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Quality Assurance

A dissertation submitted by

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ABSTRACT

This dissertation has been undertaken with the aim of investigating and analysing a Quality Assurance (QA) system, and whether such a system has a place in a small business/medium sized surveying practice based in Sydney. It aims to review the leading quality assurance systems, determine a suitable system for a survey practice, and to roll out the system in the company.

The process undertaken began with a literature review to provide background on various quality systems such s ISO 9001:2000 and TQM, and their similarities and differences, benefits and shortcomings. A gap analysis was then undertaken comparing the existing company systems (or lack there of) against one QA system requirements, in this case ISO 9001:2000. From this background information and gap analysis attaining ISO 9001:2000 compliance or registration was seen to be expensive, time consuming and extraneous in this situation. Selected readings indicated that TQM was the most appropriate option to be applied to a medium sized survey practice. Hence the processes of TQM were then followed.

A management committee was created, comprising of company management and senior staff who agreed to partake in this study and to be responsible for all aspects of the TQM system as well as providing all of the resources, training and staff necessary. From the findings of the gap analysis, the first stages of a documented TQM system specifically designed for the company were drafted in the form of a job booklet, which was then trialed over several weeks. The management committee reviewed the results and made recommendations to be implemented, with the ultimate objective of rolling out a system out throughout the entire company.

The TQM trial provided several interesting outcomes and also highlighted several deficiencies. The TQM document did not always counter all possible error sources and as such should be seen as a document in perpetual upgrade. Previous poor training and structure had lead to a culture omitting key elements of work, which was disclosed by the job booklet. But it also proved that the quality of the work performed was generally quite good and had few errors. It showed the ability of staff to readily adapt and

successfully apply a new system and provided a good basis for future expansion of TQM to other aspects of the business.

Ultimately both the short and long-term success of any new QA system is going to be strongly dependent on management and how enthusiastically and vigorously they support and believe in the need for such a system. Alas on this occasion, management failed to fully commit to the cause.

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GLOSSARY

AHD	Australian Height Datum
ISO	International Standards Organisation
QA	Quality Assurance
QMS	Quality Management System
SCIMS	Survey Control Information Management System
SQM	Strategic Quality Management
TQM	Total Quality Management

1 INTRODUCTION

1.1 Introduction

Quality is a word that is commonly used throughout all facets of life. It is used to define a good or bad meal, or maybe new shirt. But what does quality mean to the Australian surveyor? Is it fulfilling customer's requirements or avoiding errors whilst doing so?

All survey firms are required to provide a duty of care. This extends to the way they operate their company and undertake their daily work. Clients pay good money to receive a worthy product. But can they trust the product they are receiving? To ensure that these products meet requirements, quality standards are introduced.

A quality system may be the catalyst for increased performance within a business. However, implementation is the toughest step of all. Many firms falter principally through not fulfilling every step the fundamental requirements, and never achieve the benefits of a quality system.

1.2 Aims

This dissertation intends to look at Quality Systems and Quality Assurance (QA) in its many different forms – specifically two of the most common and recognised systems – International Standards Organisation (ISO) standard ISO 9001, and Total Quality Management (TQM).

An analysis of these will be undertaken to identify which system and approach is most suitable to a particular small business/medium sized surveying company assessed in this work.

From the findings it is intended that recommendations and the initial phase of a QA system will be created, introduced, reassessed and amended where necessary, and ultimately rolled out on a larger scale.

1.3 Background

Before analysing any Quality Systems, it must be recognised that they appear in a number of different forms, a sample of which will be assessed here. ISO 9001 is one of the most prominently used and publicly recognised systems not only in the surveying profession but also throughout all industries worldwide. As such, it will be considered here in greater detail, including its origins, meaning and relevance. Other systems of QA that will also be acknowledged and considered are the various forms TQM can take, referencing the likes of Hoshin Karni and the 5 S Principles. An analysis of the above will be presented including an outline of their benefits and pitfalls.

To aid this dissertation, a typical survey practice will be used as a tool for assessment and application of QA. The survey practice to be used in this work does not currently have a Quality System in place, but have agreed to partake and cooperate in this study, and are willing to trial QA systems and recommendations presented as part of this dissertation.

1.4 Methodology & Design

A review of existing literature on the subject is to be undertaken to provide a background, understanding and context for QA, both in general, and in respect of the surveying profession. Similarly a breakdown and summary of the survey practice being assessed, their existing quality systems (where present), will be outlined.

These reviews and summaries will then determine which quality system (or variation of) will be applied to the survey practice being looked at here. Further, they will be used as the foundations from which a Gap Analysis will be conducted, the purpose of which

is to obtain a summary to help outline areas most in need of restructuring and greater implementation of QA systems.

From the conclusions obtained from the literature and company review, and further from the gap analysis, the initial stages of a new quality system for the company will be outlined. These will then be introduced on trial into said company, reviewed and recommendations for change and/or further roll out in the company.

1.5 Conclusion

The firm selected for this work will have a quality system rolled out into its day-to-day activities. The system will follow all of the key principle steps involved with that quality system. This will involve analysis of each step, following the process through until completion of the first round. As most Quality Assurance systems are proponents of the notion of continual improvement, the quality system will be rolled over with the process commencing again and again. The process will provide results and conclusions at all necessary stages, including recommendations for the next phase of the quality system.

The implementation and development of quality management systems will erect a structure in which the professional capacity of a land surveyor can be further enhanced and developed. Nurturing the knowledge and skills of the surveyor by using mechanisms such as quality systems, will create an improved working culture and greater client satisfaction.

2 BACKGROUND INFORMATION

2.1 Introduction

Quality Assurance is a broad term that whilst it does have a definition, it's meaning and interpretation can often vary significantly, not only between various industries, but also within companies in the same industry, or even departments within a company. To this end, a general understanding of the *role* or *place* of QA in an industry or profession is required and will be undertaken in this chapter. Further, there are then many different types of quality systems that exist and are implemented with the aim of QA, eg ISO 9001, TQM, Hoshin Karni et al.

The following pages are intended to introduce the concept and basics of QA, QA systems in their many forms, and some of the benefits and deficiencies of these systems. This is then further considered in the context of the surveying profession and software that has become available in recent years to facilitate the implementation of such systems.

The survey practice being used in this dissertation will then be introduced with the background and the systems and procedures currently in place in the company being outlined. This information in conjunction with the prior analysis of the various types of systems will provide the foundation data and information for the following chapters.

2.2 Overview & Literature Review

2.2.1 What is Quality Assurance (QA)

The American Society for Quality (2006) <http://www.asq.org> defines QA as: "The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled".

With ISO 9001: 2000 and the move to a far more process oriented standard comes the need for a definition of a process - "a set of inter-related resources and activities which transforms inputs into outputs" (Bhuiyan & Alam 2005). Biazzo & Bernardi (2003) believe this definition to be too narrow and that it should be broadened to be more holistic and systematic.

2.2.2 International Standards Organisation and ISO 9001

As ISO (2006) <http://www.iso.org> outlines ISO started originally through the International Electrotechnical Commission (IEC) in 1906, and then in other disciplines between 1926 and 1942 by the International Federation of the National Standardising Associations (ISA). 1946 was the turning point when "delegates from 25 countries met in London and decided to create a new international organisation, of which the object would be 'to facilitate the international coordination and unification of industrial standards'. The new organisation, ISO, officially began operations on 23 February 1947"

ISO 9001:2000 basically outlines quality requirements for business-to-business dealings for quality management, and is often thought of as a beginning step in establishing an effective QA process. ISO 9001 can be applied and adapted to any industry.

Conti (1999 p S458) cites the ISO definition of ISO 9001:1987 and then 1994 as "… a model for quality assurance… for use when a supplier's capability to design and supply confirming products needs to be demonstrated." However, the success or failure of the ISO 9000 series is highly dependent on the issues driving management to certification and the strategies used to get there (Biazzo & Bernardi 2003).

2.2.3 ISO 9001:2000 – The 'New' Standard

Praxiom's (2005) "What's New" web page <http://www.praxiom.com/iso-new.htm> succinctly summarises the new distinctive aspects to ISO 9001:2000 and outlines the 21 processes and steps involved in creating a quality management system, all as detailed below.

- This standard replaces ISO 9001:1994, ISO 9002:1994 and ISO 9003:1994
- More customer oriented than prior standards
- More emphasis towards the need to make improvements in your company
- A permissible exclusion clause in Section 7 makes it implementation easier
- Less emphasis on procedures → more a process approach
- *A detailed analysis of the Standard reveals that an ISO 9001:2000 Quality Management System is made up of at least 21 processes as listed below:*
    - *Quality Management Process*
    - *Resource Management Process*
    - *Regulatory Research Process*
    - *Market Research Process*
    - *Product Design Process*
    - *Purchasing Process*
    - *Production Process*
    - *Service Provision Process*
    - *Product Protection Process*
    - *Customer Needs Assessment Process*
    - *Customer Communications Process*
    - *Internal Communications Process*
    - *Document Control Process*
    - *Record Keeping Process*
    - *Planning Process*
    - *Training Process*
    - *Internal Audit Process*

- *Management Review Process*
- *Monitoring and Measuring Process*
- *Non-conformance Management Process*
- *Continual Improvement Process*
    - *In order to develop a quality management system that meets the new ISO 9001:2000 standard, you must create or modify each of the above processes. You must:*
        - *Design each process.*
        - *Document each process.*
        - *Implement each process.*
        - *Support each process.*
        - *Monitor each process.*
        - *Control each process.*
        - *Improve each process*

Biazzo & Bernardi (2003) cite the general requirements, "to implement a quality management system an organisation has to: Identify the processes needed for the quality management system; determine the sequence and interaction of these processes; determine criteria and methods required to ensure the effective operation and control of these processes; ensure the availability of resources and information necessary to support the operation and monitoring of these processes; measure, monitor and analyse these processes; implement actions necessary to achieve planned results and continuous improvement of these processes."

2.2.4 What is Total Quality Management (TQM)

Conti (1999) states the beginnings of TQM can be found in the early years following WWII in response to Japanese quality standards. It emphasizes a total organisational approach to improving products, processes, work ethics and culture. In addition, there is a stronger focus on understanding customer problems and focusing on their value than

in quality assurance. This change from an internal focus to customer focus that emerged in the 1980s resulted in the new approach to management and organisation and was the beginnings of TQM as we know it today (Conti 1999).

TQM is just one approach that is often used in creating a quality system, another being for example Six Sigma. Combinations of various principles such as the following can also be integrated into TQM systems.

2.2.4.1 5-S Principles

First developed in the 1980's *seiri, seiton, seiso seiketsu and shitsuke* meaning organisation, neatness (efficiency), cleanliness, standardisation and discipline are principles to follow to obtain a total quality environment (Pheng 2001).

A number of Western organisations as well as numerous Japanese companies have incorporated these principles in conjunction with, or to aid attaining ISO 9001: 2000 accreditation, and as a move towards TQM (Pheng 2001).

2.2.4.2 Hoshin Karni

Another tool that can be used in the quest for TQM, Hoshin Karni is a Japanese management system used since the 1960's for *Strategic* Quality Management (SQM).

Another proponent of the Plan-Do-Check-Act cycle to managing business, it can be considered an execution tool for deploying strategic plans of companies who know what their customers will want in five to ten years (Tennant & Roberts 2000)

TQM and the above principles are proponents of the notion of continuous improvement, which was first outlined by Edwards Deming in a Plan-Do-Check-Act quality management concept (Gardner 2000). Plan-Do-Check-Act is self explanatory as to *what* is required to be done. *How* it is carried out is dependent on whether it is being done by or for the standard, for TQM purposes, or the type of industry a company is in to name a few variables.

2.2.5 How valuable are ISO 9001:2000, QA & TQM – does their performance measure up?

Many firms decide to install ISO 9001 and obtain registration as it assures customers that the company has a good QMS in place. Companies with an effective QMS are typically perceived as meeting customer expectations on a more regular basis than an organisation that does not have an effective QMS. *Mavim Software Demonstration compact disc* reiterates how ISO Quality Control Systems are used by companies to "…fight competition and cut costs… It's a strategic decision to continuously realise improvements within an organisation."

Bhuiyan & Alam (2005) perceive the benefits of ISO 9001 registration as:

- Improved documentation
- Improved quality perception
- Disciplined work environment
- Consistency across the organisation
- Improved customer confidence

There are many examples of companies implementing an ISO 9001 QMS because it has proven over the years that it leads organisations to better operations, improved profitability, and improved performance.

However, whilst this can be the case, Dalgleish (2006) cites a Spanish study which presents a case showing that registered companies may perform better than unregistered companies, but this is *not* an indicator of the benefits of the standard, as the sales and profitability performance of registered companies had in fact remained the same. "Quality pays off, but taking a quality approach is unrelated to ISO 9000 registration." (Dalgleish 2006 p.16)

It is quite common in a number of industries, including the construction industry, to require tending contractors to have ISO 9001 Registration. This is viewed as an external motivation or reason to obtain ISO 9001 accreditation. McAdam's (2001) study of quantity surveyors in Northern Ireland questions the

relevance of this under a number of guises. The industry already has a number of standards applied to it bringing in to question if there was any further benefit to be obtained through ISO 9001 registration. Further, the quantifiable benefit in the form of increase in profits was limited to 6% of respondents. Even registered companies who had undertaken accreditation in the hope of obtaining more public sectors jobs appeared not to have benefited in the manner they had hoped, and overall the evidence from the study showed the standard was being used more as a marketing tool rather than a quality systems process.

Some of this feeling also seems reflected in a study conducted amongst Swedish construction companies with ISO 9001 accreditation (1994 versions). In Landin's (2000) study, the financial benefits of accreditation were questionable. More notable the inappropriateness of certain sections of the standard to the industry was highlighted. The fact that a number of companies had adapted the standard in their quality manuals to better fit their company and industry is noteworthy. It would be interesting if the author revisited these companies now to see if this was still the case under the newer ISO 9001: 2000 with its greater emphasis on processes, and also in changes in terminology such as regarding suppliers and subcontractors (a basic yet notable problem to these respondents under the earlier standard).

Conti (1999 p.S461) succinctly summarises the opinions of many other sources when he says "the general trend today is to move upwards from quality assurance to TQM, to organisational excellence models". The ISO 9000 series is a tool to lay the foundations for continuous improvements, and a first step towards TQM (Biazzo & Bernardi 2003).

However, as recognised in 'Standards support managers' by the British Journal of Administration Management (2004) , and reiterating the above findings by Landin, a degree of flexibility and adaptability is necessary in these standards so as to best fit and most appropriately benefit the company.

"Ultimately, the single biggest mistake is for businesses to rely on the planning and management of financial outcomes, without the recognition that the outcomes can only be as effective as the business processes that deliver them." (Tennant 2000, p.80)

2.2.6 Ensuring it works for you - Audits

The audit is the official examination of the standard in practice in a company. However, an audit of any quality management system is necessary to continue to maintain and improve any system.

The advances that have been made in ISO 9001: 2000 from the earlier ISO 9001/2/3: 1994 standards towards a more process oriented standard are considered to be a positive step forward as it aims at customer satisfaction assurance, not just product quality assurance. ISO 9001 is the reference standard for quality assurance audits - but it must be considered whether the standards and audits allow room for or consider the human contribution of the company rather than merely the company as machine. (Conti, 1999)

With the new standard come a number of issues with the auditing process. The necessity to move from a compliance model to a performance (or management) model is one of the first tasks. In the past auditing has been of a more tangible object, and less judgement based. Now it is necessary to focus on performance beyond compliance "… to evaluate the *adequacy*, level of *implementation* and *effectiveness* of the company's management systems." (Biazzo 2005 p.384)
Cochran (2004 p.40-41) presents *Ten Essential Audit Questions*

1. How do you contribute to achieving your organisation's objectives?
2. What happens if your products, materials, or supplies are nonconforming?
3. How do your access product requirements?
4. How are problems prevented?
5. How do you use data on customer perceptions?
6. How are customer complaints handled?

7. How does top management review the organisation's performance?
8. What evidence can you provide of continual improvement?
9. How are training needs determined?
10. What's the most important thing about your job?

The above are certainly a good starting point to undertake a self-audit. Whilst the element of independence is removed in a self-audit, the familiarity (and hence speed) of a self audit has its advantages over an external audit, and allows the focus to be on *the company* and not the standard (Ni & Karapetrovic 2006). A self-audit is also most likely in the instance of starting to establish and introduce a quality assurance and management system in a small company.

2.2.7 Quality Assurance and the Surveying Profession

It appears that Quality Assurance and Total Quality management have become widespread across the field of the business landscape. Many industries and professions embrace it commonly without hesitation. But has the field of Quality Assurance become embedded within the surveying industry?

The following professional body is a representative and governor of the industry. They are influential and dominant in their directives and advice that is recommends private survey firms. What do these bodies advise in terms of Quality Assurance?

Australian Spatial Information Business Association

The Association (formerly the Association of Consulting Surveyors) does have a survey specific manual for QA. Mr Geoff Perry drafted this for Association of Consulting Surveyors. Additionally, the Association does have a Business Manual. This manual contains a chapter specifically on QA although this was written many years ago.

The survey specific manual complies with the current standard for QA.
Unfortunately it is only available for purchase so further analysis was not possible at this stage.

2.2.8 Quality Assurance Provided by Third Parties

Quality Assurance has become big business. Simple perusal of the phone book and Internet will reveal a multitude of companies wishing so sell Quality Assurance packages for your business. Selecting the correct Quality Assurance package for your business can be a difficult process.

A search on the web to establish the availability and distinctive points of proprietary software specifically created for Quality Assurance unearthed a plethora of options. Further research showed that from the initial information available on their web sites, little differentiation was possible without a generally significant outlay of capital for the software or system. (Some may regard this as understandable, when you consider that in general these programs are based in common applications such as Microsoft Word, Excel or PowerPoint. When a sample or trial version is available, it could be easily copied or cracked for illegal use.)

- *Total Quality Management,* Braincorp International 2006 – a brief online course that was undertaken providing an introduction to the various stages and tools used in TQM.
- www.9000store.com group of products has a few free resources available such as a good basic outline of what ISO 9001 is, a free quick start kit (that will be referred to during Project), and an outline of Gap Analysis tools. They also have a range of products available for sale to facilitate setting up and documenting a QA system, down to maintaining and auditing the system. There also is regular email newsletter available with tips and new products.
- The Mavim BV 2006 site provides a variety of TWM products, many of which can be customised to the individual companies specific need and requirements, for an undisclosed amount and only by request.

2.3 Case Study – A survey company, Sydney

The following will provide background knowledge of the company selected for the case study. It will also bestow an understanding as to how much benefit may be achieved through a TQM system.

The company is a medium sized survey firm practising in Sydney's northern suburbs. Operations commenced in Goulbourn during the late 1970s as another firm, before relocating to Sydney under its current name in 1983. Today the firm covers most forms of traditional survey work ranging from construction to cadastral work. Turn over is strong and work is plentiful.

The company was born and had developed during a 'paper' era, and all systems in place were of a hardcopy nature. These systems clearly worked well as evidenced by the fact that the company is still in operation today and has the potential to grow and prosper further. There are a number of well thought out databases, which are present throughout many aspects of the business and appear in several different formats. Table 1 on the following page gives an indication of the type of database, format and sector of the business that utilises it. These databases are of great use and quite successful over many years. However it does indicate the gross non-uniformity of formats that exist.

It should be noted that computers were not introduced into The company until 1993. The first purchase of computers was very small. But it gave access for the first time, for surveyors to use survey software (CivilCAD). This was the sole purpose of the computer purchase. Survey reports were still typed on old manual typewriters. All survey sketches (including set out surveys, identification surveys, detail surveys, deposited plans and strata plans) were still drawn by hand. A subcontractor drew most of the larger and more complex plans manually.

Table 1 – Existing Company Databases

Type Of Database	***Format***	***Departmental Use***
All local government positive covenant templates	Computer (stored in secretarial division)	All survey sections
Permanent Marks and State Survey Marks	Accessed via web and stored on computer network	Unused
CivilCAD job archive	Computer (stored on network)	All survey sections
AutoCAD job archive	Computer (stored on CAD divisions computers)	CAD division
Employee profiles	Paper	Secretarial
All jobs	Paper and computer (stored in secretarial division)	All
Plans issued	Paper and CAD. Stored in old job packets, hanging wall units and digital	All
Project web	Digital. Accessed via web	Construction
Deposited and strata plans	Paper and computer. Stored in old job packets and locally on computers	All survey sections
Reports	Paper and computer. Stored in old job packets and on secretarial computers	Management and secretarial

As more total station theodolites were purchased, so too were data recorders. This gave the survey division the capacity to download data collected from the field. The company steadily grew in size and stature. This placed demand upon available resources and more computers were purchased. It was during this purchase phase, that an AutoCAD licence was first purchased. A computer was also purchased for secretarial purposes. For the first time, survey reports and accounts were being written and processed by computer. New material was capable of being archived and recovered without substantial loss of time or quality. Whilst the use of computers has slowly been incorporated into the daily structure of work, it is quite noticeable that they have not been utilised or integrated in nearly all the old paper based systems that were operating prior to their arrival. Hardcopy systems that were in evidence prior to computers are all still currently in operation.

Today, The company employs five survey technicians as party leaders, four chainmen, two CAD operators and two secretarial staff. The company has twelve networked computers with assorted survey and drafting software. The office also contains several copiers, printers and scanners to serve all of the office requirements. The size of this company highlights the importance of maintaining order and systems to enable efficiently and effectively produced work.

Despite The company trading successfully in its own right as a survey practice for around 20 years, it still does not have any structured quality assurance plan. Nor are there many structured formalised procedures or standards to be adhered to.

2.4 Summary

QA provides tools to aid in the guaranteed quality of products and services. It can be as simple as the solo worker counting how many widgets are in his box before he sends it out, to the complexities of a multi national company's QA manual, inches thick, outlining various procedures and processes to ensure the quality of their product. It is a fairly large and broad banner companies hang over themselves to help gain a competitive advantage, and ultimately increased profit.

There are a number of ways that companies can and do go about creating and maintaining QA of their products or services. Again, it may just be the solo worker knowing he *has* to count his widgets before sending out the box, or for the multi national it is more likely to consist of the likes of ISO 9001 compliance and registration, or further the implementation of TQM strategies as just one example.

So – as a starting point, is ISO 9001 compliance and/or registration necessary, or beneficial, to a company wanting to have a QA system?

For some companies it is essential – there are many companies that require ISO 9001 registration of their suppliers, eg in the construction industry. This external pressure to comply does not necessarily accurately reflect whether there is a need or benefit to being registered. As noted in the literature review, approaching your product or services with quality objectives in mind is likely to provide competitive and financial benefits, but obtaining the ISO 9001 registration does *not necessarily* mean that these competitive and financial benefits will *increase*. In actual fact the value and cost, both direct and indirect, of obtaining ISO 9001 registration can often be questioned, especially for smaller companies. In general it seems that the smaller the company the less likely they would be to afford or justify compliance and registration of ISO 9001 (unless externally required to do so). However, this is not to say there is no value to these smaller companies to use the standard and apply it in their business – it just may be more realistic and cost effective to follow it and implement it without going the whole way or incurring the cost of compliance or registration.

Under the broader banner of QA though, ISO 9001 is a smaller component. Ironically perhaps, although it is the most internationally known, recognised and formalised system, it does not encompass as many areas as 'quality assurance' can cover in a company and it's products and services. Whilst ISO 9001:2000 has moved from a more *procedures* based approach in earlier versions to a more *process* based approach in ISO 9001:2000, in line with the need for it to be more adaptable and broadly suitable for as many companies as possible, it is still mainly product and services based. TQM and some of the other QMS around for example have shown a move towards also having *customer assurance*, ie not just the quality of the product or service is aiming to be

assured, but the satisfaction of the customer also – a stronger focus on the value of understanding customer problems than ISO 9001 has achieved thus far. The plan-do-check-act quality management concept atypical of TQM et al for continual improvement is broader in coverage than ISO 9001:2000. Interestingly (ironically?), for many customers ISO 9001 registration is an indicator to them that there's a good QMS in place in the company, and hence their expectations as customers are more likely to be met. Whether it's ISO 9001 or a broader TQM system, what can be the ultimate outcome or incentive down the track other than increased profit?

Keeping in mind that the ultimate reason behind any QA or TQM system (whether that does or does not include ISO 9001) is for increased profit, how does fit into play with a surveying firm, especially the small firm being looked at here. The nature of the surveying industry, especially when considered in conjunction with the construction industry, already has a number of standards that must be adhered to in the provision of their service, eg some surveying diagrams have to be drawn and presented in accordance with standards set by the Lands Department. Furthermore, the Surveying Act of 2001, The Surveyor General's direction and the Conveyancing Act of 1919 amongst other, also sets other standards. So, already there is a level of quality being assured in the service provided. This is not to say that is all that is required as quality assurance in a company. There is definite advantage, and ultimately financial benefit, to be gained by approaching all aspects of the service provided by a surveying firm, and the management behind the service, from a QA perspective.

When considering the lack of any existing Company QA system, it is evident that there is significant scope for improvement. However, it must be remembered with any systems proposed and outlined in the following chapters, that cost - time, effort and resources, and ultimately financial cost – *must* also remain a key priority otherwise the aforementioned financial benefit may be nullified.

3 METHODOLOGY & DESIGN

3.1 Introduction

Using the basics of ISO 9001 as a starting point, a gap analysis of the standard and the current systems in place in The company will help to identify the main areas where improvement is needed, with the ultimate aim of the skeleton of a TQM system being outlined, and the first stages implemented. This will be undertaken by outlining the processes and procedures undertaken in a topographical survey in the company. Next a gap analysis will be undertaken which looks at this information regarding the company and is going to compare it to what would be required if the company were to seek ISO 9001 compliance or registration. This step is a common trait amongst most quality assurance systems – to establish the 'gap' between where the company currently is, and where they want to be. In this instance, a blank gap analysis checklist sourced from www.9000store.com has been adopted.

From the information gleaned from this gap analysis the main areas where there is room for improvement will be established. Following this, a decision on whether to aim for ISO 9001 compliance will be made, and if not, the type of quality system to undertake will be determined.

Once this has been established, a new QA system will be developed for the company, outlining new procedures to be followed to create QA within the company.

3.2 Current Company System

One of the initial building blocks of constructing a gap analysis is a review of existing systems. A gap analysis over the entire spectrum of a company can be quite expansive, particularly over multi-disciplinary businesses and larger multinational firms. In order to restrain a gap analysis to within the scope of this dissertation, a sectional slice of the firm used for case study shall only be analysed.

The style and variety of work that most survey firms encounter is varied and often unique. However in a limited analysis, a sample of the most common job type shall be used. For The company, that job is a Detail or Topographical survey. This type of survey typically includes locating boundaries, relative heights and physical features over the subject land and its adjoining properties. This contoured plan allows designers to create shadow diagrams, drainage or stormwater runoff flows which will in turn assist architects in the final design for new houses or additions.

The process of undertaking each individual job, from lodgement by a client through to a final plan and account being issued is long and cumbersome. The following steps outline the key principle elements in this procedure.

- A perspective client will telephone the office, requesting a survey to be undertaken upon a specified property. The client will explain to the reception staff all of the necessary requirements of the job. The reception staff will catalogue all contact and job details.

- Reception staff will then facsimile a printed copy of an instruction to the perspective client. This Confirmation of Services facsimile will outline the exact work that will be undertaken during the course of the project. It states the job address, the client and the price quoted (including GST). Quite importantly, it also contains a section that must be signed and dated by the person who is responsible for payments of accounts. If necessary, consultation with a senior surveyor or principal from within the company is made with the client to ensure there are no requirements left unaddressed from a technical perspective.

- A job is not formally drawn up until a signed receipt of the Confirmation of Services document has been obtained from the client. Once received, the job is manually entered in a job book. These job books contain details of every job ever completed by The company. A file is created into the accounts section of the office computing system and a job file is physically created containing all of the details obtained to date.

- This physical job file is then placed into a job box. This job box contains all jobs of all varieties waiting to be completed. When time permits, the reception staff undertake several searches in order to make the job files more complete. These searches include:

    - A search from the archive of completed job files of other jobs that were in the near vicinity of the new job. Often these old job files will contain many deposited plans, which will be necessary to undertake the current job. This can also save the office on searching costs, by not repurchasing plans, which are already on file. The old job files will also contain copies of field notes which can save time for the surveyor undertaking the current job

    - A search of Sydney Water to reveal the location of sewer and water mains

    - A search of SCIMS. This will provide information that allows the survey to be carried out on Australian Height Datum

    - A request for Title Searchers to obtain relevant copies of Deposited Plans, Certificates of Title, Charting Maps, covenants and 88b instruments.

- When all of these searches are finalised, the job file is ready to be issued to a survey party leader by management for field work to be undertaken

- At the commencement of each day, management draft a list or diary of the activities of each employee for that given day. At this moment, a survey party leader is issued with jobs to be undertaken that day. Staff, who are not issued with fieldwork, will have office calculations and/or drafting work. It is not unique, but certainly not common for the daily diary to be drafted more than one day in advance.

- When a surveyor has completed sufficient fieldwork to provide him/her with at least one full day of office calculations, they are listed in the diary as “office” and their chainman is reissued to another survey party leader.

- When the field component of the job has been completed and the surveyor is in the office, the next phase of the job begins. The surveyor will download collected data from the total station theodolite into the survey software. Care must be taken as there are no two identical theodolites in the office and differing versions of the survey software are on each computer. Hence download procedures vary. Downloaded data is then reduced and a neutral file is created.

- The surveyor will then manipulate data to construct a simplistic plan of the subject property. Additional overlays are placed upon the plan containing information such as boundaries, water and sewer mains.

- The surveyor then plots a draft plan. This plan is then manually enhanced to contain any text, which will appear on the final plan, as well as any other information that will assist the CAD division. The raw plan is sent in a DXF form to the CAD division in addition to the hard copy draft plan. Digital photos of the job, taken by the surveyor, are also kept on file to assist drafting.

- CAD draftsmen will uses the raw DXF file together with the paper copy of the plan to create a final drawing of the job using AutoCAD. A variety of colours, line types, text and symbols are used to create a visually appealing and thorough survey drawing. This plan is then printed and shall be checked by the surveyor who undertook the fieldwork.

- When the surveyor is next in the office, they shall peruse the plan for errors or irregularities, amend and resend to the CAD division.

- The CAD draftsman will then make all changes as necessary to the plan. The plan is replotted and sent again to the surveyor. This process will continue until both the CAD draftsman and field surveyor are satisfied with the plan.

- At this stage, management will then view the plan. Again any errors or irregularities will be highlighted and the plan sent back to the CAD division. This same process will continue until management are satisfied with the plan. This last stage is viewed as a quality control mechanism over the work issued to clients.

- The surveyor drafts an account, based upon the initial quote. Reception staff type a final account and management sign off the account. Appropriate copies of the plan are made and posted together with the account to the address provided by the client. Electronic copies are forwarded to all necessary parties.

3.3 Gap Analysis Checklist Summary

As ISO 9001:2000 is to be used as a *starting point/guide* for this project, *current* compliance or lack of compliance by The company is irrelevant in this instance.

The full Gap Analysis checklist in Appendix B is from a blank checklist template sourced from www.9000store.com. Text in the 'requirements' column and footnotes is directly as sourced on the template. Analysis of what is currently in place, and the items that are needed are specifically in relation to The company.

Following is a summary of the gap analysis results, and recommendations pertaining to each area. Section headings below are as per the gap analysis in Appendix B.

Table 2 - QMS

General Issues	
Existing Summary	*Recommendations*
There is no QMS document or subsequent processes or procedures currently existing at the company	A QMS document with processes and procedures properly outlined needs to be begun and maintained.
Obviously processes and procedures exist that achieve a result, but these have never been formally or informally assessed for their efficiency or level of quality.	Reassessment of system and changes/advancements in the industry needs to be regular and **planned** – plan, act, do.
Information that may lead to changes or improvements in methodology is obtained more by accident than by design, hence potentially beneficial and vitally important information that could lead to advancements and improvements is often missed completely.	Obtaining and acting on feedback should be formalised.
Documentation	
Existing Summary	*Recommendations*
No existing QMS documentation; no existing register or related/required documentation exists; no Quality records or manual exist.	A new QMS will create the necessary documentation and how it is to be regulated, maintained and recorded for future reference.
Control and approval of documents does currently exist, albeit with significant room for improvement.	The interrelationships of various documents will be outlined via flowcharts where necessary.
Informal revision and re-approval exists with room for improvement.	Formal guidelines need to be outlined and implemented regarding revision and re-approval of documents.

Existing Summary	*Recommendations*
Existing document filing system can cause confusion and lead to errors due to confusion over identification and labelling, latest versions, and location of documents.	Document filing system to be updated and maintained. Old versions of documents to be archived; unused old forms to be destroyed; all documents to be centrally located on database accessible to all.
Management Committee	
Two company directors form top management and are responsible for outlining and communicating any and all policies, changes, or issues regarding the company. They are to be a major part of a QMS management committee.	Top management are to be an integral part of the management committee to head up the creation of a QMS.
Sign off of all work is by top management, however 'formal' quality control does not currently exist. Quality objectives are yet to be formally established.	The creation of a QMS will help to delegate responsibility for quality, which in turn should minimise the workload on top management regarding quality.
Dedication by top management to a QMS is essential for success, and is not seen to be forthcoming at this stage.	Top management need to commit to the process of creating a QMS.
Customer Focus	
Initial brief and resulting Confirmation of Services outlines requirements of each job, and is approved by management and the client.	Continued use of the Confirmation of Services document in conjunction with new documents and procedures to be outlined in the QMS.
Client feedback does exist and is noted.	Formalise customer feedback through brief voluntary customer satisfaction survey.

Existing Summary	*Recommendations*
Time taken to complete jobs is often poor, and errors often occur eg omissions of data, or incorrect submission of plans which leads to poor customer satisfaction.	Through new QMS keep timeframe of job to a minimum and ensure there is no omission of date nor incorrect plans submitted.
Quality Policy	
Currently non existent; no pre existing plans to address quality in new processes or products – this has led to room for error re omission of data or incorrect submission of information.	Create TQM system; allow room and actively investigate possible new processes or products to eliminate possibility of omission of data or incorrect submission of information.
Surveyor overseas most work until final approval by top management, however no formal chain of command readily available to refer to.	Involve all relevant staff and give them ownership for their component of a job, eg through job checklists; provide chain of command flowchart.
Currently no way of formally measuring work or objectives.	Job checklist should allow completeness of job to be measured.
Resources	
Currently no formal assessment of resources and allocation requirements.	Resource and allocation requirements to be one of the first aspects to be dealt with in creating TQM system.
Existing resources vary considerably which makes allocation more difficult, and provides potentially more room for error in accuracy of use.	More appropriate and planned allocation of resources to be implemented to remove difficulties, confusion and potential room for error in resource use.
Many resources at a level which if possible should be replaced or at least upgraded.	Update/upgrade existing resources where possible and most appropriate.
Labour resources stretched which increases possibility/likelihood of error.	Increase labour resource if at all possible.

Existing Summary	*Recommendations*
Training of staff with in house resources and systems minimal.	Increase in house training of staff on available equipment and systems, especially new TQM system – this will decrease likelihood of errors, and increase efficiency of staff performance.
Staff performance review irregular.	Where possible/appropriate increase external training of staff for increased performance capabilities.
Physical office environment at maximum capacity.	Consider expanding office environment to provide better and more suitable working conditions Regular staff performance review to assess and address performance and effectiveness in company.

Table 3 – Product Realisation

Planning	
Existing Summary	*Recommendations*
Job planning generally done day before execution.	Whilst the weather does have a significant impact on resource allocation and job planning, there should be a 'bigger picture' planning for the short, medium and long term for best allocation of staff and resources, and smoother execution of jobs.
Confirmation of Services outlines job requirements as per brief but does not specify if any standards being adhered to.	Confirmation of Services document should reference standards being adhered to if and when relevant.

Existing Summary	*Recommendations*
Insufficient time is generally allocated to complete a job. No formal checks (other than management sign off) currently exist to check for completeness of work.	Job checklist to ensure all job requirements, standards and forms are met and provided.
Existing planning and systems not suitably reactive to the reality of vital variable of the weather.	Longer term planning and resource allocation that more easily accommodates changes required due to weather conditions.
Client Processes	
Client discussion to obtain accurate brief of requirements generally satisfactory with the exception of time frame.	More accurate and realistic time frame needs to be actively sought from client.
Confirmation of Services document excellent starting point to build a more comprehensive document from to ensure quality and customer satisfaction.	Job checklist to ensure all requirements, standards and data that are required are provided.
Whilst experience and legislation provide more complete understanding of job requirements, checklist of these requirements per job does not exist which can lead to omissions if staff not experienced enough.	Top management must ensure in their time planning of resources (including their own time) that sufficient time is allocated to undertake pre job analysis to ensure surveyor is aware of all job specific requirements.
Experience is an important yet largely unquantifiable benefit regarding client and job requirements.	

Existing Summary	*Recommendations*
Pre job analysis between top management and surveyor too frequently missed or insufficiently undertaken to ensure best quality and *complete* briefing of requirements is passed on to surveyor.	A contact log should be included and maintained with all jobs to ensure that *all* contact including casual, verbal or formal and written, with client is recorded and can be accessed at a later stage if required by *any* staff. Requests for amendments to job requirements should also be recorded here.
Accurate recording of *all* contact and information with client is not recorded and omissions here can potentially lead to omissions and/or errors further down the track.	A brief and voluntary feedback section could be included with the final plans and account to allow the client the facility for feedback. Naturally if feedback is provided, it must be assessed and acted upon as required.
No formal or regular method exists to obtain customer feedback.	
Design and Development	
Work undertaken is of a process nature, not design and development. The process of assessment by senior staff for any irregular or difficult situations is suitable and appropriate to the work and industry.	Management should assess the impact of all statutory changes and ensure an adequate and appropriate flow through in the company and system.
Government and industry regulatory bodies issue any statutory changes or requirements that are incorporated by management. Impact of such changes are not necessarily analysed by management.	

Purchasing	
Existing Summary	*Recommendations*
Staff provide feedback on purchased, however are not necessarily consulted prior to purchase for recommendations.	All staff should be consulted prior to purchase to establish if recommendations or suggested requirements can provide added value as the decision makers (top management) no longer play critical roles in fieldwork.
Due to the nature of the products and limited number of suppliers of the specialised equipment required, price bargaining is generally not an option.	A checklist of equipment requirements could be created which potential purchases should be assessed against, and also reassessed once purchased and in use to ensure appropriateness of the product.
The creation of information files on new equipment when being considered has shown to be worthwhile and should be continued when appropriate.	
Production and Service Provision	
The surveyor in charge of a job controls progress (in conjunction with management planning) until final product is issued for management approval.	Job checklist will outline requirements as stages of a job are met, and will eliminate the possibility of incomplete work. It is to be maintained in conjunction with the Confirmation of Services document.
Confirmation of Services document is and shall remain the key mechanism for listing job specifics.	Job checklist will also allow progress of job to be assessed; it will be a generic outline as not all possible situations can be documented (and to do so would be cumbersome and unnecessary).

Existing Summary	*Recommendations*
Knowledge by staff of equipment requirements for fieldwork comes from experience, and initiative and adaptability are often required on individual jobs to complete the job.	Delivery requirements are to be formally recorded with job checklist, and on company network for access by all staff at any time. This will also log times taken so a better reflection of job requirements and resources can be assess for future works.
Currently no documented system for monitoring job progress exists.	Validation outside of standard certification will not be undertaken; monitoring status of jobs will be possible by assessing the job checklist available on the company network, which will have each component signed off on the network copy and the hard copy as completed.
Delivery requirements are often informally noted, and changes in these instructions are often not adequately recorded or maintained.	
Due to the nature of the work irregularities do occur which cannot always be documented.	
Validation processes do not currently exist, nor do monitoring and measuring of job status.	A register should be created so office and search documents can be easily called up if required.
Output formats are currently satisfactory, being in both hard and soft copy.	Management committee is to review performance and suitability of QMS regularly and adapt as necessary.

Existing Summary	*Recommendations*
The numbering on plans identifies the job, however unauthorised reproduction is a common problem.	Logos and copyright notices should be added to plans to try to reduce unauthorised reproduction. Whenever possible, digital output should be of a read only variety.
Regular saving and back up of data for survey data; all service documents stored in archive – no change required.	
Software subscriptions are maintained to ensure up to date programs and support.	
Staff do not need to use any client goods, other than access to properties – OHS and safe work method provide the basis for a safe external environment.	
No formal system exist for logging details in the unlikely situation of damage to client property does occur.	In the event of damage to client property, this should be formally logged in the job log, with all relevant information for reference and in case needed for legal proceedings
Equipment is not maintained nor calibrated as often as is optimal.	Regular maintenance and calibration of equipment should be undertaken to ensure accurate and optimal performance. Repairs should be undertaken as soon as they come to light.

Table 4 – Measurement, Analysis and Improvement

Existing Summary	*Recommendations*
Currently no formal performance measurements exist; draft or preliminary work has been known to be released to clients before final certification.	Job checklist and time loges will aid in assessment of performance of the system and ensure work not released prematurely.
Feedback is informal and irregular.	Informal and voluntary feedback form to be attached to final plans and account for customer feedback. All returned feedback to be reviewed by management and acted upon as required.
Currently no audit system or plan in place.	Management committee are to regularly assess QMS and act on conclusions accordingly. This process should continue until minimal or no changes are required to QMS. System to be gradually rolled out throughout all aspects of company. External auditors for annual review of QMS to take into account aims and goals of QMS – ISO registration is not to be undertaken but the standard is to be used as a guideline. After results and recommendations of audit, management to replace or rectify under performing aspects or problem areas.

3.4 Conclusions – is ISO 9001 a good system for The Company?

A pertinent reminder is that as there is no 'correct' form of quality system to adopt – even the changes made to the ISO 9000 series were in response to the need for greater flexibility and adaptation of systems to better 'fit a company. At this point in time, after careful consideration of the gap analysis and in conjunction with a detailed and intimate knowledge of the company's existing position, it is the writers considered opinion that the implementation of ISO 9001: 2000 with the intention of compliance, and ultimately registration for the company, would be excessive and agree with similar observations by Landin (2000) that the cost that would have to be incurred would be greater than the financial benefits that could ultimately be derived. Whilst many quality systems could (and would) be appropriate for the company, a decision to adopt one quality system is required, and from the material presented thus far, it is deemed that the more general yet all encompassing approach of TQM shall be adopted as the QA system for the company. [1]

3.5 The Way Forward - Conclusions drawn from Gap Analysis, and their application

3.5.1 Introduction

A newly formed management committee will be responsible for all aspects of Total Quality management within the company. This committee will comprise of both principals and two senior staff members. One of the first tasks was to review the data obtained from the recently completed Gap Analysis, and 5 issues became evident to be the focus for initial changes.

- Time taken to complete a job.
- Omissions of data.

[1] Note:- It must be remembered that the Gap Analysis was a broad-spectrum analysis designed to encompass all aspects of the business. The Gap Analysis used was a generic template that was not designed specifically for the company. This dissertation is limited in scope due to time constraints. This will mean that not all components of the Gap Analysis will be pertinent to future testing and trials. This does not mean that segments of data obtained from the Gap Analysis is irrelevant; rather it's information that can be used to build upon when a broader Total Quality Management system is implemented.

- Incorrect submission of plans.
- Poorly allocated resources and
- Poor access to current files and data.

Below is a brief outline of these issues, and management committee objectives for them.

3.5.2 Issue 1 - Time Taken to Complete A Job:

The most frequently occurring shortcoming found within the Gap Analysis was the time taken to complete a job. Previously there had been no formal process for tracking a job at the company. The only method of time tracking had been to compare the dates of job acceptance with the date of final account/invoice. Investigation of jobs prior to the Gap Analysis noted that detail or topographical surveys were taking on average 9 weeks to complete. There were instances of some jobs being completed in just over 4 months. Telephone calls and emails made by clients also displayed a level of dissatisfaction about the time taken to complete work.

At no stage in the past, had there been a system to track the status or whereabouts of a job. Frequently staff would enquire amongst themselves as to the location of a job file or the status of a job. Hence, the Management Committee aims to provide a system where the status of all jobs can be monitored. The system will note the date of when each aspect or component of the job was completed and by whom. This system is designed to contain several steps toward continual improvement. Firstly it will allow management to calculate how much time each aspect of a job is being taken. Secondly, if an error or omission occurs, the staff accountable can be easily traced, as they have signed their name and are responsible for their work. This aspect is not intended as a mechanism for disciplining staff, more so a chance for management to understand where deficiencies lie. This may highlight that further training or assistance is necessary in a particular area.

The Management Committee has set a target of completing detail or topographical surveys within a four-week period. This target may be considered ambitious given the

current time frame to complete work. However, the reviews post trial will be conductd to assess the success of the changes made by the Total Quality system.

3.5.3 Issue 2 - Omissions of Data

The value of a personal, friendly relationship with regular clients is often priceless. Regular clients are more likely to give a frank and honest assessment of the quality and value of the product provided. Informal verbal feedback from regular clients in conjunction with the Gap Analysis, revealed some unexpected shortcomings. Whilst clients were generally very happy with the standard of the product provided, frequent comments were made about omissions of data from plans, not errors. Whilst this issue was unforseen, measures can be taken to ensure that this will be overcome.

In a manner similar to that used in ISO 9001:2000, a set of checklists will be drafted that encompasses all aspects of the work required. Such checklists can be drafted for all styles of work encountered at the company, however for testing purposes, it shall be limited to the detail or topographical survey. A similar concept to the previous point will apply to the checklists. Staff will be required to sign off on work when they believe the checklist to be complete. This again will allow management to assess the completeness of work and implement changes or additional training as required.

3.5.4 Issue 3 - Incorrect Submission of Data:

The combination of Gap Analysis and client feedback also highlighted a further shortcoming. On several occasions, final submissions of plan had been incorrectly delivered. Incorrect delivery comprised of several types of errors:

- Plans delivered to an incorrect mailing address - either postal or email address.
- Plans delivered in an incompatible electronic format. This may include plans delivered in a more current version of software than the client uses or a file formate not executable by the client. Both of which means the client will be unable to open the file containing the plans for which they have paid for.

- Plans forwarded to an incorrect party. Often a homeowner will provide a job instruction to undertake a detail survey of their property. The final plan may have been sent to the client whereas the client had instructed the plan to be forwarded to the project architect.

Breakdowns in communication cost many parties time and money. This also obviously delays a project. Often these actions are perceived poorly by clients and do little to enhance the reputation of the company, despite the fact that the quality of work is high.

The Management Committee has determined that a better system for logging the desired person of receipt, location, file format and delivery address is necessary. At job initialisation, this data will be recorded and confirmed.

3.5.5 Issue 4 - Poorly Allocated Resources:

As the Gap Analysis revealed, all resources necessary to complete a survey are available at the company. However the company commenced business as a very small company run on a nominal budget. At virtually no stage has equipment or office furnishings ever been replaced. New items are implemented to compliment the existing resources. As technology has improved, it means that no two pieces of equipment are identical. Experienced staff are aware of the process necessary to obtain maximum efficiency from the equipment and software packages. However, new staff face a steep learning curve to understand the antiquated methods used on outdated equipment and software. With no formal training offered by management, new staff face unnecessary complications in completing elementary survey work. A measure of the age of equipment is highlighted by the fact that only 3 of 8 theodolites contain a reflector less capability. Of the remaining 5 theodolites, only 2 have onboard data collection facilities. It is generally and commonly known that in the current economic climate, many survey firms are suffering from limited access to resources. Many survey firms are struggling to employ sufficient staff that are trained, qualified and experienced. The company is not immune to this situation. Too frequently, survey field parties are attending jobs with inexperienced staff. Time taken to complete surveys can be significantly longer as elementary training is given to new staff on the job.

Levels of productivity are also subject to poor planning through resource loading. Job scheduling is currently drafted on a day-to-day basis. Survey parties, jobs and equipment are allocated in the morning of any given workday. Such planning inhibits continuity and efficiency of projects over multiple days. Delays are also encountered as theodolites are downloaded of data and transferred to other field parties. Theodolites are regularly transferred between staff based on the instruments capabilities and requirements of each project.

The management committee will recommend a series of changes to resource loading, allocation and equipment, to be discussed later.

3.5.6 Issue 5 - Poor Access to Current Files and Data:

When the company commenced business more then twenty years ago, computers in the commercial world were still in the infancy. As noted earlier, being a small business, the company did not have the need or cash flow to purchase computing equipment. Hence all files, forms and reference material were paper based. Such a system became difficult to maintain as the company grew in size. Keeping up to date files, forms and databases in multiple locations began to become unworkable. Outdated forms and databases began to integrate with current systems. Unwittingly, staff occasionally used outdated material, which in turn caused delays and errors.

Since a computing network has been introduced to the company, most databases are now electronically archived. Data from external sources is also accessed electronically through the Internet. However passwords, pin numbers and web addresses are often hidden from selected staff or released on a limited basis. Management adopted this stance in order to reduce ‘unnecessary’ purchases or acquiring inappropriate data.

Despite more than twenty years of file use and database access, there is still no streamlined efficient system. Staff still have no reliable contact point to obtain up to

date files, forms or data from archival sources. However all files, forms or data from archival sources are available, just not easily accessible.

The management committee aims to have a uniform documented system where all employees can obtain the files, forms or data necessary to complete a detail or topographical survey. If successful, this system will be rolled out to other aspects of the business.

3.6 Design Summary – The Job Booklet

The Gap Analysis highlighted many shortcomings at the company with respect to a Total Quality Management system. Some of the failings are major, but collectively, nearly all have the potential to be resolved through carefully drafted solutions. Possibly the most difficult task is to draft a collective solution.

The next step is to design a Total Quality Management system for the company. The new Management Committee is responsible for drafting the system. The aim is to create a documented fail proof procedure that ensures a job is done wholly and correctly. It also aims to ensure that the job is done once only and that the welfare of clients and staff are not degraded.

The Management Committee has drafted a list of all tasks currently undertaken by all staff throughout the course of a detail or topographical survey. These tasks have been placed in chronological order. Inserted into this list, are references or access points necessary to obtaining critical data.

After every phase of the job, responsible staff members are required to sign off for work completed. This step is twofold. Firstly it highlights were failings occurred and secondly by whom. The Management Committee meet at regular intervals to review and assess the Total Quality Management system. Investigation of errors allows for easier amendments through change in procedure or staff training.

Listed in Appendix C is the first draft of this document. It has been titled ‘Job Booklet’. Its intention is to be used by staff through all aspects of detail survey projects.

3.7 Conclusion

Due to the size and nature of the company, and after undertaking a gap analysis, it was decided to choose TQM as the QA system approach for the company rather than ISO 9001. The gap analysis did however highlight five recurring major issues, being: the time take to complete jobs; omissions of data; incorrect submission of plans; poorly allocated resources; and poor access to current files and data. These issues were then expanded upon and from the outcomes the next steps required by the Management Committee were established.

A job booklet was hence created using the information gleaned from the gap analysis and five major issues that were highlighted from this. This booklet is to be the first systematic advancement in a move towards a TQM system. This step has a two-fold purpose – firstly to introduce some QA steps and procedures into the company’s operations, and secondly to provide the foundation for an ongoing QA revision and assessment process.

4 RESULTS & DISCUSSIONS

4.1 Introduction

The first round of trials and testing of the new system implemented at the company are now complete. A Total Quality Management document was phased into the daily operation of the business. Company management's aim of the document was to improve completion times of jobs and improve the quality of the final product. The Management Committee's aim differed - to improve completion times of jobs, format a system that assists staff in avoiding errors, utilise resources in the most efficient manner and at least maintain the welfare of clients and staff.

Testing occurred over new jobs received within a three-week period. Only detail or topographical surveys were included in the trials. Other styles of surveys will be included at future dates when the system becomes more successful and grows. During the test period, instructions for a total of twenty-two detail or topographical surveys were given. These jobs became the sample size used for assessment.

4.2 Results

The following summary outlines the results obtained from the trials and testing of the new TQM system as made by the Management Committee. Reviews will be made and recommendations posted, ready for the process to begin again.

A collectively compiled detailed version of the results is available in Appendix D. Accuracy rates quoted in the following results section have been obtained from figures within each subsection and converted to an error rate. A mark is given for every correctly completed point within a subsection and collectively summated for all 22 jobs. This figure is divided into the maximum possible score to obtain an error rate percentage. Costing of errors was charged at $150 per hour for field survey and $95 per hour for office time.

4.2.1 Stage 1: Administration

4.2.1.1 Client Details

Compiled results have shown that this section of the Job Booklet was well adhered to. Every facet of the booklet was completed during the survey and signed by the responsible staff member.

At the completion of the trial period, a review of the effectiveness or accuracy of the section was undertaken. This revealed that no omissions or errors occurred and a 100% effectiveness figure or 0% error rate was registered.

4.2.1.2 Confirmation of Services Document

The review of this section has been measured in a different format to other sections. Since this form has no smaller components that can be measured, it is collectively assessed. On every occasion, the Confirmation of Services document was correctly and successfully sent to the client. The client signed the form and forwarded the document back to the company for further action.

4.2.1.3 Search Form

The administrative staff undertook all aspects of the search with every task complete. However during the review, deficiencies were uncovered. Even though Deposited Plans had been ordered for every job by administrative staff, field surveyors noted that four of the jobs had insufficient deposited plans to adequately complete the work. This omission caused field parties to visit site for a second and unplanned visit in addition to office time spent searching and ordering plans. These omissions resulted in a total of eight additional field hours and eight additional office hours to complete all jobs. These additional hours costs $1,960.

Field surveyors also made comment regarding two other projects. There was an indication that other jobs had been done within close proximity to the subject job, but that job had not been retrieved from archive and given to the surveyor prior to commencement of work on site. This caused unnecessary replicating work than had

been done by the company at prior date. Although no harm was caused, it did result in both surveys taking a combined 2½ hours extra fieldwork. This omission cost $375.

The search component of the jobs reported a 96% successful completion of components. Alas the 4% error rate equated to losses amounting to $2,335 (full details available in Appendix D).

4.2.1.4 Utility Search

The administrative staff undertook all aspects of the search with every task complete. The review process uncovered no errors. Hence this section was 100% successfully completed on all jobs.

It should be noted that not all components of this section were required for every job; hence the number of tasks performed was comparatively low.

4.2.1.5 Height Search

The administrative staff undertook all aspects of the search with every task complete. However during the review, a deficiency was uncovered. Eight of the twenty-two jobs reported having been issued only a Co-ordinated Permanent Mark sketch only. There was no accompanying data with the sketch illustrating the height of the Co-ordinated Permanent Mark.

This fact did not hinder the field survey procedure. Merely it added half an hour of additional office time to the project. This time was spent researching the Co-ordinated Permanent Mark through online data, purchasing the co-ordinates and adjusting heights of every surveyed point within the project to coincide with Australian Height Datum.

With eight jobs requiring an extra half hour each, a total of 4 hours extra office time was needed to complete the height search. Only fourteen of twenty-two jobs were thoroughly searched equating to a success rate of 64%. The error rate of 36% costs $380.

Upon investigation, it was revealed that one of the company directors had undertaken the AHD search. His philosophy was to only purchase Permanent Mark co-ordinates only if the mark was found. If the Permanent mark were destroyed, a purchase of $3.40 would be wasted.

Whilst the company directors' intentions were noble, rationally 14 Permanent Marks would need to be destroyed and co-ordinate purchases wasted before a breakeven point were reached. Hence it is more cost effective to purchase the co-ordinates of a Permanent Mark prior to a site visit.

4.2.2 Stage 2: Fieldwork

The field surveyors completed all components of the fieldwork section within the Job Booklet. Again the review of the survey revealed discrepancies. This highlighted the gap between ticking boxes in the Job Booklet as completed and the tasks being completed correctly.

In two of the twenty-two jobs, errors in the boundary definition were found. This consequently reflected into another category where the same two jobs were unable to 'prove distance between terminals'. These two errors combined required 3 hours of field time and 2 hours of office time to rectify. Such errors resulted in a 3% error rate and were costed at $640.

The surveyor who was responsible for the erroneous boundary definition was a young emerging surveyor. Such an error can be attributed to a lack of experience rather than gross negligence or poor attitude. Guidance and tutelage was provided to the surveyor in question.

4.2.3 Stage 3: Office work

4.2.3.1 Draft Plan Checklist

Like other employees, the draftsmen of the CAD division completed all components of the drafting section of the project. With respect to the job booklet, some errors were disclosed at the time of review. Several drafting errors were identified.

One particular job was found to have easements poorly defined. This error was discovered by the field surveyor and rectified by the CAD operator. This error required one hour of office time and was costed at $95. A further error was discovered when a title block contained incorrect information. Half of one hour of office time was necessary costing $48. Another job was found to have erroneous text and descriptions describing the improvements on the land. This error required 1½ hour's office time and cost $143.

Guided only by the job booklet, an error rate of 2% was calculated for draft plans. A total cost of $286 resulted.

4.2.3.2 Final Submission and Debriefing.

The administration staff completed all facets of the final submission section within the job booklet. Only management failed to complete the job booklet. The final review revealed that no errors had been made in this section of the project and this stage received a 0% error rate.

Consultation with clients during an informal debriefing revealed other items not found by reviewing figures from the job booklet. They include:

- The job took too long to complete
- The client or occupant was unaware of when the surveyor would be on site.
- Neighbours of adjoining properties to the subject site were never made aware that a surveyor would be present and that they would be entering their property.

4.3 Discussion

Biazzo & Bernardi 2003 said "*Management must champion the cause for Quality Assurance to succeed"*. Alas this was not the case at the company. Since the idea of Total Quality Management was first mooted, management at the company have been keen to be involved. Both directors of the company joined the management team when it was first established and were active participants until trials and testing began.

Resources in all forms, from survey equipment to administration equipment have been at peak capacity for extended periods of time. Virtually no resource or financial assistance was available for Total Quality Management. Management of the company informed the Management Committee that resources would not be forthcoming until business quietens.

Despite the burgeoning workload at the company and the time constraints of this dissertation, it was decided by the remainder of the management committee that the trial would proceed without the influence of management. At this stage, management of the company unofficially withdrew from the management committee and played no further part in the process. Management actually became disenchanted with the process when the TQM system was first rolled out into the business. It was first viewed as a hindrance to the normal procedures of business and only tolerated because of its academic purposes.

Several other points for discussion arose from the review of the trialled TQM system. These points were not readily noticeable in the facts and figures that the table produced but may still be relevant. They include:

Staff become set in their way and develop a rigid mindset. This attitude may become an obstacle when attempting to introduce new concepts or TQM systems.

New staff need to have the concept of TQM explained to them so they will understand its implications and actively participate.

To speed up the process of completing a project and job booklet, employees may become lethargic and tick boxes as tasks being complete, without thoroughly investigating if the task has been completed.

A lack of resources on many levels is a significant problem. These are problems far greater than a limited TQM system can possibly achieve. Issues such as ongoing staff training, adequate staff numbers, sufficient motor vehicles, modern total station reflector-less theodolites and current versions of survey and CAD software.

Despite the aims and goals of management, waiting times to complete jobs is excessively long. Without doubt, the single most significant cause of job completion times is due to management. This issue has deliberately not been incorporated into this dissertation, as it would distract from the fundamental doctrine of TQM and diffuse the academic principles of this project. Frequently staff are directed by management to commence new projects before an old project is completed. A surveyor may have 6-8 jobs at 90% completion, but ordered by management to commence a new project.

The mean of all successful completion rates from the job booklet equated to 94%. This may be considered a reasonable effort for the first round of trials for the TQM system. Despite this apparently high success rate, errors and omissions still totalled $3,641. This figure may be viewed more as a potential lost income figure rather than a damages claim. Rectifying erroneous data will be far cheaper as a survey wholesale rate, so the net loss through omissions and errors will be substantially less.

Another significant point of interest relates to CAD drafting of plans. Whilst the CAD division scored a 98% successful completion of tasks from the Job Booklet, discrepancies still occurred. These discrepancies were not measured within the description laid out by the Job Booklet, hence redrafting that was necessary on plans was not included on the successful completion ratios. These differences are believed to result from a CAD operator's interpretation of what a surveyors draft sketch represents.

The onus of searches for Sydney Water is now the responsibility of administrative staff. Previously, no staff member was solely responsible for obtaining such information and it was consequently frequently overlooked.

4.4 Conclusion

Implementing the job booklet into the company has provided useful feedback for implementing a TQM system on a bigger scale within the company. Whilst some issues such as the lack of sufficient resources and inadequate allocation of these were confirmed and highlighted, other relevant issues such as the important role that staff attitude can play, especially of company management also became apparent. Ironically, it was at this stage that the company management formally withdrew from the Management Committee due to time constraints, further highlighting this point, and jeopardising future development of the system beyond this trial.

5 CONCLUSION

5.1 Introduction

Many valuable insights have been acquired through the implementation of Total Quality Management at the company, including a greater understanding of the importance and structure of quality in the workplace.

The aims of this dissertation were originally to investigate quality and to control and improve competitiveness and profitability. This was initially done through investigating quality assurance through many of its derivations. ISO 9001 was found to be a rigid product driven system, and larger companies tended to be more likely to adopt it. Some studies also found that it did not necessarily greatly improve profitability and it is a comparatively expensive system to implement and operate, however this may be offset as it is publicly recognised as a world benchmark for quality and often an essential criteria when tendering for contracts.

Total Quality Management was another form of quality that was investigated. This system is broader in scope than ISO 9001 and has the capacity to deal with human-interest issues. Hence it is more adaptable to small or boutique businesses. The system can be cheaper to operate and does not require ongoing registration fees.

Applying a quality system to a survey practice was the next issue addressed. Elementary costing and literature reviews indicated that a TQM system would be the most desirable approach. So a portion of a Total Quality Management system was applied to a medium sized survey practice to assess its influence.

The fundamentals of TQM were followed, a management committee was formed, and a comprehensive gap analysis was undertaken. This illustrated the burgeoning gap between required and existing structures within the business. The committee then drafted a quality management procedure incorporating all facets of a particular style of job – outlined in the Job Booklet. This was then rolled out over a three-week period. At

the termination of this period, a review of results was undertaken with conclusion drawn and recommendations made. The Management Committee will implement these recommendations when the next version of the TQM is released. Like all forms of Quality Assurance, TQM is a proponent of the notion of continual improvement. The TQM process is cyclic and should never be seen as completely finished.

5.2 Future Recommendations

Much has been learnt from the first round of TQM at the company. Many faults and deficiencies were found both prior to and post TQM. Lessons learnt can be implemented into future versions of TQM at the company. These points include, but are not limited to:

- ✓ The Job Booklet should be stored and utilised in an electronic format. This replaces the current hard copy paper based format. The status of a job can be tracked using notes made on the Job Booklet. This can be done regardless of wether the surveyor responsible is in the office or not.

- ✓ The greatest significant change necessary to ensure that TQM occurs successfully at the company is the willingness and support of management. Management must champion the cause by providing time, money, training and resources to the process.

- ✓ A job diary is to be implemented. This is to be operated synonymously with the Job Booklet. Currently, administration staff operates a hard copy diary that covers all jobs. Messages for particular jobs are commonly overlooked and not forwarded to the appropriate surveyor. The paper-based diary will be replaced with an electronic version. This allows messages to be automatically forwarded to the job diary, ensuring no message is left un-noted.

- ✓ Every field party to be issued with a digital camera. This will allow images to be captured, allowing the CAD division to clearly view and draw a site that they have never been to. Digital cameras are a comparatively minimal expense and will reduce errors within the plan drafting stage of the Job Booklet. The Job Booklet will be updated to include a section for photo or image capture.

- ✓ Currently all jobs awaiting commencement are held in a job box. Jobs are placed here regardless of what stage they are at with respect to searching (stage 1 of the job booklet). Occasionally a job is taken from the job box and commenced without full search. Round two of the TQM system will see no job placed into the job box until a full search has been completed. The Job Booklet will be updated to reflect this.

- ✓ The greatest cause of lost potential income, as determined by the review of the trial, was poor job searching and poor searching of cadastral plans. Too frequently old jobs with close proximity to a current job are not retrieved from archive. Old jobs often contain valuable information and can save time for the field surveyor. A more concerted effort must be made in the area in the future. No amendments to the Job Booklet need to be made in this area at this stage. If failings continue to occur, then staff retraining may be necessary.

- ✓ On several occasions, administration staff ordered an insufficient number of deposited plans. This made boundary definition very difficult or impossible for field surveyors. It would be more cost effective to order (and purchase) too many deposited plans (at $6.90 each) rather than risk many hours of unnecessary fieldwork (at $150 per hour). Again no amendments to the job booklet are necessary but if the problem persists, retraining may be required. Ironically it was the same staff that inadequately retrieved jobs from archive.

- ✓ Feedback from regular clients indicated that homeowners and tenants were not notified as to when surveyors would be attending site. A simple phone call by administrative staff would rectify this concern. This will improve public relations and access to the subject site. The job booklet will be amended to include this change.

- ✓ Feedback also indicated that property owners of adjoining lands were not notified that a survey was to occur and access would be necessary. A phone call from the administrative staff would also resolve this issue. The job booklet will be amended to include this change.

- ✓ Jobs should be allocated to surveyors on a week-by-week basis. This will replace the current day-to-day allocation of jobs. It will also allow surveyors to manage their time more efficiently by reducing the number of days where there

is an underused remaining last hour. This change will not see any alterations to the Job Booklet but a reversal of policy for management.

- ✓ An ideal situation would see TQM rolled out across all of the company. It is very difficult for a business to manage one portion that is quality controlled but not others. A uniform system across all aspects of the business should ensure greater continuity and fewer errors. The results of the Gap Analysis can be applied across the whole business.

- ✓ The issue of reducing the time taken to complete jobs must be addressed on a far broader scale. A significant injection of resources into the business needs to be made immediately. Modern total station reflector-less theodolites, cars, staff, training and updated software is urgently required. TQM systems will only partially assist in reducing job times unless accompanied by additional resources.

5.3 Further Study

This dissertation has shown that Quality Assurance now has a significant foothold at the company. Company management and staff are now aware of it and their knowledge can now be considered an asset. To date, Quality Assurance has only been partially rolled out into the company encompassing only one of many types of jobs undertaken. Further study would allow TQM to be applied other types of work. When the time is suitable, and there is commitment from company management, the same fundamental principles of TQM as those used here can be reapplied to the complete roll out throughout the business. This will include all facets of the business such as accounts, car leasing, creditors and debtors' etcetera. A complete roll out is a massive undertaking, far beyond the scope of this dissertation. It is one of many of the significant business decisions that management must make to ensure the longevity and prosperity of the business. This dissertation provides such a basis for further study. Similar techniques can be used when drafting job booklets for other types of work. However valuable lessons have been learned through this study, most of which are applicable to an expanded roll out. Several deficiencies in the current job booklet may have occurred regardless of the job type so measures can be taken to correct these prior to implementing further TQM.

5.4 Conclusion

Results obtained from the first roll out of TQM were mixed. Most goals were achieved, the standard of work was quite high, and the levels of omissions of data dropped significantly. Further amendments made to the job booklet could see these results improve further. Alternately the trials did reveal a darker side to the business. For all Quality Assurance systems, management must champion the cause or the system is doomed to failure. Management always had the best intentions, but never fully committed to the cause. This lack of commitment can best be accounted by the fact that resources on all levels are beyond critical levels. Increases in staff, vehicles, training, equipment and software are chronically overdue. Whilst a revised Total Quality Management system will partly improve the performance of the company, serious business decisions need to be made.

Future prospects for Total Quality Management at the subject firm do exist, however company management must have a willingness to become involved in any system proposed, and substantial business decisions must be made.

6 APPENDICES

Appendix A – Project Specification

University of Southern Queensland
Faculty of Engineering and Surveying

Project Specification
ENG4111/4112 Research Project

Student:	Paul Brandon
Topic:	Quality Assurance
Supervisor:	Dr David Thorpe
Sponsor:	Faculty of Engineering and Surveying
Project aim:	Investigation of a Quality Assurance system. Assess wether such a system can be justified in a medium size survey practice. Construct a model for implementing Quality Assurance into the workplace.
Programme:	Revision A, 3 April 2006
i:	Write a brief overview and history of Quality Assurance. This includes definitions of ISO9000 and Total Quality Management.
ii:	Assess Quality Assurance systems against ISO9000-2000. Compare how a survey firms current practice compare with the existing ISO 9000 standards. In addition, compare them against a TQM.
iii:	Define the potential benefits and costs attached to implementing and improving a system. Evaluate current work practices and construct a model that may be implemented into a specified survey practice.
iv:	Outline potential areas of improvements for the systems.
v:	Formally record and report on findings together with recommendations.

If time permits:

vi:	Investigate Six Sigma and other advanced quality management approaches. Can their tools be implemented into a survey practice or do they discourage innovation and resourcefulness.

Agreed:

Student _____ Supervisor _____

Date 25/4/06 Date 5/5/06

Appendix B – Gap Analysis

NOTE: *The full Gap Analysis below is from a blank checklist template sourced from www.9000store.com.*

Text in the 'requirements' column and footnotes is directly as sourced on the template.

Analysis of what is currently in place, and the items that are needed are specifically in relation to the company.

Quality Management System - QMS

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
General Requirements*		
a) Look for documentation of the processes included in the QMS	Non existent	Draft a QMS document
b) Look for information on the relationship and sequence of the QMS processes.	Non existent	Ensure all items within the Gap Analysis checklist are incorporated into the QMS
c) Ask Management if operation and control of processes is effective. How do they know if it is effective?	Maintenance of existing system is possible with current processes. Improvement and innovation is difficult, if not impossible with existing processes. The final product is being achieved, so management know existing processes	Create a monitoring device within the QMS that shall measure and report on the operation and effectiveness.

* This clause addresses and identifies how management applies the process approach to achieve the effective and efficient control of processes, resulting in performance improvement. Specifically this section is looking for an overall process evaluation of all quality related processes and their interrelationships.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	work, but efficiency and quality of such have never been assessed.	
d) Ask how they are able to know if resources and information needed to support processes have been provided.	A combination of dialogue with professional colleagues; information gathered from lectures at Institute of Surveyors information nights; professional subscriptions; communication from employees.	The monitoring device should have the ability to detect any shortcoming of information and support.
e) Is there any information on the effectiveness of processes?	Feedback from staff and clients.	A continued series of feedback from staff and clients remain.
f) How are improvements made to processes?	Slowly, if at all.	Through an iteration process, created by the TQM.
▪ What processes does your organisation outsource? How is the process controlled?	Fieldwork is occasionally outsourced. This is poorly controlled. Occasional computer support and networking advisors are also hired	The field and office procedures for subcontractors can be documented to ensure that every item is covered and meets the new criterion and standards. Computer technical support and networking contractors will always

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
		be necessary as this knowledge is outside the scope of intellectual property of the company.
Documentation Requirements*		
General		
Does your quality system documentation include the documentation required by the standard?	No – there is no existing quality system	The newly drafted documents will be company specific and conform to standards
a) Is there a list or other means of identifying other documentation required by your QMS? Are the required documents available?	No - Not currently	The new QMS will provide access to all necessary documents to any staff that may require them.
b) Does the QMS documentation include Quality Records?	No – Not currently	The new QMS will include a almanac of quality. At each iteration, quality records will be updated.
Quality Manual		
Review the Quality Manual if available.	Non existent	

* This section addresses how documents and records are used to support effective and efficient operation of the organization. A review of procedures, work instructions, and records will determine if the standard requirements are met.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
a) What is the scope of your QMS?	Non existent	Entire QMS
b) What processes have been excluded? Is this appropriate?	All – not appropriate if striving for QA	The process of job acknowledgement to job completion will only be assessed. Due to the scope of this project and the size of the business, an extensive QMS will be impossible to undertake in the time frame
c) Is a description or illustration of the interrelation of the processes included?	No	Yes. A flow chart will give a simple platform for isolating individual aspects of the process.
Control of Documents*		
Do you have a formal procedure regarding the control of documents for your organisation?	Yes	All necessary documentation shall be provided within the first few steps
a) Are documents approved?	Yes	Yes
b) Are documents updated and re-approved?	Some – not uniform through company	A review shall occur regularly to ensure that all documents are current and follow legislation.
c) How are changes	On plans, revision	For the overall QMS, e

* A documented procedure is required

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
identified?	numbers on drawings/table of revisions	review will be undertaken at each iteration. A QMS is rarely complete. I is continually reviewed and updated.
d) Are documents available to those that need to use them? How is the most current version kept in the correct locations?	Yes Often current version mixed up with older versions	Yes. Professional bodies send updates whenever legislation is amended. Downloads from websites are automatically updated by the provider.
e) Can users easily identify documents? Can users easily read the documents?	No – poorly labelled Yes	Forms to be redrafted and kept on a central database accessible to all. Old forms to be destroyed.
f) If documents such as reference books, users manuals and other outside documents are used, how are they controlled?	Poorly. Documents are only updated when statutory bodies update theirs – there is no continual assessment and revision of existing forms.	Documents and manuals will be stored in a central database. Iteration of the TQM will assist in keeping documents up to date.
g) How are old documents handled? Are they removed from use? Are they labelled? In a can	Commonly there is only a single copy in a hard copy format.	By removing all old documents and printing fresh copies of

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
labelled? Is a copy maintained for reference? Is there any chance that an old document could be used by accident?	Old documents are rarely removed – they are shelved, but not archived. Old documents could definitely be used by accident as not clearly labelled when superseded.	necessary documents only as required, this will eliminate the risk of allowing obsolete forms to remain in the system.
Control of Quality Records*		
Is there a documented procedure in place for records control?	Yes	The new QMS will have a documented procedure for record control.
Where are records kept? Is this identified somewhere so users can easily find records? Can users identify the records? Are the records legible?	In the office in a combination of hard copies filed on shelving, and soft copies on network server and CDs – also kept in the office. They are not necessarily easy to find – hard copies are; digital plans on disk can be difficult. Anything digital (pre 2001) is very difficult to retrieve from archive. Identification of records – hard copy is easy;	A major overhaul of system records would need to be undertaken in order for archived items to be easily accessible. Frequency of use of old data and sheer costs may make this impractical. Ideally a uniform system would be introduced to make retrieval from archive simpler and easy for all users to obtain compulsory data.

* A documented procedure is required by this clause of the standard.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	digital is difficult. Records are legible.	data.
How are the storage time, storage requirements, and disposition identified?	A very poor and disjointed documented file contains part of the archived records. Paper based documents are held in filing cabinets.	All documents should be held in a central location accessible by all computers. Archived files can also be held on a database on the same network drive.

Management Responsibility

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Management Commitment*		
Who is "Top Management"?	The two company Directors	
a) Have employees heard about the importance of meeting customer requirements? What role did Top Management play in communicating this to employees?	Yes Sole informants to employees	The management committee will hold a meeting with staff to discuss the TQM to be implemented. Here all staff members will be made aware of quality and meeting customer

* This section asks to identify how top management demonstrates its leadership, commitment and involvement. Is management communicating the importance of meeting customer requirements? Verify how this is being done, interview personnel to see if this is actually being done. Is the quality policy signed off by top management, do they know it? Review management review meeting minutes. Ask how resources are determined. Remember resources are not limited to people.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
		requirements.
b) What role did Top Management play in establishing the Quality Policy? What evidence is there of their role?	Non existent Regarding quality, final sign off of all work is by one of the directors. The surveying profession is bound by a set of laws and guidelines for which all plans produced must adhere to.	A TQM has been mooted by the dissertation. Management will be involved in the management committee that shall dictate the progress of the TQM within the company.
c) How were the Quality Objectives established? (Have they been established?) What evidence is there of Top Management involvement?	Not established yet. Standards are reinforced to staff by management verbally	TQM objectives are obtained through a combination of self-assessment, the company mission statement and a gap analysis.
d) Can you see evidence of Top Management involvement in Management review?	The size of the company ensures that management makes all critical decisions.	Management will be involved in the management committee that shall dictate the progress of the TQM within the company.
e) What process is used for Top Management to identify and provide resources necessary for the QMS?	Management provides several forms used for the course of daily work, but not within a	The management committee shall continually review the progress of the TQM

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	recognised QMS.	by iteration. Top management will be made aware of any inadequacies and given the opportunity to supply necessary resources.
Customer Focus*		
Do you have a process in place to identify your customer requirements? How is Top Management involved?	Yes. Initial consultation with clients will outline their requirements. This is formalised with a Confirmation of Services document that is always signed by management and client.	The Confirmation of Services document has served the company well and shall be incorporated into the TQM.
How does Top Management know if customer requirements are being met?	Client feedback.	Client feedback shall continue to be a key element. Checklists shall be created and completed by staff during the course of the job to ensure all requirements are met.
Is your organisation aimed at achieving customer satisfaction? How?	There is no direct policy aimed at customer satisfaction.	Customer satisfaction is a component of repeat business. By

* This is a new requirement and it may be defined in a document describing how the organization addresses this clause. If no document is available interview top management for compliance. Top management and other personnel should be involved in this section.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	Management and staff do make a concerted effort to appease client needs.	completing work on time and within budget is a manageable way of obtaining customer satisfaction. Measuring costing and time will be part of the TQM.
Quality Policy*		
a) Does the current Quality Policy meet the requirements of the standard?	Non-existent. Not applicable	A new TQM system will be implemented into the business.
Planning		
Quality Objectives*		
Review Quality Objectives		
a) Where are objectives for meeting product requirements?	Objectives for meeting product requirements should be at all phases throughout the job	Aspects of the proposed TQM system shall bind each staff member involved in producing the required work.
b) At what levels have quality objectives been established? Department? Process?	During fieldwork, the surveyor oversees quality control. During	A TQM system will include all levels of the survey practice

* Review the quality policy, management, personnel, management review meeting minutes and other documents that might apply to this clause for compliance. Evaluate how the quality policy leads to improvements.

* Review defined quality objectives. Do quality objectives translate the quality policy into measurable goals? Are they documented so all personnel knows what they are and how the objectives apply to their processes? Are the quality objectives being reviewed? Are they measurable? Do the objectives contain commitment to the continual improvement of the QMS?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	office reduction, the surveyor oversees quality control. During first plot of the finished plan, the surveyor oversees quality control. Management oversees control of the final plan before it is delivered to clients.	and all staff members involved in the job. The staff member responsible for each component of work must complete checklists.
c) How are objectives measured? How do they contribute to meeting the quality policy?	Currently plans are visually assessed through a measure of correctness against its draft. There is no formal measure at present.	All checklists will contain every aspect of work that is necessary to complete each job. If every item on the checklist can be ticked off, then standards should be achieved.
Quality Management System Planning*		
What quality planning process is in place?		
a) How does the planning process address quality objectives for new processes or products?	With no current structured procedure in place, the current system is ready available to be radically [illegible]	The management committee shall continually review the performance of the TQM system. Each [illegible]

* Review the documents or evidence in the QMS complying with this clause. Verify planning includes requirements for continual improvement specified in clause 8.1. Verify quality planning includes resources and takes into account the needs of your organization as changes occur.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	overhauled.	review provides the opportunity to implement new resources and processes.
b) How are changes evaluated and approved? Does this take into account how changes will affect the QMS?	With no current structured procedure in place, the current system is ready available to be radically overhauled.	The TQM system will be rewritten at each review in accordance to feedback, technology and process requirements.
Responsibility, Authority and Communication		
Responsibility and Authority*		
Review documentation on responsibility and authority. Are people in the facility aware of responsibility and authority?	No formal documentation of authority exists. Being a small company, the chain of command is clearly evident.	A TQM system will dictate which staff member has the authority and responsibility to complete various aspect of the project or job.
Management Representative*		
Who is the Management Representative? a) What are their	Management are the two company directors.	The management team for the TQM system shall

* Verify how top management has defined responsibilities and authorities. This information could be in the form of an organizational chart.

* Verify the appointment of the management representative. The management representative is now responsible for implementing and establishing the QMS. Verify how customer requirements are communicated throughout the organization. If more than one management representative is appointed, how are the responsibilities and authorities handled?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
responsibilities?	Their responsibility is final in terms of quality control. Their involvement is generally at the final step.	comprise of the existing two company directors and senior staff. They will be responsible for drafting the TQM system, obtaining resources and continual reviews.
Internal Communication*		
Have you established a communication processes within your organisation?	Communication is commonly in written form. Deficiencies in plans are written manually and passed to the appropriate persons. Verbal interaction will often help clarify these.	With each job, a small booklet will be issued. This booklet will contain the entire necessary checklist required for that particular job. Also contained will be a diary. This will allow all staff to enter minutes for that job.
Do the communications include the effectiveness of the QMS?	No quality management system exists yet.	Yes.
Management Review		
General*		

* Verify the internal communication processes of your organization. It could be in the form of internal memos, bulletin boards, or meetings. Assess the communication for information on the QMS, effectiveness of the processes, and changes to the system. Verify this information is communicated to all levels within the organization.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
a) Does the Management Review Process address all the required Inputs?	There is no quality management system exists yet. However management does have the ability to review all inputs and address those as they see fit.	The new TQM system will address all required inputs.
Resource Management**		
a) Is there evidence to show that resources are being provided as needed to develop, maintain and improve the QMS?	Management has provided sufficient resources to complete the required tasks. Resources available are of differing models and version. Whilst they are all able to communicate, it does add an unnecessary level of complexity, particularly those with less experience.	All resources necessary to complete a project using the TQM system are already available.
b) Are resources sufficient to meet customer requirements?	Management has provided sufficient resources to meet the	Whilst existing infrastructure and resources are

* Review your management review records for conformance. The requirements for management review input could be presented in an agenda or written in a document. Verify the input requirements are discussed and recorded in your management review record. Review the management review record for compliance to the requirements. If there is a document defining the management review process then this will need to be assessed for conformance. Also management is required to identify customer needs. If new customer needs are identified does management review identify the improvements made to meet these new customer needs?

** Verify that resources are available for the QMS. Assess resources for addressing customer satisfaction, implementing and improving the QMS processes. Are resources available in a timely manner? Resources can be people, information, supplies, equipment, facility, work environment, or financial resources.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	client's requirements. Labour resources are commonly stretched to levels that cause angst with clients.	available to complete projects using a TQM system, significant updates of a large proportion of resources will be necessary in the short to mid time frame.
Human Resources		
General*		
Evaluate the competence of personnel. Is it meeting the requirements of the standard?	Personnel's training does not always meet standards. Little time is not allocated for this	Work shall be issued according to the competency and ability of staff
Competence, Awareness and Training**		
a) How is the necessary competence of personnel required?	Staff competence is paramount in achieved customer requirements. Whilst technology assists, the job is essentially a labour intensive one. There is no facade for incompetence.	To ensure that all aspects of the work and TQM system are achieved, staff shall be selected based on their ability to fulfil such requirements.
b) Has the required training	There is little in house	A greater effort shall

* Verify the training records of personnel, especially as related to sections 4.0, 5.0, 6.0, 7.0, & 8.0 of the standard. If you have a training document, assess the document for compliance to the standard.

** If there is a training document, verify conformance to the requirements below. If there is no document, determine how personnel know their activities. The ISO 9001:2000 standard places greater emphasis on competency. Assess how your organization evaluates the effectiveness of training and how personnel know the importance of their activities. This clause applies to all personnel at all levels.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
been provided?	training. Most is learned by experience. Formal training for the surveying discipline is achieved at external institutions.	be made to continually update staff abilities by ongoing training through courses and workshops.
c) Has training been effective?	External training has generally been effective. Although some personnel ineffectiveness is not training related but attitude and ability.	This can only be answered after the first review of the new TQM system.
d) Are personnel aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives?	Yes. All staff are aware of their position and importance in achieving quality objective	Nothing more required
e) Review records	Staff records currently do not measure quality and training.	Timetable of regular review of staff performance to be implemented in TQM system.
Work Environment*		
What work environment is needed to meet product or service requirements?	The work environment is both internal and external. Fine weather is necessary to complete	Office space has reached maximum capacity. For further growth and

* Examples to look at for compliance would be work methods, safety, ergonomics, and temperature and humidity controls. Elements that may also be included in work environment are information, suppliers and partnerships, natural and financial resources.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	most survey work. Electronic equipment is unsuitable in poor weather. The calculation and drafting component of work is internal. This necessitates a pleasant office space with adequate lighting, air, and desk space with bathroom facilities.	development, additional office space is required.
Has this work environment been provided?	Yes, thus far. Although the field component is subject to weather conditions and beyond the control of management.	See above
Does product and service meet requirements when produced or delivered using this environment?	Yes, although time delays are the biggest service breech.	Delays due to weather cannot be avoided, however better planning of resources could result in more efficient office time.

Product Realisation

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Planning or Product Realisation*		
How is planning initiated? Where are quality objectives and requirements of the product documented?	Planning for job allocation is generally done the day before a job. Any longer term planning is very rare. Product requirement - Confirmation of Services document outlines what has been requested by the client and confirmed by management. Quality objectives are only partly outlined in this.	Planning should be done for the short, medium and long term, to allow most suitable equipment and staff to be allocated to a job. When relevant, Confirmation of Services document should reference standards being adhered to.
a) How does planning determine resources for the process?	Allocation of staff, vehicles and equipment are allocated at the end of each day for the following day.	A longer-term perspective and allocation of resources should be implemented. This will ensure that jobs in excess of one day can smoothly utilise existing resources without detriment to other jobs.

* This section may be addressed in a documented procedure or in the quality manual. Does your organisation understand the processes needed to meet product requirements? The planning activity for the processes related to product realisation must address the requirements in section 4.1.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
b) Does planning address validation requirements? Where are the monitoring, inspection, and test criteria for the product documented?	Planning generally does not allow sufficient time for numerous drafts and checks to be carried out. No formal documentation exists for monitoring, inspection or testing.	Proposed TQM system must provide a checklist to ensure that all work and standards have been achieved, and sufficient time frame allocated for each process.
c) Does planning identify what records are required for the process?	Existing staff are currently aware of what records are required, however there is no documented system that a new staff member could follow.	Form/booklet outlining checklist of record requirements for different types of jobs.
d) What is the output of your planning process?	A field party that can attend a job and complete to required standards without incurring technical or resource difficulties.	Longer term planning, and a more reactive system that can accommodate changes as they occur (eg due to weather)
Customer-Related Processes		
Determination of Requirements Related to the Product*		
a) How are customer requirements determined?	Initial discussion with client by phone/meeting; Confirmation of Services document created and	Accurate time frame required by customer.

* If customer requirements are not understood there is the possibility of not meeting the customer needs. A review of customer complaints, surveys, reports will denote any problems. Also look at any contract, logs, or orders to see if any amendments have been made. If so, is the reason for the amendment documented?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	signed by both parties outlining the services to be provided.	
b) How do you determine if there are requirements that apply in addition to what the customer has specified?	Experience/industry knowledge as to similar jobs and requirements.	Documentation for legislation is already in place and not required in local TQM system.
c) How are statutory and regulatory requirements identified?	External training provides this knowledge. Attendance of industry seminars helps maintain knowledge of requirements.	Form/booklet outlining requirements should be included in proposed TQM system.
d) Are there additional requirements that your organisation identifies?	Experience is crucial in this area. The know-how of a surveyor will often acquire additional data that the client had not requested or was aware was necessary.	There is no substitute for experience. The current process of the surveyor using initiative is a positive aspect. Although budget constraints through fixed quotes may restrict just how much additional data the surveyor may forward.
Review of Requirements Related to the Product*		

* When looking at the documents (records, procedure, work instructions) consider required delivery dates, applicable standards, and any organisational requirements. Is the same process being followed for verbal orders?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
a) How does your organisation review requirements?	A pre job analysis and description are made with senior management and the surveyor that will undertake the work.	The pre job analysis is often missed, cut short, interrupted, or even overlooked due to time constraints of senior management.
b) What information is reviewed?	Management will discuss to the surveyor what information is required to be located on site, appropriate contact people and other special points of interest.	Information known by management is not formally recorded, hence may not always be passed onto the surveyor undertaking the work.
c) What records are maintained?	Often job descriptions are taken on scrap paper by management. Also, secretarial staffs are not as experienced in formal surveys as the rest of the staff and may omit technical issues due to a lack of understanding.	Management have been entrenched in a similar process of accepting jobs over a 20+ year period. They have become reluctant to change but embrace a more thorough method that can be more easily followed by other staff. Technical deficiencies of secretarial staff are more difficult to overcome. Referral to a surveyor may be the best option.
d) How are customer requirements confirmed on	A simplistic description of customers needs are	Customer requirements will be added to a file

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
a verbal order?	manually written upon informal documents and added to the job file.	that is created with every new job. If the customer requires any special services additional to the standard items, they can then be added to the checklist of requirements at this early stage.
e) How is your ability to meet order requirements confirmed?	The Confirmation of Services document has proved invaluable in verifying the specifics of each job. Shortfalls in job completeness are often due to poor verbal communication and office structure.	The challenge in meeting customer requirements is to maintain existing standards whilst improving efficiency and time schedules. The use of time lines shall be included within the new system.
f) How are changes to orders handled?	When correspondence is received from a client, the documents are generally added to the job file. Occasionally, the amendment may be verbal and no record is kept. Messages are passed within the survey firm by	Amendments received shall be documented and added within the job booklet. Updates to the job checklist will also be made.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	word of mouth.	
Customer Communication*		
a) How do you communicate product information to customers?	The only notable form of direct product communication with customers is by verbal means. The company currently has no tangible advertising, web site and mail outs. Sole advertising comes from word of mouth.	The creation of a web site will allow a public insight to the services and products available. A generic email can also be sent to the client outlining the work to be completed together with examples of such work. This will assist new customers to understand the type of product and services they are receiving.
b) What process is used for customer enquiries, contracts or order handling, including amendments?	There is few formalised process for customer enquiries, contracts or job ordering. The Confirmation of Services document is critical. Larger firms, particularly those involved in the construction business, will forward formal written contracts. Well-	The job file shall be flexible and amendable to include any obscure are delayed requests from clients. The job file should reflect any correspondence.

* If there is no document available regarding customer communication then the questions below should be asked to determine compliance to this clause. Customer requirements are important and usually involve different levels in the organization. Ask different levels to see if the answers are consistent and do they agree with the organizations policy and objectives.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	established firms, particularly law firms will forward written instructions for the content and term of work requested.	
c) What mechanism is in place to collect customer feedback, including complaints?	There is no formal mechanism to collect customer feedback at present. Clients are welcome to contact the company to discuss any matter regarding survey work. This is most commonly done by telephone.	An appendage will be made when the client is sent the final plan and account. This appendage will be a customer feedback form. This will allow clients to discuss any matter associated with the job.
Design and Development*		
Design and Development Planning**		
How does your organisation plan and control the design and development of product?	The company is not involved in the design and development of any product. Work undertaken is usually of a process driven nature that frequently requires	The new system will see no change to the present method.

* If your organization does not have a design and development function, this section will not be applicable and an exclusion should be noted.

** This section for planning is done to the level necessary to achieve the design/development objectives. Planning could be in the form of a flow chart (GANTT chart, PERT chart) to give the information. A review of projects, and records will determine how this is being done and if consistent with the clause

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	initiative to ensure the process can be completed. Whenever work of an irregular nature arises and technical difficulties are evident, a selection of senior staff will discuss possible actions to achieve solutions.	
Does the planning address the stages outlined in the standard?	Not applicable.	Not applicable.
Does the plan identify interfaces of different groups that will be involved in the project**?**	Not applicable.	Not applicable.
How is the plan up dated as the project progresses?	Not applicable.	Not applicable.
6.1.1.1.1 Design and Development Inputs*		
Are design inputs identified and documented?	Not applicable.	Not applicable.
Do inputs include the items required by the standard?	Not applicable.	Not applicable.
Is there a record of the inputs being reviewed?	Not applicable.	Not applicable.

* Although the standard does not specifically require it, consider preparing a document to address the input requirements in order to avoid any misunderstandings. Review any documents or paperwork that address this clause.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
How is it determined if the inputs are complete and appropriate?	Not applicable.	Not applicable.
Design and Development Outputs*		
Where are outputs documented? How can they be compared to the inputs?	Not applicable.	Not applicable.
What evidence is there that outputs are approved before release?	Not applicable.	Not applicable.
Do the outputs meet the requirements of the standard?	Not applicable.	Not applicable.
Design And Development Review*		
How do project managers identify the stages of design where design review is required?	Not applicable.	Not applicable.
What is covered in design review? Does this meet the standard requirements?	Not applicable.	Not applicable.
Who is included in review? How is it determined if this is the representative of the	Not applicable.	Not applicable.

* Verify the outputs of the design/development satisfy the design/development inputs. Assess the documents that apply to this clause for compliance. This clause does not require a quality record, but to demonstrate compliance some form of quality records should exist.

* Verify the design review record to confirm compliance. Confirm the reviews are taking place, done according to the plan, appropriate attendance at the reviews, and follow up action has taken place. The standard does not require the number of design reviews that should be conducted. The review is intended to confirm internal and external needs have been taken into consideration or addressed.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
functions concerned?		
What records are maintained?	Not applicable.	Not applicable.
Design and Development Verification*		
How is verification planned?	Not applicable.	Not applicable.
What does verification include?	Not applicable.	Not applicable.
Is it meeting the requirements of the standard?	Not applicable.	Not applicable.
Are the results of verification and any necessary actions being recorded?	Not applicable.	Not applicable.
Design and Development Validation*		
How is validation planned? What is included in validation?	Not applicable.	Not applicable.
Is it meeting the requirements of the standard?	Not applicable.	Not applicable.
Is validation of the product completed prior to delivery or	Not applicable.	Not applicable.

* Verification considers the product after it is finished. Verification makes the determination that the product meets the stated requirements. This can be done by review of test data, calculations, or additional testing. For verification the capability of the product must meet the specified requirements and there must be objective evidence available to demonstrate it. Assess the records for compliance.

* Validation assures that the design/development output conforms to defined user needs and is capable of meeting the requirements for the intended use. Validation is usually performed after verification. Verify that the requirements of this clause are met by reviewing the validation records.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
implementation?		
Are results of validation and any necessary actions being recorded?	Not applicable.	Not applicable.
Control of Design and Development Changes[**] ♠		
How are changes to the design recorded and implemented?	Not applicable.	Old versions of the job file shall be archived to ensure they are not used in future.
Are the changes verified, validated and approved prior to implementation?	Government and industry regulatory bodies will issue statutory changes.	The management committee shall assess and approve all changes to the job file and system. Government and industry regulatory bodies will issue statutory changes. The management committee will incorporate these changes.
Are the changes evaluated for the effect on constituent parts and delivered products?	Not at present. Visual inspection of final product, on a casual basis	The management committee will assess the impact on

[**] Some of changes that may take place are omissions, errors or inconsistencies in the design or requirements, changes in statutory or regulatory requirements, or issues raised during reviews. It is important that changes be documented and actions taken to prevent any possible effect on the product. Assess the design/development records for compliance and verify that changes have been communicated to all parties.

♠ The following section shall revise the present and proposed systems

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	may occur.	constituent parts and final product
Are the results of the review of changes and any necessary actions recorded?	Rarely. Only documented statutory changes appear to be regularly updated.	Yes. They shall be noted in minutes of the committees meetings and any necessary changes made to the appropriate aspect of work.
Purchasing		
Purchasing process*		
Is there a process in place to ensure that purchased product conforms to requirements?	The principle assessment of purchases is from the feedback given by staff. Deficiencies are quickly highlighted as the quality or volume of work is immediately impacted.	Every significant or sizable purchase will have a list associated with it. This list shall include all of the requirements that need to be fulfilled by the new product.
Is there a method of controlling the suppliers?	A comparison of suppliers' products and prices are made.	No change necessary.
How are suppliers selected?	Very few distributors, particularly for specialised products, supply the surveying profession, hence variety	Negotiation with suppliers in the past has proven to be limited in success. Updating equipment in

* This clause asks your organisation to base the type and extent of control of suppliers on the effect of the purchased material on both the product realization processes and products produced. Assess the records of supplier evaluations and follow up actions.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	and price bargaining is limited.	phases, rather than individually may see better results financially.
What criteria are there for evaluating suppliers?	The proven ability to supply necessary equipment. Purchases from new operators are very rare, particularly larger, significant purchasers.	The need for integration with all equipment and software is crucial. Devices that do not interface will not produce optimum performance. Price will also remain paramount. No company can pay for products with money they do not have or can afford to repay.
Are evaluation and any necessary actions being recorded?	Most purchases, particularly large ones are all recorded on hard copy files. A new file is created when major purchases are being considered.	The current system has proven its value. Digital copies of the current system can be made but may not provide any benefit.
Purchasing Information		
What does purchasing information include?	Most suppliers will forward copies of brochures and other promotional material. Significant purchases will also see manufacturers	Purchasing information is not produced in house, however requirements for future purchases shall be. The management

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	provide onsite demonstrations of their products.	committee shall draft such a list.
Does this meet the standard requirements?	No attempt has been made to meet any standards in terms of purchases.	The best qualified to make assessment on the requirements for the company, is the company itself, hence no extraneous efforts shall be made to meet any standards in this regard.
How does your purchasing personnel confirm that the purchase requirements are complete and correct before the order is placed?	The directors have the responsibility and selection of virtually all purchases.	The management committee shall become involved in the process of significant purchases. Both directors no longer play critical roles in fieldwork but still possess valuable experience and knowledge. The management committee will provide useful critique however the ultimate business decisions still made by

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
		the directors.
Verification of Purchased Product*		
Is inspection used to verify that purchased product meets requirements? What other methods are used in addition to inspection?	The key test of effectiveness of any purchase is with practical use. Surveying equipment and software is generally created for the local market, so its effectiveness and interaction with the surrounding systems need to be practically reviewed to assess its success.	The list of requirements (checklist) drafted prior to the purchase need to be addressed when reviewing any acquisition. Practical assessment in the old manner will still remain a critical assessment.
Do you or your customer intend to verify purchased product at the suppliers' location? If so, where are the arrangements stated? Are they included in the purchasing documents?	Smaller purchases are made online, without the need to visit suppliers' showrooms. Major purchases will see manufacturers make site visits to prospective customers.	No change to the existing system is necessary.
Production and Service Provision		
Control of Production and Service Provision*		

* Assess how the organisation has defined the inspection process for compliance and verify evidence of product acceptance. Verification of purchased product performed at the supplier's premises is seldom used. If being done assess the process for compliance.

* The requirements noted below cover process control, inspection and testing, inspection and test status, and servicing and requirements for the release, delivery, and post-delivery of the product.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
How are production and service provision controlled?	The surveyor who has been allocated the job has control over its progress until the final product is issued. At this stage, management will asses the quality of the plan and make necessary changes.	The job booklet will outline what requirements need to be met as a job progresses. This should eliminate or reduce levels of incompleteness. As management is ultimately responsible for all work their assessment should always remain a part of the checking progress.
Where are product characteristics documented?	The confirmation of services document (and if provided- a quote) will summarise each jobs characteristics.	An updated version of the Confirmation of Services document shall remain the key mechanism for listing job specifics.
When are work instructions required? Are they available?	There is no template or flow chart for work instruction at present. Verbal instructions and advice are usually freely available from senior staff.	Each job booklet will contain a checklist of work to be performed. Staff can flag them after each task has been completed. The booklet will be issued with every job.
How do personnel know what equipment to use for a process?	Experience has taught the surveyor responsible for each job what specific	The job booklet will list all equipment that is available to the

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	equipment is required to complete the task. Commonly management will explain the specific details required, if a job is of an irregular nature. Office and CAD staff uses the same resources every day.	surveyor. Initiative is commonly required by the surveyor to complete each task, as not all jobs are identical. The equipment checklist can also be used for inventory.
Does documentation identify what monitoring and measuring devices should be used, and when?	There is no documented system for monitoring or measuring services.	Each task within the job booklet will need to be signed and dated when completed. A final perusal of product by management will identify any items inadequately or not completed. These items will be noted and filed with the job folder. The management committee, using data obtained as above, will undertake regular reviews to refine the TQM process.
Where are release, delivery and post delivery activities and requirements defined?	Details of delivery activities are noted on loose paper and stored with each job file. Often these become obsolete as	When the job instruction is first received, details of delivery methods shall be logged. This data

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	time deadlines are exceeded and delivery methods are altered.	will be stored on the company computer network and accessed at the completion of the job. Data is stored here because details can be easily amended if the client requests or if the job booklet is outside of the office.
Validation of Processes for Production and Service Provision*		
Does your organisation have any processes for production and service where the output cannot be verified by monitoring or measurement? Do you validate these processes?	Due to the irregular nature of work, the science of surveying is a process of applying skills using initiative. Most jobs will involve a degree of irregularity that cannot always be documented.	A generic outline of job components will be adopted within the checklist. This will prevent the job booklet becoming cumbersome and unworkable. Regulatory bodies commonly document technical aspects, not covered within the job booklet.
How is validation performed?	No validation process currently exists.	No attempt shall be made to include validation outside the limits of standard certification. This may

* If special processes are part of your organisation's scope the above requirements will be assessed for compliance. Define conditions and the criteria for revalidation. If you have no special processes, identify that in the quality manual.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
		be amended when the management committee make the regular reviews.
Does it address the requirements of the standard?	No validation process currently exists hence this does not need to be addressed.	All components of the TQM will attempt to address standards.ISO 9001 will provide the basis or guidelines for the TQM system.
Identification and Traceability		
How is product identified?	The final product is a hard copy drawing drafted onto paper or film. Supplementary copies are produced onto CD in a dwg, dxf or pdf formats.	There will be no change to the current output except where the client requests it.
How is measuring and monitoring status identified?	Currently there are no such mechanisms.	When each component of work is completed, it is signed and dated by the appropriate staff member. This is done in both the job booklet and on the company's computer network. At any stage, accessing the networked based copy of the job booklet can identify the status

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
		of a job.
Does your organisation control and record the unique identification of the product, where traceability is required?	All plans produced are labelled with an individual identifying job number. Unauthorised reproduction of work by third parties is a common problem.	The plan numbering will remain the same, however additional labelling of plans with logos and copyright notices will be added. A review of digital output shall attempt to address unauthorised reproduction.
Customer Property*		
How does your organisation maintain the customer property while it is under your control?	There should be no occasion where staff is required to use the customer's resources to complete a job. The company provides all equipment necessary to complete a job. Care is taken to avoid damage or disruption to client's property and belongings.	No changes to current methods are required.
How do you identify and safeguard customer property? How do you determine if it is suitable for use?	Occupational health and safety guidelines and a safe work method statement provide the basis for a secure working	No changes to current methods are required.

* Property provided by the customer can include intellectual property, as well as tooling, information, software, containers, or materials. Remember to include all these items in the review of customer property.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
	environment. These guidelines should provide sufficient safeguards over client's property.	
If any customer property is damaged, lost, or unsuitable for use is it reported to the customer and recorded?	In the unlikely event of damage, consultation with clients is undertaken to resolve compensation	The same process shall remain, however any documentation obtained shall be archived with the file to assist if legal proceedings began.
Preservation of Product		
How do you make sure that product quality is maintained during processing and delivery?	At all stages of the job, data is continually saved. If data becomes lost or corrupted, earlier less developed data can be reinstated and the job recovered.	No change is necessary to survey data, however a new catalogue and data files will be used for office documents and search purchased online.
Does this process address the requirements of the standard?	No attempt has been made to address the standard.	Yes. Data storage will be on a uniform, freely accessible platform.
Control of Monitoring and Measuring Devices*		
Has your organisation identified both the measurements to be made, and the measuring and monitoring devices needed in order to	Both the surveyor responsible and management peruse the final plan in an attempt to conform to client	Time loges will be present in both the job booklet and company's computer network in order to measure the

* . Review procedures, work instructions and records for compliance.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
assure your product meets requirements?	requirements.	period taken to complete all aspects of work. Checklists are to ensure all work is completed and requirements met.
Has your organisation established a mechanism to ensure monitoring and measuring is performed consistent with requirements?	No system at present.	The management committee will periodically review the performance of the quality management system using the indicators mentioned above. Customer and staff feedback will also be important.
Is equipment handled and maintained according to the standard requirements?	Not all equipment is handled and maintained in an appropriate manor. Calibration and servicing of instruments is too infrequent and often does not conform to standards.	Regular servicing and calibration of equipment not only assists in conforming to standards, but also allows equipment to perform at the optimum potential.
What action is taken if equipment is found to be out of calibration?	The manufacturer is called and the item is services on site or at the manufacturers facility.	No change is necessary to the current process. In-house servicing of smaller items can be achieved with training of staff.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Does your organisation take appropriate action on the equipment and any product affected above?	Repairs and services are always undertaken, though commonly after an extended period of delay. Time taken by manufacturers is also often lengthy.	Speed is critical. The longer equipment is unavailable, the longer the company is without the resources to operate ate optimum levels.
What records are maintained?	All service documents are stored in archive	No change to the current system is required.
How is software used for measuring and monitoring verified prior to use and reconfirmed as necessary?	The manufacturer licenses all software. Annual subscriptions are paid to the manufacturer to ensure support and maintenance. The computer network maintained by the CAD division and a consultant provides technical advice.	There will be no change to the major software use in the office, but file storage will be better organised using generic office software.

Measurement, Analysis and Improvement

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
General*		
a) How is product conformance demonstrated? (Is there a measuring and monitoring process in place?)	There are no formal performance measures currently in use within the office.	The use of time loges and checklists will provide documented data as to the performance of the system. Customer and staff feed back will also be important.
b) How is the conformity of the QMS ensured? (Is there a measuring and monitoring process in place?)	There is no QMS currently in place.	It will be a task of the management committee to ensure that the QMS is effective. Their role will be to asses the data and act accordingly.
c) Does measuring and monitoring allow continual improvement of the effectiveness of the QMS?	There is no QMS currently in place.	Yes. With analysis, each assessment should provide fewer changes to the system than the previous review. When no changes to the QMS are required, the QMS can be regarded as operating well.

* Verify that your organisation is monitoring, measuring, and improving the processes. How this is being done is defined by your organisation. This may be written in procedures, although there is no requirement for this clause to have a procedure. Assess if your organisation has determined the need for, and use of statistics.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Does the process include identification of methods, including statistical techniques for the measuring and monitoring?	There is no QMS currently in place.	The sample size of data obtained would probably be insufficient to use statistical analysis methods for review by the management committee. Thorough discussion between the group will be the mechanism for change.
Monitoring and Measurement		
Customer Satisfaction*		
What methods does your organisation use to monitor information on customer perception regarding fulfilling customer requirements?	Virtually all customer perceptions are obtained through verbal feedback. Clients will often express their thoughts to management, particularly when under financial and time constraints. Regular clients tend to provide more rational feedback.	Current methods shall be maintained, however an additional form will be made available to the client. This shall be attached to the final plan and account when forwarded to the customer. All responses shall be collated and assessed when the management committee undertake their review.

* This clause does not define how your organisation is to monitor information on customer perceptions. For compliance to this clause, verify how your organisation monitors the customer information, follow through on the methods being used. Are the methods being used consistent with the quality policy and quality objectives?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Internal Audits[**]		
Is an internal audit system in place?	Not currently	External auditors will be employed to provide an audit of the system on an annual basis. The management committee will however undertake more regular reviews.
Are they being performed on time? Are they effective? (Do they identify good improvements and eliminate non-conformances?)	Currently no audits are performed.	The first audit is not due until 12 months after implementation.
How is the audit schedule prepared? Is it taking into account the conditions listed in the standard?	Currently no audits are performed.	The audit checklist will take into account all of the aims and goals of the QMS in addition to the components of the job booklet. The audit is not attempting to be registered with the standard, but compliant.

[**] This clause is similar to internal audits defined in the 1994. A documented procedure is required for this clause. Assess the internal audit procedure for compliance to the requirements below. Verify that the auditors have determined that the QMS has been effectively implemented. It is management's responsibility to make sure actions are taken in a timely manner.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
What is included in the audit plan?	Currently no audits are performed.	An audit will randomly select any form of job, not just detail surveys. This audit will review each aspect within the job booklet to confirm if each component has been completed and within standard. Time and budgetary constraints are also appraised.
What measures are in place to ensure the audits and auditors are objective and impartial in the audit process?	Currently no audits are performed.	To ensure impartiality and objectiveness, external auditors are employed.
Is there a documented procedure and does that procedure define the responsibilities and requirements for planning and conducting audits, including audit reports and maintaining records?	Currently no audits are performed.	Not applicable as external auditors are to be employed.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
How do the management responsible for the area audited take timely action to eliminate nonconformities and their causes?	Currently no audits are performed.	Depending on the degree of non-conformity, management will attempt to replace under performing aspects at the earliest opportunity. This will prevent under performing aspects to being used in current procedures.
Do follow up activities include verification of the corrective action and the reporting of those results?	Currently no audits are performed.	Yes. This will be an aspect of the iteration method of reviewing the YQM system.
Monitoring and Measurement of Processes*		
How are QMS processes monitored? Where are appropriate measurements identified?	Currently no QMS is in place.	The appropriate measurements for the QMS are mostly within the job booklet. This booklet is also a 'how to' guide for employees.

* Verify that your organisation has defined and is performing the measuring and monitoring activities needed to confirm product conformity. Looking at the process data will provide evidence if process parameters or specifications have been identified. If not, was corrective action taken? Compliance would also include observing the measurement and monitoring processes.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Are results evaluated to determine if the QMS processes are achieving the planned results?	Currently no QMS is in place.	The management committee will review the results at regular intervals. The QMS will be amended as necessary.
When the results are not achieved, are corrective actions taken to confirm conformity of the product?	Currently no QMS is in place.	Subsequent reviews will best determine if previous changes have been successful.
Monitoring and Measurement of Product*		
Is product measured and monitored to verify that product requirements are met?	Management review all products before being issued to clients.	The current system will remain but will be more streamlined and accurate due to the implementation of a checklist as part of the proposed QMS.
What records are maintained? Do these show conformance with acceptance criteria?	Not currently	The checklist will act as a record.
Who is authorised to release product? Is the appropriate person to release the product?	Management and senior staff.	The current system will remain.

* This section includes all measurement activities from receiving inspection to product delivery. Assess work instructions, procedures, and records to verify compliance. Verify that the records provide evidence that product criteria are met. Do the records also identify the person responsible for release?

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Is there evidence that product release and service delivery does not proceed until all activities have been completed (unless otherwise approved by a relevant authority or customer)?	Draft or preliminary plans are often released to clients before final certification has been made.	The new system aims to reduce wait times for final product, hence eliminating the need for partial and draft plans.
Control of Nonconforming Product*		
How has your organisation ensured that product which does not conform to requirements is identified and controlled to prevent unintended use?	No plan is intentionally issued containing erroneous data. Alas there is little control over third parties using data for unintended purposes.	Plan will be issued to non-regular clients in an electronic format as read only (un-editable) form.
Is there a procedure that identifies responsibilities for taking action?	Not currently	As QMS is rolled out through all aspects of the company, responsibility will be delegated to various divisions.
Does the procedure identify the ways that nonconforming product can be handled?	Any work not meeting the customer's requirements is amended.	A flow chart of the business will identify where rectification will occur.

* A documented procedure is required for this clause. Verify the correction of nonconforming product and the re-verification by review of the records.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
What records are maintained?	Not currently.	A log will be created to record any under performing aspects of the job. This will assist auditing.
Is nonconforming product re-verified after correction to demonstrate conformity to requirements?	Yes. This part of the current quality control.	No change will be necessary.
What action does your organisation take when nonconformity is detected after delivery or use has started?	A client is contacted immediately when it becomes apparent that erroneous work has been issued. Detection and notification of errors early may minimise losses during litigation.	No change will be necessary.
Analysis of Data*		
How is data from measuring and monitoring used to demonstrate suitability and effectiveness of the QMS? How is it used to continually improve the QMS?	There is no QMS currently in place.	Audits and reviews by the management committee use the data from monitoring. These are crucial in formulating changes to the QMS.

* Assess the methods used to collect and analyse the data required below. Confirm the analysis of the data is used to demonstrate the suitability and effectiveness of the QMS and the system continues to improve.

REQUIREMENTS	CURRENTLY IN PLACE	ITEMS NEEDED
Does analysis provide information on the items required by the standard?	There is no QMS currently in place.	Not applicable.
Improvement		
Continual Improvement**		
How does your organisation, continually improve the effectiveness of the QMS?	Not applicable	As yet, not applicable
Corrective Action♠		
How are non-conformances identified and corrected?	Visual appraisal by management	As before, and through noting omissions on the new checklist
Is corrective action appropriate to the effects of the nonconformities found?	Yes, as final product cannot be issued until it is accurate.	Yes, as final product cannot be issued until it is accurate.
Preventive Action*		
Has your organisation established a procedure to eliminate the cause of potential nonconformities?	No – this dissertation is to be the foundation for such	QMS to be rolled out throughout company

** This clause contains many of the requirements already specified in previous clauses. Verify that the requirements are being used to plan for continual improvement.

♠ A documented procedure is required for this clause. Review your records to confirm compliance.

* A documented procedure is required by this clause. Review records to confirm compliance.

Appendix C - Job Booklet

The following pages form a booklet, which contains all of the information or resources required to complete a detail or topographical survey. Please ensure that all information is completed fully.

SURVEY COMPANY

JOB BOOKLET

DETAIL AND TOPOGRAPHICAL SURVEYS

JOB REFERENCE:…….

This document is completed by reception when a client contacts requesting a new job.

Client Details

Job reference number:…….

Job Address:…….

Job type/description:……

Date:…….

Client:

Company:

Contact Person:

Postal address:

Telephone W:

Telephone H:

Telephone M:

Email:

Job Specifics:

List any details that may be of benefit

This task was performed by…… Dated / /

The following document is forwarded to the client. Upon receipt, they are to sign and return it to the company. The job will not commence until the company has received this form.

Confirmation of Services Document

Reference No:

Address:

Attention:

Re:
Property…….

To: Undertake cadastral search at the Land Titles Office, Survey Control Branch and Sydney Water, survey measurements and calculations on site to establish boundaries, determine Australian Height Datum, detail survey on site to locate relevant heights and physical features, services and drainage pits. Office reductions and calculations, plan preparation, issue preliminary and final copies of the same to the designer and architect and clients.

If the client had made any additional requests, it will be included in the above wording.

The search and location of other public utilities is available upon request.

Search Fees and disbursements	$
Total field time_____ hours (Surveyor and assistant)	$
Total office time_____hours (Surveyor/ CAD Operator)	$
GST	$
TOTAL	$

Upon completion of all work, final plans will be sent to:

……

Final plans will be in hard copy and a disk containing a dxf, dwg and pdf formats.

The price quoted is valid for 90 days. Payment is strictly 30 days.

Yours Sincerely

……..

Manager

The Company Surveyors

In order to commence work, the person/s responsible for payment of this account need to sign and date this document below. If contact details differ from those listed above, then please provide them with this form.

Print name:……

Signature:……..

Date:……..

This form was:

Faxed □,

Emailed □

Posted □

Presented in person □

And sent to the following address:……..

This task was performed by…… Dated / /

Search Form

Complete the following form to assist searching for this job:

- Identify the lot and deposited plan number. If unknown use:

  http://iplan.australis.net.au/landview.php

  Lot…… Section…… Deposited/Strata Plan……

- Order a copy of an electronic charting map through the searcher's web site:

  http://www.legalstream.com.au/

- Once a copy of the charting map has been obtained and perused- Does the company have copies of adjacent deposited plans in archive?

  Yes □. Obtain copies of these plans from archive

  No □. Use the supplementary notes on the charting map to obtain relevant deposited plan numbers and order these from:

  http://www.legalstream.com.au/

- Order a copy of the certificate of title. Does it contain an 88b instrument or other dealings? Order all of these from:

  http://www.legalstream.com.au/

- Has there been work completed previously within close proximity of the new job?

  Yes □. Remove these jobs from archive and attach the old file to the current file.

  No □. No action necessary.

This search was performed by…… Dated / /

Utility Search

Complete the following form to assist in obtaining a services search:

- Order a sewer and water mains sketch from:

  http://www.sydneywater.com.au.

- House service (helio) diagrams are also available from:

  http://www.sydneywater.com.au

- Has the client requested a full services search?

  Yes □. A full services search is available at: www.dialbeforeyoudig.com.au

  Make sufficient duplicates to allow the client to posses a copy.

  No □. No action required.

- Has the client, or job description required a service searcher (to mark these services on the ground)? If so, contact:

  http://www.locating.com.au/

- Is the property affected by railway or aquatic boundaries?

  No □. No action required.

  Yes □.

  Authority to enter railway property can be made by contacting:

  www.**rail**corp.info

- For assistance on technical matters and access, contact:

  http://www.shfa.nsw.gov.au/dyncontent.cfm

  Information covering maritime leases, ad medium filum aqua and other LPI related questions, refer to:

  http://www.lands.nsw.gov.au/land_titles/wal_dealing_forms

This search was performed by…… Dated / /

Height Search

Complete the following form to assist in obtaining a datum.

- Is the job required to be on Australian Height Datum?

  Yes □.

  Obtain a (free) sketch showing the location of Permanent Marks and State Survey Marks. Order the value of the closest mark that carries Australian Height Datum. This information can be purchased at:

  http://scims.lands.nsw.gov.au/scims.html

  Once this information has been obtained, store it on the computer's network at:

  j: data/survey/scimssearches

  No □. Note on the file that no AHD is required.

This search was performed by…… Dated / /

Stage 2: Fieldwork:

Complete the following form to assist in acquiring sufficient field data:

Identify the subject property	☐
Confirmation of the boundary fix	☐
Job No., date and surveyor identified	☐
North point shown	☐
Azimuth and Origin shown	☐
Distance between terminals proven	☐
Measurement of occupations of the site and adjoining occupations	☐
Street names displayed	☐
House numbers displayed	☐
Improvement descriptions and age	☐
Width of overhangs	☐
Comment on restrictions	☐
Roof ridges and valleys shown	☐
Adjoining property window locations and levels	☐
Adjoining property outdoor living areas	☐
Services located	☐
Benchmark placed	☐

This fieldwork was performed by…… Dated / /

Stage 3: Office Work:

Complete the following form to assist reductions and drafting.

Plan Checklist

Street names □

North point – MGA □

ISG □

True □

Magnetic □

Assumed □

Lot, section and deposited plan number □

Boundary bearings and dimensions □

Adjoining building descriptions □

Distance to cross street □

Adjoining lot numbers □

Easements and restrictions on the use of land □

Descriptions of improvements on the land □

Fencing type (and height if applicable) □

Title block complete □

Scale and scale bar plotted □

Lot area shown to four significant figures □

This plan was drafted by……..…… Dated / /

This plan was checked by…… Dated / /

Final Submission and debriefing

Complete the following form to assist fulfilling the requirements of submission

Produce six copies of the plan of survey □

A covering letter □

Report on the subject property. This will identify if any irregularities are □

present, if there is a need to investigate titles or other note worthy points.

An invoice or account □

This task was performed by…… Dated / /

At a set period of time, after the submission has been conveyed to the client or architect, a follow up enquiry will be made.

Consultation with the client will disclose if the service and product provided met the customer's requirements. It will also highlight if there is scope for improvement in the product or processes in addition to any other comment.

Notes from this telephone call will be made available to the management committee and used in their reviews of the system. These notes will also be valuable for the external auditors.

The final submission was compiled by……..…… Dated / /

This consultation/ debriefing was performed by…… Dated / /

Appendix D – Job Booklet Trial Report

This document is completed by reception when a client contacts requesting a new job.

Client Details

	At the relevant time was the step completed	**At review was the step completed *correctly***
Job reference number:…….	22/22 100%	22/22 100%
Job Address:……	22/22 100%	22/22 100%
Job type/description:……	22/22 100%	22/22 100%
Date:…….	22/22 100%	22/22 100%
Client:		
Company:	14/14 100%	14/14 100%
Contact Person:	22/22 100%	22/22 100%

	At the relevant time was the step completed	**At review was the step completed *correctly***
Postal address:	22/22 100%	22/22 100%
Telephone W:	20/20 100%	20/20 100%
Telephone H:	18/18 100%	18/18 100%
Telephone M:	18/18 100%	18/18 100%
Email:	22/22 100%	22/22 100%
Job Specifics:		
List any details that may be of benefit		
This task was performed by…… Dated / /	22/22 100%	22/22 100%

The following document is forwarded to the client. Upon receipt, they are to sign and return it to the company. The job will not commence until the company has received this form.

Confirmation of Services Document

	At the relevant time was the step completed	**At review was the step completed *correctly***
Reference No:	22/22 100%	22/22 100%
Address:	22/22 100%	22/22 100%
Attention:	22/22 100%	22/22 100%
Re: Property…….	22/22 100%	22/22 100%
To: Undertake cadastral search at the Land Titles Office, Survey Control Branch and Sydney Water, survey measurements and calculations on site to establish boundaries, determine Australian Height Datum, detail survey on site to locate relevant heights and physical features, services and drainage pits. Office reductions and calculations, plan preparation, issue preliminary and final copies of the same to the designer and architect and clients.	22/22 100%	22/22 100%

If the client had made any additional requests, it will be included in the above wording.

		At the relevant time was the step completed	At review was the step completed *correctly*
The search and location of other public utilities is available upon request.		22/22 100%	22/22 100%
Search Fees and disbursements	$	22/22 100%	22/22 100%
Total field time_____ hours (Surveyor and assistant)	$	22/22 100%	22/22 100%
Total office time_____hours (Surveyor/ CAD Operator)	$	22/22 100%	22/22 100%
GST	$	22/22 100%	22/22 100%
TOTAL	$	22/22 100%	22/22 100%
Upon completion of all work, final plans will be sent to:……		22/22 100%	22/22 100%
Final plans will be in hard copy and a disk containing a dxf, dwg and pdf formats.			
The price quoted is valid for 90 days. Payment is strictly 30 days		22/22 100%	22/22 100%
In order to commence work, the person/s responsible for payment of this account need to sign and date this document below. If contact details differ from those listed above, then please provide them with this form.		22/22 100%	22/22 100%

Print name:……Signature:…….. Date:……

	At the relevant time was the step completed	**At review was the step completed *correctly***
This form was:		
Faxed □,		
Emailed □	22/22 100%	22/22 100%
Posted □		
Presented in person □		
And sent to the following address:……..		
This task was performed by…… Dated / /	22/22 100%	22/22 100%

Search Form

Complete the following form to assist searching for this job:

	At the relevant time was the step completed	At review was the step completed *correctly*
➢ Identify the lot and deposited plan number. If unknown use: http://iplan.australis.net.au/landview.php Lot…… Section…… Deposited/Strata Plan……	22/22 100%	22/22 100%
➢ Order a copy of an electronic charting map through the searcher's web site: http://www.legalstream.com.au/	22/22 100%	22/22 100%
➢ Once a copy of the charting map has been obtained and perused- Does the company have copies of adjacent deposited plans in archive?		NB*
Yes □. Obtain copies of these plans from archive	6/22	
No □. Use the supplementary notes on the charting map to obtain relevant deposited plan numbers and order these from: http://www.legalstream.com.au/	16/22 TOTAL 100%	

NB *whilst checklist indicated step had been completed, comments made by field surveyors indicate 4 jobs had inadequate numbers of deposited plans. Errors cost an extra 2 hours field and 2 hours office time for each of these 4 jobs totalling $1960

	At the relevant time was the step completed		At review was the step completed *correctly*
➢ Order a copy of the certificate of title. Does it contain an 88b instrument or other dealings? Order all of the from: http://www.legalstream.com.au/	Yes		Yes
➢ Has there been work completed previously within close proximity of the new job?	TOTAL	100%	NB**
Yes □. Remove these jobs from archive and attach the old file to the current file.	11/22		
No □. No action necessary.	11/22		
➢ This search was performed by…… Dated / /	22/22	100%	

NB **Comments made by field surveyors indicate 2 of these jobs in which there were completed jobs nearby and those files had not been retrieved from archive → extra 2.5 hours field for a total of $375

Summary - 106/110=96% success rate ➔ ***4% error rate cost $2335!***

Utility Search

Complete the following form to assist in obtaining a services search:

	At the relevant time was the step completed	**At review was the step completed *correctly***
➢ Order a sewer and water mains sketch from http://www.sydneywater.com.au	22/22 100%	22/22 100%
➢ House service (helio) diagrams are also available from: http://www.sydneywater.com.au	N/A	N/A
➢ Has the client requested a full services search?		22/22 100%
Yes □. A full services search is available at: www.dialbeforeyoudig.com.au	2/22	
Make sufficient duplicates to allow the client to posses a copy.	TOTAL 100%	
No □. No action required.	20/22	
➢ Has the client, or job description required a service searcher (to mark these services on the ground)? If so, contact: http://www.locating.com.au/	N/A	N/A

	At the relevant time was the step completed	**At review was the step completed *correctly***
➢ Is the property affected by railway or aquatic boundaries?		22/22 100%
No □. No action required.	21/22	
Yes □.	1/22	
Authority to enter railway property can be made by contacting:	TOTAL 100%	
www.**rail**corp.info		
➢ For assistance on technical matters and access, contact:	N/A	N/A
http://www.shfa.nsw.gov.au/dyncontent.cfm		
Information covering maritime leases, ad medium filum aqua and other LPI related questions, refer to:http://www.lands.nsw.gov.au/land_titles/wal_dealing_forms	N/A	N/A
This search was performed by…… Dated / /	22/22 100%	22/22 100%

Height Search

Complete the following form to assist in obtaining a datum.

	At the relevant time was the step completed	**At review was the step completed *correctly***
➢ Is the job required to be on Australian Height Datum?	22/22 100%	14/22 64%
Yes □.		NB*
Obtain a (free) sketch showing the location of Permanent Marks and State Survey Marks. Order the value of the closest mark that carries Australian Height Datum. This information can be purchased at:		
http://scims.lands.nsw.gov.au/scims.html		
Once this information has been obtained, store it on the computer's network at:		
j: data/survey/scimssearches		
No □. Note on the file that no AHD is required.		
This search was performed by…… Dated / /	22/22 100%	22/22 100%

NB *8 jobs @ ½ hour office each = 4 hours → loss $380

Stage 2: Fieldwork:

Complete the following form to assist in acquiring sufficient field data:

		At the relevant time was the step completed	At review was the step completed *correctly*	
Identify the subject property	□	22/22 100%	22/22 100%	
Confirmation of the boundary fix	□	22/22 100%	20/22 91%	NB*
Job No., date and surveyor identified	□	22/22 100%	22/22 100%	
North point shown	□	22/22 100%	22/22 100%	
Azimuth and Origin shown	□	22/22 100%	15/22 68%	NB**
Distance between terminals proven	□	22/22 100%	20/22 91%	NB***
Measurement of occupations of the site and adjoining occupations	□	4/4 100%	4/4 100%	
Street names displayed	□	22/22 100%	22/22 100%	

NB * Error cost 3 hrs field and 2 hours office → $640

** Error cost $0.00

*** Error cost – incorporated in *

		At the relevant time was the step completed	At review was the step completed *correctly*
House numbers displayed	□	22/22 100%	22/22 100%
Improvement descriptions and age	□	22/22 100%	22/22 100%
Width of overhangs	□	22/22 100%	22/22 100%
Comment on restrictions	□	22/22 100%	22/22 100%
Details of any apparent easements not noted on title	□	22/22 100%	22/22 100%
Roof ridges and valleys shown	□	22/22 100%	22/22 100%
Adjoining property window locations and levels	□	22/22 100%	22/22 100%
Adjoining property outdoor living areas	□	22/22 100%	22/22 100%
Services located	□	22/22 100%	22/22 100%
Benchmark placed	□	22/22 100%	22/22 100%
This fieldwork was performed by…… Dated / /		22/22 100%	22/22 100%

Summary – 345/356 = 97% success rate ➔ ***3% error rate cost $640!***

Stage 3: Office Work:

Complete the following form to assist reductions and drafting.

		At the relevant time was the step completed	At review was the step completed *correctly*
Plan Checklist			
Street names	☐	22/22 100%	22/22 100%
North point – MGA	☐	22/22 100%	22/22 100%
ISG	☐		
True	☐		
Magnetic	☐		
Assumed	☐		
Lot, section and deposited plan number	☐	22/22 100%	22/22 100%
Boundary bearings and dimensions	☐	22/22 100%	22/22 100%
Adjoining building descriptions	☐	22/22 100%	22/22 100%

		At the relevant time was the step completed	**At review was the step completed *correctly***	
Distance to cross street	□	22/22 100%	22/22 100%	
Adjoining lot numbers	□	22/22 100%	22/22 100%	
Easements and restrictions on the use of land	□	22/22 100%	20/22 91%	NB *
Descriptions of improvements on the land	□	22/22 100%	19/22 86%	NB**
Fencing type (and height if applicable)	□	22/22 100%	22/22 100%	
Title block complete	□	22/22 100%	21/22 95%	NB***
Scale and scale bar plotted	□	22/22 100%	22/22 100%	
Lot area shown to four significant figures	□	22/22 100%	22/22 100%	
This plan was drafted by…….…… Dated / /		22/22 100%	22/22 100%	
This plan was checked by…… Dated / /		22/22 100%	22/22 100%	

NB * Error cost 1 hour office $95

** Error cost 1½ hours office $143

*** Error cost ½ hours office $48

Summary – 280/286=98% success rate ➔ ***2% error rate cost $286***

Final Submission and debriefing

Complete the following form to assist fulfilling the requirements of submission

		At the relevant time was the step completed	**At review was the step completed *correctly***
Produce six copies of the plan of survey	□	22/22 100%	22/22 100%
A covering letter	□	22/22 100%	22/22 100%
Report on the subject property. This will identify if any irregularities are present, if there is a need to investigate titles or other note worthy points.	□		
An invoice or account	□	22/22 100%	22/22 100%
This task was performed by…… Dated / /		22/22 100%	22/22 100%

	At the relevant time was the step completed	**At review was the step completed *correctly***
At a set period of time, after the submission has been conveyed to the client or architect, a follow up enquiry will be made.		NB *
Consultation with the client will disclose if the service and product provided met the customer's requirements. It will also highlight if there is scope for improvement in the product or processes in addition to any other comment.		
Notes from this telephone call will be made available to the management committee and used in their reviews of the system. These notes will also be valuable for the external auditors.		
The final submission was compiled by……..…… Dated / /	22/22 100%	22/22 100%
This consultation/ debriefing was performed by…… Dated / /	22/22 100%	22/22 100%

NB * Extra comments provided by customers:

- "*Job took too long to complete.*"
- Client did not know when surveyors would be onsite
- Neighbours adjoining subject site knew nothing of what was occurring and why surveyors had to enter their property

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