>
<th>E-MAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emme (INRO)</td>
<td>Shane Velan</td>
<td>(514) 369-2023</td>
<td><a href="mailto:info@inrosoftware.com">info@inrosoftware.com</a></td>
</tr>
<tr>
<td>CUBE (Citilabs)</td>
<td>Matthew Martino</td>
<td>(888) 770 2823</td>
<td><a href="mailto:mmartino@citilabs.com">mmartino@citilabs.com</a></td>
</tr>
<tr>
<td>OmniTRANS (DAT.Mobility)</td>
<td>Wieland Hendriksen</td>
<td>+31 570 666 111</td>
<td><a href="mailto:sales@dat.nl">sales@dat.nl</a></td>
</tr>
<tr>
<td>Quick Response System II (QRS II) (AJH Associates)</td>
<td>Alan Horowitz</td>
<td>(414) 963-8686</td>
<td><a href="mailto:alan.horowitz@att.net">alan.horowitz@att.net</a></td>
</tr>
<tr>
<td>TransCAD (Caliper Corp.)</td>
<td>Howard Slavin</td>
<td>(617) 527-4700</td>
<td><a href="mailto:howard@caliper.com">howard@caliper.com</a></td>
</tr>
<tr>
<td>Visum (PTV Group)</td>
<td>Chetan Joshi</td>
<td>(503) 297-2556</td>
<td><a href="mailto:chetan.joshi@ptvgroup.com">chetan.joshi@ptvgroup.com</a></td>
</tr>
</tbody>
</table>
Urban Transportation Planning Software

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>PRICE, PRICE OPTIONS</th>
<th>IS YOUR PACKAGE SOLD AS A SINGLE ENTITY, OR ON SOME FORM OF MODULAR BASIS</th>
<th>FORMATS ACCOMMODATED FOR DATA IMPORT AND EXPORT</th>
<th>OPERATING SYSTEMS ACCOMMODATED</th>
<th>TRIP GENERATION OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>Prices start at $9,000 per licence and vary by network size. Quantity discounts and academic discounts are available. All Emme licenses are network-ready and can support as many users as there are licenses. The software can be installed and activated on up to five computers per licence.</td>
<td>Emme is a complete transportation forecasting system for urban, regional, and national transportation planning. Emme is sold as a single, comprehensive and complete package, including Emme Desktop to map, edit and compare planning scenarios, Emme Modeler to quickly prepare and run models, Emme Standard Toolbox with 100+ modular and reusable transportation forecasting components, Emme Logbook to never get lost in a model again, and Emme API for an easy transition from interactive use to scripting. Basemaps are also included to view local, and/or live GIS maps and data in the Emme software.</td>
<td>Import: ASCII, Shape (SHP), dBase (DBF), raster graphics (BMP, JPEG, PNG, PMN, XPM, RMB), vector graphics (SVG), OpenStreetMap, HERE, annotation (ANNO), Export: ASCII, CSV, TAB-delimited, Shape (SHP), dBase (DBF), raster graphics, vector graphics</td>
<td>Microsoft Windows XP (SP3), Vista (SP2), 7, 8, Server 2003, Server 2008, Server 2012, Linux - Red Hat Enterprise Linux 5 and 6 Both 32-bit (32-bit) and x86-64 (64-bit) systems are supported</td>
<td>Regression, cross-classification, trip rates. Any method can be implemented using Matrix calculations tools and the Emme Matrix API. Tour-based or activity-based generation from population synthesis and demand micro-simulation provided by external programs.</td>
</tr>
<tr>
<td>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</td>
<td>Cube prices range from $1,500 to $12,500 for a desktop or server license with multiple copy and research discounts. Teaching licenses are free to universities. Cube Cloud subscriptions start from $1,500.</td>
<td>Cube is sold on a modular basis to keep prices low for users who do not require all aspects of Transport Planning software. Cube is comprised of the following components: Cube Base - the system interface including Application Manager, Scenario Manager, and Data Manager; Cube Voyager - the tool for passenger travel demand forecasting, scripting, and data manipulation; Cube Cluster - an add-on to Cube Voyager that enables distributed computing with parallel processing; Cube Avenue - an add-on to Cube Voyager for dynamic traffic assignment with mesoscopic simulation; Cube Analyst and Analyst Driv - tools for estimating static and dynamic roadway and static public transport origin-destination matrices.; Cube Cargo - a specialized library of programs for multi-modal, multi-commodity freight forecasting.; Cube Land - a socioeconomic land use allocation forecasting module; Cube.</td>
<td>Cube can handle most common data formats for importing and exporting data: Import: ASCII, Shape, CSV, Binary, Access, Excel, ESRI Shapefile, ESRI Geodatabases, ESRI ASCII/DBF, Mapinfo SQL, Oracle, OHDBC Tables, JPEGS, JPEG 2000, ECW, SPOT, PNG, Orthoimagery, EMME, MINUTP, SATURN, DPIPLUS, TRANPLAN, TIGER, ETAX, Text-DDF, AutoCAD, Intergraph, Atlas BNA, BTL Atlas, Ordnance Survey, SDTS, GPS Data, Export: Geo, Biff, TDIF, AutoCAD, ESRI Shape, ESRI Ungerade, ESRI Geodatabases, Mapinfo, Oracle Spatial, Spatial, KML, KMZ, ASCII, CSV, FF BIN, EXCEL</td>
<td>Any Windows-based platform including Windows XP, Vista, 7 and 8 and server environments. Fully tested on 32 and 64-bit systems. Cube Dynamics is also compatible with Linux.</td>
<td>The Cube Voyager GENERATION program provides convenient functions for application of classical trip generation techniques such as regression of post-classification models, which can be customized as needed using script options. The MATRIX program extends offered capabilities for scripting trip generation models of any forms. Examples of scripting techniques for activity day-pattern selection and tour stop generation are included in the activity-based demonstration model provided with Cube.</td>
</tr>
<tr>
<td>QRSII</td>
<td>15 zones, free; 100 zones, $395; 1,000 zones, $565; 5,000 zones, $785; 6,000 zones, $975. Ship- ping: $15 in US for standard carton shipping for next-day or overseas shipping. Four or more copies can save 20% discount.</td>
<td>Single entity.</td>
<td>Import: ASCII, CSV, SHP (ESRI shapefile), TIGER, Shape, dBase, Tabs, Export: ASCII, CSV, SHP (ESRI shapefile), dbase, Tabs.</td>
<td>Win XP, Win Vista, Win 7, Win 8.</td>
<td>Regression, cross-classification, trip rates, user-supplied.</td>
</tr>
<tr>
<td>Omnitran</td>
<td>Free for 25 zones for educational or evaluation purposes. Public market list prices USD $6K-30K. Multiple license discount regime applicable. Academia institutes benefits from significant discounts.</td>
<td>OmniTRANS has a modular structure. Starting point is either a TransCAD map pack (e.g. network editing). Additional modules are available for winning bidding tasks, such as (a.o.) trip generation, trip distribution, static assignment, dynamic assignment, public transport and matrix estimation.</td>
<td>Wide range of formats, including (a.o.) ASCII, CSV, Shape, ESRI Shapefile, GTFS, MS Office, SQL based formats, XML, and many image formats.</td>
<td>All Microsoft Windows editions since XP SP3 are supported, includ- ing Windows XP, Vista, 7, and 8. The software is also available as an independent cloud solution.</td>
<td>Regression-classification, trip rates, logit, ordered logit, discrete models of trip frequency, stated and notated for trip attraction; user written procedures; generation from population synthesis and micro-simulation.</td>
</tr>
<tr>
<td>TransCAD</td>
<td>$4,000 - $12,000 multiple license discounts, academic discounts, discounted prices in many states and metropolitan regions around the world.</td>
<td>TransCAD is a single integrated package with a full suite of procedures for passenger and freight demand forecasting. No other modules must be purchased, and there are no model size limitations. TransCAD also has a fully integrated GIS with special extensions for transportation, a powerful relational database manager, numerous supporting transportation analysis tools and utilities, valuable geographic and transportation databases, and a comprehensive scripting language for batch runs and developing applications. New for 2015 are added procedures for traffic impact analysis.</td>
<td>Import: ASCII, CSV, FB BIN, XLS, XLSX, ESRI Shape and Geodatabases, DGN, DXF, DWG, MapInfo, TIGER, Google SketchUp and Imagery, TrasnpPlan, MINUTP, TIGER, TRIPS, Emme API, QRSII, TM, Modelor, Ordnance Survey, BIDS, DEM, DLG, VPF, Access, Oracle; Oracle Spatial, ODBC-compliant DBs, MSID, JPEG, PNG, WK1, EMF, XML, GTFS, WMS, OpenStreet, OMX Export: ASCII, CSV, FF BIN, XLS, XLSX, ESRI Shape and Ungerade, ESRI Geodatabases, Mapinto, SQL, Oracle, Oracle Spatial, DXF, TranPlan, Emme2, SBTS, BMP, JPG, PNG, WK1, EMF, XML, Google KML, GTFS, OMX</td>
<td>Windows XP, 7, and 8. 64-bit versions are preferred but 32-bit is also provided</td>
<td>Regression, cross-classification, trip rates, logit, ordered logit, discrete models of trip frequency; stated and notated for trip attraction; user written procedures; generation from population synthesis and micro-simulation.</td>
</tr>
<tr>
<td>VISUM</td>
<td>$6,000-$40,000 depending on license level and purchase of add-on modules. Discounts are available for groups/multi- ple license purchases. Discounts are also provided to academics and stu- dents. The software can also be leased.</td>
<td>A single entity with license levels for network size. Some specialized features (ex. Tour based modeling, Line blocking etc.) are sold as extra add-on packages.</td>
<td>Import: ESRI shape files and geodatabases (MDB), Synchro UTDF, GTFS, Open street map (.osm), various graphics formats (jpg, svg, dxf, dwg etc.), Data exchange via clipboard, export to ASCII text files (for- matted to Visum NET file format), MS Office and SQL server, VISUM, Cube and TransCAD networks when exported to shape file format. Export ESRI shape files and geodatabases (MDB), Synchro UTDF, various graphics formats (jpg, bmp, dxf, svg etc). Data exchange via clipboard, Import of ASCII text files (formatted to Visum NET file format), MS Access and SQL server, VISUM</td>
<td>Windows 32 and 64 bit editions, including server editions.</td>
<td>Trip generation may be implemented as: regression, cross classification, trip rates, frequency choice, tour-based or activity-based generation. Unprecedented flexibility to implement any type of trip generation model with the scripting interface.</td>
</tr>
</tbody>
</table>
Urban Transportation Planning Software (continued)

EMME

All of the above are supported. Two-dimensional matrix balancing procedures allow a wide variety of growth-factor or synthetic trip distribution models. Results of any form may be scripted or customized as needed. Examples of scripting techniques for primary and intermediate stop assignment are included in the Cube activity-based demonstration model.

CUBE (TP+, TRANPLAN, TRANPLAN PRO+)

CUBE Voyager also supports destination choice and joint mode-choice assignment models. Models of any form may be custom written using scripting techniques for primary and intermediate stop destination choice are included in the Cube activity-based demonstration model.

QRSS

Logit, Split between transit modes occurs during transit-assignment step at stations and transfer points.

OmnitRANS

OmniTRANS discrete choice modeling class is independent upon the model's language. Examples of scripting techniques for any model choice are included in the CUBE activity-based demonstration model.

TransCAD

Logit and nested logit, incremental logit, household or individual microsimulation, combined mode and destination choice, tour mode choice, maximum likelihood estimation of logit and nested logit model parameters.

Visum

Logit and nested logit, incremental logit, household or individual microsimulation, combined mode and destination choice, tour mode choice, maximum likelihood estimation of logit and nested logit model parameters.

TRIP DISTRIBUTION OPTIONS (INPUT: NAME OF PROGRAM, DESTINATION CHOICE MODELS, TOUR AND STEP LOCATION CHOICE)

MODAL SPLIT OPTIONS

(e.g. logit, nested logit, joint mode-choice destination choice, incremental logit and tour mode choice)

TRIP ASSIGNMENT: HIGHWAY NETWORK (INPUT: TRANSPLAN, TRIBUTION, interaction-based capacity constraint, stochastic/probabilistic, incremental, equilibrium)

(e.g. logit, nested logit, joint mode-choice destination choice, incremental logit and tour mode choice)

TRIP ASSIGNMENT: TRANSIT NETWORK (INPUT: VISUM, multi-class with path storage, link-based, stochastic/probabilistic, nested, equilibrium)

(e.g. frequency-based with paths, frequency-based with strategies, timetable based, crowded, capacity constraint)

EMME

All of the above are supported. Two-dimensional matrix balancing procedures allow a wide variety of growth-factor or synthetic trip distribution models. Results of any form may be scripted or customized as needed. Examples of scripting techniques for primary and intermediate stop destination choice are included in the Cube activity-based demonstration model.

CUBE (TP+, TRANPLAN, TRANPLAN PRO+)

CUBE Voyager also supports destination choice and joint mode-choice assignment models. Models of any form may be custom written using scripting techniques for primary and intermediate stop destination choice are included in the Cube activity-based demonstration model.

QRSS

Logit, Split between transit modes occurs during transit-assignment step at stations and transfer points.

OmnitRANS

OmniTRANS discrete choice modeling class is independent upon the model's language. Examples of scripting techniques for any model choice are included in the CUBE activity-based demonstration model.

TransCAD

Logit and nested logit, incremental logit, household or individual microsimulation, combined mode and destination choice, tour mode choice, maximum likelihood estimation of logit and nested logit model parameters.

Visum

Logit and nested logit, incremental logit, household or individual microsimulation, combined mode and destination choice, tour mode choice, maximum likelihood estimation of logit and nested logit model parameters.

TRIP DISTRIBUTION OPTIONS (INPUT: NAME OF PROGRAM, DESTINATION CHOICE MODELS, TOUR AND STEP LOCATION CHOICE)

MODAL SPLIT OPTIONS

(e.g. logit, nested logit, joint mode-choice destination choice, incremental logit and tour mode choice)

TRIP ASSIGNMENT: HIGHWAY NETWORK (INPUT: TRANSPLAN, TRIBUTION, interaction-based capacity constraint, stochastic/probabilistic, incremental, equilibrium)

(e.g. logit, nested logit, joint mode-choice destination choice, incremental logit and tour mode choice)

TRIP ASSIGNMENT: TRANSIT NETWORK (INPUT: VISUM, multi-class with path storage, link-based, stochastic/probabilistic, nested, equilibrium)

(e.g. frequency-based with paths, frequency-based with strategies, timetable based, crowded, capacity constraint)
### Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>MULTIMODAL ASSIGNMENT CAPABILITIES</th>
<th>ADDITIONAL BASIC OPTIONS</th>
<th>SOFTWARE CAPABILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>Program supports virtually any travel mode: bus, bike, pedestrian, car, park-and-ride. Applications include: bus, bike, pedestrian, car, park-and-ride.</td>
<td>The software supports various modes of travel, including bus, bike, pedestrian, car, and park-and-ride.</td>
<td>The ArcGIS Basemap Add-on provides access to georeferenced maps and data. It allows ArcGIS users to seamlessly integrate their own data with ArcGIS data, providing a rich visual context for transportation analysis. The software can support multiple data sources and files, including shapefiles, geodatabases, and other GIS formats.</td>
</tr>
<tr>
<td>TRANS</td>
<td>Trip access and path generation.</td>
<td>The software supports various modes of travel, including trip access and path generation.</td>
<td>The software integrates with ESRI technology for seamless compatibility with ArcGIS. The software provides support for multi-user and multi-version environments.</td>
</tr>
<tr>
<td>TRANSCAD</td>
<td>Multi-modal assignment, including park-and-ride, kiss-and-ride, bi-cycle, and pedestrian flows.</td>
<td>The software supports various modes of travel, including multi-modal assignment, park-and-ride, kiss-and-ride, bicycle, and pedestrian flows.</td>
<td>The software integrates with ESRI technology for seamless compatibility with ArcGIS. The software provides support for multi-user and multi-version environments.</td>
</tr>
<tr>
<td>VISUM</td>
<td>The travel network is modeled as an integrated multi-modal network.</td>
<td>The software models the travel network as an integrated multi-modal network.</td>
<td>The VISUM software provides a comprehensive set of tools for modeling and analyzing various transport modes, including road, rail, and pedestrian.</td>
</tr>
</tbody>
</table>

**INTEGRATION WITH TRUE GIS**

- **ArcGIS Basemap Add-on** provides access to georeferenced maps and data. It allows ArcGIS users to seamlessly integrate their own data with ArcGIS data, providing a rich visual context for transportation analysis. The software can support multiple data sources and files, including shapefiles, geodatabases, and other GIS formats.
- **QuickTransit** also allows for seamless integration with ArcGIS, providing a rich visual context for transportation analysis. The software can support multiple data sources and files, including shapefiles, geodatabases, and other GIS formats.
- **QuickTransit** also supports the integration of various data sources and files, including shapefiles, geodatabases, and other GIS formats.

**ADDITIONAL BASIC OPTIONS**

- **Programmed path selection** for two-leg trip chain and multimodal applications:
  - **Parking costs** in trip distribution, or in combined mode-destination choice models. Non-motorized trips including bicycles and pedestrian access, or in combined mode-destination choice models.
  - **Travel network is modeled** as a walk mode along roads or pedestrian-only links, for example walking through green spaces and within transit stations. Bike paths are assigned to the same network as other modes on either bike-only or shared facilities.

**SOFTWARE CAPABILITIES**

- **ArcGIS Basemap Add-on** provides access to georeferenced maps and data. It allows ArcGIS users to seamlessly integrate their own data with ArcGIS data, providing a rich visual context for transportation analysis. The software can support multiple data sources and files, including shapefiles, geodatabases, and other GIS formats.
- **QuickTransit** also allows for seamless integration with ArcGIS, providing a rich visual context for transportation analysis. The software can support multiple data sources and files, including shapefiles, geodatabases, and other GIS formats.
Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>ENHANCED SURVEY EXPANSION METHODS</th>
<th>GEOCODING OF O-D SURVEYS</th>
<th>ANALYSIS OF NON-MOTORIZED TRAVEL</th>
<th>EMISSIONS ESTIMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>An incremental format for matrix input facilitates entering demand data from a survey. Any survey expansion method can be implemented with the Matrix calculation tools or the Emme Matrix API.</td>
<td>Geocoding can be performed externally in a GIS package, then imported to Emme.</td>
<td>Walk trips, bicycle trips, and other non-motorized modes are integral to the network, assignment, and analysis. Non-motorized trips including pedestrian and bicycle access to transit are assigned on the same network as a walk mode along roads or pedestrian-only links, for example walking paths through greenspace and within transit stations. Bicycle links are assigned to the same network as other modes on either bike-only or shared facilities. Bicycle route choice models implemented in Emme consist of two phases: generating a set of paths likely to be used by bikers and applying a disaggregate choice model on these bike paths to determine the proportion of their use.</td>
<td>Emme supports any emissions model based on average speed, link volumes, and cold starts, such as MOBILE and MOVES. Cold starts can be modelled, as well as circulation for parking. Maps display results on links, nodes, or a grid.</td>
</tr>
<tr>
<td>CUBE</td>
<td>Cube Analyst can be used to estimate the most statistically likely origin-destination trip matrix based upon all-or-nothing assignment of a travel survey trip matrix and current link or turning movement traffic counts (or passenger counts, in the case of public transit). Cube Analyst Drive takes this a step further using data assimilation techniques to optimize either dynamic or static roadway trip matrices. The Cube Voyager MATRIX program can be used to calculate and apply expansion factors to survey data records using record processing script techniques when standard access to matrix cell values. MATRIX DBI offers a comprehensive and powerful solution for relational database management within a travel demand model application environment, allowing the user to join up to 10 database tables using multi-alphabet sort keys and/or search for specific records matching requested values, or load entire tables into rectangular or multi-dimensional arrays for faster access and manipulation. AnyArcGIS™ compatible data source or geocoding service can be directly integrated with the Cube system.</td>
<td>The software is fully multi-modal and supports specific network objects for pedestrian and bicycle. All modeling classes are available to motorized and non-motorized modes. The software offers specific routines that look at the interaction between modes on mixed networks and in trips made using a chain of multiple modes.</td>
<td>Any air pollution emissions post-processor is standard.</td>
<td>Cube has been integrated with EPA’s MOBILE and MOVES air quality models by Citilabs, as well as the EMFAC models used in California. Cube Polar is Citilabs integrated module for air quality analysis projects and Cube’s versatile modeling ability means user defined calculations, parameters and bespoke emission estimation methodologies can be implemented and fully integrated within the transport model.</td>
</tr>
<tr>
<td>OmniTRANS</td>
<td>OmniTRANS supports a range of functionality for implementing OD surveys in the transport model. Basic functionality includes count- and screenline definitions, count and value associations to rate matrices (classes, modes, times) and reliability of count values. Matrix calibration/estimation is based on these values and can simultaneously estimate/calibrate multiple matrices. The estimation can be controlled by defining an unlimited set of constraints on the objective matrix, matrices or subsets within matrices.</td>
<td>An OmniTRANS plug-in to manage survey data has been developed by a third-party and is available for purchase. It provides the means to append grid references and to determine zonal coding using Point in Polygon procedures.</td>
<td>The software is fully multi-modal and supports specific network objects for pedestrian and bicycle. All modeling classes are available to motorized and non-motorized modes. The software offers specific routines that look at the interaction between modes on mixed networks and in trips made using a chain of multiple modes.</td>
<td>Assignment output (both static and dynamic) can be calculated in emissions (a.o. CO2, NOx, PM10, Fuel consumption, Noise). Following the ARTEMIS standard.</td>
</tr>
<tr>
<td>TransCAD</td>
<td>Survey data can be managed, analyzed, and directly displayed in TransCAD. Data can be expanded and modeled using sample expansion and enumeration methods. Cube Analyst and Cube Analyst Drive take this a step further using data assimilation techniques to estimate and optimize either dynamic or static roadway trip matrices. The software is fully multi-modal and supports specific network objects for pedestrian and bicycle. All modeling classes are available to motorized and non-motorized modes. The software offers specific routines that look at the interaction between modes on mixed networks and in trips made using a chain of multiple modes.</td>
<td>Full support for address matching to street locations, intersections, ZIP4, ZIPCODES, and centroids is built in. GPS support and reverse geocoding also provided. Support for international address geocoding. TransCAD has been used effectively for locating and mapping walk and bicycle trips at the address level. Optionally TransCAD comes with nationwide or statewide HERE road and street networks for many countries that have up-to-date representations of address ranges and street names leading to very high match rates for geo-coding.</td>
<td>Can have separate and fully integrated networks for bicycles and pedestrians. Pedestrian links can be full street networks. Walk links on streets can be included in transit networks. Sidewalks can be included in TransModeler, bicycles can be simulated directly and both their LOS and impact on motor vehicles can be assessed. TransModeler also includes pedestrian crossings where those impact vehicle flows.</td>
<td>TransCAD supports emissions estimation with Mobile 6 and MOVES. Prediction of air quality factors (cold starts); VMT by link type, speed class, vehicle type, and by time of day. Emissions can be mapped and visualized with TransCAD’s built-in GIS.</td>
</tr>
<tr>
<td>VISUM</td>
<td>Traffic survey data can be managed and displayed as turn counts, node counts, or link counts, all in a fund of user-defined objects and attributes. VISUM’s data model also includes models and locations objects and detectors for modeling permanent counters. Transit survey data can be managed per stop, per point and/or per route and aggregate routes. A special module allows the validation of transit itinerary surveys.</td>
<td>Geocoding of addresses available as external desktop, and/or web-based tools. Usually NAVTEG navigation networks serve as the base layer, but custom networks can be used. Phonetic correction for misspelled city and street names and reverse geocoding available as well.</td>
<td>It is possible to model bikes etc. as separate Transportation Systems either concurrently with other modes of transportation or as standalone bike only models. All other standard analysis tools like Select Link, Flow Bundle etc. can be used for this new mode. Walk and bike can be included in the trip chain model (as mode choice alternatives). In assignment they can be modeled as simple transit access mode, or with separate route choice in a full street network. Z Coordinates are available and can be used in user-specified impedance functions for modeling the effect of slope on route choice.</td>
<td>Emission models included for NOx, CO2, particles, HC and noise based on vehicle speeds after assignment. A post-processor for MOVES is also available as script solution. HAMBECA module is fully integrated for emission modeling based on European standards.</td>
</tr>
</tbody>
</table>
Urban Transportation Planning Software (continued)

**NAME OF SOFTWARE PROGRAM**

**SOFTWARE CAPABILITIES**

**EMME**

Interface with land use models has been done with UrbanSim, UPlan, Dramm/Empart, and MEPLAN.

**TRIP CHAINING BEHAVIOR / ACTIVITY BASED MODELING**

The Dynamic Add-on for Emme provides an industry-leading traffic simulation module for activity based modeling (DAM) procedure. It provides a unique traffic simulation that moves individual vehicles and captures lane-based effects at the retail level, retail and other mesoscopic approaches. And its highly-tuned dynamic assignment feature achieves dynamic user equilibrium (DUE) route-choice faster and more reliably than other microscopic approaches. Learn more at www.inrosoftware.com/dynamed

For Zonal aggregate trip chaining, Emme handles efficiency for trip chaining (2 legs and more) and performs choice of intermediate destinations based on combinatorial multimodal impedance. Emme has been integrated with a variety of ABMs with use of flexible network assignment and skimming procedures, along with flexibile APIs and Matrix tools.

Any choice model can be (and has been) integrated for use with the Emme API or Emme macros.

**CUBE (TP+ PLAN, TRIPS MINUT)***

Cube Land is a socioeconomic land use allocation forecasting model based upon the acclaimed bid-auction framework of Dr. Francisco Martinez and designed by Citilabs for easy integration with Cube Voyager and ArcGIS. It is the first commercially supported land use model on the market and the only land use model that is directly integrated by a transportation modeling company. Cube is also currently used in various locations with PECA, UrbanSim, DRAMEMPAL, U-Plan and others. Cube’s open architecture and powerful scripting language makes implementation and integration of third-party or user-coded land use models very easy. Cube has also been integrated with nine-level scenario planning tools such as J-PALC33S, CommunityViz, and Envision Tomorrow for interactive land use visioning workshops. Cube Cloud offers the ability to run travel models over a web-based connection at accelerated speeds for real-time feedback to meeting participants of land use scenario performance measures such as traffic, emissions, economic impact and benefit, equity, etc.

**TRANSIT**

TransCAD is compatible with virtually all land use models and can be linked to them through GIS files. TransCAD has been linked to UrbanSim, Uplan, and many other packages. TransCAD can host the inputs and maintain the outputs of land use models, display and color code parcel and land use data directly and can transform data between disparate zone systems and networks. Support for terrain data bases can be used to determine developable land and visualize development patterns in 3 and 4-D. The STEP3 demographic and land use simulation system is completely implemented in the TransCAD environment. A TransCAD version of the legacy DRAM-EMPAUL system is also available.

**OmniTRANS**

The software architecture easily allows to incorporate land use models and supports a wide range of land use and/or level of service data with (external) land use packages. Successful models have specifically been realized with the DELTA land use package.

**VLSIM**

VLSIM is compatible with most land use models. Users can define custom attributes for houses, areas/landlots, etc and communicate land use model inputs and outputs through these attributes. In addition, zoning/pixel layers can be displayed and visualized. VLSIM has been integrated with MetroScope, OPUS/UrbanSim and various other land use models around the world in the past based on project needs.

**VISUM**

VISUM has a built-in procedure for an analytical Dynamic User Equilibrium Assignment (DUE) and Dynamic Stochastic Assignment. Results for highways and Dynamic Assignment for Transit. For TVISIN-Suite users, networks can be exported to VISUM with a micro simulation between available and other mesoscopic approaches. The results can be imported back into VISUM for link flow Visualizations and other scenarios. VISUM supports the interface of interfacing with external third party Dynamic Assignment modules such as Dynatax.

The VLSIM module for trip chaining based modeling is now integrated with the VISUM system. This trip chaining is built from activity schedules and mode choice is subject to restrictions from previous trips in the chain. This trip chaining allows the inclusion of additional decision points added continuously to support interfacing with fully disaggregate ABMs like DaySim and CT-RAMP.

In addition to graphically specifying Multimodal and Nested Logit as well as simultaneous destination-modes choice models, advanced models such as Mixed Logit and Cross-Nested Logit models can be implemented in VISUM using its own MON interface and a scripting language such as Python, VB or C. A wide variety of parameters/coefficients can be used in transit assignments that allow for consistent sub-mode assignment.

**ORIS**

Includes a Lowry-Garin model for activity allocation. Land-use step is fully integrated.

**QRISIL**

Full equilibrium DTA capabilities with both static and dynamic path building, fully compatible with all other assignment options. Dynamic select link, analytic multi-class assignment, dynamic OD table estimation from ground counts, intervals as small as one minute. Dynamic intersection timing, acts on signals. Occupancy.

**QRISIL**

None.

**TransCAD**

TransCAD provides a dynamic traffic assignment designed for large complex networks. It allows for equilibrium and stochastic user equilibrium solutions and handles multiple user classes, en- trance to egress, intersection delay and delay, and traffic signal settings. Many other and other detailed traffic assignment options are available in TransModeler, Caliper’s companion traffic simulator. A mesoscopic traffic simulator is also available for TransCAD networks for optimized applications.

TransCAD is being used as a simulation software solution for both the most advanced and for less complex activity-based models. The activity model components can be used in flexible combinations to pro- duce a variety of ABM formulations. Basic components are provided for population synthesis, user generation and trip chaining, nested trip timing, destination, and mode choice models, and more complex discrete choice models. TransCAD has also been suc- cessfully used as the platform for DASIM, CT-RAMP, and CEMAP based models where it provides the highest performance for modal network skimming and assignment.

**QRISIL**

TransCAD has a flexible and very fast procedure for applying systems of nested logit model choice equations. This is complemented by a powerful, multi-threaded matrix engine and calculator that handles huge matrices. Matrix DLLs for FORTRAN, C, C++, VB, and JAVA for user-written models. Handles choice set variation for logit estimation and application. Diagrammatic interface for nested logit. Skimming of transit and road networks. Multi-threaded nested logit application procedures. Full-information maximum likelihood nested logit pa- rameter estimation programs at no additional cost. Support for nested logit withOwn models has also been implemented.

**QRISIL**

The Cube Voyager MATRIX program supports the direct coding of mode choice computations in script as well as the ACHIEVE command for efficient coding of nested logit mode choice models, which can be distributed across multiple processors or computing grids using Cube Cluster. A Voyager file access API is available for use by software developers who wish to program mode choice sub-models or entire activity-based travel demand models in other languages such as FORTRAN, C, C++, Cil, Java, or Python. Apps for maximum-likelihood estimation of multinomial logit models are available from Cittals free of charge. User-custom- ized logics for both hierarchy and transit sub-mode choice (SOV, HOV, toll, bus, rail, walk/duke access- ibility, etc.) can also be evaluated within the Cube Voyager route choice engine, with a composite cost benefit to travel demand calculations. Examples of applications for advanced algorithms such as path-search are included in Cittals’ software user training materials.

**QRISIL**

The Cube Voyager MATRIX program supports the direct coding of mode choice computations in script as well as the ACHIEVE command for efficient coding of nested logit mode choice models, which can be distributed across multiple processors or computing grids using Cube Cluster. A Voyager file access API is available for use by software developers who wish to program mode choice sub-models or entire activity-based travel demand models in other languages such as FORTRAN, C, C++, Cil, Java, or Python. Apps for maximum-likelihood estimation of multinomial logit models are available from Cittals free of charge. User-custom- ized logics for both hierarchy and transit sub-mode choice (SOV, HOV, toll, bus, rail, walk/duke access- ibility, etc.) can also be evaluated within the Cube Voyager route choice engine, with a composite cost benefit to travel demand calculations. Examples of applications for advanced algorithms such as path-search are included in Cittals’ software user training materials.

**QRISIL**

© THE URBAN TRANSPORTATION MONITOR, OCTOBER 17, 2014, VOL. 28 NO. 8 Page 20
Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>TIME OF DAY HIGHWAY ASSIGNMENT PROCEDURES AND MODELING PEAK SPREADING</th>
<th>TRIP TABLE ESTIMATION PROCEDURES</th>
<th>TRANSIT SERVICE PLANNING / OPERATIONS MODELING FEATURES</th>
</tr>
</thead>
</table>

**ENME**

Parking costs can be included in mode choice functions, and also when modeling park-and-ride. The impac
t of circulation to finding parking can also be captured.

Time-of-day parking can be stored in scenarios, which permits common model data to be shared across an ENME Pro
ejct; time-of-day models can be auto
mated with the ENME API.

The MultiClass demand-adjustment tools for transit trips. Leading multiclass demand adjustment tools to
generate a set of line-of-trip models for different demand matrices (both optional) for each class.

**CUBE (TP+ TRANPLAN, TRIPS, MINUTEP)**

Parking fees can be also included in the multimodal transport plan
t network used for public transit planning. Transit parking is an important aspect of transit mode choice. Predictions of travel time and parking rates can be integrated into the model. Transit parking fees can be applied to different transit modes, including public transit, buses, and rail.

Time-of-day parking can be included and modeled with the CUBE API.

**ORSII**

None.

D TA in up to 240 intervals as well as static assignment for any period consist
ing of whole hours; standard and user-defined time-of-day tables (post
distribution); automatic time-of-day inter
pooling of hourly rates for DTA.

Eight methods of static and dyna
mical OD table estimation in cluding whole table least squares (LS), Fratar bi-proportional LS, Fratar unipropor tional LS, and entropy estimation.

Highly refined route-level estimates; station-to-route loadings; transfer point loadings; intermodal connections.

**OmniTRANS**

The public transport module makes full use of the multi-modal transport network, in
cluding all links, zones, and network elements. Model results can be displayed with an animated map.

Omnitrans is a multi-modal, multi-temporal model. It supports the modeling of transit and rail systems, including limited capacity on parking lots. The effects of parking costs are included in the exact stage of the demand model. For example, it might influence time of day, destination and mode choice.

OmniTRANS network are multi-temporal. This structure permits the modeling of transport networks in time. It can be used for a range of applications, from traffic simulation to traffic assignment.

The software provides a flexible framework for matrix estimation. Multiple matrices can be esti\n\nted at the same time taking into constraint into account that can be both single-matrix bound (e.g. truck counts) or bound to a set of constraints (e.g. loop counter for all routes in the system). The number of matrices can be 
combined to allow usage of constraints that are covering multiple time periods.

Visum also has a built-in procedure for modeling time-of-day choice as part of a four-step model. Time varying assign
ments can be displayed with an anima\tion tool and with pi/box/zoom charts showing variations by time period.

**VISM**

VISM offers a highly advanced traffic modeling capability with embeded simulation features such as vehicle line blocking fully integrated. It also in\cludes a built-in cost revenue model, a fare model, line blocking, schedule cost and a time dependent model.

Traffic assignment and simulation use the method of least travel time. Traffic assignment is done with the VISUM demand model. VISUM offers a highly advanced traffic assignment model. Traffic assignment and simulation use the method of least travel time. Traffic assignment is done with the VISUM demand model. VISUM offers a highly advanced traffic assignment model.
Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE</th>
<th>SOFTWARE CAPABILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encke</td>
<td>A wide variety of tolling and generalized cost computation, including HOT lanes, ramp-to-ramp tolls, distance-capped tolls etc.</td>
</tr>
<tr>
<td>CUBE</td>
<td>Cube is widely accepted as a standard platform throughout the traffic and revenue industry and is often selected by consultants for its advanced investment-grade analysis of toll facilities and projects even in locations where public agencies are obligated to use other software for internal planning analyses. The CUBE Voyager Highway models can be uniquely powerful and flexible in its ability to represent travel behavior and costs computed for multiple user classes based upon any number of user-specified input and working link variables, as well as its support for completely customized travel time performance and generalized cost functions differentiated by link class. Static queueing models representing platoon operations have been coded in Cube Voyager permitting the travel time benefits of electronic open road tolling and managed lanes may also be assessed by using Cube Avenue for flexible queues at conventional facilities. Different value of time and vehicle operating cost assumptions may be assigned to various segment markets, or the user may perform toll diversion assignment using an empirically derived value of time distribution function. Alternatively, complete discrete choice models may be coded in the ILOP script to determine the probability of selecting a toll vs. non-toll path. Cube also supports the integration of activity-based modeling with dynamic traffic assignment and simulation for fine-grained evaluation of traveler values of time.</td>
</tr>
<tr>
<td>OmniTRACS</td>
<td>The software supports a range of tolling strategies, both static and dynamic. Advanced traffic assignment algorithms can implement congestion charging, cordon tolling, link tolling and path/route tolling. Reports can be exported in a multitude of data formats (PDF, HTML, RTF, ODS, CSV, Text, Excel) and image formats (BMP, JPG, TIF and GIF). Report data can directly be exported into a database table facilitating the data exchange with third-party applications. Reports can automatically be published for the web and accessed via common browsers.</td>
</tr>
<tr>
<td>TransCAD</td>
<td>The multiclass, multi-modal generalized cost traffic assignment has the most advanced capabilities for modeling the effects of tolls. Each user class has its own rate value for time and face its appropriate network restrictions. Tolls can vary for each type of vehicle. Non-linear, entrance to entrance assignment can be used in addition to link-based tolls. Time and cost bicriterion traffic assignment has also been implemented for TransCAD. An application for SETRA in France provided an elastic demand formulation of a time and cost algorithm for evaluating the effects of tolls on freight trucking. Dynamic HOT lane pricing is fully supported in our TransModeler traffic simulator.</td>
</tr>
<tr>
<td>VSUM</td>
<td>Price elasticity and different toll policies can be modeled using the bi-criterion highway assignment module known as TRIBUT. A simpler approach based on general cost is also available. A transit fare rate/toll rate comparison module is used to model different pricing strategies and to estimate revenue.</td>
</tr>
</tbody>
</table>
Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>ABILITY TO MODEL LATENT DEMAND</th>
<th>SOFTWARE CAPABILITIES</th>
<th>INTERSECTION MODELING</th>
<th>INTERSECTION CAPACITY ANALYSIS TOOLS</th>
<th>SIMULATION CAPABILITIES</th>
<th>WEB PUBLISHING SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMME</td>
<td>Latent demand is represented through user-specified demand functions. Lower impedances are fed back to the demand model to yield higher demand. Peak spreading is represented through user-specified departure time demand functions. Higher impedances are fed back to the demand model to yield lower demand.</td>
<td>Delay due to traffic control and conflicting movements are incorporated in turn penalty functions and volume delay functions. Turn penalty functions can include intersection delay and delay due to opposing flow volumes.</td>
<td>Standard measures, such as the Highway Capacity Manual, are calculated with the Network calculator tool.</td>
<td>The Dynaflow Add-on for Emme provides an industry-leading traffic simulation and dynamic traffic assignment (DTA) procedure. Dynaflow’s traffic simulation is often referred to as mesoscopic due to the larger scale of network that can be calibrated; however, it bears far more similarity to the detail and fidelity of a microsimulation than other macroscopic approaches. Dynaflow moves individual vehicles on lanes, with car-following models, gap-acceptance models and explicit signal timings.</td>
<td>None.</td>
<td>none.</td>
</tr>
</tbody>
</table>

| CUBE (TP+, TRANPLAN, TRIPS MINUTP) | CUBE 2015 demand models can be scripted using CUBE’s scripting language. Cube Land can be used to forecast induced demand generated by socioeconomic development in response to increased transportation network accessibility. | Cube fully supports full junction modeling of all types of intersections. Intersection libraries may be created to facilitate rapid coding of data in large networks, or signal configuration and timing information may be imported from SYNCHRO format. Cube Avenue supports dynamic modeling of queues at intersections as well. | Cube fully supports HCM capacity analysis and level of service calculations. | Cube Avenue enables DTA with mesoscopic simulation of bottleneck queues and blocking back suitable for wide-area networks such as entire cities, counties, and regions, with two-dimensional animation of outputs on a GIS map. Cube Dynasim is a complete multi-modal traffic microsimulation program with 3D animation capabilities and direct export/report of Cube Vary data. Cube Dynasim now also offers state-of-the-art parking modeling capabilities. | Cube Cloud publication of models online, where they can be securely shared with others and accessed through a web-based application. Integrated web-based GIS mapping and reporting capabilities enable the conduct of an online analysis of model results. In addition, model data can be stored natively in ESRI-compatible geodatabase and then integrated into web mapping services using ArcGIS Server or ArcGIS Online (www.arcgis.com). Existing streaming internet map services, such as Aerial Imagery can be loaded in the Cube GIS View and overlaid on model data for comparison and mapping purposes. | none. |

| QRSII | Land use allo-cation and travel accessibility at inter- sections in both highway and transit accessibility. | Assignment delay is a function of intersection characteristics, including traffic controls (stop signs, yield signs, signals, roundabouts), exclusive left-turn and right-turn lanes, cycle length, green splits, and other geometry. Optional automatic signal timing that is sensitive to assigned traffic volumes and turning movements. Capability to have actuated signals. Traffic assignments are sensitive to signal delay. | None. | None. | none. |

| OmniTRANS | Elastic demand and other approaches to model suppressed demand are readily implemented using the editing environment. | OmniTRANS provides a comprehensive intersection/junction modeling engine within both its static and dynamic assignment modules. The junction manager provides a rich GUI for editing and visualizing the geometric layout and settings of intersections including approach and exit lanes and signal plans which can be manual, automatic or vehicle-actuated. It handles a wide variety of junction types, bus priority and special lanes, and allows turn attributes and data to be filtered and set by mode time. | The software provides rich graphical user interfaces to visualize assignment results at junctions, including green times, calculated delays, saturation rates and queues/spillback. Calculations are in accordance with a variety of sources including HCM. | The StreamLine dynamic assignment framework offers semi-dynamic (STAG) and full dynamic VOS performance models that include queue building, spillback, travel delays and junction queuing. The software also has successfully been applied in conjunction with third party simulation packages such as InVision Peripherals, Integration and INDEX. | OmniTRANS Remote Hosting provides the software-as-a-service (SaaS). The application and data are accessible through any internet connection (user login applies). |

| TransCAD | Any reasonable demand function can be accommodated to model latent demand. TransCAD supports detailed modeling of intersections and provides flexibility with respect to treatment of delay for each specific movement. Volume dependent HCM queuing models are used to calculate intersection delays in traffic assignment taking traffic signal settings into account. More detailed modeling of intersections of all types with very high geographic accuracy is performed in the TransModeler traffic simulation. TransCAD has the same intersection control editor as TransModeler making facilitating data input, management, and analysis. | TransCAD supports detailed modeling of intersections and provides flexibility with respect to treatment of delay for each specific movement. Volume dependent HCM queuing models are used to calculate intersection delays in traffic assignment taking traffic signal settings into account. More detailed modeling of intersections of all types with very high geographic accuracy is performed in the TransModeler traffic simulation. TransCAD has the same intersection control editor as TransModeler making facilitating data input, management, and analysis. | TransCAD provides an implementation of the intersection Capacity Utilization (ICU) method popularized by SYNCHRO. There are also implementations of Chapters 16 & 17 of the Highway Capacity Manual that are available as TransCAD add-ons. | TransModeler is a companion package that provides the most advanced multimodal traffic simulation and assignment capabilities available. TransCAD and TransModeler are tightly integrated and make it straightforward to simulate long corridors and large networks in great detail. | TransCAD for the Web provides a complete solution for publishing model data and providing analysis tools on the web. TransCAD for the Web supports modern browsers and can serve maps generated by TransCAD. Multiple instances and load balancing are provided for heavily used sites. A public example of a TransCAD for the Web application is the FWSA HEPGIS site found at http://hepgis.fhwa.dot.gov/ hepgismaps11/. |

| VISUM | Flow demand models can be accommodated via built-in procedures or with scripts. VISUM features a highly user-friendly node/intersection editor, with the various editor sub-sections, lane utilization and storage bay lengths. Additionally, user defined templates for approaches and intersections can also be used for quick editing of standard intersection geometry. Turn prohibitions or penalties (using volume-delay functions if desired) can be set individually or by using filters. VISUM includes a Stage-based as well as Signal-Specific model for signal control and timing settings. Intersection delays can be modeled by using turn specification, node specifications (including stop line management and roundabouts), and HCM methodologies. VISUM includes MultiPoint Assignment for more accurate trip assignment for turn movements, as well as an integral NCHRP 440 procedure for application in intersection geometry coding and control in VISUM can all be exported for use in VISUM micro-simulation. VISUM includes a preview model that lets the modeler examine how the intersection will appear in VISUM. Because VISUM saves all paths during assignment, these paths can also be exported for use in VISUM. | Intersection capacity analysis can be run within assignment or after assignment, including NCHRP 255 add-justments. Users can use HCM 2000 to model NCHRP 255. Routines can be modeled using TRRL/Kimberly or HCM 2010′s methodologies. Visualization of capacity analysis results can be directly done as well as VISUM stores LOS. Average Delay, V/C Ratio, etc. as node attributes. VISUM includes both individual signal timing optimization and network signal optimization. | PTV Vision Suite integrates VISUM and VISUM. VISUM’s detailed transportation and traffic modeling network can be exported to VISUM for microsimulation, as can all assignment results and demand. The microsimulation results of VISUM can be imported back into VISUM for visualization. The use of ANM (Alternative Network Model) facilitates integration with knowledge of changes in either VISUM or VISUM. | VISUM supports Web publishing of its results through the export of graphics in many bitmap and vector formats, including SVG. The ex- porting of models to a web page with hooks for triggering user actions is heavily used sites. A public example of a Web Publishing services using its own own Omega W3 browser and a web-based scripting language such as Python or VB. | none. |
Urban Transportation Planning Software (continued)

**NAME OF SOFTWARE PROGRAM**

**TRAFFIC MANAGEMENT**

**SOFTWARE CAPABILITIES**

**OPTIMIZATION OF SURVEY AND COUNT LOCATIONS**

**TRANSIT MOE’S**

**EMME**

Interfaces to Synchro and other route-optimi-

zation packages are at-

tainable with EMME export capabilities. A va-

riety of ITS and opera-

tional strategies can be evaluated.

The Traffic count lo-

cation analyses are a series of optimal links on which to conduct traffic counts.

Robust and flexible analysis framework to evaluate and optimize system performance. Easily and simul-

taneously skim any component of transit trips by node subset, including actual or perceived first or total boarding times, in-vehicle times, access or egress times, first, total or in-vehicle transit times. Easier save network statistics like initial, transfer or total boardings; final, transfer or total alightings; or through passengers on links, transit segments or transit lines. Select-boarding, select-in-vehicle de-

lighting, select-vehicle transit.all combined via expressions for transit and auxiliary transit flows passing through specific sub-accounts whether or not contiguous, demand/supply on key or critical infra-

structure, directional screenline analysis and more. Efficient user-defined transit path and transit strategy analysis permits unmatched performance and flexibil-

ity to compute virtually any statistic for local applica-

tions. Translight provides a complete, current database of where you want, at specific nodes, links, transit lines or transit segments, on any trip plan, in-vehicle initial boarding, transfer boarding, transfer alighting, final alighting, or auxiliary transit. Permits a wide va-

riety of gate-to-gate, line-to-line or station-to-station analyses, or demand computations for sub-area cus-

cumulating, Generate reports listing complete, multi-modal transit line itineraries by O-D. Selected by path or by impedance or flow proportion. For use in model inspection or as efficient, exhaustive transit path set generation.

The Emme Deitcho includes a comprehensive mapping framework which provides general and advanced maps and charts for visualization, analysis and reporting. Communicate with module effectively with graphical outputs produced using either out-of-the-box transport-themed maps and charts covering the entire transport planning domain. Emme Deitcho contains all the one照明 framework provides transport professionals with the building blocks needed to extend the box with customizations that they are always relevant for local use. Georeferenced basemaps to display stoplighters, PostgreSQL/PostGIS databases, online TAB, AutoCAD, DFX and U.S. Census TIGERLine files, any ArcGIS™-supported data, and online map services with worldwide coverage, including ArcGIS Online and OpenStreetMap.

**CUBE (TP+, TRIPS, TRUNC, MINUTP)**

Cuba Avenue and Cude dynamics and integrated with robust traffic anal-

lysis capabilities.

Cube scripting can be used to calculate and prioritize optimal survey and count lo-

cations. Cube scripting can be used to calculate any number of transit MOEs. Cube also includes its own MOE analysis, functions designed directly for FTA New Starts fund-

ing measures.

Cubes is built using URSI mapping and displays. Any URSI or compatible methods that can be used for fast, comprehensive and flexible flow analysis. Additional-

ly, Cude includes dynamic display of vehicle movements, charts, and bandwidth analysis of vehicle movements. Cude also provides user-defined transit path and transit strategy analysis permits unmatched performance and flexibil-

ity to compute virtually any statistic for local applica-

tions. Translight provides a complete, current database of where you want, at specific nodes, links, transit lines or transit segments, on any trip plan, in-vehicle initial boarding, transfer boarding, transfer alighting, final alighting, or auxiliary transit. Permits a wide va-

riety of gate-to-gate, line-to-line or station-to-station analyses, or demand computations for sub-area cus-
cumulating, Generate reports listing complete, multi-modal transit line itineraries by O-D. Selected by path or by impedance or flow proportion. For use in model inspection or as efficient, exhaustive transit path set generation.

**GRSII**

Capacity, pricing, and signal timing can be valued by line of day-

incident and work zones. Work zone diver-

sion estimation.

Not standard avail-

able. In the past some advanced us-

ers have success-

fully developed de-

veloped-in-house routines using the Ruby scripting lan-

guage. Several MOEs are available to assess the effective-

ness of the public transport: passenger flows, pas-

senger time, passenger distance, number of-

boarding, changing and alighting at stopline, occu-

pency, transitline load factor, crowding, accessibility
directly use an MXD file in ArcGIS or in the GIS in Cube Base.

**OmniTRANS**

The StreamLine frame-

work for dynamic traffic assign-

ment includes full sup-

port for active traffic manage-

ment that operate traffic flow;

vestment. Several model-

applications have been carried out with (near) real 

time information is used to provide model 

input and DTA simula-

tions evaluate the effect of available measure 

and WHEN model out-

puts feed back to on-street systems that control those measures.

TransCAD makes it easy to map it and count locations and to evaluate the sample properties of different locations. The robust select-

link analysis can be used to identify key links

in the network for counting.

TransCAD provides many transit-oriented MOEs such as boarding and alighting volumes, stop to stop

flows, wait times, transfers and transfer times, route

level and system passenger miles and passenger

hours.

OmniTRANS provides an integrated development environment (IDE) for

transport modeling. The GUI presents the user with a straightforward

interface to setup, manage, develop and control scenarios, transport supply data (e.g. networks), transport demand data (e.g. zonal data and matrices), model scripts and model runs. It provides specialized inter-

faces for editing and managing functions, transit lines and fares. It in-

cludes several interfaces to support data extraction, data manipulation, analysis tasks and produce reports, charts and plots including animated ones. Network objects can be styled individually or in groups and pro-

vide all typically required labelling and colouring techniques. Typical data visualization techniques include object/area colouring, desire lines, bandwidths, histograms, pie charts and route objects. The interface can fully be customized and expanded through extensions and plugins.

**TransCAD**

Traffic management

strategies are most ap-

propriately evaluated with the TransModeler traffic simulator in con-

 junction with a

TransCAD travel demand model.

TransCAD makes it easy to map it and count locations and to evaluate the sample properties of different locations. The robust select-

link analysis can be used to identify key links

in the network for counting.

TransCAD provides many transit-oriented MOEs such as boarding and alighting volumes, stop to stop

flows, wait times, transfers and transfer times, route

level and system passenger miles and passenger

hours.

TransCAD has the most extensive graphics capabilities of any package

providing high quality map output with dozens of thematic mapping

styles and options, unlimited colors, fully scalable lines and TrueType map symbols, and a complete set of free drawing and annotation tools. There is automatic display of one-way streets, labels that adjust to the map scale, and built-in highway shields. There are specialized displays for flow maps, transit route systems, and multimodal desire lines. There are also pie, line, and bar charts, intersection diagrams, and strip charts based upon linear referencing. Page layout tools let you combine any number of maps, charts, and data ta-

bles in a single presentation. Support for image layers makes it possi-

ble to overlay networks on top of aerial photographs and satellite

imagery. TransCAD also has multimedia capabilities making it possible to integrate imagery and video associated with transportation facilities.

Adding 3-D visualization tools have been added such as support for Google SketchUp.

**VISUM**

VISUM’s integrated net-

work data model in-

cludes locations and detectors for model-

ing real-time traffic con-

ditions with OPTIMA

which uses VISUM as its

platform. OPTIMA, based largely on VISUM, is a traffic man-

agement tool for esti-

mating real-time traffic conditions by analyzing real-time detector information.

Even though VISUM does not have a built-in routine for optimization of count and survey loca-

tions. Survey and travel time can be

calculated via screenlines and can be added to the VISUM network.

VISUM has capabilities of advanced Transit Modeling and analysis and offers feature rich MOE evaluations for transit analysis. User cost evaluation, line blocking for vehicle utilization, and operator cost evaluation.

VISUM has standard GIS data visualization capabilities (such as dis-

playing all network objects in terms of colors, line size, symbols, etc.) and

including travel time and speeds in a "point-to-point" view. The VisumB.

BISUM also supports the display of image labels (e.g. highway shields) using the VisumB.

BISUM sends all pathways from assign-

ment to fast, comprehensive and flexible flow analysis. Additional back-

ground display options include: omnipotent flow, compared to user specified, simulated traffic and user specified, simulated traffic.
## Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>MANAGEMENT OF DATA ACROSS MULTIPLE MODELING DIMENSIONS OF PURPOSE, MODE, TIME PERIOD, AND USER DEFINED CLASSIFICATION</th>
<th>TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH PROJECT AND SCENARIO MANAGEMENT, INCLUDING DATA MANAGEMENT AND SCENARIO COMPARISONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMME</strong></td>
<td>All these dimensions are integrated in the Emme Database. Trip purpose, mode, time-of-day, and socio-economic classes, and other classifications can be modeled with separate demand matrices. Assignment results for different time periods are stored in separate scenarios. All this data is available for consistent, automated processing with the Network calculator tool, a set of Matlab calculation tools, and the Emme API.</td>
<td>An Emme project permits central management of related Emme Databases, associated media (e.g., images, GIS data) and customized worksheets. The Emme Database provides a unified, consistent and structured way to work with network data and demand data for model automation across transportation planning scenarios. Each database stores multiple scenarios which the Emme Desktop can access simultaneously. Demand data are also housed consistently within the Emme Database, and are accessible from the full tool suite of Emme. The data management tools in Emme Modeler are provided to create, modify and delete persistent data stored in the Emme database. The Emme API permits completely automated builds (and re-builds) of the entire Emme Database, so users are free to integrate with project management systems and/or version control systems of their own choosing. The relational structure of networks (i.e., modes, nodes, links, turns, transit lines, transit segments) in the Emme Database provides an integrated framework to guarantee network consistency. In Emme, data validation is built directly into the data model to ensure model integrity. Any changes to scenario status model specifications are recorded and stored for consultation. Emme provides a host of scenario management utilities to lock/protect scenarios, check status, and perform other administration. In Emme, scenario comparison capabilities underlie both the Emme mapping framework and the Emme analysis and expression engine. As a result, comparing scenarios is as easy as swapping scenarios in the Project Explorer; all worksheets and tables are updated immediately to match the current scenario(s). Emme manages the correspondence between all scenario data, so the exact same expression syntax to access cross-scenario data is used for network calculations, tables or maps. Use the out-of-the-box comparison worksheets provided in Emme, or create custom analyses/visualizations using the Emme scenario comparison framework. Exhaustive textual comparison reports can be generated for scenarios to showcase any/all differences.</td>
</tr>
<tr>
<td><strong>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</strong></td>
<td>Each Cube matrix file can include up to 255 two-dimensional matrices, supporting travel market segmentation by a large number of user classes, time periods, modes of travel, and trip purposes. The Cube Voyager MATRIX program can store and access up to 999 working matrices in memory and provides scripting commands and keywords needed to aggregate data across market segments and calculate composite impedance measures, such as logsums, for feedback to &quot;higher&quot; stages of the model system.</td>
<td>For many years, Cube Base has been known for its robust scenario management capabilities. Cube Base's Scenario Manager allows users to quickly create and document new scenarios without going to the file system. Cube Reports allows multiple scenarios to be dropped in pre-configured reports for on-the-fly analysis. And Cube's 'model applicant' settings allow organizations to distribute models for end-users to create model scenarios without jeopardizing the models integrity. Cube Cloud brings the same scenario-based planning principles and techniques to a streamlined, easy to learn web interface designed with both veteran Cube users and novice model applicants in mind.</td>
</tr>
<tr>
<td><strong>QRSI</strong></td>
<td>Networks can be dynamic and/or multiclass. Parameter menus and files have the ability to differentiate purposes, time periods, and vehicle classes. Static traffic assignments may be for any time period of consecutive full hours.</td>
<td>Separate parameter files defined for each project/scenario. Parameters are kept in separate folders with input data. No automatic scenario comparisons, although traffic assignments are easily compared within GNE.</td>
</tr>
<tr>
<td><strong>OmniTRANS</strong></td>
<td>OmniTRANS was the first package to introduce the handling of multiple purposes, modes, and time periods in transport planning software. The architecture of the software is based on these key dimensions: Purpose, Mode, Time Period, and User Segmentation. In keeping with the concept of multi-scenario analysis in mind, the software provides a programmable framework to guarantee network consistency. In OmniTRANS, data validation is built directly into the data model to ensure model integrity. Any changes to scenario status model specifications are recorded and stored for consultation. The modeler/analyst manages the correspondence between all scenario data, so the exact same expression syntax to access cross-scenario data is used for network calculations, tables or maps. Use the out-of-the-box comparison worksheets provided in OmniTRANS, or create custom analyses/visualizations using the OmniTRANS scenario comparison framework. Exhaustive textual comparison reports can be generated for scenarios to showcase any/all differences.</td>
<td></td>
</tr>
<tr>
<td><strong>TransCAD</strong></td>
<td>TransCAD automatically and seamlessly supports multiple purposes and modes and time periods. Each can be flexibly defined by users without restrictions. The built-in database capabilities and support for external databases such as SQL databases provide additional flexibility when needed for data management.</td>
<td>TransCAD includes a powerful automatic scenario builder and manager. The scenario manager is configured from a user-specified database table. The scenario manager main menu shows the input and output files for scenarios. This makes it easy to use tools to display statistics on differences between scenarios. The scenario manager is integrated with the user interfaces that are provided for interactive model application. Also, it supports multiple runs and distribution of runs and model components over a network of computers. Macro source code is provided for the scenario manager and a standard user interface so that it can be customized by consultants and other users. The scenario manager lets users choose the input files associated with any scenario and specify the output file names and their location. New scenarios can be created with the click of a button. Scenarios will initially inherit all the model settings from its parent scenario, but can then be modified interactively through dialog boxes, or by editing batch scripts. The built-in relational database facilities allows all forms of data management and maintenance. The scenario manager allows the user to make multiple runs simultaneously and provides user friendly tools for output comparison. The comparison tools provide reports, as well as informative map graphics. A preprogrammed procedure provides detailed statistics on differences between two assignments.</td>
</tr>
<tr>
<td><strong>VISUM</strong></td>
<td>All assignment results can be stored and evaluated according to purpose, mode, and time period. All these classifications are user defined. From time dynamic methods, VISUM allows the user to store results for every user-defined time-interval (e.g. for every hour of the day). VISUM's data model includes demand, so users can specify demand segments (market segments, activities, etc., and VISUM manages the trip accounting for each segment. There is a calendar for transit modeling (i.e., you can model specific days of the year), and time-variant attributes (for modeling express lanes by time-of-day for example). The over all flexible yet integrated setup of the data model allows seamless management of data across multiple dimensions of purpose, mode, time period, and user defined classification.</td>
<td>VISUM includes a fully functional scenario manager which can be used to define various scenarios (network changes, traffic control changes, time periods, horizons, calculations and more) as well as to define procedural dependencies between scenarios. The scenario manager also allows comparison of scenarios via graphical as well as tabular display of results.</td>
</tr>
</tbody>
</table>
### Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH CROSS SCENARIO SIMULTANEOUS DATA EDITING</th>
<th>ARE NETWORKS USED BY SOFTWARE TRULY MULTIMODAL, OR MUST SEPARATE NETWORKS BE BUILT FOR DIFFERENT TRANSPORTATION MODES?</th>
<th>DOES MODELING PROCESS IMPLEMENTED USE A SCRIPTING LANGUAGE?</th>
<th>IF THE MODELING PROCESS IMPLEMENTED USES A SCRIPTING LANGUAGE, IS THIS SCRIPTING LANGUAGE PROPRIETARY TO THE PACKAGE?</th>
<th>IF THE MODELING PROCESS IMPLEMENTED USES A SCRIPTING LANGUAGE, AND IF THERE IS NO PROPRIETARY LANGUAGE, WHAT LANGUAGE IS USED?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMME</strong></td>
<td>Basic operations in the Emme network editor, as well as combined operations, such as adding two-way links and automatically updating transit line itineraries when splitting a link, are added to the undo/redo stack. The editing history may be saved and used to re-apply the same changes to other scenarios and to share with colleagues to update their project. The Emme Database is, and has always been, truly multimodal, so transit lines usually run over the road network, and private and public transport network coding will stay in sync with each other.</td>
<td>True. Separate networks are not necessary for different transportation modes.</td>
<td>Yes.</td>
<td>Yes.</td>
<td>Python</td>
</tr>
<tr>
<td><strong>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</strong></td>
<td>CUBE is an extension for ArcGIS, the Sugar Network Editor, supporting simultaneous network editing via ESRI's version management technology and ArcServer for centralizing data management. Cube 6 also supports ESRI's multi-user version management technology and ArcServer for scenario management and multi-user model development/analysis. Yes. Cube networks are truly multimodal. A single network comprising highway and non-highway links as well as public transit lines is referenced for all travel modes.</td>
<td>Yes.</td>
<td>No.</td>
<td>Ruby</td>
<td></td>
</tr>
<tr>
<td><strong>QRSII</strong></td>
<td>QRSII's 'Extract' and 'Update' allow data to be moved across networks.</td>
<td>Networks are truly multimodal, multi-temporal and multi-scenario.</td>
<td>No.</td>
<td>No.</td>
<td>Ruby</td>
</tr>
<tr>
<td>SOFTWARE PROGRAM</td>
<td>IF THE MODELING PROCESS IMPLEMENTED USES A SCRIPTING LANGUAGE AND IF THERE IS NO PROPRIETARY LANGUAGE, ARE ADVANCED PROGRAMMING SKILLS REQUIRED?</td>
<td>CAN SOFTWARE BE EASILY EXTENDED/TAILORED TO PROVIDING A USER INTERFACE DIRECTED AT DEALING WITH A SPECIFIC APPLICATION?</td>
<td>CAN SOFTWARE BE EASILY EXTENDED/TAILORED TO SPECIFIC MODELING FUNCTIONALITY?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMME</td>
<td>The only pre-requisite for the &quot;Scripting with Emme Modeler&quot; training course is basic Python tutorial that can be completed in a few hours.</td>
<td>Yes, the same user interface tools that are used for the 100+ tools in the Emme Standard Toolbox are available for users to provide their own user interfaces.</td>
<td>Yes. The Emme system provides unmatched flexibility and development possibilities with the Emme APIs which provide the ability to automate every aspect of the system from model procedures, report generation, network and matrix data access.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</td>
<td>Many models can be implemented using Cube's pre-scripted model libraries. This only requires that the model builder understands basic modeling concepts. Model library components are added using drag-and-drop functionality in Cube Application Manager.</td>
<td>Yes. Cube is designed to develop and deploy models for specific types of analysis or applications. Cube's Application Manager is supported by a streamlined end-user interface that manages the specific requirements of each model. Deployed Cube models are in effect &quot;locked down&quot; to preserve the specific model function and integrity of the model. At the same time allowing model users to change model data inputs and parameters to test specific scenarios. The web-based user interface for Cube Cloud could also easily be customized to support specific applications.</td>
<td>Yes. Almost any type of modeling process can be coded in Cube Voyager script, and an API is available for developers who wish to extend Cube using third-party software. Cube Cloud serves as a platform for distribution of user-generated applications and utilities. Cube is a flexible model building framework, with several model specific libraries. Cube Voyager handles much of traditional pas- senger forecasting and simulation. Cube Cargo is designed specifically for freight or commodities modeling. Cube Land is designed specifically for land use allocation. The modular Cube system is designed to solve all types of transport problems by support planners with the specific model libraries needed to achieve specific needs or goals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QRSII</td>
<td>N/A</td>
<td>Menus and dialog boxes; in addition &quot;Cascade&quot; is a feature that allows one to easily connect to another simulation in the same run. Thus, it is easy to string together simulations that build fairly complex multipurpose/multiclass models.</td>
<td>No.</td>
<td>No. QRs II can be called as a subroutine from within programs written in any programming language. Interface to travel microsimulation for traffic assignments.</td>
<td></td>
</tr>
<tr>
<td>OmniTRANS</td>
<td>No programming skills are required to make simple model scripts or to run existing transport models. Also, there is provides numerous example scripts and code snippets ranging from novice to advanced level. The development of enhanced model scripts and custom tools is task for interme- diate and advanced users; modelling skills do come in handy for those tasks.</td>
<td>TransCAD's functionality is fully accessible through a well-designed and easy to understand user interface. Models may be run interactively which greatly aids in model development and can also be run by those who are not interested in programming.</td>
<td>Yes. TransCAD provides a complete environment for developing applications including tools for building new user interfaces for any GIS or transportation software applications. TransCAD for the Web makes it possible for TransCAD applications and custom programs to be configured with elegant web interfaces and run on a web-server and to be accessed with conventional browsers and browser interfaces.</td>
<td>Yes. Users can easily develop/predict model functionality (graphical and non-graphical). The methodology is based on a scripting approach to be compatible with the various OmniTRANS modules. Ruby supports mathematical operations and can link with external libraries to further extend modeling capabilities. Existing model classes can be easily expanded. The OmniTRANS SDK offers sample codes and a fully documented interface module to access OmniTRANS data files from within add-in applications. A variety of third party extensions are available on the market.</td>
<td></td>
</tr>
<tr>
<td>TransCAD</td>
<td>Programming TransCAD does not require advanced programming skills as many functions have been simplified. Sample scripts are provided for the most common types of models. Also, batch scripts is automatically captured from the interactive menu eliminating sub- stantial programming and reducing errors in model scripts.</td>
<td>TransCAD's functionality is fully accessible through a well-designed and easy to understand user interface. Models may be run interactively which greatly aids in model development and can also be run by those who are not interested in programming.</td>
<td>Yes. TransCAD is extensible and run- time scripting can be written in any programming language. Support for several model data formats makes TransCAD data access- able to model extensions.</td>
<td>Yes. TransCAD is extensible and runtime scripting can be written in any programming language. Support for several model data formats makes TransCAD data accessible to model extensions.</td>
<td></td>
</tr>
<tr>
<td>VISUM</td>
<td>Advanced programming skills are not typically required for writing scripts for VISUM. PTV provides an extensive repository of examples and tutorials that can be used to easily learn scripting for VISUM.</td>
<td>Basic Modeling procedures like Trip Generation, Trip Distribution, Mode Choice, and Assignment in addition to basic ma- trix operations and network object attribute calculations can be implemented in VISUM using a graphical interface. Further, all these steps can be stored in a procedure (par) file for reuse. Additionally, any COM compliant scripting language may be used to implement more advanced operations. Custom procedures can further be written using python scripts and fully integrated into the graphical interface.</td>
<td>Yes. Python, VBS, and Javascript scripts can be run from within VISUM. User de- fined menu items can be added to the standard menu selection. Custom inter- faces can be built with Python and called from VISUM. In addition, users automate VISUM from other COM compliant programs such as ArcGIS and Excel</td>
<td>Yes. Typical advanced modeling function- ality that users have implemented in their own applications, are: special Park &amp; Ride solutions in mode choice, unique choice models (e.g. car ownership) inside a sequential model, special solutions for travel capacity constraints, particular ap- proaches to multi-stage model conver- gence or similar applications. It is important to note that the combination of a COM based interface and a modern programming language allows the advanced user to develop specialized applications and solutions without limit.</td>
<td></td>
</tr>
</tbody>
</table>
Urban Transportation Planning Software (continued)

### NAME OF SOFTWARE PROGRAM

<table>
<thead>
<tr>
<th>CAN SOFTWARE BE USED AS A HOST TO WORK IN SYMBIOTIC MANNER WITH OTHER APPLICATIONS?</th>
<th>DOES SOFTWARE ACCOMMODATE DISTRIBUTED PROCESSING?</th>
<th>DOES SOFTWARE ACCOMMODATE CLOUD COMPUTING?</th>
<th>DOES SOFTWARE INCLUDE TRAVEL TIME RELIABILITY IN ITS PATH BUILDING AND LATER STEPS SO THAT THE PATH IMPEDENCE CAN INCLUDE THE EFFECTS OF VARIATION IN TRAVEL TIME, LINK BY LINK?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMME</strong></td>
<td>Yes. Emme can be scripted along with other scientific libraries from the popular Python ecosystem.</td>
<td>Emme procedures like traffic and transit assignments are heavily multi-threaded and benefit from parallel computing systems. It is possible to arrange distributed computing for portions of models which may be run at the same time (e.g. different scenarios).</td>
<td>NREL can provide licenses for Emme on Amazon EC2.</td>
</tr>
<tr>
<td><strong>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</strong></td>
<td>Yes, Cube is an open framework designed to integrate any type of third party application, user customization or script. While some organizations choose to use Cube's built-in capabilities for everything, others have chosen to write their applications using Java or other languages. In these cases, Cube is used primarily for managing the model flow, data, scenarios, and to send and receive data from external model components.</td>
<td>Cube Cluster enables parallel processing for Cube Voyager, allowing users to distribute model computations across multiple cores on a single computer or multiple machines connected together in a local area network (i.e. grid computing). Two types of cluster computing are supported: 1) &quot;intra-step distributed processing&quot; (IDP), which applies to routines that iterate over multiple zones (such as highway assignment or mode choice), dividing the problem into independent groups of zones that are sent to different processors for calculation and subsequently merged together for data storage and analysis; and 2) &quot;inter-step distributed processing&quot; (MDP), which applies to sequentially performed steps that can be performed in parallel on separate processors instead of the absence of any input/output data interdependencies. These two techniques have been combined to dramatically reduce the run-times of many complex travel demand models by networking together standard workstations, without having to purchase costly specialized hardware that can be difficult to set up and becomes even more expensive to maintain over time.</td>
<td>Cube Cloud is the world's first cloud computing solution for transportation modeling, combining a high-speed, infinitely scalable distributed computing platform with secure model sharing and built-in web-based mapping, reporting and analytics. This system is also unique in that it allows publication of the model itself and permits invited users to perform model runs on the Cloud and then view their results online using a streamlined web-based user interface. No specialized local hardware resources are required and all required software is pre-loaded onto a virtual machine image associated with each model. Inherent version control ensures consistency and comparability of results produced by guest users of the platform with those produced in-house by model owners. Cube Cloud uses Cube Cluster to distribute each model run across up to 1,024 cores in a virtual computing grid, and further efficiency gains are realized by allowing multiple runs to be performed in parallel, whether requested by a single user or multiple users accessing the system from physically separated locations. The Software-as-a-Service is offered on a subscription basis with plans ranging in size from $20 to $250,000 core-hours per year. Cube Cloud also serves as a platform for sharing user-generated apps and utilities as well as big data and other resources, including fully functional turnkey models suitable for transfer to small cities and large towns as a quick-response traffic forecasting solution.</td>
</tr>
<tr>
<td><strong>QRSII</strong></td>
<td>No.</td>
<td>Yes. Automatic parallel processing, up to the number of coresprocessors in the computer.</td>
<td>No.</td>
</tr>
<tr>
<td><strong>OmnITRANS</strong></td>
<td>Yes. The most common approach is to embed the application in a custom made Ruby class, which can then be used in combination with other OmnITRANS modeling classes.</td>
<td>Automatic parallel computing (multi-threaded) for selection of transport modules.</td>
<td>The OmnITRANS software itself is currently ported to a cloud operated product. However, SaaS solution OmnITRANS Remote Hosting offers flexibility and scalable solutions.</td>
</tr>
<tr>
<td><strong>TransCAD</strong></td>
<td>Yes. TransCAD can call other packages, manage their inputs, and outputs, and perform other operations. TransCAD can be used to extend the functionality of ArcGIS for GIS-T or to simplify many data management tasks. Similarly, TransCAD can be called from other applications. TransCAD and TransModeler are particularly symbiotic in that planning model data can be accessed directly in TransModeler and simulated. Networks from TransCAD can be transformed into simulation network as work that can be further enhanced and used in TransModeler, greatly reducing the work required to perform traffic simulations.</td>
<td>Yes, and this feature has recently been greatly enhanced in the latest version which provides for very efficient parallel processing on one machine to exploit shared-memory programming models. TransCAD 7 comes with additional compute engines that provide parallel processing so that complex models can be run in a fraction of the time that would ordinarily be required. Distributed, parallel, and multi-threaded applications can all be accomplished giving users the flexibility to choose the best computing strategy for their hardware environment.</td>
<td>Yes, TransCAD can run in the Amazon cloud and in other cloud environments.</td>
</tr>
<tr>
<td><strong>VISUM</strong></td>
<td>Yes, through the COM interface, VISUM can easily be embedded within an application. There are numerous custom applications where VISUM serves as a back-end engine - for example a custom interaction capacity analysis and count management system and a transit service planning platform. In addition, PTV embeds VISUM in OPTIMA, the real-time traffic prediction tool.</td>
<td>VISUM uses multi-threading for internal operations to the extent possible. It is also possible to set up VISUM for distributed computing over multiple processors or multiple networked computers.</td>
<td>PTV does not host any cloud services at this time. However, PTV is evaluating the possibilities which may be truly beneficial to the users and it will come up with a solution accordingly.</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>EMME</td>
<td>Emme offers disaggregation methods for static O-D matrices, which can be time-sliced to model dynamic O-D matrices.</td>
<td>28</td>
<td>200-399</td>
</tr>
<tr>
<td>CUBE (TP+, TRANPLAN, TRIPS, MINUTP)</td>
<td>Yes. In addition to high-performance maximum likelihood estimation of static highway and public transit trip tables in Cube Analyst, the latest Cube Analyst Drives implements a robust algorithm for dynamic origin-destination matrix estimation based upon original research performed by Citilabs in collaboration with the Florida Department of Transportation. The dynamic ODME process requires origin-destination matrices for each time segment, traffic counts for each time segment, and a dynamic route choice probability matrix which can either be generated internally from the packet log file output by Cube Avenue, or supplied by the user in a general format converted from the output of another DTA tool.</td>
<td>12</td>
<td>400-599</td>
</tr>
<tr>
<td>QRSII</td>
<td>Yes. OD tables may be disaggregated from &quot;districts&quot; to &quot;zones&quot; using origin or destination factors. Factors may be input by the user or calculated automatically to best match traffic counts.</td>
<td>27</td>
<td>400-599</td>
</tr>
<tr>
<td>OmniTRANS</td>
<td>Support for OD table disaggregation on purposes, modes, time periods, user groups and custom user segments. Geographical disaggregation can be achieved through scripting. Disaggregated matrices are usable in static and dynamic model calculations.</td>
<td>less than 200</td>
<td>200-399</td>
</tr>
<tr>
<td>TransCAD</td>
<td>Yes, TransCAD supports a full range of disaggregation methods which can be done using the Matrix disaggregation utility or any user-written method.</td>
<td>25</td>
<td>1,000 or more</td>
</tr>
<tr>
<td>VISUM</td>
<td>VISUM offers static OD table disaggregation methods, matrices can be disaggregated on the fly as part of the model calculations. In addition, OD tables can be linked with time series in the Dynamic assignment environment to produce time varying OD tables.</td>
<td>14</td>
<td>400-599</td>
</tr>
</tbody>
</table>
### Urban Transportation Planning Software (continued)

<table>
<thead>
<tr>
<th>NAME OF SOFTWARE PROGRAM</th>
<th>MAIN STRENGTHS OF SOFTWARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emme</td>
<td>Emme provides a uniquely flexible, open approach to modeling that allows users the freedom to leverage established techniques or create new methods to address local needs, from simple 4-step models to the most complex multimodal travel demand models with feedback. Emme Modeler makes it efficient and fun to work with transportation forecasting models across the entire modeling life cycle. A modern component-based application framework provides a Toolbox structure to organize model procedures, utilities, or any other unit of processing into an open, extensible system that promotes understanding, experimentation, and design. Each Tool provides its own processing logic, a clean and refreshing user interface, and log book history. The Modeler frame work takes care of the rest, providing a seamless transition from interactive use to automation and component reuse. Removing much of the tedium of developing models from scratch. Virtually any model or application can be accommodated using 100+ tools provided out-of-the-box in the Emme Standard Toolbox. The Emme Standard Toolbox contains a comprehensive suite of tools to perform powerful network and matrix calculations, leading traffic and transit assignments, unmatched traffic and transit path analysis, the best demand adjustment framework, the only mathematically rigorous congested transit assignment procedures, efficient evaluation of choice models and trip chaining models, open and transactional data management and much more. Modeling matters, and the difference is always in the details. The Emme Logbook contains a reliable record of execution, and a way to review, revise or re-run any step, even weeks or months after it was run. For full model applications or more complex procedures involving many tools, the effects are often illuminating, clarifying even conditional logic that may vary from run to run. Because Modeler works the same whether interactive or scripted, the Logbook always matches the model results. The Logbook shows what actually happened, even errors, providing a degree of visual debugging without even opening model code. The Logbook is also useful for model communications and team collaboration, as it provides a visual representation of model flow and structure and reports, along with Emme Desktop maps, charts and tables recorded during execution. Furthermore, new workflows can be assembled from Logbook entries using the steps of different model runs. Emme Desktop offers a tremendously varied and complete template library for mapping, reporting and visualization, as well as network editing tools and analysis capabilities. Like other Emme tools, the Emme mapping framework provides transport professionals with the building blocks needed to extend and customize out-of-the-box templates so that they are always relevant for local use.</td>
</tr>
<tr>
<td>CUBE (TP+, OMNITRANS, TRIPS, MINUTP)</td>
<td>1. Total integration with the esri GIS platform, including both transit and roadway network editing with an embedded version ArcGIS. 2. No limit to the size or complexity of the modeled networks. 3. Flexible scenario management capable of managing and organizing an unlimited numbers of scenarios across an unlimited number of projects. 4. An intuitive flexclient-based interface for model building, editing, and management. 5. Cube is scalable to the needs of the user and organization, allowing model developers to deploy models with the right level of sophistication for their end-user audience. 6. A comprehensive and completely flexible scripting language for transportation modeling which is easily learned by non-programmers, yet robust, allowing more sophisticated computer programmers to extend the software and develop sophisticated capabilities. 7. A flexible Matrix Estimation system, capable of using data derived from different sources with optional independent quality factors associated with each data point. 8. A land-use modeling system that integrates Transportation with Land-Use and Land-Use with Transportation. 9. The ability to share data and analysis easily (such as exporting models to the cloud) offering unrivaled speed, scalability and ease of sharing results among stakeholders in the transportation planning process.</td>
</tr>
<tr>
<td>TransCAD</td>
<td>TransCAD is America’s most popular and capable planning software and the world’s only comprehensive and truly integrated GIS-based travel demand forecasting package. TransCAD is used by approximately two-thirds of all the MPOs in the U.S. that do modeling and is standard or predominant in a majority of states. It is also used extensively in Latin America, Europe, Asia, and throughout the world. TransCAD combines the broadest set of planning model procedures with the best GIS for transportation to supply all best practice methods. TransCAD is the only package that can be used easily and successfully by a wide range of users ranging from beginners to experts at modeling and analysis. It is used extensively by experts for GIS, database management, model application, model estimation, user interface development, and graphics. Can be used solely with menus, with provided push button or flowchart user interfaces or completely programmed with Caliper scripting language and other languages. TransCAD has superior algorithms for key modeling methods and especially public transit, and computes gravity models, highway skims, and traffic assignment solutions faster and with greater accuracy than other software. Multi-threading of key procedures enables TransCAD to produce remarkably fast results on the latest multi-core and multi-chip computers. New support for parallel processing and distributed processing more fully exploit the latest computer environments. TransCAD provides numerous alternative methods including those in other packages so TransCAD can clone models that reside in all other packages and generate results that can be compared. TransCAD has the most powerful and flexible scripting language and scripting tools. For each modeling method, including assignment, TransCAD has the full set of state-of-the-art and field-proven algorithms. Further, TransCAD has the most capable, flexible, easy-to-use, yet powerful and robust GIS capabilities. TransCAD is the only software that allows users to build complex, powerful custom modeling methods and workflows. Caliper has the largest technical support team of any planning software provider in North America and the fastest support request time. Caliper has trained more than 3000 planners and engineers in our courses in the last decade.</td>
</tr>
<tr>
<td>VISUM</td>
<td>VISUM is used in over 100 countries on 6 continents. Our industry-leading, truly multi-modal network data model is the backbone of VISUM. VISUM is a modern GIS-based Windows software, with exceptional visualization capabilities. The saving of all paths after high way and transit assignment allows for fast post-assignment analysis. VISUM’s Transit modeling capabilities are unmatched in the industry. Our integration with microsimulation and intersection capacity analysis tools are very strong. The Vision Suite (PTV Visum, and PTV Visum) development team pursues an aggressive research agenda, in an effort to make PTV Visum the most advanced (and recommended) platform for transportation modeling and analysis around the world. Finally, our dedicated team of transportation professionals offers high-quality customer service and industry-leading technical support.</td>
</tr>
</tbody>
</table>
REQUESTS FOR PROPOSALS

1. On-Call Transportation Planning and Engineering Services
   
   **Agency:** The Maryland-National Capital Park and Planning Commission
   
   **Deadline:** October 28, 2014, or before 11:00 a.m.
   
   **Contact:** Stephanie Scanio, e-mail: Stephanie.Scanio@mncppc.org
   
   **Website:** http://www.mncppc.org/Our_Departments/Central_Administrative_Services/Finance/Purchasing/Current_Solicitations.html
   
   **Description:** RFQ35-102 On-Call Transportation Planning and Engineering Services
   
   The Montgomery County Planning Department of the Maryland-National Capital Park and Planning Commission (“M-NCPPC” or “Commission”) is responsible for providing transportation planning technical services to the Montgomery County Government (“the County”) as well as the Montgomery County Planning Board. The Department is soliciting the qualifications of firms with expertise in transportation planning and engineering in a two-step process. The first step is requesting qualification statements/proposals from firms who have experience in Transportation Planning and Engineering Services and selecting and qualifying firms to proceed to step two. Step two will entail the actual solicitation of the tasks based upon the fees and qualifications submitted in step one, from the firms which qualify under step one.
   
   Pre-bid Date/Time/Location: October 14, 2014 at 2:00 p.m. at the Montgomery County Regional Office, 8787 Georgia Avenue, Planning Board Auditorium, Silver Spring, MD 20910.

2. General Planning Consulting Services
   
   **Agency:** Metropolitan Transit Authority of Harris County, Houston.
   
   **Deadline:** November 5, 2014, at 2 p.m.
   
   **Contact:** Alan P. Scanio, e-mail: alan.scanio@ridemetro.org
   
   **Website:** http://www.ridemetro.org/Opportunities/Procurement/solicitation.aspx?id=RFQ1400006
   
   **Description:** Solicitation Number: RFQ1400006
   
   General planning support services to assist with work related to the development of the METRO Transit Plan, including regional, corridor, and facility planning; conducting travel demand forecasting and model maintenance; and preparing Federal Transit Administration (FTA) New Starts submittals, environmental documents and other required documents for federal review and approval.
   
   The anticipated METRO Board meeting month for approval of a contract resulting from this solicitation will be forthcoming. It is the responsibility of the proposer to check METRO’s website for notices on the specific dates for METRO Board meetings. All proposers of this Solicitation and METRO hereby agree that this provision shall serve as the minimum required action by the proposer toward exercising due diligence in obtaining the results of this Solicitation. The requirement of approval by the METRO Board of Directors for any particular solicitation is dependent upon several factors. However, all proposers shall be required to check the METRO web site regarding whether or not the solicitation associated with their proposal requires approval by the METRO Board of Directors.

3. Urban Transiway Phase II / ITS Design and Construction Administration / Integrator
   
   **Agency:** City of Stamford
   
   **Deadline:** November 13, 2014
   
   **Contact:** Contact Barbara Gayle, tel. 203-977-4108, e-mail: bgayle@ci.stamford.ct.us
   
   **Website:** https://www.esbexchange.com/Solicitation.aspx?id=fae4d02d-9824-4a10-9a9f-937821a24e ad&uid=00000000-0000-0000-0000-00000000 0000&sid=54681
   
   **Description:**
   
   • Number RFQ #660
   • Categories of services: 2 Services - 2375 General Contractors; 2 Services - 2375 Transportation Services (Buses).

4. Long-Range Strategic Issues Affecting Preservation, Maintenance, and Renewal of Highway Infrastructure
   
   **Agency:** Transportation Research Board
   
   **Deadline:** November 25, 2014
   
   **Contact:** Amir N. Hanna; tel. (202) 334-1432, email: ahanna@nas.edu
   
   **Website:** http://apps.trb.org/cmsfeed/TRBNetProjectDis play.asp?ProjectID=3894
   
   **Description:**
   
   NCHRPR 20-83(03)A—Long-Range Strategic Issues Affecting Preservation, Maintenance, and Renewal of Highway Infrastructure
   
   Funds: $500,000
   
   Contract Time: 24 months
   
   This project is one of seven projects conducted to examine long-range strategic issues, both global and domestic, that will likely affect state departments of transportation (DOTs). These projects were selected based on the 2008 report, Long-Range Strategic Issues Facing the Transportation Industry, funded by the National Cooperative Highway Research Program (NCHRP). The objective of this project series is to provide guidance to state DOTs that will prepare them for possible futures that may emerge 30 to 50 years out so DOTs can act, rather than react. Six of these projects have been completed; reports are available on TRB Website (http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.aspx?ProjectID=2628). Work on the seventh project started under NCHRPR Project 20-83(03); interim reports on completed work are also available. This request for proposals—NCHRPR Project 20-83(03)A—is seeking researchers to design and implement a research plan, and develop guidance for transportation stakeholders to deal with long-range highway infrastructure maintenance, preservation, and renewal. This is in contrast to current research in similar subject areas that focuses primarily on improving and building on existing conditions to make advances. The project panel will be looking for a long-range vision in evaluating the submitted proposals. In addition, this request for proposals has been prepared to allow proposers flexibility in the design of a research plan.

5. Wayfinding Signage Master Plan
   
   **Agency:** The Village of Mamaroneck, New York
   
   **Deadline:** October 30, 2014, at 2 p.m.
   
   **Contact:** Mr. Samoff, email: dsamoff@vommy.org
   
   **Website:** http://www.village.mamaroneck.ny.us/Pages/MamaroneckNY_Bids/RFP%20-%20Wayfinding%20Signage%20Master%20Plan
   
   **Description:**
   
   The Village of Mamaroneck, New York (the “Village”) is issuing a Request for Proposal (RFP) from qualified vendors to develop a master Wayfinding signage program that:
   
   • Guides travelers from the area’s major highways to the Village’s key destinations (including parks, governmental buildings, tourist attractions, points of historical interest, etc.);
   
   • Guides travelers from the area’s major highways to Village’s municipal parking facilities;
   
   • Provide a unified theme for the Central Business District and Guide pedestrian travel within the Village of Mamaroneck and the Central Business District to various tourism, entertainment, shopping and dining destinations.

**NOTE:** If you wish to receive these and other RFP notices IN ADVANCE VIA THE INTERNET OR BY FAX, please call us at tel.(703)764-0512 for details.

**PUBLIC AGENCIES — RFP notices are published here FREE OF CHARGE — call (703)764-0512 for details and deadline.**
### CONFERENCES

<table>
<thead>
<tr>
<th>DATES</th>
<th>CONFERENCE AND SPONSOR</th>
<th>CITY</th>
<th>VENUE</th>
<th>MAIN TOPICS</th>
<th>WEBSITE /CONTACT INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 26-29</td>
<td>40th International Forum on Traffic Records &amp; Highway Information Systems</td>
<td>St. Louis, MO</td>
<td>Hilton St. Louis at the Ballpark</td>
<td>The Traffic Records Forum provides an opportunity for traffic records professionals of all disciplines and in all types of organizations to share their experiences, innovations, studies, technologies, etc. in presentations, sessions and conversations. The Forum program includes a keynote speaker, one or more plenary sessions of general interest to all attendees, and multiple break-out sessions, with additional training sessions preceding the Forum proper. Presentations are given on all types of traffic records/highway safety data, and may address such topics as Usage, Collection, Analysis, Current and Emerging Technologies, Current Systems and Programs, Research and Current Issues and Emerging Needs.</td>
<td><a href="http://www.trafficrecordsforum.org/">http://www.trafficrecordsforum.org/</a></td>
</tr>
<tr>
<td>Nov. 3-7</td>
<td>3rd International Conference on Connected Vehicles and Expo (ICCVE 2014), co-sponsored by the TRB</td>
<td>Vienna, Austria</td>
<td>Messe Wien</td>
<td>The conference is designed to provide a forum for all the relevant communities to exchange the latest advances on connected vehicles and discuss the implications on policy and economics. It also will promote and facilitate exchanges and collaborations between developed and developing countries.</td>
<td><a href="http://www.iccve.org/2014/">http://www.iccve.org/2014/</a></td>
</tr>
<tr>
<td>Nov. 18-22</td>
<td>National League of Cities Congress of Cities and Exposition</td>
<td>Austin, TX</td>
<td>Austin Convention Center</td>
<td>The conference is aimed at anyone interested in how cities are solving problems and becoming greater places to live. It is especially useful to mayors, council members, newly elected officials, city managers and municipal department heads. Although membership in the National League of Cities is not required to attend, representatives from member cities enjoy discounted registration. The conference will include innovative sessions, mobile workshops, inspiring keynote addresses, skill-building seminars and great opportunities to meet colleagues from across the country</td>
<td><a href="http://www.nlccongressofcities.org/">http://www.nlccongressofcities.org/</a></td>
</tr>
<tr>
<td>Nov. 21-24</td>
<td>American Association of State Highways and Transportation Officials (AASHTO) Annual Meeting</td>
<td>Charlotte, NC</td>
<td>The Westin Charlotte</td>
<td>The American Association of State Highway and Transportation Officials (AASHTO) Annual Meeting is one of the industry’s most important gatherings of transportation, government and commercial organizations. The Annual Meeting offers transportation executives the opportunity to network and share the latest in industry policies and innovations.</td>
<td><a href="http://www.aashtoannualmeeting.org/">http://www.aashtoannualmeeting.org/</a></td>
</tr>
<tr>
<td>Dec. 10-11</td>
<td>TRB’s 8th University Transportation Center Spotlight Conference on the Role of Transportation in Economic Competitiveness</td>
<td>Washington, DC</td>
<td>The Keck Center of the National Academies</td>
<td>The conference will focus on the role of freight supply chains, transportation system resiliency, and changing energy markets in terms of national economic competitiveness. The event will be designed to identify roles that university transportation research programs may have in developing new tools and concepts to enhance the nation’s economic competitiveness.</td>
<td><a href="http://www.trb.org/Calendar/Blurbs/170428.aspx">http://www.trb.org/Calendar/Blurbs/170428.aspx</a></td>
</tr>
</tbody>
</table>

N/A = Not Available; m = member; nm = non-member. To list your transportation conferences here FREE, send all information as above to: The UTM Conference Dept., P.O. Box 12300, Burke, VA 22009-2300, or call (703) 764-0512, or fax (703) 764-0516, or email: editors@lawleypublications.com.
<table>
<thead>
<tr>
<th>DATES</th>
<th>CONFERENCE AND SPONSOR</th>
<th>CITY</th>
<th>VENUE</th>
<th>MAIN TOPICS</th>
<th>WEBSITE /CONTACT INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 10-12</td>
<td><strong>TPMDC-2014 -- International Conference on Transportation Planning &amp; Implementation Methodologies for Developing Countries</strong></td>
<td>Powai, Mumbai, India</td>
<td>Indian Institute of Technology Bombay</td>
<td>The conference is being organized by the Transportation Systems Engineering group at the Indian Institute of Technology Bombay. TPMDC will serve as a platform to share transportation-related findings more relevant to developing countries, though work more relevant to developed countries may also be presented at the conference. Conference themes will include Transportation Planning, Traffic Operations and Pavements.</td>
<td><a href="http://www.itiitb.ac.in/">http://www.itiitb.ac.in/</a></td>
</tr>
<tr>
<td>Dec. 13-15</td>
<td><strong>19th International Conference of Hong Kong Society for Transportation Studies</strong></td>
<td>Hong Kong</td>
<td>N/A</td>
<td>The conference is being jointly organized by the Hong Kong Society for Transportation Studies and the Department of Civil and Environmental Engineering at Hong Kong Polytechnic University. Topics may include Transportation Infrastructure and Built Environment; Sustainability Issues in Transportation; Transportation Surveys; Travel Behavior Modeling; Technology, Transportation and Telecommunications; Logistics and Supply Chain Management; and Transport Dynamics.</td>
<td><a href="http://home.netvigator.com/~hksts/conf.htm">http://home.netvigator.com/~hksts/conf.htm</a></td>
</tr>
<tr>
<td>Jan. 7-9</td>
<td><strong>National Committee on Uniform Traffic Control Devices (NCUTCD) Winter Meeting</strong></td>
<td>Arlington, VA</td>
<td>Hilton Crystal City Hotel</td>
<td>The technical committees will be meeting during the afternoon and evenings of Wednesday and Thursday and the NCUTCD Council will meet Thursday and Friday mornings.</td>
<td><a href="http://www.ncutcd.org/">http://www.ncutcd.org/</a></td>
</tr>
<tr>
<td>Jan. 11-15</td>
<td><strong>Transportation Research Board (TRB) 94th Annual Meeting</strong></td>
<td>Washington, DC</td>
<td>Walter E. Washington Convention Center</td>
<td>The spotlight theme for the 2015 TRB Annual Meeting is Corridors to the Future: Transportation and Technology. A number of sessions and workshops will focus on this theme. The meeting program covers all transportation modes, with more than 4,500 presentations in nearly 800 sessions and workshops addressing topics of interest to all attendees -- policy makers, administrators, practitioners, researchers, and representatives of government, industry and academic institutions. The information-packed program is expected to attract 12,000 transportation professionals from around the world.</td>
<td><a href="http://www.trb.org/AnnualMeeting2015/AnnualMeeting2015.aspx">http://www.trb.org/AnnualMeeting2015/AnnualMeeting2015.aspx</a></td>
</tr>
<tr>
<td>March 9-11</td>
<td><strong>2015 Design-Build in Transportation Conference, sponsored by the Design-Build Institute of America</strong></td>
<td>San Antonio, TX</td>
<td>Henry B. Gonzalez Convention Center</td>
<td>The Design-Build in Transportation Conference is the world’s only event dedicated to enhancing the use and delivery of design-build in the transportation sector. Nearly 900 key players and decision-makers from industry will take part in the conference educational programs and networking events -- all geared towards teaching them how to save time, save money, and increase the quality of our nation’s construction projects.</td>
<td><a href="http://www.dbia.org/conferences/transportation/Pages/default.aspx">http://www.dbia.org/conferences/transportation/Pages/default.aspx</a></td>
</tr>
<tr>
<td>March 22-25</td>
<td><strong>Institute of Transportation Engineers (ITE) 2015 Technical Conference and Exhibit</strong></td>
<td>Tucson, AZ</td>
<td>Westin La Paloma</td>
<td>Program details not yet available, however, the event will showcase the latest in ITS and transportation software and applications, signal information systems and reliability products in the logistics &amp; transportation industry.</td>
<td><a href="http://www.ite.org/">http://www.ite.org/</a></td>
</tr>
</tbody>
</table>

N/A = Not Available; m = member; nm = non-member. To list your transportation conferences here FREE send all information as above to: The UTM Conference Dept., P.O. Box 12300, Burke, VA 22009-2300, or call (703) 764-0512, or fax (703) 764-0516, or email: editors@lawleypublications.com.
<table>
<thead>
<tr>
<th>DATES</th>
<th>CONFERENCE AND SPONSOR</th>
<th>CITY</th>
<th>VENUE</th>
<th>MAIN TOPICS</th>
<th>WEBSITE /CONTACT INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 13-15</td>
<td>The 7th International Symposium on Travel Demand Management</td>
<td>Tucson, AZ</td>
<td>Hilton Tucson El Conquistador Golf &amp; Tennis Resort</td>
<td>The goal of this conference is to connect the domestic and international TDM research and practice communities to spark ideas that inspire the present and future direction of TDM in urban mobility. The conference will feature both an academic track and an industrial track and provide more than two days of intellectual exchange, best practice sharing and networking with leading TDM researchers and professionals. This is the first time this conference will be held in the U.S</td>
<td><a href="http://www.tdmsymposium.org/">http://www.tdmsymposium.org/</a></td>
</tr>
<tr>
<td>April 14-15</td>
<td>Kansas Transportation Engineering Conference, sponsored by the Kansas State University Transportation Center, Kansas Department of Transportation and others</td>
<td>Manhattan, KS</td>
<td>Kansas State University Student Union</td>
<td>Details not yet available.</td>
<td><a href="http://www.dce.k-state.edu/conf/transportation/">http://www.dce.k-state.edu/conf/transportation/</a></td>
</tr>
<tr>
<td>May 10-13</td>
<td>4th International Choice Modeling Conference (ICMC), hosted by the Center for Transportation Research at the University of Texas at Austin and Resource Systems Group</td>
<td>Austin, TX</td>
<td>AT&amp;T Hotel and Conference Center at the University of Texas at Austin</td>
<td>The International Choice Modeling Conference brings together leading researchers and practitioners from across different areas of study, with presentations looking both at the state of the art methodology as well as innovative real world applications of choice models. Following on from the success of the third Conference held in Sydney in 2013, the fourth International Choice Modeling Conference will be organized jointly by the Center for Transportation Research (CTR) at The University of Texas at Austin and Resource Systems Group, Inc. (RSG).</td>
<td><a href="http://www.icmconference.org.uk/index.php/p/icmc/ICMC2015">http://www.icmconference.org.uk/index.php/p/icmc/ICMC2015</a> or Contact: Chandra Bhat - <a href="mailto:bhat@austin.utexas.edu">bhat@austin.utexas.edu</a> or Thomas Adler - <a href="mailto:tom.adler@rsginc.com">tom.adler@rsginc.com</a></td>
</tr>
<tr>
<td>May 17-21</td>
<td>TRB's 15th National Transportation Planning Applications Conference</td>
<td>Atlantic City, NJ</td>
<td>Sheraton Atlantic City</td>
<td>Every other year since 1987, hundreds of transportation planners from around the country and abroad have gathered to celebrate their successes, lament their challenges, and share their experiences at TRB's National Transportation Planning Applications Conference. The conference will cover a host of transportation planning topics that demonstrate applications, procedures, techniques, experiences and/or provide insight that may be of use to practitioners.</td>
<td><a href="http://www.trbappcon.org/">http://www.trbappcon.org/</a></td>
</tr>
<tr>
<td>May 26-29</td>
<td>International Conference on Public-Private Partnerships</td>
<td>Austin, TX</td>
<td>University of Texas at Austin</td>
<td>This will be the second in a series of international conferences on public-private partnerships (PPPs), building on the 2013 conference organized by the Dalian University of Technology in China and The University of Texas at Austin. ICPPPP2015 is intended to cover a wide range of topics related to PPPs ranging from policy to engineering, and economics to legal issues. Examples of the main themes include, but are not limited to: Financing Policies, Financial Viability and Risk Analysis of PPP Projects, Design, Construction, Operation, and Management of PPP Infrastructure Projects and Legal Issues Related to PPPs.</td>
<td><a href="http://www.trb.org/Calendar/Blurb/169382.aspx">http://www.trb.org/Calendar/Blurb/169382.aspx</a></td>
</tr>
<tr>
<td>June 8-10</td>
<td>2015 UITP World Congress &amp; Exhibition</td>
<td>Milan, Italy</td>
<td>MiCo - Milano Congressi</td>
<td>Politicians, transport CEOs and urban visionaries from around the world will convene to discuss the challenges facing public transport: dealing with growing urbanization; liberating cities from congestion; offering better quality services; finding alternative funding, reacting to changing customer needs and more. The Exhibition will present and demonstrate the very latest innovative products and solutions from the world’s leading manufacturers and the emerging trends set to shape the future of urban mobility in the years to come.</td>
<td><a href="http://www.uiotpilan2015.org/">http://www.uiotpilan2015.org/</a></td>
</tr>
<tr>
<td>DATES</td>
<td>CONFERENCE AND SPONSOR</td>
<td>CITY</td>
<td>VENUE</td>
<td>MAIN TOPICS</td>
<td>WEBSITE / CONTACT INFO</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Summer 2015</td>
<td>TRB’s Second International Conference on Public-Private Partnerships</td>
<td>Austin, TX</td>
<td>University of Texas at Austin</td>
<td>The conference will be designed to cover a wide range of topics related to public-private partnerships (PPPs), including how to use pavement management systems data to facilitate various analyses related to PPPs. In addition, the conference will cover financing policies; financial viability and risk analysis of PPP projects; design, construction, operation, and management of PPP infrastructure projects; and legal issues related to PPPs.</td>
<td><a href="http://www.icppp2015.org/">http://www.icppp2015.org/</a></td>
</tr>
<tr>
<td>June 22-24</td>
<td>5th International Symposium on Highway Geometric Design</td>
<td>Vancouver, Canada</td>
<td>Fairmont Waterfront hotel</td>
<td>Held every five years, the aim of the Symposium is to encourage the continuous improvement of highway geometric design. The theme of this conference, which is being organized by the Transportation Research Board, Transoft Solutions and the University of British Columbia, is “Safe and Efficient Design for the 21st Century.” It will include presentations and workshops on urban and rural roadway geometric design research and practice.</td>
<td><a href="http://www.ishgd2015.net/">http://www.ishgd2015.net/</a></td>
</tr>
<tr>
<td>June 29-July 2</td>
<td>International Parking Institute (IPI) Conference and Expo</td>
<td>Las Vegas, NV</td>
<td>Mandalay Bay Resort &amp; Convention Center</td>
<td>The IPI Conference and Expo is the largest educational and networking event for parking and transportation professionals in the world. Traditionally, more than 2,800 attendees gather for the four days for meetings, keynotes, leadership discussions, networking awards, special events, tours of parking facilities and an exhibit hall with more than 235 exhibitors.</td>
<td><a href="http://www.parking.org/meetings--events/ipi-conference--expo.aspx">http://www.parking.org/meetings--events/ipi-conference--expo.aspx</a></td>
</tr>
<tr>
<td>Nov. 15-17</td>
<td>National Light Rail Conference: Light Rail Transit and Streetcars: Mobility Partners in the Evolving Metropolitan Environment, sponsored by the TRB and the American Public Transportation Association</td>
<td>TBD</td>
<td>TBD</td>
<td>The conference is designed to explore the latest issues and trends in light rail research and practice related to planning, design, construction, and operations and maintenance. The theme of the conference is the role of light rail in providing mobility in the evolving international metropolitan environment.</td>
<td><a href="http://www.trb.org/Calendar/Blurbs/169859.aspx">http://www.trb.org/Calendar/Blurbs/169859.aspx</a></td>
</tr>
<tr>
<td>2016</td>
<td>International Parking Institute (IPI) Conference and Expo</td>
<td>Nashville, TN</td>
<td>N/A</td>
<td>The IPI Conference and Expo is the largest educational and networking event for parking and transportation professionals in the world. Traditionally, more than 2,800 attendees gather for the four days for meetings, keynotes, leadership discussions, networking awards, special events, tours of parking facilities and an exhibit hall with more than 235 exhibitors.</td>
<td><a href="http://www.parking.org/meetings--events/ipi-conference--expo.aspx">http://www.parking.org/meetings--events/ipi-conference--expo.aspx</a></td>
</tr>
</tbody>
</table>

N/A = Not Available; m = member; nm = non-member. To list your transportation conferences here FREE send all information as above to: The UTM Conference Dept., P.O. Box 12300, Burke, VA 22009-2300, or call (703) 764-0512, or fax (703) 764-0516, or email: editors@lawleypublications.com.