



Patron: The Honourable Alex Chernov, AC, QC, Governor of Victoria



The boundary between Tasmania and Victoria



J G Gillespie Gold Medal Prize Formal Call for Nominations

**The Institution of Surveyors, Victoria (ISV)
is now accepting nominations for the
2014 J G Gillespie Gold Medal Prize.**

Lt Col James G Gillespie, MBE, LS, Hon.FIS Aust., FRICS established the Prize in 1983 to encourage aspiring, young professionals to cultivate their careers. Each year the award recognises a member of the profession who shows a combination of academic merit, technical ability, professional achievement, leadership and community spirit.

Eligibility

The award is open to graduates in the Science of Surveying at RMIT University.

To be eligible, candidates must have:

1. between 2 and 10 years (approx.) professional experience since graduation;
and
2. completed further education or training (ie. awarded a post-graduate degree or obtained Registration as a Licensed Surveyor or similar); and
3. displayed qualities that reflect credit on the broader surveying profession and on themselves.

The intention of the Prize is to recognise outstanding achievements of RMIT graduates in the broader discipline of surveying, and to honour qualities that reflect credit on the profession. All candidates, irrespective of professional memberships, must show how they satisfy this Prize criterion. Nominations from non-ISV members should include details of other professional memberships and how their actions generally align with the objects and principle aims of the ISV. The Judging Panel will assess the level and calibre of achievements when determining parity.

Any RMIT surveying graduate who draws on expertise inherent in the discipline in their work and who demonstrates service to the community and exceptional professional achievement may be a contender for the Gillespie Prize.

Selection Criteria

The Prize commemorates Lt Col Gillespie's service to the profession and the community. Contenders for the Prize will demonstrate the attributes that Lt Col Gillespie himself considered important to the life and education of a surveyor, including continuing higher education and contributions to the community.

In accordance with Lt Col Gillespie's Will, the Prize is awarded on the basis of a combination of any or all of the following:

- (a) paper/s submitted for publication in a reputable journal
- (b) achievement in post-graduate study in the broader discipline of surveying science (eg. Masters Degree), including projects submitted and examinations completed by the candidate in conjunction with obtaining Registration as a Licensed Surveyor under the Surveying Act 2004.
- (c) any other outstanding academic ability or achievement displayed (eg. MBA)
- (d) notable professional achievement, including demonstrated leadership qualities
- (e) professional reputation
- (f) any development of improved methods or working systems initiated by the candidate

Nomination

It is the duty of all members of the profession to submit nominations for worthy candidates. In particular, employers and colleagues of RMIT surveying graduates are in the best position to nominate a suitable candidate. Your nomination alone will be a tangible recognition of their work and value. Nominating an employee for one of the profession's most elite prizes also reflects prestige on the company they work in and their colleagues.

To encourage a broad range of candidates, members should look beyond the traditional fields and roles for surveying graduates. Today surveying graduates are involved in diverse applications of the discipline across expanding market sectors.

The Judging Panel will also accept nominations directly from candidates. A minimum of three referee statements must be attached in support of self-nominating applications.

It is a condition of the award that candidates cannot be nominated more than twice or win it more than once.

To Make an Expression of Interest

If you know of a worthy candidate, you need only forward an Expression of Interest to the ISV office containing:

- Proposer's name and preferred contact details
- Nominee's name, degree name and year of graduation
- Proposer's relationship to Nominee

Expressions of Interest should be forwarded as soon as possible and addressed to:-

Gary White, Executive Officer, The Institution of Surveyors Victoria, Suite 207, 21 Bedford Street,

North Melbourne Vic 3051. Email submissions encouraged to: gwhite@isvic.org.au

Please do not delay in making an Expression of Interest.

A representative of the Prize Secretariat will then contact you and assist in preparing a formal nomination, which will include:

- a detailed written description of the accomplishments of the nominee
- an explanation of why those accomplishments merit the Gillespie Prize
- resume (optional but will aid in the selection process)

Suitable candidates will be invited to discuss their nomination in an interview with the Judging Panel. Expectations on Prize winners in upholding the Gillespie spirit will also be broached.

Formal Nominations for the 2014 J G Gillespie Gold Medal Prize should be received by Friday 23 May 2014.

The determination of the Judging Panel is final. The award will be presented at the annual ISV Surveying Industry Awards Gala Dinner. Conferral of the award includes a plaque bearing a replica of the gold medal of the Institution that Lt Col Gillespie returned to the profession upon his death. Winners' names are inscribed on the J G Gillespie Gold Medal Prize honour board displayed at RMIT University.

In addition, the prize-winner will receive free membership subscription to ISV for one year.

Summary of Objects and Principle Aims of the ISV

- Advance and elevate the science of surveying as a profession in Victoria
- cultivate friendly relations among members
- encourage the study of the discipline
- improve and elevate the general and scientific knowledge of the profession and improve professional performance

... follows on page 3

From the President



Cornerstones of professionalism

Last December's edition of Traverse included an article being the keynote address by Bronwyn Weir, Partner – Maddocks Lawyers, on the occasion of last November's SRBV Conferral Ceremony. This address has been referenced on several occasions since; and deservedly so. Some of the points made by Ms Weir in relation to professional responsibilities and reputation are well worth reflecting on.

The following extract of this address holds true when, from time to time, we find need to pause and recalibrate. It is also a valuable touchstone for candidates and younger surveyors finding their way in the corporate food chain of modern business. I recommend that you find time to acquaint yourself with the following extract of Ms Weir's insightful commentary on some of the essential elements of professionalism.

"Our Parliament has decided that we undertake tasks in the community which are of such importance and which, if performed incorrectly carry such risk, that our occupations must be regulated through a statutory licensing scheme....."

...There are many things that all professionals have in common but tonight I want to highlight the four which I believe are of most significance. These are:

1. The attainment of qualifications, experience and demonstration of good character which has entitled you to being granted your license.

*... this means that the license we hold immediately tells the broader community that we are highly skilled, and that we have studied and attained a level of qualification and expertise **which our peers have decided has allowed us to be licensed...***

2. The broader responsibility that a licensed professional has above and beyond their duty to their clients.

*... In your case the work you do underpins Victoria's entire property and land development market. **Every survey you carry out and any advice you give must seek to maintain the integrity of that system.** Your broader responsibility to maintain that system must never be forgotten and must take precedence over your duties to your client...*

3. The responsibilities we have to our fellow licensed professionals and to our industry.

*... the third responsibility we all have as licensed professionals is to our colleagues. **We must respect our fellow licensed practitioners.***

*... this means that we should become part of our professional institutions, and to find ways to give back to our profession. **It also means that we need to call out inappropriate behaviors by others in our cohort in a respectful and measured way so as***

to ensure that our profession is not brought into disrepute. We each have a responsibility to ensure that our profession is a constructive and cooperative group that seeks to support and learn from each other and to build on the work and good reputation of those before us ...

4. The need to strive to earn a great reputation through behaving with integrity at all times.

*... The final attribute that is common to all licensed professionals is the need to maintain our personal reputation and integrity. **Maintaining one's reputation and integrity requires us to continue to learn and develop** ... you must also embrace innovation and new technologies so that your craft is relevant now and into the future.*

*... Having a great reputation is reflected if you have a constant awareness of your broader responsibility to maintain the Victorian system of land and property development. **The service you give and the product you produce must be able to be relied upon by others without question** ...*

*... Having a great reputation does not mean that you will not make mistakes ... **you will make mistakes, we all do. However, a measure of a person's integrity is how they behave when they make a mistake** ... in relation to discipline inquiries the common and most serious matter for inquiry is often not the mistake that was made but the person's failure to act on it and seek to remedy the consequences of their mistake ...*

*... we are all subject to market forces, competition and the need to find efficiencies in what we do for our clients. However those commercial imperatives must be carefully weighed against the need to maintain quality and to value what we do as professionals. If we undercut our fees by undercutting quality our reputation and integrity will be quickly reflected by our cheap and substandard product. **The work that we do is important and requires skill. That is why Parliament has created a regulatory regime to supervise and protect it. This also means that we have something of value to offer and we need to behave in a way that dignifies that skill** by maintaining our standards and not undercutting quality and service ..."*

I recall many years ago when I was preparing for my own Board interview, the one question that all candidates could expect was "What are the responsibilities of a Licensed Surveyor? The stock answer was to recite the mantra of "Cadastre/Legislation, fellow surveyors, community and client". This was the acceptable response although it declared little more than the candidate had taken the time to memorise the required verse.

Ms Weir's article provides a learned perspective which would prudent reading for any candidate and a wise reference for all practitioners. It clearly underscores the importance of these essential cornerstones of professionalism.

Glenn Collins
MISVic

- develop surveying as a necessary and respected discipline and provide liaison with associated areas
- maintain high standards of professional ethics, promote greater public understanding, and demonstrate a responsible and dignified presence in the community

Through the Prize, the spirit of Lt Col Gillespie inspires us all.

Glenn Collins

ISV President & Chairman of the Gillespie Prize Judging Panel

2014 Surveying Expo and Surveying Industry Awards Gala Dinner



Both to be held Friday 25 July at the superb beachside venue Encore @ St Kilda

The Surveying Expo guarantees a day of education and networking with a highlight being the Keynote Speaker: acclaimed ethicist Dr. Richard Lucas.

The Surveying Industry Awards Gala Dinner – the night of nights when industry colleagues congratulate and acknowledge their peers with our Guest Speaker being International Cricket player, commentator and raconteur Mr Kerry O’Keeffe.

The perfect opportunity for Metropolitan and Regional Members to attend two of ISVs premier events.



Dr. Richard Lucas



Mr Kerry O’Keeffe

Note your diaries now for these two *must attend* events!



The Committee and members of The Institution of Surveyors Victoria acknowledge and thank our sustaining members for 2014

GOLD




SILVER



GENERAL






The boundary between Tasmania and Victoria: Uncertainties and their possible resolution

(Address to the Regional Conference of the Institution of Surveyors Victoria in Launceston on Saturday, 1 March 2014)

This afternoon, I propose to provide you with a brief overview of some of the uncertainties surrounding the boundary between Tasmania and Victoria. I also propose to give you an outline of the legal doctrine of prescription and acquiescence, and to say a little about how that doctrine might be applied to resolve some or all of the boundary uncertainties I will talk about.

Many of you will have seen maps or charts which purport to show a line along Bass Strait separating Victoria from Tasmania. However, as the American author Robert Kaplan observed in his book, "The Revenge Of Geography" :

"A map is a beginning, not an end, to interpreting the past and the present"

As most of you will be aware, the original British colony in Australia was New South Wales.

What are now the States of Victoria, Tasmania and Queensland, together with most of South Australia, were carved out of New South Wales over time.

The original boundaries of New South Wales were laid down not by Statute, but in the exercise of the Royal prerogative. Those original boundaries are to be found in Captain Arthur Phillip's 1787 Commissions as the first Governor of the Colony.

Governor Phillip's Commissions defined New South Wales in terms encompassing all of eastern Australia; from the top of Cape York to the bottom of Tasmania, and as far west as the 135th meridian of east longitude. That meridian bisects Australia on a north-south line running a little to the west of Port Lincoln in South Australia.

The first of the daughter colonies to be hived off New South Wales was Van Diemen's Land, which, in 1855, was re-named Tasmania.

By an Order in Council dated 14 June 1825, Van Diemen's Land, or Tasmania, was erected into a separate colony independent of New South Wales. That Order in Council did not define the territorial extent of the new Colony.

Governor Ralph Darling was simultaneously appointed the seventh Governor of New South Wales and the first Governor of Van Diemen's Land. By his Commission of 16 July 1825 as Governor of the latter, Van Diemen's Land was defined as consisting of the:

"... Island of Van Diemen's Land and all Islands and Territories lying to the Southward of Wilsons Promontory in thirty-nine degrees and twelve minutes of South latitude, and to the northward of the forty-fifth degree of South latitude and between the hundred and fortieth and hundred and fiftieth degree of longitude East of Greenwich, and also Macquarie Island ...".

For over a century, Governments have taken the boundary prescription in Darling's 1825 Van Diemen's Land Commission as placing the boundary between Victorian territory and Tasmanian territory along the line of latitude 39° 12' south. That line lies about 6½ kms to the south of Wilsons Promontory. It cuts across a small island, Boundary Islet, in the Hogan Group. The Hogan Group lie some 42 kilometres



east south east of Wilsons Promontory. Boundary Islet is about 85 metres wide from west to east and about 160 metres long from north to south. I should point out that there are a number of islands, islets and rocks which lie to the north of Boundary Islet in Bass Strait. Of these, the most significant are Wattle Island and the islands of the Anser Group (Anser Island, Cleft Island or Skull Rock, Kenowna Island, the Anderson Islets and Carpenteria Rock). These lie immediately to the south west of Wilsons Promontory.

I would argue that to place the boundary at latitude 39° 12' south is to misread Governor Darling's Van Diemen's Land Commission. I would further argue that properly read, the boundary lies instead at the southern extremity of Wilsons Promontory. In 1825, that extremity was thought to be situated at near enough to latitude 39° 12' south. At that time, the nearest thing to an official British Chart of Bass Strait was Matthew Flinders' "**Terra Australis South Coast**

Sheet V', first printed in 1814. On this chart, the southern tip of Wilsons Promontory lies at latitude 39° 11' 40" south. It was not until the early 1840s that Captain John Lort Stokes more correctly charted the southern extremity of the Promontory at latitude 39° 08' 18".

The force of the contention that, properly read, Governor Darling's Van Diemen's Land Commission placed the boundary at the southern extremity of Wilsons Promontory is overwhelmingly strengthened when one considers the wording of Darling's simultaneous Commission as Governor of New South Wales.

That Commission relevantly defined New South Wales as:

"... extending from the Northern Cape or extremity of the Coast called Cape York in the latitude of ten degrees thirty-seven minutes south to the Southern Extremity of the said Territory of New South Wales or Wilson Promontory in the latitude of thirty-nine degrees twelve minutes south ...".

Thus, latitude 39° 12' was used simply as a guide to the location of the southern extremity of Wilsons Promontory. The reference to Wilsons Promontory in Governor Darling's Van Diemen's Land Commission was not meant as a guide to the location of latitude 39° 12'.

The Tasmanian boundary definition in Governor Darling's 1825 Van Diemen's Land Commission has never been replicated in statute.

That boundary definition was, in substance, repeated after Darling's term of Governor of Van Diemen's Land in every Van Diemen's Land and Tasmanian Governor's Commission up to and including that of Sir Frederick Weld on 27 August 1874.

The definition was then repeated in Letters Patent for the Office of Governor of Tasmania promulgated in 1880. Further Letters Patent to the same effect issued in 1900 and also in 1986.

Turning to the boundaries of New South Wales, the definition in Governor Darling's New South Wales Commission of 1825 was repeated in those of his first two successors; Sir Richard Bourke (26 June 1831) and Sir George Gipps (5 October 1837).

Darling's third successor as Governor of New South Wales was Sir Charles FitzRoy. Curiously, and so far as I can ascertain, inexplicably, his first Commission of 20 February 1846 defined New South Wales as:

"... lying between the one hundred and twenty-ninth degree and the one hundred and fifty-fourth degree of East Longitude and between the twenty-sixth and *fortieth* degrees of South Latitude ... save and except that part of Our said Territory herein before described which is called and known by the name of the 'Province of South Australia' " (my italics).

Importantly, this definition extended New South Wales's southern boundary southward from the southern extremity of Wilsons Promontory to latitude 40° south; about 100 kilometres to the south. This latitude cuts across both King and Flinders Islands. Latitude 40° south divides King Island along a line lying between Currie in the north and Grassy in the south. The parallel runs through Emita on Flinders Island.

The latitude 40° southern New South Wales boundary descriptor in Governor FitzRoy's 1846 Commission was repeated in subsequent New South Wales Governors' Commissions; with allowances being made only for the separation of Victoria from New South Wales.

The descriptor was repeated in Letters Patent for the Office of Governor of New South Wales of 1879 and 1900.

Thus, from 1846 on, the boundary prescriptions in the Commissions and Letters Patent dealing with the appointment of the Governors

of Tasmania and New South Wales were in conflict. Those relating to Tasmania's Governors placed that Colony's northern boundary at the southern extremity of Wilsons Promontory. Those relating to New South Wales Governors placed that Colony's southern boundary at latitude 40° south.

The New South Wales Constitution of 1855 added a new dimension to the conflict.

On 21 December 1853, the New South Wales Legislative Council passed the New South Wales Constitution Bill. Clause 53 of the Bill relevantly provided that the southern boundary of New South Wales was at latitude 40° south save and except for the territories comprised in the Province of South Australia and in the Colony of Victoria.

The Bill was reserved and dispatched by Governor Denison of New South Wales to London. In London, the Imperial Parliament made a number of changes to the Bill. However, the only change made to clause 53 was to re-number it as clause 46. The Bill was then incorporated as a Schedule to an Act of Parliament. The Queen was empowered by s.1 of the Act, the **New South Wales Constitution Act 1855** (Imp), to give her assent to the Scheduled Bill as amended. This she did.

There has been some debate as to the status of the Scheduled Bill which became the **New South Wales Constitution Act of 1855**. In form, it purports to be an enactment of the New South Wales Legislative Council assented to by Queen Victoria. However, in my opinion, it was given the force of law by an Imperial enactment. It can, perhaps, be appropriately characterised as a "deemed New South Wales enactment."

Section 46 of the 1855 **Constitution Act** was unaltered until the Act's replacement by the New South Wales **Constitution Act** of 1902. Section 4 in the latter Act (which is still current) also places New South Wales' southern boundary at latitude 40° south, save and except for the territories comprised in South Australia and Victoria.

The issue arises as to whether the words used in s.46 of the New South Wales **Constitution Act** of 1855 can be read down or given a construction consistent with the boundary prescriptors in the Tasmanian Governors' Commissions and Letters Patent. In my opinion, they can't.

The Commission and Letters Patent dealing with the appointment of the Tasmanian Governors were issued in the exercise of the prerogative power of the Crown. All prerogative powers are powers accorded to the Crown by common law. As such, they, and the fruits of their exercise, are liable to be displaced by statute.

In my view, that is precisely what has occurred here. The northern boundary provided for Tasmania in the Commissions and Letters Patent relating to the Tasmanian Governors has been displaced by the statutory prescription in the New South Wales **Constitution Act**.

What of Victoria's boundary descriptors? Section 1 of the **Australian Colonies Government Act** of 1850 (the Separation Act) separated Victoria from New South Wales, and declared the new Colony to consist of :

"... the Territories now comprised within the ... District of **Port Phillip**, including the Town of **Melbourne**, and bounded on the North and North-East by a straight Line drawn from **Cape Howe** to the nearest source of the river **Murray**, and thence by the Course of that River to the Eastern Boundary of the Colony of South Australia..."

There was no mention of a southern boundary in that statutory definition. As Jacobs J. observed in the High Court in 1975 in **New**

South Wales v. The Commonwealth (1975) 135 CLR 337 (the Seas and Submerged Lands case):

"The Victorian boundaries stated in the Act of 1850 were only inland boundaries to the North and North East and to the West. There was no need to state an Eastern or Southern boundary because there lay the sea."

What was implicit in the Separation Act of 1850 was rendered explicit in Sir Charles Darling's Commission of 13 June 1863 as Governor of Victoria. The latter Colony was defined as :

"... consisting of the Territories bounded on the West by Our Colony of South Australia, *on the south by the Sea*, and on the North and East by a straight line drawn from Cape Howe to the nearest source of the River Murray, and thence by the course of that River to the Eastern Boundary of the Colony of South Australia" (my italics).

Thus, when one looks to the Imperial boundary descriptors, one finds that :

- First, s.1 of the Separation Act of 1850 places the land mass of Victoria, to its ocean coastline and as far south as the southern extremity of Wilsons Promontory, within the bounds of Victoria.
- Second, s.46 of the *New South Wales Constitution Act* of 1855 places the islands lying between the southern extremity of Wilsons Promontory and latitude 40° south within the bounds of New South Wales.
- Finally, the lands below latitude 40° south are left as parts of Tasmania.

It should be noted that at Federation in 1901, the boundaries of the Australian Colonies, as prescribed by the United Kingdom, became the boundaries of the Australian States. As Gipps J. observed in 1975 in the Seas and Submerged Lands case:

"That which had been the territory of the colonies became the territory of the States."

So, how might these boundaries originally prescribed by Imperial law now be reconciled with the current, if misguided, general Australian understanding as to where the boundary between Tasmania and Victoria lies?

One way would be a recourse to s.123 of the Commonwealth Constitution. That section provides for the alteration of State boundaries. However, any such alteration under the section requires legislation passed by the Commonwealth Parliament, coupled with:

- (a) consenting legislation passed by the Parliament of each affected State; and
- (b) the approval of a majority of the electors in each affected State voting in a referendum.

This process would be cumbersome, expensive and by no means assured of success. Historically, referenda have been viewed with suspicion by Australian voters.

However, there might be no need for recourse to s.123 of the Commonwealth Constitution. It may be that the currently accepted boundary location between Tasmania and Victoria at latitude 39° 12' south might be judicially recognised as the true legal boundary by virtue of the application of the legal doctrine of prescription and acquiescence.

The doctrine of prescription and acquiescence was originally developed in international law. It is analogous to the principles of

adverse possession which operate in each of the Australian States. In 2008, the International Court of Justice in the Pedra Branca case (2008) ICJ Reports 12 summarised the doctrine as follows:

"Under certain circumstances, sovereignty over territory might pass as a result of the failure of a State which has sovereignty to respond to conduct *à titre de souverain* (i.e., with the title of a sovereign) or, as Judge Huber put it in the Island of Palmas case, to concrete manifestations of the display of territorial sovereignty. Such manifestations of the display of sovereignty may call for a response. The absence of reaction may well amount to acquiescence."

In 1982, the High Court in *Hazlett v. Presnell* (1982) 149 CLR 107 (the Beveridge Island case) unanimously concluded that the doctrine of prescription and acquiescence might be invoked with respect to the boundaries of Australian States; at least in relation to circumstances obtaining prior to Federation. The Court expressly declined to consider whether the doctrine might also operate with respect to circumstances occurring after that date; no doubt because to do so was unnecessary in that case, and because no arguments had been addressed to the Court with respect to the impact on the doctrine of s.123 of the Commonwealth Constitution.

In my view, and whilst the position is far from certain, it is likely that the Court would, in an appropriate case, acknowledge a continuing role for the doctrine after Federation.

In my opinion, Victoria has engaged in relevant prescriptive conduct with respect to the Bass Strait islands lying to the north of latitude 39° 12' south without objection from either New South Wales or Tasmania.

In the case of Wattle Island and the islands of the Anser Group situated just off Wilsons Promontory, these were incorporated into the Victorian County of Buln-Buln by Proclamation in 1871, and were further effectively included within the Wilsons Promontory National Park in 1909.

Whilst neither the northern portion of Boundary Islet nor Seal Rock, which lies some 600 metres to the north-east of Boundary Islet, has been incorporated into the Victorian cadastral system, or into a Victorian Park or Reserve :

- (a) Victorian, Tasmanian and Commonwealth maps dating back at least to the 1940s show them on the Victorian side of a marked boundary with Tasmania;
- (b) various intergovernmental and administrative measures dating back to the Offshore Constitutional Settlement of 1979 are predicated in part on the boundary being located at latitude 39° 12' south; and
- (c) both Victoria and Tasmania saw fit in 1990 to re-name what had previously been known as North East Islet as Boundary Islet.

Likewise, I am of the opinion that since the 1830's, Tasmania has engaged in a myriad of legislative and administrative actions of a prescriptive nature with respect to the islands lying between latitudes 39° 12' and 40° south; all without objection from New South Wales or other parties.

Thus, we might be able to take matters "full circle"; with judicial recognition of the legality of a boundary between Tasmania and Victoria at latitude 39° 12' south which, although not in accordance with Imperial prescriptions, has nonetheless been generally accepted in practice by all relevant Australian authorities.

Dr. Garry Moore



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Oh, the Bane of the Rural Surveyor

Oh, the bane of the rural surveyor. No amount of searching, planning or wishful thinking can prepare you for that missing or destroyed Permanent Survey Mark (PSM). I speak of the elusive PSM as opposed to the easily detected iron pipe, rod or star picket with a modern, directional ferrite metal detector – a mandatory piece of equipment in the arsenal of the modern rural surveyor. I, like my predecessors, have undertaken my fair share of unwavering excavations resulting in something between a foxhole and a bomb shelter in a desperate bid to find the ever elusive PSM. Whether the survey mark is from a prior subdivision or an original application survey the frustration is the same and often leads to further exasperation from having to backfill the crater you have just created that rivals Wolf Creek. Excavation works are often bitterly halted after the remnants of broken concrete rubble are discovered. The culprit of such unwanted destruction is often attributed to the placement of underground services such as telecommunications, council drainage / road works or the aggrieved local farmer who has just destroyed the slasher blades on his mower after taking out not only the PSM, but also the marker post that was set in concrete. As an aside, one of the most valuable sources of information on the location and status of the PSM is often the local farmer for he or another unnamed assailant has already undertaken the unthinkable and destroyed a set of mower blades (and the PSM) and is acutely aware of the remaining PSM's locations that are avoided like the plague.



From a project management point of view the result of the destroyed PSM is the same - whether it be for a cadastral survey that now requires additional survey work to the next intersection or crown section together with additional computations, or a level or coordinated mark set out by survey for flood study or a gas exploration drill rig (respectively) and that is time (not to mention angst) - a very difficult variable to factor into any fee proposal or project budget without an extensive, pre-survey reconnaissance expedition.

Reminiscent of a job not long past, a large scale, liner asset mapping project undertaken with GNSS that was required to be connected to locally co-ordinated MGA and AHD marks. Very late one particular Friday after having located the required assets over a five day period our last remaining task was to tie the end of the survey onto a known co-ordinated mark. Armed with an extensive Survey Mark Enquiry Service (SMES) search, several kilometres of back roads were navigated (not to mention the archaeological studies undertaken at several intersections along the way) until a collective sigh of relief resonated from inside the vehicle – we had just sighted the silhouette of a triangle on the fence line just inside the road intersection. Not just a random piece of tin placed on the fence for target practice by the local boys, but a distinct, freshly painted blue triangle marker plate recently placed specifically for and by the surveying fraternity.

Following previous discussion at a regional Glenelg Grampians Group (GGG) dinner it was decided as a collective to assist the Office of Surveyor General Victoria (OSGV) in preserving the local PSM's. When a missing marker plate or post was discovered we would simply place a new marker plate on the adjoining fence. The purpose of this was twofold:

- 1) We would identify the position of the PSM's that were still present in a bid to help ourselves and;
- 2) Identify the presence of the PSM's to the public in an attempt to both protect the marks and, as a by-product, promote profession.

The process is inexpensive and in our instance had worked. We have saved / prolonged the useful life of several PSM's recently along routes of major road upgrades with construction crews further highlighting the marks before construction. The triangles are easily transported within our vehicles in a small, inexpensive aluminium case with a pair of pliers and a roll of tie wire and netting crimps. Each triangle takes as little five minutes to place, be it nailed or tied to the fence. The GGG picked up a bulk delivery of triangles by way of a round trip past the OSGV's geodetic section depot, but with a little organisation the triangles could be dropped off annually to the companies that host the EDM baselines in each regional area for pickup.

Thank you to Dr Roger Fraser, Manager, Geodetic Survey Office of Surveyor-General Victoria for his assistance and supply of our 'blue triangles'.

Clint Joseph
MISVic



ISV welcomes the following new Members:
Don Grant, Mark Oldfield and Leon Wilson

Advancements in Global Navigation Satellite System (GNSS) Surveying with BeiDou Satellites

Nick Talbot

Trimble Fellow/Senior Software Engineer

The United States has provided the world with free access to the signals from the Global Positioning System for more than two decades. The multi-billion dollar investment in GPS has spawned a revolution of positional awareness across the world and helped to improve many aspects of survey data acquisition. Since the development of GPS, Russia has followed with GLONASS, Japan with their Quasi-Zenith Satellite System (QZSS). More recently China, has unveiled their BeiDou system and the European Union with Galileo. The following article briefly examines China's BeiDou System, and provides some insight on how the new satellites and signals will help to improve surveying in Victoria.

The Global Positioning System has around 30 satellites in medium earth orbit (MEO). At any one time, we typically see 6-14 GPS satellites above our local horizon. For centimetre-level, Real-Time Kinematic (RTK) positioning applications used by surveyors, we need at least 4 GNSS satellites to obtain a fix, but in reality 5 and preferably more satellites should be used. An increase in the number of satellite signals tracked leads to improved availability. Having over-determined observations should be a familiar concept to surveyors. The addition of around 24 GLONASS satellites has nearly doubled the number of GNSS satellites in view. This has allowed RTK operation in environments where some of the satellite signals are obstructed.

Apart from improving positioning availability, having more satellites helps to improve position accuracy. A dominant error in RTK positioning is due to signal multipath. With multipath, rather than just receiving the direct signal from a satellite, signals are reflected from objects near the antenna. This introduces cm-level errors in the respective user-satellite range measurements. Multipath errors are dependent on the satellite-reflector-antenna geometry. Therefore multipath errors tend to average out when satellites from different parts of the sky are used in the position solution.

BeiDou, is the Chinese equivalent of GPS. The system currently consists of 14 satellites: 5 in equatorial geosynchronous (geostationary - GEO) orbits; 5 with inclined geosynchronous orbits (IGEO) ; and 4 medium earth orbit (MEO) satellites. The BeiDou geostationary and inclined geosynchronous satellites are configured to provide good coverage over China. Fortunately, this configuration also yields excellent coverage over Australia. Today, it is normal to see 6-12 BeiDou satellites above 10 degrees elevation over Victoria at all times (see satellite availability plot). China plans to add medium earth orbit satellites for global coverage over the next 5 years, bringing the total BeiDou satellite count to 35.

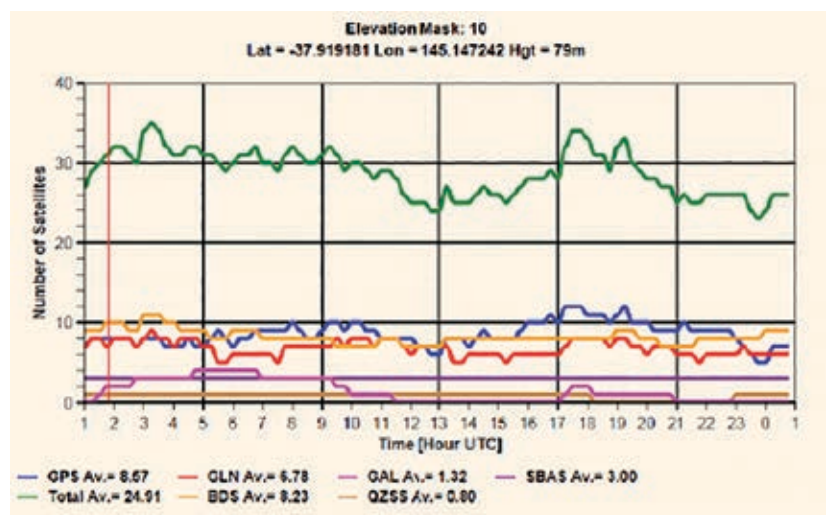
The BeiDou signals are broadcast on three frequency bands, B1, B2 and B3, which all differ from the GPS L1, L2 and L5 bands. Therefore, special antenna and receiver hardware is needed to track and use BeiDou signals. In the coming years, new BeiDou satellites are expected to move their B1 band to GPS L1, thus providing a level of compatibility across satellite systems.

For the past 12 months, Trimble has been shipping the NetR9 infrastructure receiver, the R10, R8, R6 and R4 survey systems, which are all capable of tracking and using BeiDou satellites for

RTK positioning. The inclusion of BeiDou satellite signals provides a significant improvement to the integrity of the solution. Furthermore, there is a noticeable reduction in peak-to-peak position errors for RTK surveying, particularly in high multipath environments.

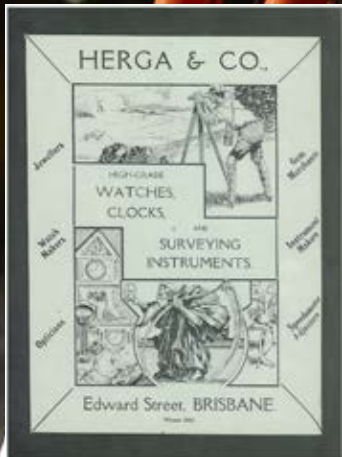
Many surveyors in Victoria obtain RTK correction signals from the world-class GPSnet reference station network, established by the State Government, Department of Environment and Primary Industries. At present GPSnet infrastructure only supports GPS and GLONASS data. However approximately 10 reference stations have been established to form a sub-network around the Melbourne metropolitan area with QZSS and BeiDou support. There is a desire to upgrade the entire state-wide network to support all GNSS signals in the future. BeiDou rover equipment will not see the full state-wide benefit from GPSnet until all reference stations in the network are upgraded. However, GNSS users with their own BeiDou-capable reference and rover equipment can enjoy the full benefits of the Chinese system today.

Europe's Galileo system is gathering momentum now, with 4 satellites in space. The Japanese QZSS has one GPS-like satellite in space today over Asia and Australia, with more QZSS satellites to follow. By 2015 we can expect to see 90 satellites circling the globe and by 2020, the number will grow to 120. GNSS users in Australia will be the beneficiaries of satellite coverage that is heavily biased towards our region. The availability and integrity of high-precision GNSS surveying will be greatly enhanced by the expanded satellite signals.



Twenty-four hour visibility plot for Melbourne, with satellites above 10 degrees elevation. The plot includes the following GNSS satellites: GPS, GLONASS (GLN), Galileo (GAL), BeiDou (BDS), Quasi-Zenith Satellite System (QZSS) and Satellite Based Augmentation Systems (SBAS). At times the number of BeiDou satellites in view exceeds the number of GPS satellites. The QZSS satellite is seen for around 19 hours; all 4 Galileo satellites are visible for only 2 hours a day. Note that the SBAS satellites are not generally used for RTK applications.

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A Leap Forward in Monitoring Technology



The iMetrum video gauge set up to measure displacement of tracks

If you're in the game of using technology to monitor structures dynamically for things like deflection, strain, rotation and displacement, you're probably familiar with the traditional method of using a total station and prisms or GPS. While these methods are effective for measuring one point at one moment in time, if you require accurate, simultaneous, high frequency measurements in real-time when there are dynamic forces in play, for example a train or traffic passing over a bridge, you'll need to look for another solution.

Introducing iMetrum video monitoring

DataHawk and UPG (formerly Ultimate Positioning), providers of rail and geospatial technology in Australia, have an answer – iMetrum video monitoring. iMetrum is a cost effective, completely passive, video monitoring solution that leads to less time on site and no need for mounting GNSS receivers or prisms in hard to reach areas. This is all while achieving accuracies down to 0.01mm and measurements of 0.5mm from a kilometre away. And, because it takes measurements up to 300 times per second and can measure 200 points simultaneously, you can accurately monitor a structure even when there are multiple dynamic forces in play. Add to that the benefits of being able to store the video and archive it so further measurements can be pulled out at a later date, or to use as a visual aid, iMetrum is a very exciting advancement in monitoring technology.

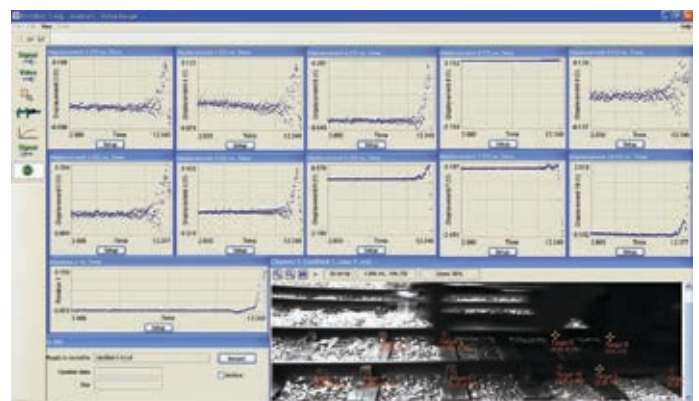
To use the system, all you need to do is:

1. Set up the camera
2. Choose the quality of the image
3. Pick the points of interrogation – these need to be features that are defined or have contrast e.g. a bolt or a paint line
4. Capture the video
5. This is automatically loaded into the iMetrum software which then uses pattern recognition technology and sub pixel interpretation of the video images to display the displacement of the structure down to 0.01mm at over 300HZ

Applications for a surveyor

Aside from bridge monitoring and rail monitoring there are a great many opportunities for a surveyor to use this technology for example:

1. Vibration/displacement monitoring of conveyors, fixed plant or structures within the zone of influence during construction.
2. Monitoring of dams, levies and embankments
3. Building monitoring
4. Monitoring the growth of structural cracks



Snapshot out of a live video in the iMetrum software which shows track movement as a train moves over the tracks.

In fact, it can be used anywhere a structure is impacted by an external force where the result needs to be measured in real time with a high degree of accuracy and confidence. Not to mention, the iMetrum Video Gauge offers continuous 24/7 monitoring.

Using iMetrum with existing monitoring technology

iMetrum also provides a module which makes it a versatile interface between the video gauge and existing sensors, data loggers or

monitoring equipment. The output of other sensors can be fed into the video gauge where they're logged alongside the video gauges measurements. Equally, the output of the video gauge can be fed into existing logging or monitoring equipment. Typical applications for this module include measuring:

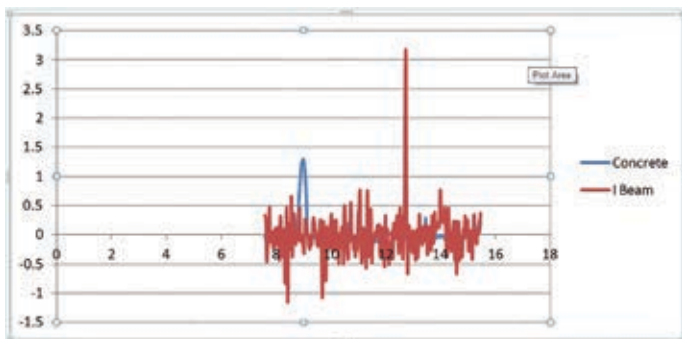
1. Displacement
2. Velocity
3. Rotation
4. Bending

The iMetrum system in action

Bridge monitoring in the greater Sydney area

Recently iMetrum was used to dynamically measure displacement of a bridge over rail in the greater Sydney area. This was done during normal traffic conditions in order to quantify normal movement of the structure under load.

The software used pattern recognition to define targets on the structure which meant the monitoring was done passively without installing or mounting targets and having access to the structure.



In this case one target was a rivet on the 'L' beam and the other was a patch of staining on the concrete beam. The movement (displacement) of the targets was measured 30 times a second over 256 seconds to give a 'snap shot' of normal movement. The video was saved and post processed in the office and the results below were given. The graph shows the movement of the bridge over time and this can be matched with the video (screenshot below) to link the movement in the graph to specific points in the video.

Open front drilling in the Netherlands

The following information is taken from a 2013 report about a railway pipe-jacking project in the Netherlands which required a high quality solution allowing for real-time monitoring and alerts. iMetrum was selected for these qualities as well as its non-contact nature.

Since the beginning of 2014 Prorail in the Netherlands has specified that all pipe drillings for pipes over 1.2m in diameter need to be monitored to ensure the safe running of trains. For this reason Prorail approached iMetrum late last year to continuously measure the displacement of two tracks whilst a 1.2 metre diameter concrete pipe was driven through the railway embankment using open front drilling. The iMetrum video gauge was set up 3.5 metres away from the nearest rail and was focused on a section of track directly on top of the line of concrete pipe. The video gauge was able to capture real time measurement data which was recorded and displayed in the iMetrum software instantaneously. This meant the contractor could monitor any impact of their works on track alignment straight away and this was all carried out while normal train traffic ran on the line.

As the video gauge is able to use natural patterns on a structure to monitor movement, there was no need to obtain a track possession to add reflective targets on the rails or to take the measurements, saving money by eliminating the approval process, capital expense of procuring multiple prisms, and also saving time in arranging the track possession. The project was also safer as there was no need for surveying staff to access the track. Additionally, as the video gauge is able to monitor multiple points at the same time at over 100Hz, all points of interest can be monitored under train loading, giving a more accurate picture of the impact of the works on ride quality and likelihood of derailment.

Interested in more information?

If you're interested in more information about iMetrum or these particular case studies please contact Craig Mathie from DataHawk today.

Phone: 07 3851 8300

Email: craig_mathie@datahawk.com.au

Web: www.datahawk.com.au or www.imetrum.com

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CALENDAR 2014

APRIL

- Wednesday 2** ISV Committee Meeting
- Sunday 6** Clocks back one hour
- Monday 8** ISV GOLF DAY
- Friday 18** Good Friday
- Monday 21** Easter Monday
- Tuesday 22** School Term 2 commences
- Friday 25** Anzac Day

MAY

- Wednesday 7** ISV Committee Meeting
- Friday 23** Joint ISV / ACSV Seminar (& ISV General Meeting)

JUNE

- Wednesday 4** ISV Committee Meeting
- Monday 9** Queen's Birthday Public Holiday
- Friday 27** School Term 2 ends

JULY

- Wednesday 2** ISV Committee Meeting
- Monday 14** School Term 3 commences
- Friday 25** SURVEYING EXPO and SURVEYING INDUSTRY AWARDS GALA DINNER

AUGUST

- Wednesday 6** ISV Committee Meeting

SEPTEMBER

- Wednesday 3** ISV Committee Meeting
- Friday 19** School Term 3 ends
- Thursday 25** Gippsland Group Seminar

OCTOBER

- Wednesday 1** Seminar / Annual General Meeting
ISV Committee Meeting
- Sunday 5** Clocks forward one hour
- Monday 6** School Term 4 commences
- Friday 24** RMIT Major Project Presentations
- Friday 31** Murray Group Seminar & AGM

NOVEMBER

- Tuesday 4** Melbourne Cup Day
- Wednesday 5** ISV Committee Meeting
- Tuesday 11** North Central Group Seminar & AGM

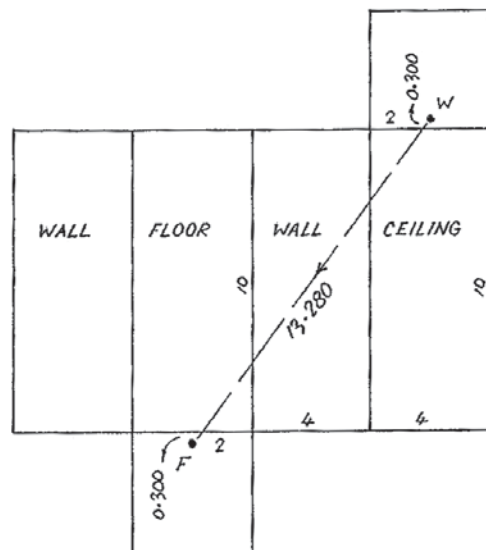
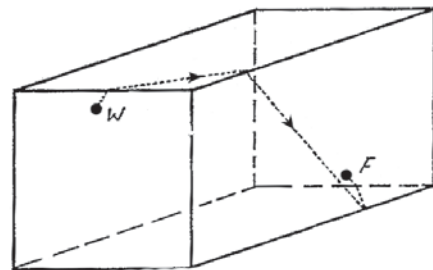
DECEMBER

- Thursday 4** Seminar & General Meeting & Christmas Networking Event
ISV Committee Meeting
- Friday 19** School Term 4 ends
- Thursday 25** Christmas Day
- Friday 26** Boxing Day

Solution to Curly's Conundrum No.29

The solution to this problem can be found by cutting a sheet of paper so that, when folded properly, it will make a scale model of the room. This can be done in several ways. If the paper is spread flat and the points representing the wasp and the fly are joined by a straight line lying wholly on the paper, this line represents the geodesic route between them. The diagram below shows the construction for the shortest distance between W and F equal to 13.280m.

The other possible straight-line distances are 13.557m and 14m.



Curly's Conundrum No.30

Tennis

Steffi beat Martina in a set of tennis, winning six games to Martina's three. Five games were won by the player who did not serve. Who served first?

(This puzzle appeared in *The Unexpected Hangings and Other Mathematical Diversions* by Martin Gardner, Simon and Schuster, 1969)

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SEMINARS, CONFERENCES & UPCOMING EVENTS 2013-2014

ACSV & ISV Joint Seminar

Friday 23 May

Manningham Club, Bulleen

The XXV FIG International Congress

“Engaging the Challenges, Enhancing the Relevance”

16-21 June 2014 Kuala Lumpur, Malaysia

Web: www.fig.net/fig2014

FIG Institution of History of Surveying & Measurement

Charting and Mapping the Pacific Paradise of the Pitcairners

Conference 2014 6-10 July 2014

Contact: maria@travelcentre.nlk.nf

ISV Surveying Expo and Surveying Industry Awards Gala Dinner

Friday 25 July 2014

Encore, St Kilda

A Reminder to our Members:

**The use of post-nominals indicating
membership of ISA is no longer correct.
Please check to see if you need
to update your signatures or plan proformas
to reflect MIS Vic (etc).**

TRAVERSE is published bi-monthly. Articles and letters related to any aspect of spatial science are invited and should be sent to the Executive Officer at the ISV Office by the 12th of the month prior to the edition.

Statements of opinion expressed in this newsletter are not necessarily those of The Institution of Surveyors, Victoria and no responsibility can be accepted in respect of the opinion of any contributor.

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GARY SAYS:

*If a word is misspelled in the dictionary,
how would we ever know?*



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