

## Curriculum Vitae for GRANT JOHNSTON

Chartered Professional Engineer (MIE No. 168292)  
B.E. (Civil), M.Eng. Sc., MIE (Aust), FAITPM

I have filled a number of roles with leading international road safety research organisations including Principal Reconstructionist with ARRB (formally Australian Road Research Board, AUS), Principal Consultant within the Investigations and Risk Management Group of Transport Research Laboratory (TRL, UK), General Manager of Simulation Graphics Pty Ltd (a subsidiary of Jamieson Foley & Associates), Senior Traffic Engineer NRMA (formally National Roads and Motorists Association), Consulting Engineer for Accident Investigation Services (AIS) and the Principal Consultant of Grant Johnston Consulting Engineers which incorporates the advanced forensics arm of CSI Australia and the recently created entity specifically involved in the download of vehicles on board data systems, a process known as Crash Data Retrieval.

I am currently or have been a Member of the Institution of Engineers (Aust), a Member of the Society of Automotive Engineers (International), a member and the currently elected President of ASPACI (Australasian & South Pacific Association of Collision Investigators), a full member of the National Association of Professional Accident Reconstruction Specialists Inc. USA (NAPARS) and a Fellow of AITPM (Australian Institute of Traffic Planning and Management).

I firstly gained a **Bachelor of Civil Engineering Degree** from the University of NSW, majoring in Transport Engineering and Engineering Construction. I was also awarded a university prize, as dux of the final year Transport Major. My undergraduate research project involved the evaluation of photomontage techniques that visually demonstrate alternative design proposals at an existing intersection.

Thereafter, I completed a postgraduate **Master's Degree in Traffic and Pavements Engineering**, also at the University of NSW. My thesis for the Master's Degree was an in-depth analysis of crashes occurring on the Pacific Highway between 1985 and 1991. The specific crash types I investigated as part of this thesis were roadworks crashes, alcohol

involved crashes, speed related crashes, single vehicle crashes, T-junction crashes and fatigue crashes. Specific course work undertaken included Pavement Design, Pavement Maintenance and Evaluation, Pavement Materials, Traffic Engineering, Traffic Signal Design, Street Lighting, Road Safety, Urban and Rural Geometric Design, Traffic Surveys and Transport Planning.

In 1999, I returned to the University of NSW in order to commence a Master of Biomedical Engineering degree. Subjects were undertaken towards this degree in the Schools of Biomedical Engineering, Medicine and Safety Science. Specific subjects completed include Gross Anatomy, Functional Anatomy, Clinical Laboratory Science, Mechanics of the Human Body, Ergonomics 1, Ergonomics 2, Risk Management, Introductory Biomechanics and Properties of Biomaterials.

I have been working in this area of study for approximately 25 years, I have undertaken a number of additional programs of study as documented below and I have attended and presented papers at a number of international conferences over the past 20 years.

I am regularly briefed by a number of State Police Forces which has included NSW, Victoria, Western Australia and South Australia as an external expert in biomechanics and traffic accident reconstruction matters including critical incidents, restraint use, vehicle safety systems, injury biomechanics, speed assessments, point of impact assessments, forensic analysis of evidence and “who was driving” analysis. I have also been briefed by the NSW and Northern Territory Coroner to investigate a number of incidents including a petrochemical tanker rollover and fire.

I have undertaken investigations of serious crashes and near miss incidents in various mines across Australia including testing calibrated testing of braking and deceleration rates of large haulage equipment, mapping of blindspots and review of traffic management guidelines.

I have also undertaken Road Safety Audits of the surface transport system within mine environments.

I have recently completed a major study for a large Federal Government Organisation which involved investigation of a fatal incident, preparation of reports and evidence to a coronial enquiry, review of some of their vehicle design policies, review of some of their emergency

response policies and a follow up study and recommendations on certain operating procedures.

I have undertaken “**Measuring at the Scene of Traffic Accidents**” and “**Traffic Accident Investigation**” independent study programs of the Traffic Institute, Northwestern University, Chicago USA, 1993.

I have undertaken “**Tyre Failure and Analysis Course**” conducted by South Pacific Tyre and Rim Company Penrith, Australia 2000.

I have completed the **Biomechanics of Impact Injury Course** run by the Biomechanics Laboratory, School of Safety Science, University of NSW, 2001.

I have completed a **Biomechanics of Impact Injury and Crashworthiness Course** run by the Association for Automotive Medicine as an in-house course for Holden Australia engineers and design staff at Holden’s Australian Headquarters, Melbourne 2007.

I have completed the **Advanced Motorcycle Collision Investigation Course** run by the Institute of Police Technology and Management, North Florida University USA for the Australian Federal Police at the AFP College, Canberra, ACT, February 2008.

I have completed the **Applied Vehicle Dynamics Course** run by the Society of Automotive Engineers (International) and the BMW Performance Laboratory, at the BMW test facility, Greer, South Carolina, USA, May 2010. This course involved a series of twelve theory workshops on topics of advanced vehicle dynamics each followed by a performance limit driving exercise on the skidpan or racetrack to test and capture data on the theory discussed.

I have completed the **Advanced Reconstruction with Excel Applications Course**, instructed by C. Gregory Russell of Accident Analysis & Reconstruction Inc, Maryland, USA conducted at the Queensland Police Academy, QLD Australia, 2010.

I have completed the **Crash Test Boot Camp**, instructed by Rusty Height of Crash Safety Institute San Diego, USA and Bob Anderson and Biomechanics Analysis, Tempe Arizona, USA. This was a workshop conducted as part of the 2011 ARC-CSI crash testing

conference held at the Las Vegas Speedway. As part of the crash test boot camp team we conducted a full scale angled impact between two moving vehicles. We were responsible for setup and design of the test, design and installation of the instrumentation package which included vehicle based instrumentation, human driver based instrumentation, instrumentation of an adult size dummy and instrumentation of a child seat which was installed in one the crashed vehicles. We were then responsible for the collection and analysis of this data and presentation of the data and results to the conference. I was personally responsible for the design, installation, collection, analysis and presentation of the biomechanical data from the adult dummy, human subject and child restraint.

I have completed the **Human Factors in Traffic Crashes Course**, instructed by Jeffrey Muttart of Crash Safety Research Group, Connecticut, USA conducted at the Australian Federal Police Academy, ACT Australia, 2011.

I have completed the **ARAS360 Crash Animation and Simulation Course**, instructed by Mike Greenfield of ARAS360, British Columbia, Canada conducted at the offices of DV Experts, Melbourne Australia, 2011.

I have recently agreed to operate as a trainer and support person for ARAS360 technologies focussing on the Australian and Asian markets which includes a current contract to train 50 NSW Police.

I am a certified Crash Data Retrieval Analyst having completed the **CDR Systems Operators Course** and the **CDR Data Analyst and Applications Course** instructed by Brad Muir and Jon Northrup of Crash Data Specialists, New York, USA, C. Gregory Russell of Accident Analysis & Reconstruction Inc, Maryland, USA and Don Floyd, General Motors Holden, Detroit USA, hosted by ASPACI Penrith, Australia, 2011. I have also undertaken the **CDR Update Course** as at September 2013 also instructed by Brad Muir and Jon Northrup of Crash Data Specialists, New York, USA.

I have completed the **Crush Energy Analysis Course**, instructed by C. Gregory Russell of Accident Analysis & Reconstruction Inc., Maryland, USA hosted by ASPACI at Penrith NSW Australia, 2012.

I have completed the **Excel for Collision Reconstruction**, instructed by C. Gregory Russell of Accident Analysis & Reconstruction Inc., Maryland, USA hosted by ASPACI at Penrith NSW Australia, 2012.

I have completed **Pedestrian and Cyclist Collision Investigation**, instructed by C. Gregory Russell of Accident Analysis & Reconstruction Inc., Maryland, USA hosted by ASPACI at Penrith NSW Australia, 2013.

I have completed **Advanced Collision Reconstruction with CDR Applications**, instructed by C. Gregory Russell of Accident Analysis & Reconstruction Inc., Maryland, USA and Brad Muir and Jon Northrup of Crash Data Specialists, New York, USA hosted by ASPACI at Penrith NSW Australia, 2013.

I have attended or presented papers at numerous specialist traffic safety and biomechanics conferences including the Annual Impact Biomechanics Australia conferences in 2000 (Neck Injury) and 2001 (Head Injury), International Crashworthiness Conference 2002, HVE Forum 2001 & 2004, biannual conferences of the Australasian and South Pacific Association of Collision Investigators, Association for Automotive Medicine International Conference, AIRIL (Accident Investigation Reconstruction Interpretation and the Law) Biannual Conferences.

I regularly attend or review proceedings of International Accident Reconstruction Conferences including the ARC-CSI conferences in Las Vegas, SAE World Congress, CDR (Crash Data Retrieval) Users Conference and HVE Forums.

I have participated in the conduct and / or organisation of numerous full scale crash testing including, full scale impact testing of tyre buffers on Eastern Creek Raceway, deceleration testing of gravel arrestor bed on Eastern Creek Raceway using a fully instrumented race vehicle, numerous car to car impacts from head-on to ninety degrees to rear end, numerous pedestrian and cyclist impacts, motorcycle slide to stop tests, heavy vehicle braking, instrumented yaw testing and airborne trajectories. I hold an unlimited class 3 heavy rigid licence and was a former driver in a Transport Platoon of the Australian Army Reserve for a period of around four years. Whilst with the Army I undertook specialist training in general off-road driving and steep grade ascent and descent.

I have conducted forensic examinations of numerous vehicles, components, seat belts, airbags and tyres for the purpose of reconstructing the causes and circumstances of rear world traffic collisions including criminal investigations, civil claims, fraud investigations, staged collisions and product liability allegations.

I have also authored and presented numerous papers to various national and international conferences, a sample of which includes:

- **“Safety at Roadworks Sites”** - Institution of Engineers. Northern Division Annual Conference,
- **“Road Safety - Now and into the Future:** - Insurance Institute of NSW, Northern Regional Annual Conference,
- **“Carpark Rating Scheme - Customer information when they need it”** - 3<sup>rd</sup> Australian Parking Convention (Awarded Inaugural Parking Association award for Best Paper),
- **“The case of the disappearing line”** - NSW and New Zealand Road Marking Associations Annual Conference,
- **“Traffic Accident Animation - Towards an ASPACI policy”** - The Inaugural, International Conference on Accident Investigation, Reconstruction Interpretation and the Law,
- **“Computer Simulation in Traffic Accident Investigation”** - Australian Plaintiff Lawyers Association National Conference, 1997,
- **“Three Dimension Simulation in the Courtroom”** - Public Prosecutors National Conference, 1999.
- **“Linemarking - A matter of life and death”** - NSW Roadmarking Association Local Government Conferences, 1999.
- **“Road Engineering Aspects of the ACT on-scene crash study”** - ARRB Roads 96 Conference, Christchurch, NZ.

- **Computerised Simulation of car and 4WD impacts into alternative median barrier profiles**, ICrash2002 International Crashworthiness Conference, 2002 ASPACI National Conference and 2004 HVE Forum (San Francisco).
- **“I say tomato, you say tomayto”: an appreciation of the use of skid resistance data by highway management practitioners and crash investigators**”, Hillier, P & Johnston, G 3<sup>rd</sup> International Surface Friction Conference, Christchurch New Zealand, 2005.
- **“Innovation in highway engineering – too risky?”** Hillier, P & Johnston, G 23<sup>rd</sup> ARRB Conference, Adelaide Australia 2008.
- **“Walking on marbles – a review of the involvement of spray seals in civil liability cases”** Hillier, P & Johnston, G 1<sup>st</sup> International Spray Sealing Conference, Adelaide Australia 2008.
- **“Accident Investigation and Reconstruction Principles and Evidence Gathering”** Taling Ngam Resort, Koh Samui, Thailand, April 2009.
- **“The friction circle and practical vehicle dynamics”**, Varadero, Cuba, April 2010.
- **“ARC-CSI Crash Test Boot Camp Data Presentation”**, presentation to the ARC-CSI annual conference on the biomechanical data collected during a full scale instrumented crash test, Las Vegas USA 2011.
- **“Forensic Biomechanics & Crash Investigation”** NSW Police Crash Investigators Annual Conference, Newcastle 2011.
- **“ARC-CSI Crash Test Boot Camp Experience and Crash Data Review”**, Collision, The International Compendium for Crash Research, Volume 2, Fall Edition 2011.

- **“Do you see what I see? The Accuracy and reliability of Observer Accounts of Vehicle Manoeuvres”** Hillier, P & Johnston, G 25<sup>th</sup> ARRB Conference, Perth Australia 2012.
- **“Method for Estimating the Distance an Object will First Enter the Headlight Beam”** Jeffrey Muttart, Crash Safety Research Group; Chris Kauderer, Kauderer & Associates; Jan Unarski, Institute of Forensic Research; Wade Bartlett, Mechanical Forensics Engineering Srvc; Grant Johnston, Grant Johnston Consulting; Dan Barshinger, Quest Engineering & Failure Analysis, In; Matthew Romoser, University of Massachusetts-Amherst, SAE World Congress, Detroit USA 2013.

From 1983 to 1984, I was employed as an Engineering Assistant with the firm Walker Civil Engineering. Primary duties included the co-ordination of sub-consultants, allocation of resources and tendering for various civil projects.

In 1987, I was employed by NRMA. Initially as a Projects Officer in the Traffic and Safety Department, I was then later appointed as a Traffic Engineer, and ultimately as the Senior Traffic Engineer.

Primary duties with the NRMA involved the completion of highway inventory surveys, road safety studies, travel time surveys, reviews of road design proposals, reviews of Environmental Impact Statements, Road Safety Audits and representation of the NRMA and Australian Automobile Association on various committees. Committees on which I have served include:

- Traffic Authority of NSW Regional Technical Committee,
- Department of Minerals and Energy, Hazardous Poles Committee, Sydney Region,
- Department of Minerals and Energy, Hazardous Poles Committee, Hunter Region,

- Department of Minerals and Energy, Hazardous Poles Committee, Illawarra Region,
- Pacific Highway Road Safety Task Force,
- Standards Association of Australia Committee for Car Parking,
- Standards Association of Australia Committee for Street Lighting
- Standards Association of Australia Committee for Obtrusive Effects of Outdoor Lighting,
- Invited Delegate to Fatigue Working Group at the Country Road Safety Summit, Port Macquarie.

I also managed the NRMA's Hazardous Locations Service, which included inspection of hazardous locations identified by NRMA members. This role required intersection design, road environment modification, traffic signal design and evaluation, capacity analysis and general road safety improvements.

In February 1993, I joined the firm of Jamieson Foley & Associates Pty Ltd, as a Consultant Engineer. In 2001, I was appointed General Manager of the subsidiary firm Simulation Graphics Pty Ltd. I resigned from Simulation Graphics in March 2002 to take up his current positions.

Whilst with Jamieson Foley & Associates, I was involved in around 1000 individual crash investigations as well as a number of biomechanical evaluations involving injury incidents associated with the use of such equipment as ladders, exercise equipment, fire fighting equipment, earthmoving equipment, hand railings, stairs, vehicle restraint systems, machine guarding, forklifts, sports stadium seating and trains.

I have also undertaken a number of marine investigations involving the operational aspects of various craft including ski-boats, jet skis, ferry's and dive boat operations. I hold both a maritime boat licence and advanced, deep diving, wreck diving and marine rescue qualifications in scuba diving and I am currently completing my divemaster certification. I have operated as a divemaster as both dive guide and instructor in the open water dive

course. I am able to undertake advanced underwater searches and forensic documentation of underwater crime scenes.

In the course of many of these investigations, I have used Engineering Dynamics Corporation's HVE 3 Dimensional Computerised Crash Reconstruction and Simulation programs for which I am recorded on the EDC website as the only accredited HVE partner in the Australasia and South East Asia region.

We also use and operate other crash reconstruction specific software including CadZone's CrashZone and PocketZone software. I have also recently been asked by this organisation to run a training course for the CrashZone product in Australia on their behalf.

We have also recently commissioned ARAS360 crash visualisation and simulation software. This is a purpose built crash and crime scene 3D visualisation tool which allows high definition three dimensional video recreations of fully calibrated crash sequences which can be constructed using either animation or simulation techniques. Once a scene and sequence of events are created videos can then be created from either earth fixed or object fixed cameras.

I have also been involved in a number of road safety research programs, including the following:

- Review of NSW Driver Reviver Sites and Development of Safe Access Policies, NSW RTA.
- Review of Fatigue Related Crash Potential on the Pacific Highway, including design of guidelines and conduct of a trial fatigue related road safety audit between Grafton and Port Macquarie, NSW RTA.
- Investigation of blackspots for a number of Western Sydney LGA's, NSW RTA.
- Review of high frequency head-on crash locations, NSW RTA.
- Review of high frequency right angle crash locations, NSW RTA.

- Review of Victorian “safe routes to school” program, NSW RTA.
- Review of Rural Truck Blackspots and Truck Crashes on NSW Highways, Austroads 2007.
- Review of runaway truck speeds and design of a barrier restraint system using HVE Simulation software for Bulli Pass descent, 2007.
- Investigation of a multiple vehicle fatal bus crash and review of vehicle selection and driver training policy for Dubai Buses, United Arab Emirates, 2008
- Review of runaway truck speeds and design of an alternative arrestor system using HVE simulation software for Mount Ousley descent, 2008.
- Evaluation of Victorian Rest Areas and Review of NSW RTA Rest Area Policy, RTA Road Safety Bureau.
- Review of Alternative Signposting and Linemarking Practices on the Pacific Highway, RTA Northern Division.
- Design of Crash Sequence using HVE simulation software for “Brothers” and “Mates” Television Road Safety Advertisements.
- Analysis of Speed Related Safety Issues for ministerial briefing associated with the 1994 RTA Christmas campaign.

I have also been involved in the traffic planning exercise for a number of major events as well as production of certified traffic control plans for major roadworks projects, including the following:

- Traffic Planning and Implementation of Traffic Control Scheme for the 1998 Commonwealth Games Welcome Home Parade in the City of Sydney, Major Events Planning.

- Traffic Planning and Implementation of Traffic Control, Parking and Public Transport for AVIEX 98, Aviation Trade Exhibition and Public Air-show, Bankstown Airport.
- Traffic control plans for M4 upgrade Mays Hill to Prospect, Statewide Roads.
- Review of Advertising Sign Warrants for M4 Motorway, Statewide Roads.

I am an accredited Senior Road Safety Auditor and have also completed several thousand kilometres of road safety audits, including both design audits and existing road audits.

Design audits include

- Sydney's Eastern Distributor,
- Windsor Road,
- Old Windsor Road,
- Old Windsor Road / Seven Hills Road roundabout reconstruction,
- various innovative design proposals for the then number one Sydney blackspot intersection at Homebush Bay Drive,
- crude haulage routes in Thailand, and
- engagement as the road safety consultant to Queensland Transport on the Pacific Motorway project, which included road safety advice involving a design audit of the entire project, as well as evaluation of aquaplaning issues in the design stages.

Existing road audits include the

- Pacific Highway,
- O'Sullivan's Gap,

- Burringbar Range,
- numerous far western NSW roads,
- numerous roads in the Tamworth region,
- Powderworks Road in Sydney's north,
- Princes Highway Coach Audits,
- Rural bridges across western NSW,
- Pacific Highway fatigue crash audit, and
- Hunter Region Coach Audits.

I have also undertaken a number of traditional Traffic Engineering type investigations. An example would be preparation of numerous traffic studies for rezoning or development applications, including child care centres, registered clubs, hotels, "adult" entertainment venues, residential developments, shopping centre developments, retail markets and industrial developments.

I have been instructed to investigate accidents and / or assisted several courts across NSW, Tasmania, Victoria, Northern Territory, the ACT, Western Australia, South Australia, Queensland, New Zealand, Fiji, Thailand, Brunei, Malaysia, Dubai and Singapore as an expert witness in Traffic Accident Investigation and Reconstruction, Biomechanics and Ergonomic type matters. I have testified in jurisdictions from Local through to Supreme, Coroners Court, Land and Environment Court and to the NSW Parliamentary Staysafe Committee.

I have been involved in the detailed investigation of around 4000 serious motor vehicle accidents assisting both Defendant and Plaintiff clients in Civil Matters and both the Prosecution and Defence in Criminal matters. I have given evidence in about 300 to 500 of these matters.

Typical matters in which I am able to assist include vehicle speed estimates from forensic evidence, pedestrian and cyclist impacts, computer reconstruction and simulation, “who was driving” investigations, occupant biomechanics and restraint systems, crash data retrieval, go karting and motor racing incidents and legal liability of road authorities arising from roadworks, pavement maintenance, road design, traffic signal design, road environment safety, crash attenuation systems, signposting and linemarking.

I am also involved in teaching Local Government and State Road Authority engineers in Legal Liability and Accident Investigation / Reconstruction techniques on behalf of the IPWEA (Institute of Public Works Engineers) & TRL in NSW and on behalf of ARRB in other states. Courses have been conducted in Sydney, Melbourne, Perth, Lismore, Hobart, Adelaide, Brisbane, Cairns, Parramatta and Dubbo.

I have participated in two in-depth crash research projects; including one as principal author conducted for the NRMA ACT Road Safety Trust which involved the on-scene attendance at serious traffic crashes in the ACT over the winter of 1995, in conjunction with the ACT Emergency Services Personnel. This in-depth crash study involved detailed investigations of all serious traffic accidents, in order to specifically determine how and why crashes occur, and included detailed inspection of crash scenes, detailed examinations of involved vehicles, interview with witnesses and participants and analysis of medical records for associated injury mechanisms. Computerised reconstruction of incidents was also undertaken using the EDC EDVAP suite of programs.

Over the last 20 years, I have been actively involved in the investigation and research of advanced computerised crash reconstruction and simulation techniques, including, in particular, the use of 3 Dimensional Simulation Models. I presented a paper to the Inaugural, International Conference on Accident Investigation, Reconstruction Interpretation and the Law on developing an industry policy on the use of animation techniques (note this preceded many of the physically constrained simulation programs).

In June 1996, I attended the offices of Engineering Dynamics Corporation in Portland, Oregon, USA in order to conduct a hands-on evaluation and training of the HVE 3 Dimensional Simulation Model. Following this evaluation, the advanced HVE system was commissioned for use in Australian investigation of traffic accidents and occupant

Biomechanical issues in March 1997. More recently I have also added the ARAS360 HD suite of simulation and animation tools to the variety of techniques that can be used to analyse and demonstrate the results of a crash investigation process. I have been involved in more than 200 serious or complex incidents that have been analysed utilising advanced reconstruction or simulation systems.

From 1988 to 1998, I was the National Publications Editor on the National Executive of the Australian Institute of Traffic Planning and Management. I was also a committee member of the NSW branch of the same institute from 1989 to 1992 and in 1992 was elected as the NSW Treasurer of this Association. In 1994, I moved into the role of NSW Vice President, and in 1996 was elected as NSW President for a two year term.

I am also currently the elected president of ASPACI (Australasian and South Pacific Association of Collision Investigators) having held the position since the Biannual Conference in Brisbane, Qld 2006.