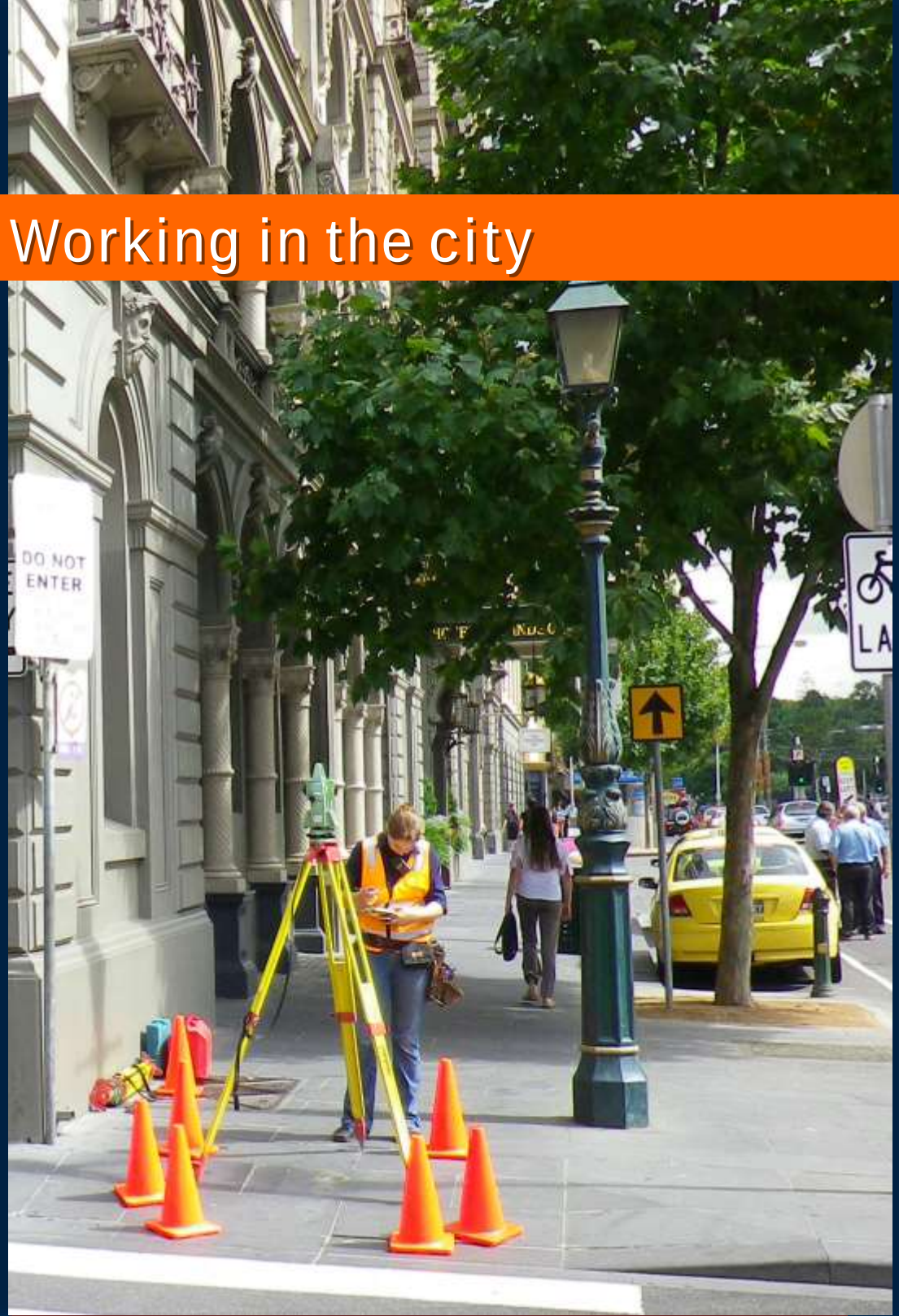
Working in the city



What will I be?
Surveyor

URBAN SURVEYORS

- Survey Technician
- Graduate Surveyor
- Cadastral Surveyor
- Spatial Surveyor

Do you love maths and maps plus lots of variety and intellectual challenge?

VOLUME 2

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WORKING IN THE CITY

URBAN SURVEY TECHNICIAN
URBAN GRADUATE SURVEYOR
URBAN SURVEYOR

Written and compiled by Beverley Neil

Andrew — an Engineering Surveyor — Perth, WA

This series is dedicated to
my beautiful daughter, Breanna ...
and to all those who have a bigger vision for their lives.

With thanks and gratitude to the NSW Surveying Taskforce

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ISNSW Southern Group

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We acknowledge the Traditional Owners of this awe-inspiring land

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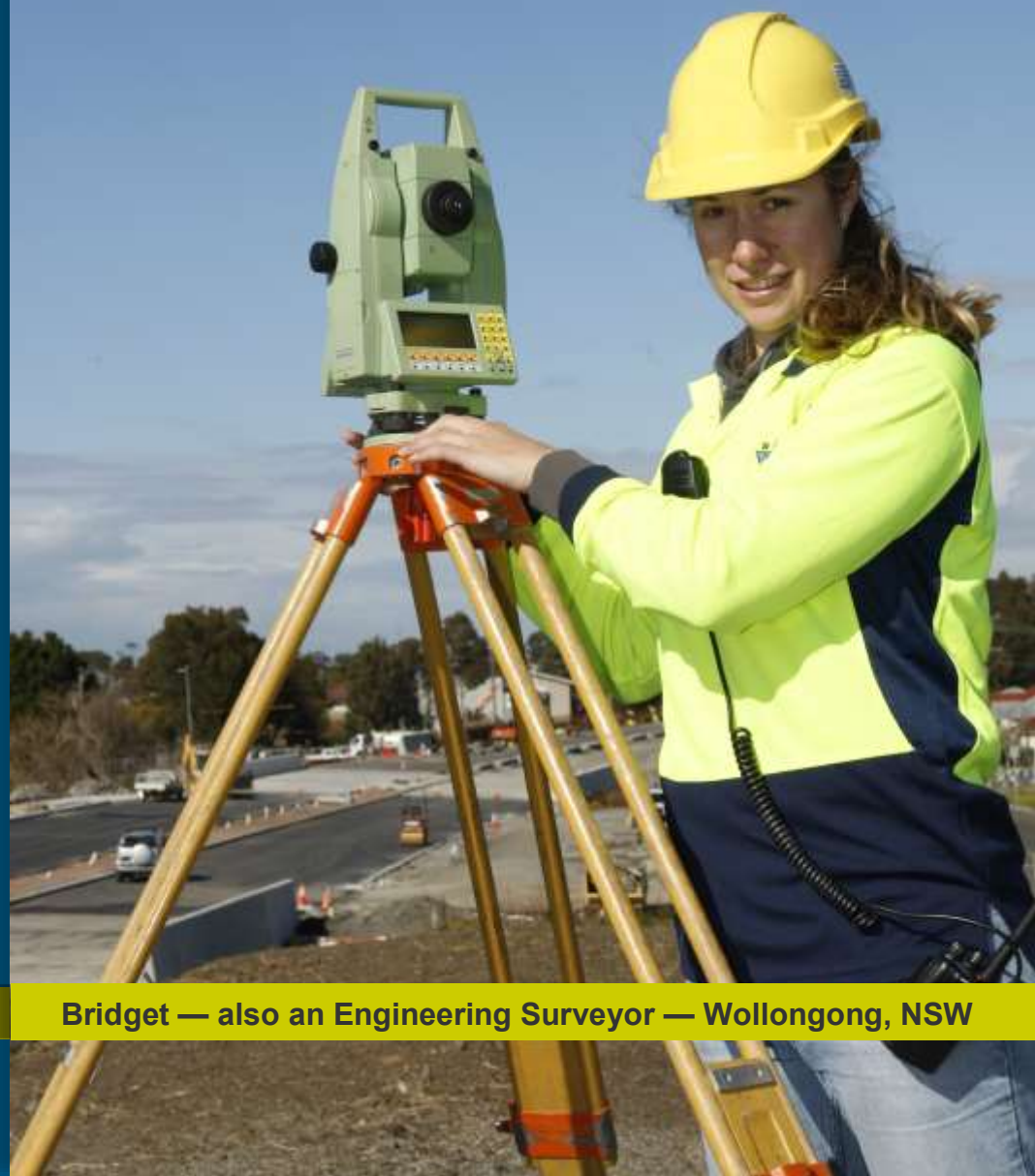
And to Michael Green, Phil Dingeldei, Mick Rose and Peter Noble for their yarns and their inspiring love for their profession

Author: Beverley Neil | Design: Beverley Neil
Desktop publisher: Beverley Neil

CONTENTS

"I love surveying. It's a mix of indoor outdoor work, going into the field to collect data, be it on a road or in a creek, then processing the data back at the office using different CAD software and analysing the relevant plans.

I'm an out-doorsy person and love to get into the elements to exert a bit of energy and brain power."



Bridget — also an Engineering Surveyor — Wollongong, NSW

Just a bit of history

Surveyors have always been essential to civilisation!

When you get into the high tech equipment and satellite position technology used by surveyors today, it's incredible to think once all surveying was carried out by chains, steel bands, and 'moving' rulers, known as slide rules. Yet, Surveyors hundreds, even thousands, of years ago were still amazingly accurate down to the inth degree!

Land and boundaries have always been vital to individuals, groups, towns and countries, so it's hardly surprising that the accurate measurement of those boundaries was of the utmost importance—just think how many wars have been fought over a border! This has made Surveyors some of the most influential and respected people in any country throughout history, right back to early Egypt around about 3000 plus years ago.

1960 - Snowy Mountains Scheme
Surveying at Tooma Dam site

Enduring structures such as the pyramids all needed surveyors on the job first and foremost as well as other feats of engineering from the aqueducts of ancient Rome to our own home-grown Snowy Mountains Hydro Electric Scheme and the Sydney Harbour Bridge.

Surveying is all about accurately mapping, measuring, calculating and marking in both 2-dimensions and 3-dimensions — very accurately! This may be anything from an ocean bed or the sky, the polar icecaps, a mountain range, a new golf course, a bridge or a land boundary.

In 1836, despite ill-health, Colonel William Light was sent to South Australia with a team of only 10 largely inexperienced surveyors plus 30 labourers and given a mere two-months to 1/ Explore and survey 1500 miles of coast line to choose a site for a town; 2/ Found not only that town but a series of secondary towns; 3/ Carry out a survey on 100,000 country sections. He chose the beautiful location where Adelaide now rests, and also managed to peg 1004 town acres within eight weeks despite labour shortages and strikes.

Because the colony was growing so rapidly, Light and his team had to measure up and produce a plan covering another 100,000 acres. Light contacted London requesting more staff to assist with the project, and was told to work faster instead of working so accurately. It's possible at this point that Light politely suggested alternative uses for their survey pegs. What is definite however is that Light handed in his resignation (as did most of the other surveyors) and went and established South Australia's first private surveying business. Good job.!

...and a little bit more

1910 - Residency and Fort Hill, Port Darwin

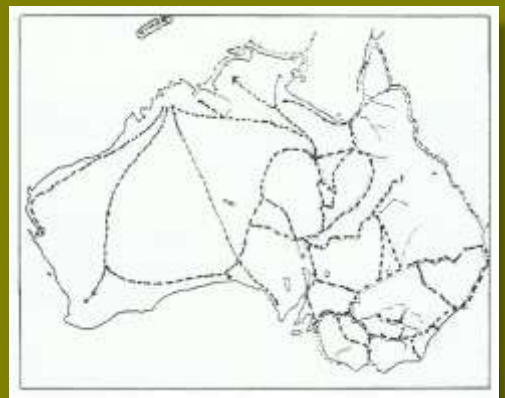
A life lesson from history — before you buy land, check with a Surveyor!

When Queen Victoria signed the Letters Patent in 1863 to legally separate the Northern Territory from South Australia, the South Australian Government told the citizens of the newly formed Northern Territory they needed to be financially independent.

To do this, before even one Surveyor was on site, an area was chosen and the 'town to be' named Palmerston. Land sales were held in March 1864 and within six-months 250,000 acres of half acre blocks were sold. It was a major financial success, and the lots were snapped up sight-unseen by buyers in Adelaide and London.

When a Surveying Team, led by the appointed Government Resident, Boyle Travers Finniss, finally reached Palmerston they discovered the area chosen was little more than swamp country and totally unliveable. It wasn't until 1869 that the Surveyor General of South Australia , George Goyder, led a party to the north of Australia and identified and surveyed the site for the beautiful town of Darwin.

Our sixty thousand year history...



Did you know?

Long before European settlement, Indigenous tribes had established designated 'track-ways' and trade routes across Australia.

Surveying to preserve Aboriginal Cultural Heritage sites

In each capital and regional city, as well as throughout country and Outback regions, there are hundreds of thousands of sites that are culturally and historically significant not only to Aboriginal people but to Australia as a whole, and each state maintains their own register.

To help to make this happen, and to preserve many of these locations, potential development sites first undergo surveys to compile information about Aboriginal heritage and, often, to also identify the presence of artefacts.

For example, in Sydney, development sites that were surveyed, assessed and monitored during construction include the Olympic Park Site (Homebush Bay) where many of the events were staged during the 2000 Olympics; Lane Cove Tunnel; the M7 Eastern Creek Motorway, and dozens more.

WAITING FOR -

PHOTO OF CULTURAL HERITAGE SURVEY

Virtually *nothing* happens without a Surveyor!

Surveyors and their toys

The way Surveyors take measurements has not really changed over the years, but the equipment has massively changed and improved and it is far easier to get accurate measurements then when only sticks, pegs, string and chains were used. Now, Urban Surveyors use instruments such as laser range finders, robotic-guided total stations with electronic distance measuring devices, optical and laser levels, GNSS (Global Navigation Satellite Systems) and more. It is even possible to email the data straight to a computer sitting in an office thousands of kilometres away.

There are dozens of surveying tools on the market, plus they are constantly being updated or created, but these images will give you a rough idea of the fascinating equipment you'll be playing with as a Surveyor…

Machine guidance control unit

Rail Laser Scanner
You may never use this, but isn't it cool!

SmartStation using GNSS

Optical Level

Laser Scan Station

Theodolite

GNSS/GIS Handset

Laser Distance Meter

Aerial Video Recorder

...and their tales

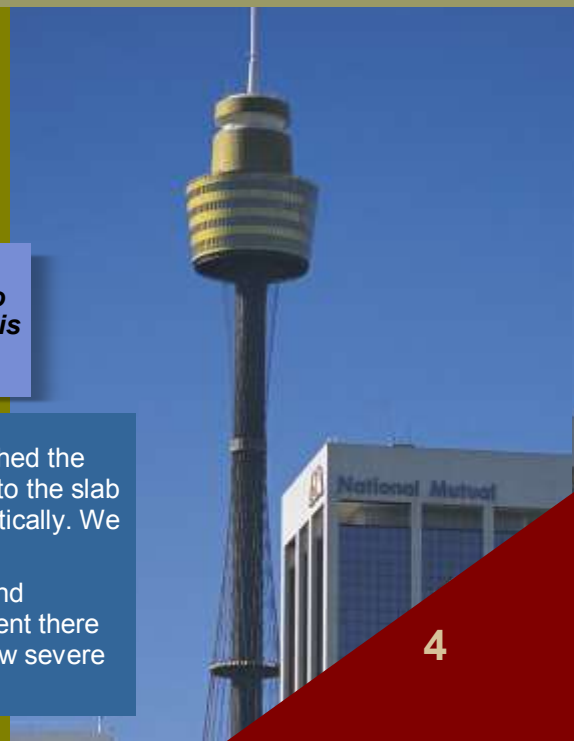
"Just before the 2000 Olympics they increased the size of the flags at the top of the bridge, then Sydney had a very gusty day. The concern was that the flagpoles were going to break with the extra flag weight billowing in the breeze, the wind was so strong. Our job was to climb the bridge with surveying equipment and measure the deflection angle of the flagpoles. We were up there from late afternoon, through dusk and sunset: a beautiful sight as the city lights came on. City Surveying doesn't get much better than that."

"I measured up for a newly constructed sewer tunnel that wound through the foundations of an existing building in the city. At one point they had to break a hole into the existing sewer. You're talking about a tunnel that's about a meter wide and two meters high and the engineers broke a hole in above the flow level. I could not believe the speed of the sewer flying down this tunnel – you could go white water rafting in it. Thankfully at that point the surveyor's job was over and I was out of there."

"One job I had to take a swim to measure an "Olympic size" swimming pool, which should measure 50 metres in length. Turned out the survey measured less at 49.7 metres. A local that I was working with said that explains why interclub swimmers all have their personal best times competing at that pool!"

"When they were building Centrepoint (also known as Sydney Tower Eye), when they had reached the halfway point I had to measure the height. I had to make sure the distance from that disc down to the slab was exactly right. This was before electronic equipment so we had to get a tape and hang it vertically. We actually found it was 25mm shorter than it should have been.

Later they had to map the movement of the structure as the sun rose in the east and warmed and expanded the metal, then moved through the sky heating the metal as it went. With the movement there is a kind of twisting effect and they had laser beams going up through the centre to measure how severe the twist was. The engineers then made adjustments to the cables to keep everything secure."



Survey Technician

What does a Survey Technician Do?

Survey Technician Is a senior role which supports the Surveyor. Some of the many and varied duties a Survey Technician can perform is to upload calculated information from survey specific programs into the field survey equipment, which may be either a hand controller or a survey total station. A Survey Technician can then use this information to make additional measurements, check and analyse data, draft plans using drafting software, and set out points, or gridlines, on a construction site.

A Survey Technician is TAFE trained with the education pathway including Associate Diploma of Engineering (Surveying).

Another key role, 'Technical Assistant', also undertakes a wide variety of jobs. Working out in the field, he or she assists senior, or Licensed/Registered Surveyors to complete jobs by hammering in pegs, identifying survey marks, making sure the senior surveyor has all the tools and equipment needed for the day's work, downloading data, and ensuring the work is completed quickly and correctly. Assistants also maintain all of the survey equipment and vehicles, keeping them clean and making sure everything is in working order.

In the office, both the Technician and Assistant may enter data and draft plans on the computer working through a 'CAD' drafting program, which is used to show the scope of work completed in the field.

Q&A INSIGHT

Meet Belinda - She's a Survey Technician

"Knowing you've been there every step of the way. It's incredible."

Location:
Sydney,
New South Wales

What first got you interested in surveying?

BELINDA: My extended family are in surveying, so when I finished high school and didn't know what to do my mother's cousin, who was a survey drafter, said, 'Why don't you come in and do some work experience'. I did that for two weeks and thought, 'Yeah, this is for me'. I really enjoyed it. It was outdoors, it was maths related and you have to think, so that's what really drew me towards it.

How did you find the study?

BELINDA: I'm a Survey Technician which is a TAFE trained qualification. I completed the Associate Diploma of Engineering (Surveying) at Ultimo TAFE, NSW, which was a two year full time course. I can't brag about TAFE enough. I think it is absolutely amazing because you get the hands on experience as well as the academic. At TAFE it is like, from day one, this is what you will be doing in the field whilst you're working. If I did struggle with anything, the teachers were there to help you out. It was amazing.

What do you enjoy the most about being a Survey Technician?

BELINDA: Right now I'm enjoying both working outdoors plus doing the office calculations inside, out of the rain, but mostly I enjoy the diversity. I've been with this company for five months and the different standard of surveying they do here compared to my last job it's just amazing. In my last job it was more industrial and commercial surveying for leases whereas with this company we are involved in all aspects of residential development.

So, what sort of projects do you work on?

BELINDA: At the moment I work on various projects from placing marks in the ground to show the location of where a fence should be placed, up to 50 storey residential buildings with lots of variety in between. With the multi-story building, we go from surveying the excavations all the way up to the finished completed survey. Once it's completed we are just finalising and making sure the building has been put in the exact location that it should be, and that it has been built to the correct height. Then you measure it up for the strata plan so that individual units can be sold off.

Basically, what you do is a survey to tell the builders where to build the structure, then once it is built we check that they have built it as per the plan. The building also gets checked on a level by level basis throughout the project so you're really just doing a final overall measure right at the end.

Seeing the progress and seeing that you've been involved from a big excavated hole in the ground right up to this magnificent building – like, once it's all completed and furnished and knowing you've been there every step of the way – it's incredible.

What do think are the downsides to your job?

BELINDA: The weather is one. When it's six o'clock in the morning in the middle of winter and it's raining it's not fantastic to be working outside, but this doesn't happen very often. Really the only negative, and this is just me trying hard to think of something, is doing something repetitive on some of the really big projects, such as with putting in the hundreds of nails to define the gridlines. As I say, that's me trying hard to find something, anything, that could be a downside in a job I really love.

WHAT IS A GRIDLINE?

"A gridline is like playing Battleships – you've got your letter lines and your number lines which are used as building reference points. So every level of a building has the same gridlines, and the design of the building is all related to the gridlines. "

What have been your greatest challenges?

BELINDA: Along the roadside are marks that other surveyors have put in and which you can use to calculate your true position. Nine times out of ten they work really well but you may get that one where the plan says the distance should be ten meters but you are actually measuring ten and a half meters.

So then you have to do a bit of investigation and a lot more calculations to find out why. They get really interesting – time consuming but interesting. I really enjoy being challenged.

What are other surveyors like to work with?

BELINDA: Generally they are really fantastic though some to start off with have been a little hesitant because I am a female. It was more like that when I first started surveying but even now I come across it from time to time. I just go along and do my work and my work speaks for itself. Through experience I know they always come around when they see my work.

Every surveyor seems to have a funny story. What would yours be?

BELINDA: I was doing a survey in the back of a client's property. It was about a hectare in size and there was just stuff everywhere. We were walking through and I fell – my foot actually fell through the ground and I needed my assistant to go and get a shovel and dig me out.

Graduate Surveyor

What does a Graduate Surveyor Do?

A Graduate Surveyor has already undertaken his or her Bachelor of Surveying or similar university degree. This may have taken up to four-years full-time study to complete, though the length of study can vary from state to state. To move on from being a Graduate Surveyor it is necessary to gain one year's field experience.

Depending on the type of surveying that is being carried out, a Graduate Surveyor could be working outdoors doing a variety of practical, hands-on tasks, or may be working on computers, using programs such as CAD, and data management.

Tom has been a Graduate Surveyor for just five months, and says he undertakes four main types of survey work being Engineering Detail Surveys, Cadastral Surveys, Identification Surveys and also occasionally assists with demanding Construction and Set Out Surveys for subdivisions. He talks about each of these areas in his interview.

A Graduate Surveyor is under the 'mentorship' of a Senior Surveyor, however, as his or her demonstrable knowledge and experience grows, will work quite independently and often lead small two-man teams.

Q&A INSIGHT

Meet Tom - He's a Graduate Surveyor

Location:
Adelaide,
South Australia

What was it about surveying that grabbed your attention?

TOM: My mum was long-term friends with a surveyor so when we were discussing things I could do surveying was always one of them. I forgot about surveying through high school but I was interested in geology then when I was looking through the university subjects for geology I came across surveying.

I always liked the idea of working out of doors and you get to see some fantastic things when you're out working in paddocks in rural areas or working in high rise buildings in the city.

*(**Main photo:** Tom is conducting a detailed survey of the topography of a section of a golf course. A new subdivision will be built adjoining the golf course and the developers need to know the potential impact.)*

What qualifications do you currently have?

TOM: The course I ended up doing was Masters of Surveying at the University of South Australia. It's changed a bit now but then it was a three year course in Geospatial Information Systems which led into the two year Masters. The first year of the GIS course was based on theory and practical work and the second year there were two big projects. The first project was redefining the boundaries of a residential environment and the second was a rural project.

Were you working while you were studying for your degree?

TOM: Yes, from second year uni I was a Field Assistant helping a Senior Surveyor. There were three of us in the class that got work at the same time. We emailed around to all the surveying firms more or less saying, 'Hi there, we're doing surveying at university, can we get work experience with you'. We all got responses at the same time saying yes. As soon as the work-experience week ended the firm I was with said, 'Yeah, we'd love to have you'. So, I became a casual Field Assistant which fitted in well around my university study.

What do you enjoy most about being a Graduate Surveyor?

TOM: I've been a graduate for five months and I haven't been disappointed. There is huge variety. With Cadastral surveying, AKA title boundary surveying, often the subdivisions are going up in semi-rural locations plus I have ended up in all sorts of country areas such as Lyndhurst. With construction sites I guess the word is hectic. When you're on a construction site there are workers everywhere and you get a sense of how massive the project is. *Continued...*

Continued… Monday this week I did an Engineering Detail Survey, yesterday I was doing an Identification Survey in the city, which is basically marking boundaries for a private property. Two weeks ago I was at a wind farm in Snowtown and a month ago I was on Kangaroo Island. It's incredible, you get to do dam monitoring and all sorts of things. Dam monitoring is measuring how much the dam wall is moving. It is very high precision and you are measuring just a few millimetres over such a massive structure.

What do you like least about being a Graduate Surveyor?

TOM: It would be the same thing – variety. You might not know what you are doing the next week, you might not know until two days before, so that's a downside but it's also one of the upsides. Surveying is never boring. Downsides can also be another of the upsides – that is being outside a lot. Early this week it was days of low 40 degrees, all day working in the sun. We can work in light rain but once the rain gets too heavy it's no good for the equipment so we pack up and sit in the car and wait.

What projects are you mostly involved with?

TOM: There are Engineering Detail Surveys, which are essentially painting a picture of what's on the ground. So say a building was going up the architects and engineers would need to know what's on the road and footpath, for example rough ground, fire hydrants, trees, fences, where they are and how big – essentially all of it.

Cadastral jobs I do would be allotment pegging where there is a new subdivision and I mark the title boundaries for work to start. And Identification Surveys are for private properties to be sure where their title boundary is.

What I have done least of is Construction Set Out. That's setting out where roads will be, angles of the curves, building corners, that sort of thing. It's very exact. You need lots of experience and it's mainly done by Surveyors with lots of experience in that area. This is chiefly due to needing to get your head around how you're going to do things straight away – so being incredibly accurate while dealing with the time pressure.

What has been your greatest challenge?

TOM: When you first start 'party leading', which is being the Senior Surveyor in a party of two, you have to make all the decisions. You've been an Assistant and been briefed and know what to do, but the first time you're the leader then it's a challenge trying to get your head around how you do everything. I really enjoy that challenge though. Once you've tackled a new job and you know how to do it, then there's no need to be nervous any more.

What is the funniest or strangest thing you've experienced so far as a Graduate Surveyor?

TOM: Nothing I can think of yet. Perhaps I haven't been a Surveyor long enough. But I did have a really cool experience about a year ago when I was working as an Assistant. We were doing a job at a private house for architectural purposes, and the owner was an elderly man who used to be a Licensed Surveyor during the 1950s to 70s.

We talked to him for quite a while and showed him the type of equipment we're using these days, and he showed us some of his old survey plans. He was blown away by the modern 'Total Station' we were using. I really liked the professional camaraderie!

By using a Remote, Tom is able to control the Total Station himself and can still conduct detailed surveys without an assistant

" I wish I could turn my memories into pictures."

Greg Monaghan

Create the life you want

It's not up to others - it's up to you!

During April 2013, the Scottish Ten Project (you must check out their amazing projects at www.scottishten.org) surveyed the entire sail area plus the interior of the Sydney Opera House. The project provided the Opera House management with invaluable, detailed information vital to conserving the Opera House for generations to come. Now, that's taking surveying to new heights!

Cadastral Surveyor

What does a Cadastral Surveyor Do?

If you see someone referred to as a Licensed Surveyor, what this means is that they have undertaken the process to become a 'Cadastral' or 'Title Boundary' Surveyor. You can be a Surveyor without being Licensed and can conduct any number of surveying jobs, but you can not determine and mark up title boundaries and fencelines that are recognised legally. Only Surveyors who have passed a rigorous licensing examination process can establish title boundaries that are recognised by governments, councils and the courts.

The name Cadastral comes from the word Cadastre, essentially a French word with some Latin and Greek roots and meaning a list or register. The Cadastre actually underpins societal and economic development. There's a bit of a history to the Cadastre but guess what kick started the whole thing — governments wanting taxes!

The tax element still applies but the real importance is what it means to each of us every single day — the biggest being the home you live in and being able to say, this is my patch of the world.

Another Surveyor you'll meet, Greg, perfectly stated what the Cadastre means, *"To me, the Cadastre is the biggest element of surveying – it's the mathematical model of the boundaries of what we own and where we live."*

It's clear that Jill, soon to be a Licensed Surveyor, has this same passion.

Q&A INSIGHT

Meet Jill - She has one exam to go to be a Licenced Surveyor

> "I love the combination of mapping, data collection, history and tracing back other people's steps."

You'll soon be a Licensed Surveyor. What does that mean?

JILL: Currently I'm a Surveyor but I'm on a training agreement which allows me to work toward becoming a Licenced Cadastral Surveyor. You can be a Surveyor without being Licensed, but only Licensed Surveyors can legally define, mark out and record the boundaries.

So far I've successfully submitted three of the four assessments towards being licensed. These have been an Urban Cadastral Survey project, a Professional Assessment project, and a Cadastral Law project. I'm about to do the Rural Cadastral Survey project, then I'll be eligible to sit my professional examination before the Surveyors' Registration Board. They interview me and generally test my knowledge to decide whether I'm suitable to be registered as a Licensed Surveyor.

Location:
Melbourne,
Victoria

How long does this process take?

JILL: After you have your surveying degree, on average it takes between five and eight years to do your Licence because you're also working full time. You can do it faster if you want to, but for me it's about having the balance between your work and private life plus doing the projects and gaining the experiences needed to become Licensed.

It's an extensive process but it's important because the stakes are quite high. You're determining title boundaries and the entire Cadastre of people's property ownership. The land market and the general economy all rely on the stability and the accuracy of the Cadastre so, for example, when you buy a piece of land you have the certainty the title boundaries are correct. It's very important when we mark out these title boundaries in the CDB, say they are building a 50 storey building, that the boundary is in the right spot otherwise you can imagine the problems! So it's appropriate that the whole process you go through should be detailed and extensive. You need to have gained the professional confidence to make these calls.

What got you interested in being a Surveyor?

JILL: It was mapping more than anything. I always enjoyed looking at and navigating with maps, topographical maps in particular. Then when I found out about the law and the history of Cadastral surveying, that was what really grabbed me - the combination of the mapping, data collection, history and tracing back other people's steps.

I was always good with maths when I could see an application, but when it got into more pure maths it struggled to hold my interest because I couldn't see the relevance. Surveying is a great practical application for maths, which suits me.

What qualifications do you have?

JILL: I hold a Bachelor of Geomatic Engineering from the University of Melbourne.

Do you have a favourite part about being a surveyor?

JILL: The history and the legal side of surveying, so that's probably a little unusual, oh, and the variety as well. It's great to be both in the office and out in the field – I get to do a fairly straight 50/50 split.

As the field Surveyor I can collect the data but then also do the title boundary determination calculations and help produce the plans that my data supports. I really do get to see right from the start from locating existing fences and banging in pegs, through to drawing up the formal survey documents and plans using a CAD drawing system.

Then what types of projects do you work on?

JILL: I do a lot of work on urban title re-establishment, so usually survey work at the beginning of a development project. The developer needs to know where the land boundaries are so they can design a new development whether it's a high rise building, residential estate or multi-unit development.

Sometimes I do surveys for people who just need to know where their title boundaries are, or who might be in a fencing dispute, and also for subdivision — which is splitting existing properties into multiple new ones.

I also do surveys to collect data describing features and street scapes and levels and things like that to assist architects in designing dwellings for new developments or for planning submissions. A Surveyor gets the first picture, or snapshot, of what's there - the title boundary as well as existing buildings and trees and where the drains and the driveways are.

I get to work on rural projects as well. A client owned a bush block on the South West Coast and they built their beach house right down the front but they also needed to know where the boundary was up in the steep, bush covered hill section. We had to locate the title boundary and then mark it in the ground with wooden survey pegs, so there was no option but to be crabbing sideways up hills where you couldn't even stand because it was too steep.

That's part of the variety. I've done weeks where I've been on the road for five days doing surveys across country Victoria. You do get a very good mix even if you're based in the city.

The monitor behind Jill displays a page of the ***'Abstract of Field Records'*** prepared for the survey she is conducting on the opposite page (she was working on her project at the time). This record is the official registered record of a Cadastral Survey and a permanent public record of the boundary determination that has been made. This means it is **one of the most important documents a Licensed Surveyor produces.** In conducting this survey, Jill relied on previous survey records, some dating as far back as the 1880s.

Are there any downsides to surveying for you?

JILL: I'll have to be honest - when surveying land for a new development you see some fairly grimy, dingy parts of the city such as run down, abandoned houses, but then you also get to see these areas improved in the long run so that's a positive. In Melbourne a lot of the inner suburbs, the older suburbs, have terraced houses and you need to go into the building because the boundary runs through the middle of the wall that the two houses share – so you can't avoid going in no matter how derelict it is.

What has been your greatest challenge?

JILL: My projects for gaining my Cadastral License. The jobs have to be really complex to demonstrate I've gained the necessary skills to become Licensed. I've surveyed entire blocks of the CBD (central city) of Melbourne to re-establish all the titles and all the laneways and roadways in order to help the council declare new roads. That sort of really detailed Cadastral re-establishment is what I enjoy most.

Has anything strange or funny happen to you during a surveying project?

JILL: Field work in particular is fun. You're out with another person, it's just you and them all day, you're sharing jokes, you're physically challenged but it's still enjoyable.

One of the strangest things that have happened was on a project I did towards my qualification. There are some strange tunnels and left over historical parts of buildings in Melbourne, you know, old dingy dark stairwells that don't seem to go anywhere. We found one of these strange tunnels that had a grate over the top. We weren't sure what it was for so we surveyed around it and took a photo. Then five minutes later as we were further up the laneway a man climbed out of the tunnel. Just a regular guy. He randomly climbed up out of the hole and bid us, 'Good day' and walked off down the street. It may have been a tunnel to somewhere but I wasn't keen to check it out so I guess I'll never know. I believe the underside of Melbourne is riddled with tunnels and conduits and things.

Spatial Surveyor

What does a SPATIAL SURVEYOR do?

‘Spatial’ means ‘relative place or location’. A Spatial Surveyor collects, stores and analyses data and information to assist with urban and regional planning, land and resource development, environmental and marine management, government-provided infrastructure such as new hospitals and schools, transportation and other facilities — and far more — employing GNSS (global navigation satellite system) and GPS (global positioning system) technology.

The data a Spatial Surveyor gathers is, surprisingly, referred to as ‘spatial data’ and holds within it a description of objects such as buildings, landscape and natural resources, street addresses, parks and way more which can help predict community/environmental trends.

The DTDB (Digital Topographic Database) provides information regarding buildings such as hospitals and schools, transport infrastructure and the routes they take. The DCDB (Digital Cadastral Database) is a record of suburbs, roads, electoral districts, rivers and coastlines and provides information to the official Cadastre (land boundary register). These two databases provide major insight and assistance to governments, councils and the business sector. And who gathers this information? The Spatial Surveyor.

Our next Surveyor, Greg, says he uses GPS every day for everything from establishing residential boundaries to measuring up new bridges to structural monitoring and assessment of the M7 motorway in Sydney.

Q&A

INSIGHT

Meet Greg - *He's morphed into a Spatial Surveyor*

Working sky high—taking measurements for a sales brochure promoting a multistorey residential apartment building.

Location:
Have a guess

What got you interested in surveying in the first place?

GREG: I was about 17 when surveying was suggested to me by a careers advisor. Basically, I was interested in working outdoors, I was quite good at mathematics and enjoyed physics and I was brought up around machinery. I enjoyed the practical world. Actually, the real reason I took up surveying is a mate of mine said I'd never make it and I wanted to prove him wrong – and I did!

M7 Motorway, Sydney – Replacing an over-rotated bearing between the pillar and the overpass. **Greg's role was crucial,** ensuring the bridge was not jacked up to high, the correct placement of the bearing, and spot-on replacement of the bridge.

How did you get your qualifications?

GREG: Initially I started in my tech college certificate. I'd been too busy playing rugby league for Penrith and didn't put in the effort at school. I didn't matriculate but I did do my higher school certificate and picked up science and physics which allowed me to do a part time TAFE course for four years.

I started in the practical part of the career as a Surveyor Assistant and then went on to be a Survey Technician leading field parties. By the time I'd matured enough to go to university to get my degree I had four solid years of field work and calculations and all sorts of things, plan drawing and working in a small business. Also, I had a chance to take on part time work for surveyors while I studied.

What types of surveying projects do you do?

GREG: When I finished my university degree I pursued a career in land development and ended up being a project manager with a company that was doing a lot of large sub-divisions like 600 to 800 lots. It was a varied and interesting career but I became restless and decided to set up my own business, moving out of the office into the field basically banging in pegs and doing subdivisions and boundary checks. I grew that business over about six years – then I discovered GPS surveying and that led me in a totally different path that allowed me to connect with infrastructure development.

I use GPS every day from fixing boundaries to putting up bridges. All sorts of things. I put the 42 kilometre M7 Motorway on the map – I was the surveyor for that job and have been the only surveyor on it since, assessing bridge and pavement settlement, doing structural monitoring, that sort of thing.

I believe we should always be involved in something bigger than ourselves.

Being involved with these motorways is an amazing, fulfilling thing. I have to pinch myself every now and then.

New Bridge for Old replacement at St Leonards, Sydney – Greg set out and monitored the placement of bridge abutments, bridge girders, each weighing 100 tonnes, and services – working blind until the old bridge was removed.

"Spatial surveying is incredibly complex technology. We need to have this amazing appreciation and respect for it."

What do you like best about being a surveyor?

GREG: I like helping people and solving people's problems. You can help create places to live, manage urban development, contribute to the construction of major structures, help resolve drainage issues and much more. You know, surveyors have used GIS to map the bush fires and how they have impacted on the urban fringe .

How about the down sides?

GREG: The impact on my skin from working in the environment as I'm fair skinned. The stress that I might make an error, deadlines, and meeting other people's unrealistic expectations – while subtly trying to change them.

What challenges have you enjoyed tackling the most?

GREG: Gaining development approval for complex projects and subdivisions. Plus taking current technology to successfully generate an income - this has always been a challenge I have enjoyed. If I was to give an up and coming surveyor some advice, it would be to embrace the current technology but understand its shortfalls before you accept it at face value.

So, what's the funniest thing that has happened to you?

GREG: I remember one day climbing a barbed wire fence, and as I climbed over the top of it my trousers got caught. Seriously, I fell upside down ,and almost dislocated my shoulder, and hung there with my pants still caught on the top wire of the fence. My off-sider just stood there and laughed at me. I tried really hard to get out of it, even tore my pants, but the only way I could escape was to take my pants off upside down.

eXtreme surveying

Peter (pictured beside (right) and in the helicopter (below) has experienced a surveying life of adventure over the years and now works with an award-winning team that takes on some unusual and challenging projects.

"We are always measuring but use helicopters, boats, scuba diving equipment, quad bikes, walking, climbing and abseiling to get there to be able to measure. We use dozens of different softwares, hardwares and technologies for land surveying, photographic surveying and aerial surveying.

The nature of the work requires us to be always inventing things, whether it be a piece of measuring equipment that enables me to measure to better than 1mm of accuracy the top of a building from 100 metres away, or the deflection in a rail as a train impacts it, or a bridge to cross a creek in a four wheel drive. The team has won a lot of awards for our work, including the Sir Thomas Mitchell Award, Lands Department Award and several international awards."

River Survey

Harbour Survey

Information resources

It's always a good idea to completely investigate a potential career direction. You can do your own research on the Internet, plus these resources are fantastic for finding out more about Surveying (and Spatial Science):

Destination Spatial @ www.destinationspatial.org | A Life Without Limits @ www.alifewithoutlimits.com.au | Spatial Industries Business Association @ www.spatialbusiness.org | Surveying and Spatial Science Institute (SSSI) @ www.sssi.org.au

When you become a Surveyor, it will be essential to belong to a professional organisation, **such as the Spatial Industries Business Association, Association of Consulting Surveyors, The Royal Institution of Chartered Surveyors, The Country Surveyors Association, Australian Institute of Mine Surveyors, or any of the other professional organisations, because they can offer you lots of advice and help if you need it, plus help you to grow and advance in your career.**

How do you become a Surveyor?

You can gain surveying skills through a university or TAFE, whether this be on-campus, via e-learning or distance education. Depending which course you choose, study may last up to 4 years. After you have completed your course, you work as an assistant to a Senior or Licensed Surveyor for one to two years before becoming qualified yourself.

Some of the different courses you can look into include Certificates II and III in Surveying and Surveying and Information Services; Certificate IV in Surveying; Spatial Data Collection and Surveying; Bachelor of Surveying and Spatial Sciences; and Graduate Diploma in Surveying. A great place to start investigating these options and more information is the Destination Spatial web site.

There are different surveying disciplines, for example **Engineering Surveyor** - setting out roads and infrastructure projects, **Geodetic Surveyor** - taking precise measurements over large distances and undertaking complex calculations on the shape of the earth, even using satellites for earthquake prediction and more, **Cadastral Surveyor** - measuring and establishing legal property boundaries enforceable by law, **Mining Surveyor** and several other disciplines. Surveyors may also do town planning and prepare statements detailing the environmental effects of a development. Make sure you investigate all the options because knowing your area of interest can help you choose your study direction.

What skills will you need? Over time, you'll need to gain good computer skills and skills in a relevant technical drawing software, such as AutoCAD Civil 3D, CivilCAD and others, plus the ability to use GPS instruments. You'll also need to develop high attention to detail, the ability to write up good reports and to communicate clearly and politely with other workers and clients, with people from the government, and with members of the general public.

How about personality traits? Eventually, you'll need to be able to work independently, have lots of initiative, be very observant and able to think clearly to solve problems. You'll also need to be good at working in teams or with another person, and be calm and patient. **Sounds a lot doesn't it -** but many of these skills will come with age and a love for your work.

FYI: When searching for surveying courses, also look under 'Spatial Science'

Even if you're working for a surveying company in the city, you may end up working on projects anywhere across Australia. It's all great experience!

Fiona Stanley Hospital, Murdoch
Perth, Western Australia

Now you know a bit about being an Urban Surveyor. If you enjoy maths and maps and being outdoors, if you care about the environment, like variety and working on computers, maybe this could be the job for you.

Over time web addresses, names of organisations, available options and other information may change, so be sure to do your research.

A fabulous app that provides current information on salary rates, career options etcetera, is the Career Hunter app. You can download it for free at the App Store on iTunes.

This is your one and only life. Make the most of it!

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Page 2: Waiting

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Haven't you always wanted to stop traffic!

Surveyors are the people who usually fly under the radar — few people notice them going about their work, but nothing happens without them!

It's true!

There are dozens of options open to Surveyors at every level, working with environmental planners, engineers, architects, rail, road and infrastructure planners, even archaeologists, and far more.

Surveyors are in high demand which means it's far easier to get a job when you graduate. Maybe it's time to look a little closer!

SURVEYING

A life without limits