Monday 14th September 2015

16.30 - 18:00
Registration Reception
Collect your delegate pack, meet your peers, and enjoy drinks and canapés kindly sponsored by Zitrón.
Visit Seattle representatives will be available for tourist information.

Tuesday 15th September 2015

07:30 Registration with Breakfast

09:00 ISAVFT Welcome from Norman Rhodes, Chairman, ISAVFT 2015

09:05 Opening Address: Alaskan Way Viaduct Replacement
Presented by Susan Everett and David Sowers, WSDOT, USA

Plenary Session 1: Seattle
Session Chairperson: Pierre Carlotti, LCPP, France

09:45 Optimization of mechanical ventilation operations for State Route 99 Tunnel
Y Liu, S Cassady, HNTB Corporation; S Everett, WSDOT, USA; Page 725

10:10 Final testing of fire detection and fire suppression systems at Mount Baker Ridge and First Hill Tunnels in Seattle
I Maevski, B Josephson, R Klein, Jacobs Engineering; D Haight, Z Griffith, WSDOT, USA, Page 745

10:35 Sizing of extraction ventilation system and air leakage calculations for SR99 tunnel fire scenarios
Y Liu, S Cassady, HNTB Corporation, USA; Page 755

11:00 Exhibitor Presentations

11:10 Refreshment Break
## Wednesday 16th September 2015

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<tr>
<th>Time</th>
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<tr>
<td>07:30</td>
<td>Breakfast</td>
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</table>
| 09:00 | Keynote Address: Tunnel Fire Safety Systems, Then, Now and Future  
**Presented by Gary English, Fire Department, City of Seattle, USA** | 127  |
| 09:00 | Plenary Session 5: Fire  
**Session Chairperson:** Marco Bettelini, Amberg Engineering Ltd., Germany |      |
| 09:30 | FFFS for flammable liquid fires in road tunnels,  
*K Harris, J Harder, WSP | Parsons Brinckerhoff, USA* | 67   |
| 09:55 | Impact of fixed fire-fighting system on road tunnel structure  
*Y Li, D Hahm, I Maevski, Jacobs Engineering, USA* | 97   |
| 10:20 | Performance of a state-of-the-art low pressure water spray system – results from full scale tunnel fire tests  
*M Lakkonen, IFAB (Institute for Applied Fire Safety Research); A Feltmann, D Sprakel, FOGTEC Fire Protection, Germany* | 141  |
| 10:45 | Exhibitor Presentations                                                                       |      |
| 11:00 | Refreshment Break                                                                             |      |

### Parallel Session 6A: Road and Rail - Fire

**Session Chairperson:** Conrad Stacey, Stacey Agnew Pty Ltd, Australia

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<th>Time</th>
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</table>
| 11:30 | Generic quantification of consequences of road-tunnel fires  
*R Brandt, N Riklin, V Butty, S Frey, HBL Haeter; M Schubert, Matrisk GmbH; N Høj,  
HJ Consulting GmbH, C Gammeter, B Gogniat, Federal Roads Office (FEDRO), Switzerland* | | 81   |
| 11:55 | Managing tunnel emergency and evacuation in most populous Indian city - A case of Delhi MRTS  
*A Gupta, A Singh, R Jain, Delhi Metro Rail Corporation Ltd, India* | | 113  |
| 12:20 | Characterization of electric vehicle fires  
*F Colella, N Ponchaut, H Biteau, K Marr, V Somandepalli, Q Horn, R Long, Exponent, Inc, USA* | | 157  |

### Parallel Session 6B: Metro and Rail - Pressure Transients

**Session Chairperson:** Marco Bettelini, Amberg Engineering Ltd., Germany

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| 11:30 | Reduction of the pressure gradient in railway tunnels using vented tunnel portals  
*D Heine, G Lauenroth, S Huntgeburth, K Ehrenfried, German Aerospace Center DLR Göttingen, Germany* | | 483  |
| 11:55 | The behaviour of long entrance hoods for high speed rail tunnels  
*A Vardy, University of Dundee; R Sturt, Arup; C Baker, D Soper, University of Birmingham, UK* | | 449  |
| 12:20 | Dynamic pressure tightness of very high speed train CRH380D  
*M Sima, B Schulz, P Götz, E Thoss, Bombardier Transportation, Germany* | | 467  |

### Plenary Session 5: Fire

**Session Chairperson:** Gary English, Fire Department, City of Seattle, USA

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| 11:30 | Characterization of electric vehicle fires  
*F Colella, N Ponchaut, H Biteau, K Marr, V Somandepalli, Q Horn, R Long, Exponent, Inc, USA* | | 157  |
| 12:00 | Lunch                                                                                       |                                           |      |
### Parallel Session 7A: Road Tunnels - Ventilation Control
**Session Chairperson:** Ian Sweetland, Yyss Ltd, UK

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<tr>
<td>13:45</td>
<td>A long urban road tunnel that has longitudinal and transversal ventilation systems combined in it</td>
<td>S. Kubota, H. Saito, Metropolitan Expressway Company Ltd; Y. Mikame, Shutoko Engineering Company Ltd; H. Yanagi, Echoplan Company Ltd; A. Mizuno, Kagakui University Tokyo, Japan</td>
<td>607</td>
</tr>
<tr>
<td>14:10</td>
<td>Ventilation of the E4 Stockholm bypass</td>
<td>R. Brandt, E. Engel, S. Lucchini, HBI Haerter, Switzerland; L. Elertson, C. Berg, Swedish Transport Administration; U. Malmros, AF Consulting Engineers, Sweden</td>
<td>631</td>
</tr>
<tr>
<td>14:35</td>
<td>Outline of ventilation control strategy for urban tunnel</td>
<td>S. Kume, K. Kanazawa, H. Haru, Hanshin Expressway Company Ltd, Japan</td>
<td>621</td>
</tr>
<tr>
<td>15:00</td>
<td>Ventilation simulation of a large and complex road tunnel: A safe journey - E4 The Stockholm bypass project</td>
<td>L. Elertson, Swedish Transport Administration, Sweden</td>
<td>645</td>
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<td>15:25</td>
<td>Refreshment Break</td>
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### Parallel Session 7B: Metro and Rail – Thermodynamics and cooling
**Session Chairperson:** Joseph Grella, Amtrak, USA

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<tbody>
<tr>
<td>13:45</td>
<td>Acceptability of air velocity from a human thermal comfort and safety perspective</td>
<td>M Legg, M Gilbey, WSP</td>
<td>Parsons Brinckerhoff, UK</td>
</tr>
<tr>
<td>14:10</td>
<td>Interaction between station openings and environmental control systems</td>
<td>C. Graham, C. Gonzalez Mesa, M. Gilbey, WSP</td>
<td>Parsons Brinckerhoff, UK</td>
</tr>
<tr>
<td>14:35</td>
<td>Application of heat recovery to long tunnels</td>
<td>J. Thompson, M. Gilbey, M. Legg, WSP</td>
<td>Parsons Brinckerhoff, UK</td>
</tr>
<tr>
<td>15:00</td>
<td>Diesel locomotive operation with steep grade, high ambient temperature, and long consist</td>
<td>A. Bagis, WSP</td>
<td>Parsons Brinckerhoff; B. Dandie, RRT Pty Ltd, Australia</td>
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### Plenary Session 8: Risk Assessment
**Session Chairperson:** Eleftheria Aini, VINCI CGP Hellas, Greece

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<tbody>
<tr>
<td>16:00</td>
<td>Risk assessment of zero-flow ventilation strategy for fires in bidirectional tunnels with longitudinal ventilation</td>
<td>I. Nakahori, T. Sakaguchi, Sohatsu Systems Laboratory, Japan; B. Kohl, C. Forster, ILF Consulting Engineers, Austria; A. Vardy, University of Dundee, UK</td>
<td>501</td>
</tr>
<tr>
<td>16:25</td>
<td>Methodologies for accurate risk modelling in the context of integrated quantitative risk analysis</td>
<td>C. Forster, B. Kohl, ILF Consulting Engineers; S. Wiesholzer, Austrian Ministry for Transport, Innovation and Technology, Austria</td>
<td>517</td>
</tr>
<tr>
<td>16:50</td>
<td>Debate sponsored by AECOM: This symposium believes that quantitative risk assessment improves the suitability of tunnel design codes targeted at the safety of humans and infrastructure</td>
<td>For: Rune Brandt, HBI Haerter, Switzerland and Pierre Carlotti, LCPP, France Against: Gary English, City of Seattle Frie Dept. and Norman Rhodes, WSP</td>
<td>Parsons Brinckerhoff, USA</td>
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### Gala Dinner at Sodo Park
*Welcome drinks and canapés precede a splendid three-course meal in this one-of-a-kind venue, kindly sponsored by WSP | Parsons Brinckerhoff. Transport will depart from reception at Hilton Seattle Airport and Conference Center at 19:00, and will return at approx. 22:30. Additional tickets are available to purchase for guests. Dress code: Business Formal*

### Best Paper Award
*The winner of the prestigious ISAVFT 2015 best paper award, as voted by the symposium’s Technical Advisory Committee and panel of referees, will be announced. The cash prize fund, kindly sponsored by HBI Haerter, will be presented to an author whose paper is deemed to demonstrate outstanding originality, innovation, or otherwise notable features.*
### Thursday 17th September 2015

#### Parallel Session 9A: Road Tunnels - Ventilation Control
**Session Chairperson: Kate Hunt, WSP | Parsons Brinckerhoff, UK**

- **09:00**
  - On effective close-loop control of longitudinal ventilation in road tunnels in case of fire
    - P Altenburger, I Riess, R Brandt, HBI Haerter AG, Switzerland; Page 661

- **09:25**
  - On transient issues in road-tunnel ventilation design and control
    - M Bettelini, S Rigert, Amberg Engineering Ltd, Switzerland; Page 677

- **10:15**
  - (In)appropriate control of road tunnel ventilation systems
    - A Vardy, University of Dundee, UK; Page 703

- **10:40**
  - Application of air purification system in road tunnel projects
    - S Lai, WSP | Parsons Brinckerhoff, Hong Kong; W Xie, WSP | Parsons Brinckerhoff, Singapore; Page 717

#### Parallel Session 9B: Metro and Rail - Simulation, Modelling and Testing
**Session Chairperson: Igor Maevski, Jacobs Engineering, USA**

- **09:00**
  - Coupling ventilation and egress analyses to design a safer station
    - Andrew Louie, Silas Li, WSP | Parsons Brinckerhoff, USA; Page 315

- **09:25**
  - Cross-City-Link Zurich – Proof of proper functionality of the emergency ventilation system in the case of a fire using smoke tests, measurements and CFD simulation
    - R Yousaf, J Badde, S Wälchli, Pöyry Switzerland Ltd, Switzerland; Page 327

- **09:50**
  - Computational analysis to assess the performance of on-board high pressure water mist systems for rail cars for improving survivability
    - I Ong, Hatch Mott MacDonald; T Eng, G Kildare, Los Angeles County Metropolitan Transportation Authority (Metro), USA; Page 343

- **10:15**
  - The worst fire location in tunnel fires with natural ventilation
    - Z Yuan, B Lei, H Bi, Southwest Jiaotong University, China; Page 359

- **10:40**
  - Smoke/thermal control of a transit terminal: An integrated and optimization design process
    - A Wang, N Rhodes, WSP | Parsons Brinckerhoff, USA; Page 373

### Plenary Session 10: Guidelines and Their Application
**Session Chairperson: Davar Abi Zadeh, Arup, UK**

- **11:35**
  - Minimising the height of a vent stack while still complying with EPA requirements
    - B Dandie, RRT Pty Ltd; A Bagis, WSP | Parsons Brinckerhoff; C Richardson, Air Noise Environment, Australia; Page 171

- **12:00**
  - PIARC and fixed fire-fighting systems: A report on working group activity
    - N Harvey, Hatch Mott MacDonald; N Rhodes, WSP | Parsons Brinckerhoff, USA; L Fielding, London Bridge Associates Ltd; R Hall, Mott MacDonald, UK; B Dandie, RRT Pty Ltd, Australia; R Brandt, HBI Haerter, Switzerland; H Ingason, SP Fire Research, Sweden; Page 185

- **12:25**
  - Development of new US standards and guidelines for tunnel ventilation
    - I Maevski, Y Li, Jacobs Engineering, USA; Page 197

### Exhibitor Presentations

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**ISAVFT 2015**
16th International Symposium on Aerodynamics, Ventilation & Fire in Tunnels

**TROX**
The art of handling air

**AQUASYST**
### Plenary Session 11: Assessment and Design
**Session Chairperson:** Rune Brandt, HBI Haerter AG, Switzerland

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<tr>
<td>14:00</td>
<td><strong>Evaluation of the radiative hazard in tunnel fires</strong></td>
<td>Antoine Mos, CETU (Centre of Expertise on Tunnels), France; Page 5</td>
</tr>
<tr>
<td>14:25</td>
<td><strong>Optimization of jet fan deployment and operating conditions in lay-bys and in proximity of tunnel portals</strong></td>
<td>R Gertl, J Mütterlein, D Stix, ILF Consulting Engineers Austria GmbH, Austria; Page 21</td>
</tr>
<tr>
<td>14:50</td>
<td><strong>Review on the configuration of outlet duct for air supply in a tunnel - aiming for safety improvement</strong></td>
<td>S Masukura, R Takagi, Central Nippon Expressway Company Ltd., A Kobayashi, Central Nippon Highway Engineering Tokyo Company Ltd., T Chihara, K Takahashi, FITUT Laboratory Company Ltd., Japan; Page 37</td>
</tr>
<tr>
<td>15:15</td>
<td><strong>Scaled experiments using the helium technique to study the vehicular blockage effect on longitudinal ventilation control in tunnels</strong></td>
<td>W U Rojas Alva, G Jomaas, A Dederichs, Technical University of Denmark, Denmark; Page 49</td>
</tr>
<tr>
<td>15:40</td>
<td><strong>Discussion: Are we as a community doing enough in terms of long term operation and control?</strong></td>
<td>Panel: Conrad Stacey, Stacey Agnew Pty Ltd, Australia; Ian Sweetland, Yyss Ltd, UK; Joseph Grella, Amtrak, USA; Mohammad Tabarra, ARUP, UK</td>
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### Friday 18th September 2015 - Technical Visits

**SOLD OUT! Places are only available for those who have pre-booked.**
**Sensible clothing, Safety boots and cash for lunch required (unless pre-payment has been made for the walking tour). All other safety equipment will be provided.**

#### Technical Visits - Group 1
**ISAVFT Representative:** Eleftheria Aini

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<td>09:15</td>
<td>Coach departs from the Hilton Seattle Airport and Conference Centre</td>
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<tr>
<td>10:00</td>
<td><strong>Tour of the I-90 Mount Baker Tunnel</strong></td>
<td>Hosted by Doug Haight, WSDOT, USA</td>
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<tr>
<td>12:15</td>
<td><strong>Coach departs for Pike Place Market</strong></td>
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<tr>
<td>14:00</td>
<td>Coach departs from the drop off point</td>
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#### Technical Visits - Group 2
**ISAVFT Representative:** Norman Rhodes

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**Technical Visits - Group 1**
**Technical Visits - Group 2**

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