Aimsun

19th-21st September 2016

14th Aimsun Users' Meeting
& Training Course

Athens

TSS TRANSPORT
SIMULATION
SYSTEMS

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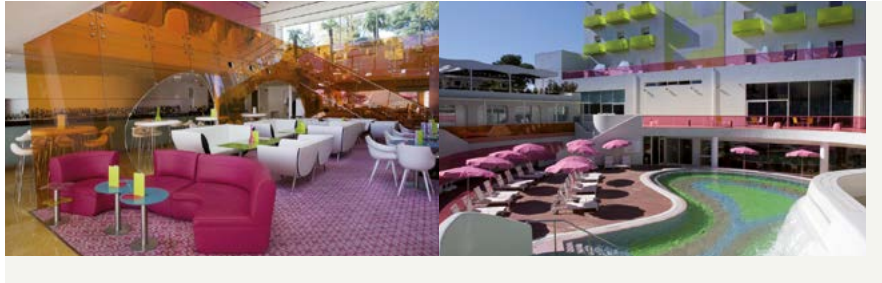
EVENT SUMMARY

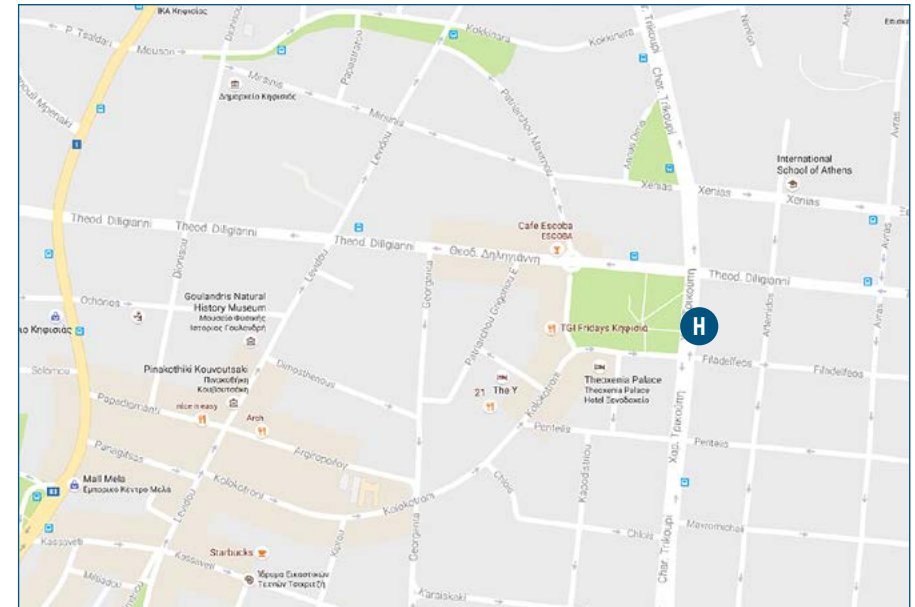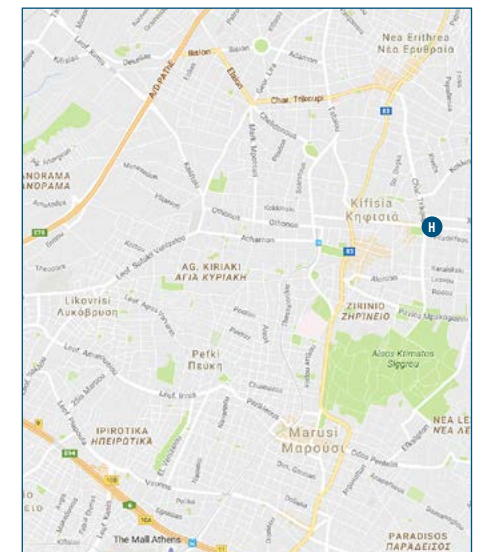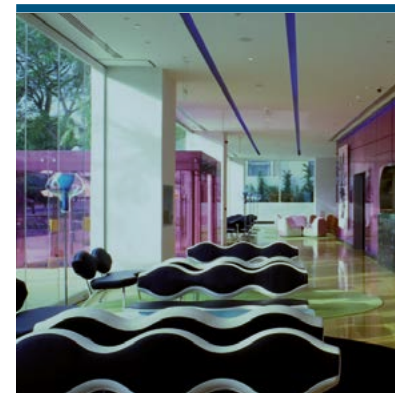|	
Monday 19th September	TSS sessions, expert panel and case studies Omni Meeting Room, Semiramis Hotel 09:00 - 18:00 Cocktail dinner Terrace, Semiramis Hotel 20:00 – 23:00
Tuesday 20th September	User presentations Omni Meeting Room, Semiramis Hotel 09:00 – 16:30
Wednesday 21st September	Aimsun Training Course Omni Meeting Room, Semiramis Hotel 09:00 - 18:00

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TSS TRANSPORT SIMULATION SYSTEMS

DAY 1 - MONDAY 19th SEPTEMBER

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09:00 - 09:15	Registration
09:15 - 09:30	Welcome and opening remarks / Alex Gerodimos, TSS
09:30 - 11:15	Aimsun around the world / Chair: Omid Ejtemai, TSS / Regional presentations from Karen Giese, North America / Dave Keenan, Asia-Pacific / Pete Sykes, UK / Josep Mª Aymamí, Spain and South America / Aurore Remy, France and Russia
	Refreshment break
11:30 - 12:00	Traffic simulation in the era of connected and autonomous vehicles / Alex Gerodimos and Paolo Rinelli, TSS
12:00 - 12:30	Advances in Aimsun / Jordi Casas, David Garcia, Paolo Rinelli, TSS
12:30 - 13:30	Panel discussion: The future of modelling mobility / Chair: Costi Rentzos, MHC Traffic Ltd., UK / Børge Bang, Norwegian Public Roads Administration, Norway / Wai Cheung, City of Edmonton, Canada / Vladimir Vorotovic, Transport for London, UK
	Lunch
15:00-15:30	The San Diego County-wide Aimsun mesoscopic model: progress and pitfalls / Pascal Volet, WSP	Parsons Brinckerhoff
15:30-16:00	Calibration of Aimsun's mesoscopic gap-acceptance model with delay time as measure of performance / Torbjørn Birkeland, Asplan Viak
16:00-16:30	Applying a congestion pricing framework in Athens city centre / Ilias Gkotsis, National Technical University of Athens
	Refreshment break
16:45-17:30	Two Aimsun case studies - in depth / Alexandre Torday, TSS

DAY 2 - TUESDAY 20th SEPTEMBER

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09:00-09:30	Mesoscopic and microscopic real driving emission models for Aimsun / James Tate, ITS Leeds
09:30-10:00	Aimsun and the production line / Danie Venter, 4in1 Simulations
10:00-10:30	Evaluation of the impact and applicability of cooperative intelligent transport systems in urban road networks / Evangelos Mintsis, Centre for Research and Technology Hellas – Hellenic Institute of Transport
	Refreshment break
11:00-11:45	Enhancing sustainable urban mobility in Papagou – Cholargos municipality & Using Aimsun to model three grade-separated intersections in Gaborone, Botswana / Eleni Papatzikou, NAMA Consulting Engineers and Planners SA
11:45-12:15	Public transport in Aimsun: A method for automatic coding and updating of public transport lines / Mattias Stridh, Sweco Norge AS
12:15-12:45	Integration of pedestrian and traffic modelling for major events – the case of the Gold Coast 2018 Commonwealth Games / Eduardo Lazzarotto, Legion
12:45-13:00	The "YMCA" node in Thessaloniki: modelling alternative upgrades for a major intersection. / Georgios Barmpas & Aristomenis Kopsacheilis, Aristotle University of Thessaloniki
13:00-13:15	Selfish routing and the price of anarchy: evidence from a large-scale urban road network. / Emmanouil Ph. Kampitakis, National Technical University of Athens
	Lunch
14:30-15:00	Data collection and preparation for traffic modelling in Aimsun / Carlos Suárez, Vectio
15:00-15:30	CSI: Aimsun / Ken Fox, Fox Traffic Simulation, UK
	Refreshment break
15:45-16:30	Open discussion of user requirements / Chair: Paolo Rinelli / Jordi Casas / David Garcia
16:30	**Closing remarks and end of meeting**

DAY 3 - WEDNESDAY 21st SEPTEMBER

AIMSUN TRAINING COURSE

NEW FEATURES IN AIMSUN 8.2
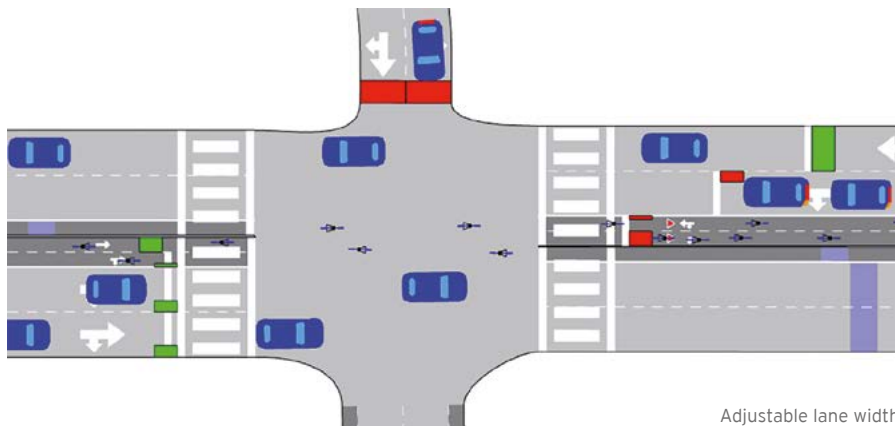
Adjustable lane width
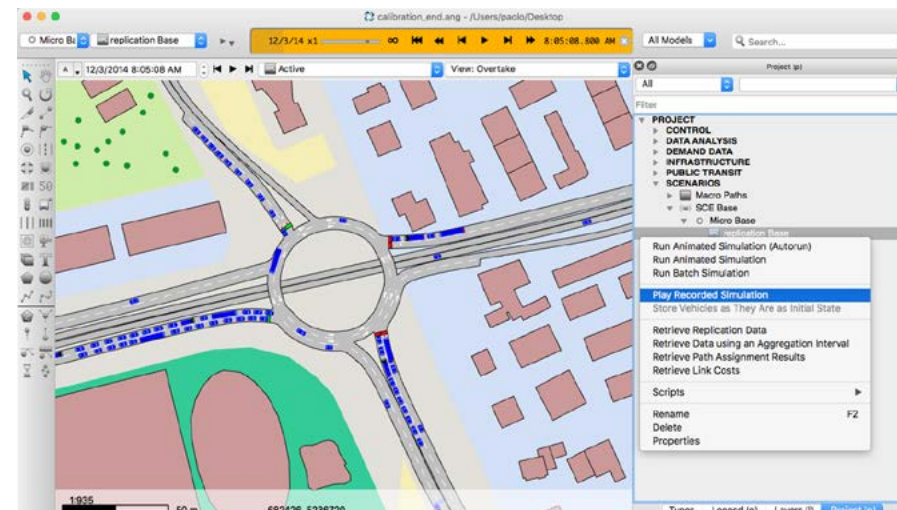
Simulation Recorder & Player

COURSE TUTOR:
Paolo Rinelli

The aim of this course is to familiarise participants with the new features in Aimsun 8.2.

Each topic will be supported by practical, hands-on exercises and we'll finish up, as always, with plenty of time for questions and answers.

TRAINING TOPICS WILL INCLUDE:

1. Dynamic OD adjustment

2. Transit assignment with crowding

3. New options for DUE assignment

4. In-depth RGap analysis

5. Signal timings and node conflicts at macroscopic level

6. Simulation recorder and player

SCHEDULE

09:00-11:00	Morning session
	Coffee break
11:15-13:30	Morning session continued
	Lunch
14:30-16:00	Afternoon session
	Coffee break
16:15-18:00	Afternoon session continued

TRAINING COURSE PARTICIPANTS:

Please note that you must bring your own laptops. Computers will not be provided.

TSS TRANSPORT SIMULATION SYSTEMS

Abstracts of presentations by Aimsun users and TSS technical partners

The San Diego County-wide Aimsun mesoscopic model: progress and pitfalls

Pascal Volet, WSP | Parsons Brinckerhoff

This presentation takes a look at progress and pitfalls of the Aimsun mesoscopic model of the whole of San Diego County.

This ambitious integration of mesoscopic DTA with ABM is among the first projects out of the gate in this developing area. Data issues have considerably slowed its progress, as other MPOs in Chicago, Columbus and Atlanta are now progressing towards ABM/DTA integration; however, this is the first ABM/DTA project to use Aimsun.

Before ABM integration could take place, the first phase of the project was network creation and DTA calibration and validation: this consisted of creating an automated replicable process to extract data from GIS and signal timing databases to create the Aimsun network: 57,000 sections and close to 19,000 intersections, of which 3,600 are signalized (not including ~320 ramp meters). Then, network verification used a stepwise method: first debugging city wide geometries and signal timings, then five large subareas and finally the whole county, by five time periods (early AM, AM, midday, PM, night). The 24h county-wide assignment of 3.1M people and 9M vehicle trips is the ultimate goal. The validation and calibration was done using mainly readily available freeway count data (PeMS) and INRIX speeds for the rest of the arterial network.

Calibration of Aimsun's mesoscopic gap-acceptance model with delay time as measure of performance

Torbjørn Birkeland, Asplan Viak

Experience with mesoscopic traffic models in Norway suggests that behaviour models need to be calibrated in order to achieve a correct traffic assignment. This study gathered data from three separate intersections in Trondheim, Norway: a signalised intersection; a roundabout and a give-way ramp, in order to calibrate Aimsun's mesoscopic gap-acceptance model.

Delay time was used as the measure of performance because of its importance in Aimsun's dynamic traffic assignment. The signalised intersection was used to find a global value for the Reaction Time that gave compliance with the estimated delay and saturation flow rate. This Reaction Time was then used as a basis when calibrating the gap-acceptance parameters in the roundabout and give-way ramp.

The analysis suggests that the default gap-acceptance parameters simulate delay times very close to the observed values in the roundabout when the Reaction Time was defined. However, in the left turn in the give-way ramp with a larger measured critical gap, the default values for the Initial and Final Safety Margins simulated a delay time that was too low, suggesting that these parameters should be set higher for turns with a high estimated critical gap.

Applying a congestion pricing framework in Athens city centre

Ilias Gkotsis

National Technical University of Athens

A popular remedial measure against traffic congestion worldwide is congestion pricing: imposing fees on drivers who want to access certain city areas during particular time periods.

A dynamic tolling system as a part of a proposed cordon-based congestion pricing scheme for the Athens road network is under consideration as a possible management measure to mitigate the negative impacts of traffic congestion. The preliminary evaluation of the framework was established through a macroscopic approach, whereas the latest assessment is currently using dynamic traffic assignment (DTA). A dedicated API is triggered by traffic measurements (of volume and occupancy), produced by integrated sensors operating in real time. These indicators produce a weighted cost, which is then implemented at the entry points, affecting path calculation and selection.

In order to define congestion pricing rules, three thresholds have been defined, based on previously documented research in the specific area, with a different toll price, which is derived from the results of the field survey. Each toll price has been translated in time, based on the value of time for the Athens network users. This is implemented in a stochastic route choice model in order to evaluate the impacts of the congestion pricing policy through the simulation of the alternative scenarios.

Mesoscopic and microscopic real driving emission models for Aimsun

James Tate

Institute for Transport Studies (ITS), University of Leeds

The impact of poor air quality on health is a growing concern across the globe. The continuing #dieselgate scandal has highlighted how little we know about the dominant source of the air quality problem in urban areas: road transport.

If policy makers are to develop effective interventions, they need robust evidence and tools. Traffic simulators coupled to vehicle emission models can test and help improve the design of policies to reduce emissions. Unfortunately the default emission models in most traffic simulation packages are often out of date and fail to reflect Real Driving Emissions (RDE) and the current age/ mix of vehicle types and powertrains.

This talk will present two new vehicle emission models being integrated into Aimsun: the first is for mesoscopic simulations, the second for miscrosimulation. The mesoscopic vehicle emission model is fundamentally different to widely applied models such as the European models COPERT and HBEFA, which allows it to reliably predict Real Driving Emissions for short links and low speeds. This talk will also present the microscopic fast instantaneous emission model for European passenger cars, vans and trucks that has been coded into an Aimsun API, in addition to the validation of the model against laboratory measurements. It is hoped that these advancements will make vehicle emission models more accessible to Aimsun users and help us clean the air in our cities.

Aimsun and the production line

Danie Venter, 4in1 Simulations

As part of the development of a Roads Master Plan for the Ekurhuleni Metropolitan Municipality (EMM), ten areas required in-depth investigation. Different land use contributes to each area's different characteristics; these land uses include residential, commercial, industrial, central business districts and low density residential. The driving forces behind investigation of these areas included an urban renewal project, local spatial development framework, densification initiatives, applications for development and proposed road network upgrades and improvements.

The work involved for each of these areas consists in developing and calibrating an Aimsun model linked to a strategic demand model for the EMM. This was followed by testing the impact of the proposed initiatives on the current road network and testing the proposed road upgrades and improvements. Lastly projects were identified and their cost calculated.

The challenge was to accommodate this work at a time when the workload was already high. A production line approach was followed where different individuals did specific work on each model, passing the model onto the next person once their specific part was completed. This production line approach made it possible to complete the models in a shorter time compared to previous approaches and it even created time slots to accommodate additional projects.

Evaluation of the impact and applicability of cooperative intelligent transport systems in urban road networks

Evangelos Mintsis, Centre for Research and Technology Hellas - Hellenic Institute of Transport

Cooperative Intelligent Transport Systems (C-ITS) present the current intermediate stage between conventional Intelligent Transport Systems (ITS) and automated systems of the future. Since the advancements in communication technologies have progressed and provide mature solutions for efficiently communicating messages between vehicles and the road infrastructure, attention is placed on the understanding of the capabilities offered by the existence of such information and their optimal exploitation towards improved and more efficient transport operations.

The Energy Efficient Intersection Service (EEIS) comprises the day one application of C-ITS, utilizing the SPAT (Signal Phase and Timing) message communicated by the roadside infrastructure to the vehicle in order to provide energy efficient speed advice to drivers. This present study assesses the applicability and performance of a speed advice algorithm, which has been simulated in Aimsun with the use of an Aimsun API. A detailed microscopic simulation model of the city of Thessaloniki, Greece, has been also developed in Aimsun and is utilized to assess the impact of the EEIS under various traffic demand and users' penetration levels.

NAMA

Eleni Papatzikou,
NAMA Consulting Engineers and Planners SA

Enhancing sustainable urban mobility in Papagou – Cholargos Municipality

The Municipality of Papagou-Cholargos is a recent merge of two adjoining municipalities just outside Athens. In an effort to enhance sustainable urban mobility in the region, NAMA evaluated current conditions, identified problems and developed alternative scenarios, which were evaluated using Aimsun microsimulation of specific areas to estimate relevant data for the calculation of key performance indices.

NAMA was then able to present the City Council with an enhanced visualisation of the proposed solutions during the selection process.

Using Aimsun to model three grade-separated intersections in Gaborone, Botswana

In an effort to improve traffic flow and road safety in the city of Gaborone, the Ministry of Transport and Communications in Botswana adopted the recommendations of the Greater Gaborone Multimodal Transportation Study; these comprise upgrades to three major at-grade intersections along the main Western Bypass traffic corridor.

After survey, analysis, and estimation of current traffic demand and forecast traffic growth for the next 25 years, NAMA developed five geometrical designs for each intersection, including at-grade and grade-separated options of two or three levels. This presentation describes our use of the Analytical Hierarchy Process (AHP) to compare options for the three intersections. The AHP is a method for converting subjective assessments of relative importance into overall scores and weight, with performance criteria including transportation measures and effectiveness produced through the Aimsun microsimulation model.

SWECO

Public transport in Aimsun: a method for automatic coding and updating of public transport lines

Mattias Stridh, Sweco Norge AS

At Sweco, we have designed a method for linking up public transport data from the Oslo region public transport provider (Ruter) to our Aimsun models that we develop within the area. We have currently used this method successfully on two of our Aimsun models.

This presentation focuses on the strength of Aimsun when it comes to using the Python interface in order to read input data, process data, and automatically create objects in Aimsun with minimal work. We will show how using Python can save not only time but also take the model to a higher level of detail. Under normal circumstances, this would not be possible using manual editing due to time constraints.

The method is based on exporting large datasets from existing databases from the systems that Ruter uses, storing it on a readable format, processing it with Aimsun/Python, and automatically creating a complete PT network in Aimsun. There are also some manual steps required for this process to work. Our presentation will show which the manual steps are, how we have designed the system, the general strategy for linking the data, and what results we can achieve.

Integration of pedestrian and traffic modelling for major events – the case of the Gold Coast 2018 Commonwealth Games

Eduardo Lazzarotto, Legion

The 2018 Commonwealth Games will be held on the Gold Coast, Queensland, Australia, from 4th to 15th April 2018. One of the key technical aspects of Gold Coast City's successful bid was the fact that 80% of the planned venues already exist, most within 20 minutes' drive of the Athletes' Village in Parkwood. The City of Gold Coast and the Queensland Department of Transport and Main Roads are using both Legion and Aimsun to test the different venues and plans for the event.

Pedestrian and traffic modelling are key tools for delivering successful events, particularly as major events, such as World Cups, Olympic Games and expos grow bigger with every edition. Aside from important topics such as legacy, austerity and safety, a major concern for the organisers is the public experience: host cities are usually large and already face the usual issues of congestion and crowded public transport, so it is important that city councils and delivery authorities have access to a shared, transparent and accountable platform where ideas can be tested. Models are the best answer to this need.

Legion focusses on understanding how people interact with infrastructure. Our software simulates and analyses the step-by-step movement of pedestrians across all kinds of public facilities, such as rail and metro stations, bus terminals, airports, sports and leisure venues and public buildings. The ultimate goal is to optimise the flow of people and the efficient use of physical space: a goal that has a dramatic impact on costs and revenues associated public facilities as well as safety and the quality of service for final users.

The "YMCA" node in Thessaloniki: modelling alternative upgrades for a major intersection

Georgios Barmpas & Aristomenis Kopsacheilis, Aristotle University of Thessaloniki

This study uses Aimsun microsimulation to propose and analyse alternative design infrastructure scenarios for a congested signalised intersection. The scenarios include the construction of an underground bypass as well as a set of traffic management interventions. The team analysed the applicability of the proposed scenarios and then evaluated them with Aimsun microsimulation, using a video of the AM peak plus in-situ measurements to model and calibrate the existing situation. The main traffic indicators taken into account for calibration and validation were: GEH index; mean section queue length per 15-min interval; traffic volume per 15-min interval; and average travel time. The final phase of the study examined the scenarios in terms of financial effectiveness and sustainability.

Selfish routing and the price of anarchy: evidence from a large-scale urban road network

Emmanouil Ph. Kampitakis, National Technical University of Athens

The Price of Anarchy (PoA) is a well-known concept from algorithmic game theory that quantifies the inefficiency of selfish behavior. The goal is to establish the concept of Price of Anarchy as a metric in urban traffic management strategies such as route guidance strategies and to investigate its effectiveness in the reduction of traffic congestion due to selfish behavior.

The team modelled the Athens inner ring road in Aimsun and estimated the Price of Anarchy for different demand levels. We found a measurable inefficiency due to selfish behaviour, which, while numerically small, could have significant financial and environmental impact. From a topological point of view, the investigation of the PoA properties of real road networks, could offer a better understanding of the opportunities for route guidance systems.

Data collection and preparation for traffic modelling in Aimsun

Carlos Suárez, Vectio

The first step in simulation is data collection. The way traffic data (inputs) is collected determines results of the simulation (outputs), just as the reliability of traffic analysis results depends on the accuracy and quality of the data used.

Data needs to be collected in a way that meets the goal of the analysis. Data collection should be categorized, homogenised and presented from what is available from existing sources and complemented with field-measures using appropriate technologies.

Traditional techniques such as radar, pneumatic tubes or loop counters are limited to counting and classifying in the section where they are installed even though this does not cover the simulation area. Looking forward to future needs, Vectio focuses on data collection using artificial vision technology, meaning we can capture longer scenarios, from roundabouts to complex intersections over 2 kilometres. Moreover, field measurements with cameras provide more factors than counts; they can classify time reactions, lane selections and speed along the controlled section in order to obtain data to calibrate and validate our model.

This presentation covers how data is captured, processed and input into Aimsun models at both the macroscopic and microscopic level, showing models of different scenarios, including heavy congestion.
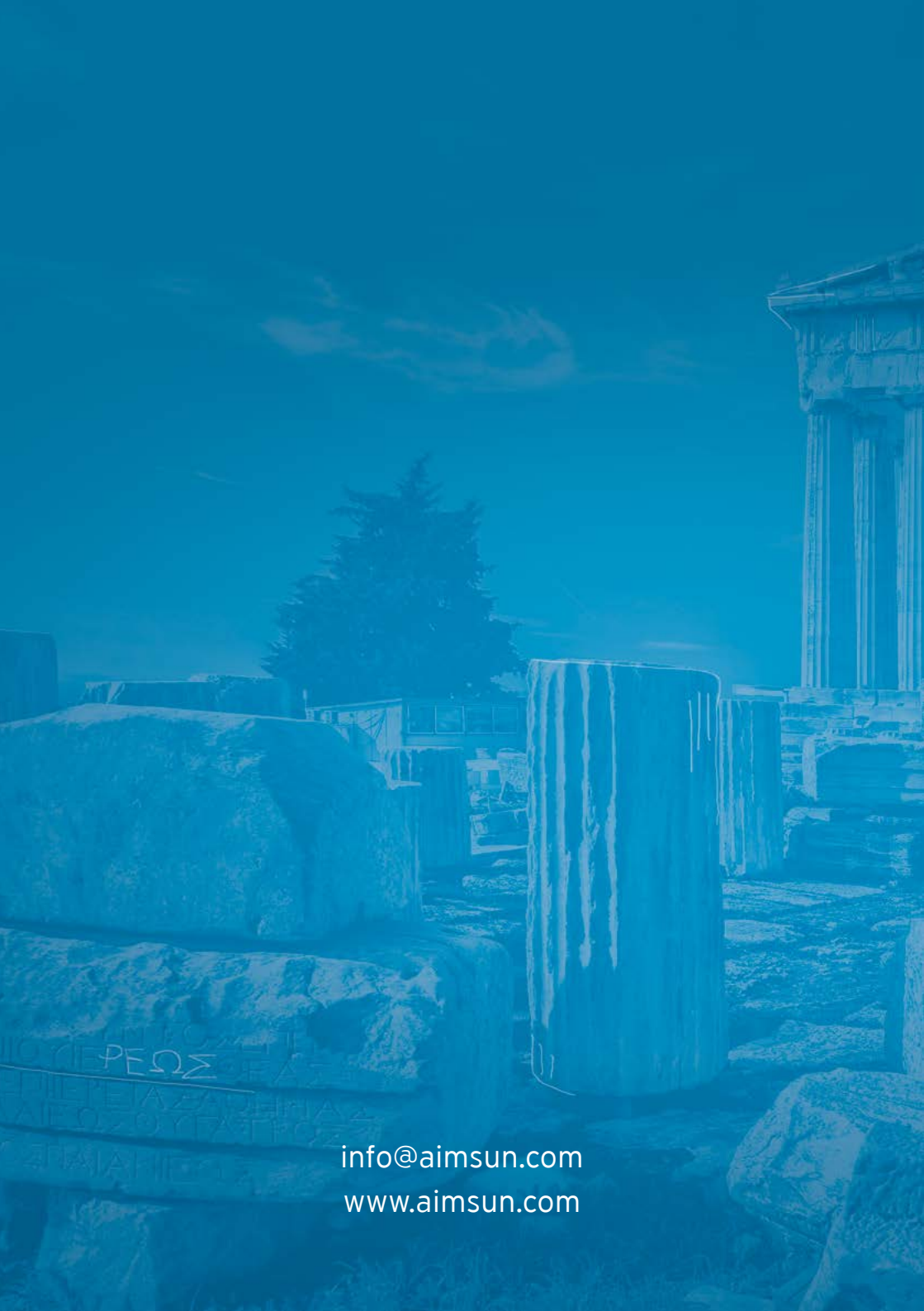
CSI: Aimsun

Ken Fox, Fox Traffic Simulation

I recently received an unusual request. This client had been out driving and had been stopped by the police and charged with dangerous driving. However, this came as a surprise to them as they weren't aware of having done anything wrong.

The police gave my client a statement describing the dangerous manoeuvre that they had supposedly made. The description didn't really agree with their recollection of events that day and there was no video footage available to confirm who was in the right.

What my client wanted to know was if it would be possible for me to take all the information they had about the incident and produce a video clip of it with a traffic model. They weren't expecting the model to show whether the driving had been dangerous or not, they simply wanted to visualise the incident and check it was consistent with their own experiences on the day.

Although not something I had considered before, I thought it should be possible to produce something with Aimsun, so I had a go. This presentation describes how I got on and what tricks I had to use to reproduce one specific event at the given location that was consistent with all the available evidence....

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