Submission to the Senate Inquiry in to the Shortage of Engineering and Related Skills

(Zaf) Zdravko Michael Pavlic-Sahin, BE, RPEQ

Total of 22 years experience.

Queensland Department of Transport and Main Roads (TMR)
Principal Civil Engineer (4 years)
North Coast Region, Gympie District.

Additionally I am:-

- APESMA Workplace Representative
- Member of APESMA / TMR Joint Working Group to enhance attraction and retention of engineers within TMR
- Member of Gympie LCC (Local Consultative Committee under EDA7 Enterprise Agreement)

Roads and Traffic Authority of NSW (RTA)
Various Roles (18 years)
Moree, Newcastle, Singleton and Parkes

Ethically Engineers Need To Have These Issues Addressed

As a professional engineer, a member of APESMA and a RPEQ's ethically I support APESMA's submission for the following:-

- The first Tenet of the Code of Ethics *"Members shall place their responsibility for the welfare, health and safety of the community before their responsibility to sectional or private interests, or to other members;"*
- The second Tenet of the Code of Ethics *"Members shall act with honour, integrity and dignity in order to merit the trust of the community and the profession;"*
- The last Tenet of the Code of Ethics *"Members shall not assist in or induce a breach of these Tenets and shall support those who seek to uphold them if called upon or in a position to do so."*

Ethically and as a professional engineer, I provide this information to this Senate Inquiry with the aim of finding solutions to the problems caused by the engineering skills shortage that are

- confronting engineers individually,
- the profession as a whole,
- all governments,
- my employer TMR,
- causing the cost over-runs on projects,
- resulting in new projects not providing the value for money or level of service they were designed for,
- putting the public at risk due to aging infrastructure which is suffering from a lack of maintenance and upkeep,
- burnout of over worked engineers, lack of work life balance.

Inability to Attract and Retain Engineers

In the North Coast Region of Transport and Main Roads (TMR) the vacancy rate among engineering positions has been pretty steady at around 33% for some time now, one in three positions are vacant.

- 47 engineering positions of which 15 are vacant (32%)
- Of the engineers in North Coast 67% should be RPEQ's, the current rate is 58%
- Of the 13 engineers who have recently left TMR 8 are RPEQ's (62%)
- We are loosing engineers across the board but high ratios who are leaving are amongst the most experienced which leaves disproportional gaps in TMR's corporate knowledge.
- In the 4 years I have worked for TMR 13 engineers have left TMR,
  11 of who were PO4 and above (should be RPEQ's or CPEng equivalent)
  2 at SO levels were given VSP's (redundancies)
- One of the engineers who recently left said at his farewell morning tea *"I had never thought I would work for anyone other than Mainroads"* and yet he left 26 years of working for TMR. This demonstrates the scale of the problem when highly skilled and experienced engineers, who never thought they would leave, are leaving.

This leads to waste in the government infrastructure spend, as I will detail later.

Previous Attempts to Address Engineering Shortages

Over the years agencies such as TMR have grappled with the engineering shortages and have tried various things to address the shortage such as:-

- Trying to use project managers rather than professional engineers to undertake some of the work typically done by engineers. (often termed de-engineering)
- Introducing Transport Infrastructure Capability Scheme (TICS) to enhance attraction and retention of engineers and other Highly In Demand Positions.
- Use of 457 Visas and overseas qualified engineers.

These schemes have had limited success for the following reasons:-

- The use of Project Managers may have filled gaps but the lack of engineering oversight and involvement may have contributed to problems in project selection and delivery.
- TICS was used by the Queensland Government for 3 years and it did assist in the attraction and retention of engineers and other highly skilled staff, but on 6 July 2009 at the peak of the Global Financial Crisis the government decided to scrape the scheme and any gains made have now been lost.
- Any new staff to an organisation, 457 Visa holders, graduates or even experienced engineers, require significant time and effort to mentor and bring up to speed before they can contribute significantly to the productivity or an organisation. With excessively high staff turnover and shortages within the workforce, the time and effort required has not been available.

High turnover rates increase inefficiencies, longer learning curves for new staff and need more mentoring required from existing staff.

Burnout of Over-Worked Engineers

Do to engineering shortages, engineers are working excessive hours for prolonged periods and in the South East of Queensland this may be combined with significant amounts of night work. I recently read an article in APESMA's Professional Network Magazine about avoiding burnout. When I finished reading the article it dawned on me I have witnessed a case of burnout. I was trying to help a colleague with a few suggestions and I was threatened with what might happen with a phone. A short time latter this engineer was on stress leave for several months, they did come back during last year but he has since resigned from TMR. The symptoms obviously point to a case of burnout and if TMR could have attracted and retained sufficient engineers, this engineer may not have suffered and I may not have been the victim of workplace threats and abuse. I certainly didn't go home that day in as good or a better condition as when I came to work.

This increases the risk of scoping, design and implementation flaws.

Reduced Life of Road Reconstruction Projects.

Shortage of engineering capacity can lead to roads not providing the level of service they were designed for. Most road pavements are designed for a 20 year life, but if they are not designed and built with adequate engineering input they may fail within 5 years of opening. There are two recent examples within North Coast Region but similar cases exist across Australia:-

- The Caboolture bypass was opened in 2003 at a project cost of $32M and last year TMR spent $13M on rehabilitating the pavement because it wasn't constructed as a Heavy Duty or High Load Intensity Low Intervention Pavement (HILI). Almost 4 km of the 5 km section has already been reconstructed.
- The Kawana Way was opened in 2004 and a business case is being done for its rehabilitation, again because the pavement wasn't constructed as a Heavy Duty or HILI pavement? The Options Analysis had $15 Million for the reconstruction work which is likely to be $20M when escalation is allowed for. This for a 5km section of a new road.
- Both of theses sections did not provide the expected level of service or design life because the traffic volumes were underestimated

These are fundamental errors that occur because of a fundamental lack of public sector capacity in the scope, design delivery of projects.

Changes to Pavement Design and Other Standards.

The pavement design processes used by all the states in Australia is not keeping pace with advances in transport technology. New Trucks can be imported to Australia in a matter of weeks, and historically wheel loads have been increasing and will continue to increase. Even if we were to allow for these changes in our pavement designs now, it would take at least 20 years to build these changes into our pavement, if we were to reconstruct our pavements every 20 years based on a pavement design life of 20 years. Many of our pavements actually last 40 years or more, so in reality, it will probably take 40 or 50 years to rebuild our roads to cater for the changes that have already occurred. It may take even longer based on actual funding levels. During the 40 or 50 years it will take, there will be additional developments which we will need to cater for.

There are other examples of standards that do not keep up with technological changes due to a shortage of expertise within the government and government agencies to keep up with the changes.

Due to changing standards, by the time we get to rebuild our public assets many are significantly below current standards when they are replaced. This is a significant risk to public safety.

Inability to Respond Quickly Due To Skill Shortages.

This summer's wet weather has contributed to a number of accidents on Mooloolaba Road on Buderim Hill which have received coverage on the local channel seven news.

- TMR was able to respond quickly with the design and installation of some guardrail work to improve safety in the short term.
- A larger Safer Roads Sooner project already identified for this section could also have been accelerated if TMR had adequate resources. Because of TMR's inability to attract and retain technical and professional staff the design for this SRS project could not be accelerated and has now gone to consultants to be done.
- Emergency works are being delayed because of a lack of internal resources and the time it takes to engage consultants do the work. Many of the consultants are also working at capacity which increases the time to deliver these projects.

Emergency works are being delayed because of a lack of internal resources. This is a significant risk to public safety.

Additional Cost to Engineering Projects

There have already been reports of projects costing an additional 20% due to effects caused by the engineering skills shortages.

There are also many examples in the last two summer seasons of flooding damage has been caused or exacerbated by a lack of maintenance. There are several landslips that have partially closed roads for prolonged periods that were either caused by, or made significantly worse because culvert drainage structures that were blocked. If there was adequate engineering input into the maintenance of these roads and associated structures some of the damage would have been avoided.

The maintenance works would have cost a fraction of the remedial works which are now required.

Commitment to Develop Professional Engineering Capacity

All governments must realise and commit to develop the level of professional engineering capacity in Australia so that government departments such as TMR can once again become an informed client and purchaser.