University of Southern Queensland

Faculty of Engineering and Surveying

ANALYSE ORIGINAL MARKS AND OCCUPATION USED TO REINSTATE BOUNDARIES FOR IDENTIFICATION SURVEYS

A Dissertation submitted by

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in fulfilment of the requirements of

Courses ENG4111 and 4112 Research Project

towards the degree of

Bachelor of Spatial Science: Surveying

Submitted: December, 2009

ABSTRACT

This project investigates the concerns that some surveying professionals have in the surveying profession about the approach some cadastral surveyors are taking to boundary reinstatement, in particular identification surveys.

The aim of this project is to analyse identification surveys in relation to the reinstated boundaries and how the surveyor has fixed the boundaries based on the original survey marks and occupation. From this a quality control form or guidelines will be designed.

The research approach involved gathering a number of identification surveys, completing a radial search over each parcel and acquire all required survey plans to compare and analyse each identification survey. From this it could then determine the strength and quality of each identification survey based on the hierarchy of evidence.

The initial results show that just over half of the plans that were compared and analysed were of an appropriate survey standard quality, the other half fell into the average and poor standards.

The guidelines produced are going to make the quality of identification surveys better and more consistent.

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ACKNOWLEDGEMENTS

I wish to thank the following people for their assistance with the completion of the project:

1 Mr Shane Simmons from the Faculty of Engineering and Surveying at the University of Southern Queensland for his assistance during the supervision of this project.

2 Members of the Department of Environment and Resource Management for their assistance with the project

3 My wife and family for the support and encouragement to complete the project.

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CHAPTER 1 INTRODUCTION

1.1 The Problem

There are a number of reasons for some surveyors not adopting the correct approach to reinstatement. A major factor is the current shortage of surveyors, (reported by the Labour Economics Office Queensland, Department of Education, Employment and Workplace Relations) which is placing added pressure to have jobs completed quickly. This can lead to surveys not being done as carefully as they should be, and surveys being carried out by less qualified staff that may not be receiving adequate leadership and training. Standards and guidelines for cadastral surveys in Queensland cover aspects such as accuracy, survey monuments, integration of surveys, methods of lodging the survey records and access to that information.

The legal principles of reinstatement are not as widely understood. This could be due to the lack of guidance, either at university or on the job, and may be a result of the supervising surveyor not understanding these principles, or not applying them in practice.

In this technology age, there is also a rising dependence on technology to deliver a solution. It is now rather easy to load the data applicable to a cadastral survey into a software package, and manufacture a mathematical consistent result. However, that result may not be defensible if tested in a court of law.

Some consider that the price of obtaining searches is a hurdle to boundaries being reinstated correctly. In a case where a fixed price has been quoted for a survey and a problem is recognised that requires copies of extra plans to determine, the surveyor

may be unwilling to bear the cost of the additional search, and as an alternative adopt a substandard reinstatement solution.

Priebbenow (2008) lists some of the causes for poor reinstatement which include the following:

- Surveyors obtaining insufficient searches, in some instances purchasing only the original and most recent plans;
- Surveyors not taking time to do a proper assessment of the approach adopted by previous surveyors;
- Surveyors not collecting sufficient evidence of the location of boundaries, and in particular ignoring the evidence provided by occupation;
- Surveyors not understanding or choosing not to apply the legal principles of boundary reinstatement;
- Surveyors not considering the interests of all parties;
- A propensity to apply a mathematical, rather than a legal, approach to boundary determination;
- Inadequate supervision of registered surveyors, graduates or associates undertaking cadastral surveys;
- In some instances, difficulty in obtaining historical information about surveys.

1.2 Project Aim

This project aims to analyse Identification Surveys in relation to the reinstated boundaries and how the surveyor has fixed the boundaries based on the original survey marks and occupation. It also looks at the identification surveys see if there is a decline in the standards and quality of identification surveys.

This project is also trying to define if there is a decline in the quality and standards of identification surveys, and how some surveyors are approaching identification surveys in the field.

The aim of this project is to develop a quality control form and guidelines that will increase the accuracy and quality of identification surveys. A reliable and easy to follow quality control form and guidelines will aid in future identification surveys and all boundary reinstatement surveys in becoming of a better quality and made more professional.

1.3 Project Background

Identification Surveys report on the position and extent of property boundaries. Usually this type of survey is undertaken as part of works for building design, new construction, building renovation, site retaining works, fencing or to verify a site for a property purchase. The record of this survey is an Identification Survey Plan. In Queensland, these plans have to be lodged in the office of the Registrar of Titles for survey information purposes so that subsequent surveyors working in the area know what was done on that identification survey.

The profession of Cadastral Surveying in Queensland has evolved from surveying practices adopted by the New South Wales Surveyor-General's department prior to the disconnection of Queensland in 1859. Since that time a considerable body of knowledge has been developed by the Surveying Profession in the reinstatement of cadastral boundaries under the Torrens style system of land titles. This knowledge is based on common law principles and many years of practical application by surveyors in the field.

Priebbenow (2008) reported that there is a growing level of concern by some in the surveying profession about the approach some cadastral surveyors are taking to boundary reinstatement. Some consulting surveyors are raising these concerns with the Department of Environmental and Resource Management, and departmental plan examiners are noting similar issues. There is a substantial concern that this is leading to a decline in the quality of the cadastral surveys, in particular identification surveys.

The mission of the cadastral surveyor in reinstating a boundary is to accumulate evidence (such as original survey reference marks, original occupation at boundary corners, original boundary marks) about the location of the boundary and, guided by accepted legal principles, to interpret that evidence to draw a conclusion about the most likely place in which a court would determine the boundary to be. It is suggested that in some instances, not enough evidence is being collected and or inappropriate conclusions are being drawn from the evidence that has been collected.

1.4 Research Objectives

The objectives of this project are to:

- Research a number of Identification Surveys lodged with the Department of Environmental and Resource Management (comprised of the former Department of Natural Resources and Water, and the Environmental Protection Agency);
- Complete radial searches over each identification survey and gather other survey plans over the area;
- Analyse the original marks and occupation used to reinstate corners, lines (frontage, side, back) for each identification survey
- Determine the strength and quality of each reinstatement based on hierarchy of evidence;
- Investigate how identification surveys have evolved and the purpose of them, what are the problems within them;
- Analyse the results and design a quality control form for identification surveys.
- Design a quality control form/checklist for identification surveys.

1.5 Conclusion

The aim of this project is develop a quality control form and guidelines that will increase the accuracy and quality of identification surveys. A reliable and easy to follow quality control form and guidelines will aid in future identification surveys in becoming of a better quality and made more professional.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter seeks to review and analyse the previous work of other professionals in the area of cadastral surveys. The aim of this chapter is to recognise the main issues regarding the quality of cadastral surveys and in particular identification surveys. It will also review preceding cadastral survey regulations and legislation concerning cadastral surveys

2.2 Identification Surveys

2.2.1 Characteristics

Priebbenow (2008) lists the optimal characteristics of a quality cadastral system as being:

- Cadastral surveys are conducted in accordance with relevant legal principles;
- Cadastral surveys are based on the interpretation of evidence;
- Cadastral surveys are of an appropriate quality;
  - They are fit for their purpose;
  - They are of an appropriate accuracy; and
  - They comply with the relevant standards;

- Cadastral surveys are durably marked;
- There is sufficient redundancy of marks, measurements and other evidence to support the replacement of marks as they disappear over time; and
- There is a permanent, accessible record of the survey.

Jensen (2007) states that technology advancement in survey instrumentation has facilitated a development in the survey methodologies adopted by surveyors in the field; the main beliefs of reinstatement have remained unchanged and are determined by long standing precedent in the courts. In recent years however, it has become increasingly obvious that the sound reinstatement logic of our forebears is steadily being forgotten in favour of expedient technology based on purely mathematical solutions to reinstate problems.

The Cadastral survey requirements version 5 states that all cadastral survey plans are required to show a certificate in accordance with Form 13 or Form 18. The surveyor's name must be shown in full. The surveyor should be a cadastral surveyor at the time of survey and signing of the plan. The manner of execution of a plan by a corporation must be in accordance with its constitution, which will specify whether or not the common seal is to be affixed. Whenever a corporation signs a plan, the individual who undertook the survey must be identified on the certificate, along with their registration status.

The date of signature must not precede the survey completion date. The plan should be signed and dated prior to lodgement for sealing with the local government. An identification survey must bear a completed Form 13 certificate. (NRW Cadastral Survey Requirements). A Form 13 is a certificate for cadastral plans, it states who and when the survey was completed and the company or surveyor that is accepting responsibility for the work completed. See Appendix C, Figure C.1.

An identification survey will result in new pegs or other markers being placed and measurements taken to the improvements on the property to make sure they are within the boundaries and not encroaching on the neighbour's land. Likewise, the neighbour's improvements may be checked to make sure they are not encroaching on the subject land.

The owner of the land will normally receive a plan showing the property boundaries, the marks placed, and the relationship of the improvements to the boundaries.

An identification survey is a cadastral survey and the surveyor has to reestablish the property boundaries where the original surveyor placed them and make sure that all land owners in the vicinity have their proper entitlement of land. Any identification survey must bear a completed Form 13 certificate.

It is required for the maintenance of the integrity of the cadastre that identification survey plans show all of the survey information relied on for the purpose of reinstating the boundaries of the subject land, including the existing reference marks and any new ones placed.

To do that, the surveyor locates original boundary markers, reference markers and other evidence of the original boundaries and makes a series of judgments as to the current location of the boundaries. In most cases, the surveyor will then place new boundary markers and additional reference marks so that the corners can be more readily re-established next time.

The requirements for presentation of the information from the survey will vary with the request from the landowner and from State to State. In most cases, the surveyor will draw up a plan showing:-

- the boundaries of the property
- the relationship of the improvements to the boundaries that are close to the boundary
- the relationship of the neighbour's improvements to the boundaries if they are close to or encroaching on the boundary
- the new boundary markers and reference marks placed
- any other information requested by the landowner

The Cadastral Survey Requirements Version 5.0 2008 states the standards under the Surveying and Mapping Infrastructure Act 2003 that any identification survey must bear a completed Form 13 certificate. They must be presented in A3 size, and must be numbered using a barcoded label affixed in the bottom right hand corner with the plan held in portrait mode. The label must be affixed to the plan being deposited with the department such that its long side is parallel to the short side of the plan form immediately adjacent to the margin.

The Cadastral Survey Requirements also include that an identification survey should demonstrate:

- Sufficient detail to be capable of lodgement in CISP.
- That relevant legislation, including the Surveyors Act 2003 and the Surveying and Mapping Infrastructure Act 2003, is satisfied.

An identification plan should display the following as a minimum:

- The department's barcode in the designated space on face
- Description, referring to the lot on plan or secondary interest being identified
- Form 13, issued under the Surveying and Mapping Infrastructure Act 2003
- Parish/county
- Original portion
- Local government
- Survey data in a manner that satisfies general presentation requirements.

In Queensland, these plans receive a unique number and have to be lodged in the office of the Registrar of Titles for survey information purposes within 40 business days of the completion of the survey under section 16 of the Survey and Mapping Infrastructure Act 2003.

The Survey and Mapping Infrastructure ACT 2003 states;

"16 Obligation on cadastral surveyor

(1) A cadastral surveyor must, within 40 business days after placing a survey mark in carrying out a cadastral survey, or supervising the placement of the mark, give the chief executive a copy of the plan of survey complying with subsection (2), unless the surveyor has a reasonable excuse.

Cadastral surveying is the process of determination of boundaries of a piece of land or water and is defined in Queensland by the *Surveyors Act 1977* as follows:

> **"Cadastral survey"** means any process of determining, mapping or planning the boundaries of a piece of land or waters required or authorised.-

(a) under any Act dealing with the alienation, leasing, and occupation of Crown lands or with mining, or affecting titles to land; or
(b) by the proprietor, lessee or mortgagee under any Act affecting titles to land; or
(c) by the owner, proprietor, lessee or mortgagee or occupier of, or any person holding a registered interest in, any land for the re-establishment of, or identification of, or adjustment of any boundary of such land; or
(d) Under any Act to be made or certified by a Licensed Surveyor.

The process of the cadastral surveying system in Queensland is described as follows: The process includes:

- The determination and marking of the position of the boundaries of a parcel/parcels of land by a Licensed Surveyor in accordance with the Surveyors Act 1977, Surveyors Regulations 1992 and other relevant legislation.
- The presentation and lodgement of the Licensed Surveyors determination of the boundaries in a format (usually plotted on a fixed format plan form in accordance with standards as shown in the Survey Plan Manual) for examination by registering authority, and

- The examination and verification of the information shown on the plan by registering authority before registration of the surveyor's work by amendment of the cadastre.

Halsbury's (2nd) Edn.) Vol.3, page 124 the following description of a boundary line appears:-

> "A boundary is an imaginary line which marks the confines or line of division of two contiguous estates. The term is also used to denote the physical objects by reference to which the line of division is described as well as the line of division itself. In this sense boundaries have been divided into natural and artificial, according as such physical objects have or have not been erected by the agency of man."

Apart from natural boundaries e.g. high water mark (as a physical feature), watercourses, water sheds etc, the best part of the original boundaries in Queensland were first formed by lines surveyed and marked on the ground by surveyors. (Skelton, 1930).

2.2.2 What is the Problem?

The task of the cadastral surveyor in reinstating a boundary is to collect evidence about the location of the boundary and, guided by accepted legal principles, to interpret that evidence to draw a conclusion about the most likely place in which a court would determine the boundary to be. It is suggested that in some instances, insufficient evidence is being collected and or inappropriate conclusions are being drawn from the evidence. Priebbenow (2008).

For example, a survey might identify a minimum number of recent reference marks to establish a datum, and then lay in all boundaries at deed from those two marks, without reference to other marks or occupation. Or, a survey might refer to the original plan, and mathematically proportion excess or shortage, despite this not agreeing with subsequent surveys, or with occupation. Priebbenow (2008).

According to Priebbenow (2008), causes for poor reinstatement include the following:

- Surveyors' obtaining insufficient searches, in some instances only the original and the most recent plans are ordered.
- Surveyor's not taking the time to do a proper assessment of the approach adopted by previous surveyors.
- Surveyors not collecting sufficient evidence of the location of boundaries, and in particular ignoring the evidence provided by occupation.
- Surveyors not understanding, or choosing not to apply, the legal principles of boundary reinstatement.
- Surveyors not considering the interests of all parties.
- A propensity to apply a mathematical, rather than a legal approach to boundary determination.
- Inadequate supervision of registered surveyors, graduates or associates undertaking cadastral surveys.
- In some instances, difficulty in obtaining historical information about surveys.

2.3 Legislation and Regulations

The Surveyor's Act 1977 defines an **identification survey** as a cadastral survey carried out for the purpose of identification, re-establishment, marking or remarking of existing boundaries of a piece of land or waters.Identification Surveys report on the position and extent of property boundaries.

The Survey and Mapping Infrastructure Act 2003 defines a **cadastral surveyor** as a surveyor who holds a registration endorsement under the *Surveyors Act 2003* for carrying out cadastral surveys.

The main purposes of this act are stated below:

"(1) The main purposes of this Act are to provide for the following—

(a) Developing, maintaining and improving the State survey and mapping infrastructure;

(b) Maintaining and improving cadastral boundaries throughout the State and information held by the department about the boundaries;

(c) Coordinating and integrating survey and mapping information;

(d) Improving public access to survey and mapping information;

(e) Defining administrative areas, and describing and working out administrative area boundaries."

(Surveying and Mapping Infrastructure Act 2003, (Qld), s.3.1)

These purposes are to be achieved by developing new standards and guidelines for achieving an acceptable level of survey quality. The establishment and maintenance of PSMs and the recording of survey and mapping information in the appropriate State Datasets also help to achieve the above aims.
(Surveying and Mapping Infrastructure Act 2003, (Qld), s 3(2))

2.4 Reinstatement Principles

The surveyor examines the historical evidence in relation to what exists. The position of the reinstated boundaries is then determined taking into consideration the evidence and the principles of reinstatement. To help to try to achieve this to the best possible solution, there are a set of principles and directions set out that must be followed.

The Surveyors Regulation 1992 sets out directions in regard to reinstatement in Section 26.

Reinstatement of existing boundaries

26. (1) When a cadastral survey (including an identification survey) is required to determine the position of an existing boundary, a Licensed Surveyor must –

(a) Ascertain the positions and descriptions of the existing survey marks and occupation that provide evidence of the boundary; and
(b) Give primary consideration to the existing survey marks, unless other evidence (including original measurements, the position of improvements or statements by occupiers) suggests that the existing marks were incorrectly placed or have been disturbed; and
(c) If it is positively determined that a survey mark has not been placed as originally intended, reset the mark according to the original intentions, after recording the position of the mark being reset; and
(d) Determine whether or not the position of an ambulatory boundary is significantly different from the position marked on the registered plan; and
(e) Record whether an encroachment, within the meaning of section 183 of the Property Law Act 1974, has arisen; and
(f) Ascertain and record the position of any occupation that affects or is affected by the reinstatement of a boundary.

The Surveyors Regulation 1992 establishes the guiding principles that must be used to determine reinstated boundaries within Queensland. Additional principles of reinstatement have been developed through a process of legislation and interpretation by the courts to supplement the guiding principles.

Cook (2004) states that some of the problems of surveying standards was that however simple it may have seemed to lay out land parcels on the ground and describe what was laid out in written documentation, experience showed that it was in fact more difficult to do than most people imagined. A system of proving the competence of surveyors emerged at an early stage. Initially this was done within a public service structure as a condition of appointment. Out of this grew a practice of licensing surveyors to act on behalf of government in creating, perpetuating assessing evidence of boundary location. Cook (2004).

In practice, it is not so much licensing surveyors that overcome the problems of boundary evidence. What matters more is the knowledge, skills, attitudes and diligence that surveyors bring to bear on their task. Understanding the purpose and rationale behind rules and conventions is important to efficient operation of a cadastral system. Cook (2004).

Cooley (1881) wrote in his essay "The Judicial Functions of Surveyors":

> "Surveyors are not and cannot be judicial officers, but in a great many cases they act in a quasi-judicial capacity with the acquiescence of parties concerned; and it is important for them to know by what rules they are to be guided in the discharge of their judicial functions."

Ovan's (2006) commented that the main point in Cooley's opinion relates to recovering lost corners, extinct corners, the facts of possession, the duty of the surveyor, water courses and meander lines. His opinion on the judicial functions of surveyors was written over 100 years ago, yet is still very applicable for modern day surveyors.

In Cooley's essay (1881) he states in relating to facts of possession:

> "that the general duty of the surveyor is not to assume that a monument is lost until after he has thoroughly sifted the evidence and found himself unable to trace it. Even then he should hesitate long before doing anything to the disturbance of settled possessions. Occupation, especially if long continued, often affords very satisfactory evidence of the original boundary when no other is attainable, and the surveyor should inquire when it originated, how, and why the lines were then located as they were, and whether a claim of title has always accompanied the possession, and give all the facts due force as evidence."

Corners and monuments can and do go missing or destroyed over time. When retracing the steps of a previous surveyor or survey, the current cadastral surveyor is trying to re-establish corners or boundary lines. Surveyors must consider where the original boundary lines and corners are supposed to be, according to the original

survey. This is especially important in cities or populated areas where more disputes about boundary positions occur.

2.5 Cadastral Reinstatement Standard

Priebbenow (2008) report "what's happening to the cadastre?" He states what surveyors must comply with when conducting a cadastral survey when reinstating existing cadastral boundaries. These are:

- Obtain a full search, incorporating all relevant plans including historical plans;
- Gather sufficient evidence to effect the reinstatement;
- Consider and connect to sufficient monuments to reinstate each corner and prove that the adopted marks are reliable, with greater weight being given to older monuments;
- Assess the origin of each piece of evidence and its relevance to boundary location, based on the hierarchy of evidence;
- Ensure that they understand the previous surveyor's reinstatement;
- Consider the rights of all adjoining owners;
- Place appropriate marks to ensure there is long standing evidence of the corner and the survey;
- Record all relevant occupation; and
- Provide a reinstatement report which documents their approach to reinstatement of the boundaries and their assessment of the evidence, and submit this report with the survey plan.

He concludes that there is a need to provide more guidance to surveyors about the correct approach to reinstatement of boundaries, partly by providing more information to surveyors, and partly by strengthening the standards regarding reinstatement of boundaries.

The Cadastral Integrity Committee considers that if there was current, written material on cadastral reinstatement, this would assist not only practicing surveyors, but could also be a useful guide to supervising surveyors in providing training to registered graduates who are working towards gaining registration with a cadastral endorsement.

The Oxford dictionary defines the term 'monument' as:

> Any object natural or artificial fixed permanently in the soil and referred to in a document as a means of ascertaining the location or a tract of land or any part of its boundaries.

Robillard, Wilson and Brown (2003) stated that –

> "Surveyors create evidence, recover evidence and interpret evidence of boundaries. The legal community argues evidence of boundaries."

Priebbenow (2008) reports that the very first step in the cadastral survey is to obtain a full plan search incorporating all relevant plans including historical plans. The significance of obtaining a complete and accurate search cannot be more important. A plan search is gathering all recent and older survey plans completed not only on the subject block, but also in the surrounding areas and streets near the subject block. This will give the surveyor every opportunity to ensure that he will gather enough information on survey monuments to define his boundary pegs are placed in the correct place.

A lot of poor cadastral surveys could be put down due to poor or insufficient search. Once a complete search is compiled, the surveyor can plan how to go about their survey and identify which evidence will best reinstate the original position of a boundary (Hamer 1967).

2.6 Hierarchy of Evidence

The courts have established rules governing the relative importance of various, sometimes conflicting evidence on which the surveyor must base his survey, in order to arrive at what the original intention was. These generally accepted rules are often referred to as the Hierarchy of Evidence and are required to be observed by s.11 Surveying and Mapping Infrastructure Regulation. The hierarchy of evidence according to Brown (1980) is:

1. The greatest weight must always be given to surveyed lines actually marked on the ground.
2. Next most important are natural monuments mentioned in the deed.
3. Adjoiners – "a well established line of an adjacent survey" – often rank as natural monuments.
4. Artificial monuments rank next.
5. Maps or plans actually referred to in the deed rank after artificial monuments.
6. Unmarked lines which are well recognised rank next to maps and plans in importance.
7. Bearings and distances will over ride other calls only, in most cases, where there is no trustworthy evidence of such other calls.
8. As between bearing and distance, neither is given overall preference – if they are inconsistent with each other the circumstances dictate which is preferred.
9. Area (or Quantity) will in general be the least valued evidence, but may in some cases be the key to the problem.
10. Finally, but most important of all, any one of these rules may be of more (or less) weight in one case than another. The rules set out are for cases of conflict, they are general rules, and are intended to be guiding principles not a strict formula.

As stated by many authors on this topic, these rules on the hierarchy of evidence are open to interpretation and any component may be accorded particular weight, depending on the situation. Cook (1999) describes "Analysing each element in terms

of what is best should not detract from the general aim of obtaining the best evidence when it is seen in its totality."

2.7 Shortage of Surveyors in Queensland

The Labour Economics Office Queensland for the Department of Education, in relation with, Employment and Workplace Relations (DEEWR) (2009) report on the shortage of registered surveyors in Queensland, a significant issue amongst surveying professionals is an ageing workforce, with the median age for a surveyor at 55 plus.

Entry into the profession is generally via the completion of a four year bachelor degree in spatial science or urban development. Registration with the Surveyors Board of Queensland is mandatory. Specific commencement figures for surveyors are difficult to ascertain as some universities offer a year of generic development subjects prior to students choosing a discipline.

The 2009 study by DEEWR showed that only 60 percent of advertised vacancies for surveyors in Queensland were filled within 6 weeks of advertising. Only 26 percent of the applicants were considered suitable. Employers deemed applicants as unsuitable in most cases because they lacked experience with local conditions, had insufficient experience, or they lacked knowledge of specific industries such as mining. Employer's outside the mineral resources sector reported difficulties attracting Australian applicants due to their inability to match the remuneration offered by that sector. DEEWR (2009)

2.8 Summary

The aim of this chapter was to identify the critical issues concerning the current cadastral surveys being performed and to introduce methods of analysing the identification survey plans that I have acquired.

Recognising what surveyors must comply with before undertaking an identification survey and the hierarchy of evidence is an initial step in reviewing and analysing the identification plans and to try and gather the strength of these as well.

This chapter was an investigation of previous reports and journals and text that have come across the issues regarding the decline in quality of the identification surveys. Surveyors must not get into a mindset of “it’s only an identification survey, not a subdivision.” Surveyors have this mindset mainly because identification surveys are lodged with the Department of Environmental and Resource Management, but not examined by the Department.

CHAPTER 3 RESEARCH METHOD

3.1 Introduction

The research method used for this project is based on the desirable characteristics of a quality identification survey, by following the surveying principles, standards and guidelines, which can be found in the Surveyors Act 2003 and the Survey and Mapping Infrastructure Act 2003.

Principles are defined as what is projected to be achieved by utilising a specific procedure.

The Survey and Mapping Infrastructure Act 2003 defines standards as certain outcomes, levels of quality, which must be achieved in order for the prescribed principles of a specific procedure to be confidently achieved.

The Survey and Mapping Infrastructure Act 2003 defines guidelines as possible methods to put into practice during a specific procedure, so that the prescribed standards are met. The basis of guidelines is such that if a person follows them, that person can be certain the required standards are met.

The principles and standards of cadastral surveying have remained unchanged and are decided by long standing precedent in the courts. The aim of the principles and standards is generally to protect the public interest.

Guidelines are more flexible. They are created with the technology, practicality and knowledge currently available. Technology advancement in survey instrumentation has facilitated an evolution in the survey methodologies adopted by surveyors. Some surveyors may find themselves trying to utilise a set of guidelines designed for obsolete procedures or equipment. This can be inefficient and may cause standards to be no longer met when modern technology and methods are used.

3.2 Project Procedure

1. Research the general rules and regulations of cadastral surveys and current legislation.
2. Investigate and acquire a number of recent identification surveys lodged with the Department of Environmental and Resource Management.
3. Compile a complete search over the surveyed lot for each identification survey incorporating all relevant plans.
4. Analyse each identification survey looking at how many original survey marks where connected to, datum of survey and occupation connected to used to reinstate boundary corners, lines (frontage, sides, back).
5. Determine the strength and quality of each identification survey based on hierarchy of evidence.
6. Ensure that the surveyor placed appropriate marks to ensure there is long standing evidence of the corner and the survey.
7. Analyse the results of all identification surveys and design a quality control form and guidelines for future identification surveys.

3.3 Acquiring Plans and Information

The identification plans were provided by the Department of Environmental and Resource Management. From the plans that were provided a decision was made to focus on plans in the Brisbane and Gold Coast area that were lodged with the Department earlier this year.

The Brisbane and Gold Coast areas were chosen as a more localised area to concentrate on to try and get a comparison with a variety of different surveyors and surveying companies in an area.

Once there were enough plans to start a comparison, it was then time to gather more information on each identification survey. This included getting a smart map for each survey, and doing a radial search over each parcel of land that was surveyed and surrounding area. A radial search brings up information on all previous surveys on a particular property or multiple properties that has been lodged with the Department of Environmental and Resource Management.

After each radial search, the next procedure was then to go through the plans and ordered and printed out the subject plan and all other recent or relevant survey plans and other identification survey plans that had been completed in that area.

3.4 Comparing Data

After each identification survey had been searched for previous survey information it was time to start comparing the plans.

Each identification survey was studied and analysed in relation to the previous surveys that have been completed either over the subject block or near the subject block. From this study, I was able to analyse each identification survey looking at how many original survey marks where connected to, the datum of survey and what occupation had been connected to used to reinstate boundary corners.

From this the strength and quality of each reinstatement is determined based on what original marks were connected to, occupation connected to, the installation of new additional reference marks, and also how the surveyor has gone about the survey, have they followed in the footsteps of previous surveys, or have they marked out what the original survey had intended to do?

Once the strength and quality of each reinstatement is achieved, then the guidelines for a good quality identification survey can be developed. This will be achieved by analysing the results and comparing the good quality plans to the poor quality plans.

3.5 Resource Analysis

The resources requirements for this project are quite simple, all the identification surveys, surveying smart-maps, radial searches and relevant plans for each identification survey was provided by the Department of Environmental and Resource Management.

The Department of Environmental and Resource Management provided me with recent identification surveys. Then I used the Department's plan searching software to gather smart-maps, radial searches and relevant plans. One of the causes of poor quality identification surveys is due to the cost of plan searching, so to have this at my disposal is a huge benefit.

Without the Department of Environmental and Resource Management's assistance in plan searching and gathering information, the project would have been very costly.

3.6 Aspects of Sustainability

The Code of Ethics in the Spatial Science Institute is based in the values of:

- Competence
- Truth
- Social Justice
- Ethical Behaviour

Members of the Spatial Science Institute are required to abide by the Code of Ethics as a condition of their membership.
This project is directed in part, at making a guide for identification surveys so that they are of a higher quality and of better standards for all surveyors because the overall aim of the cadastral surveyor is to walk in the footsteps of the original survey, and be convinced that any other cadastral surveyor will place the boundaries in the same position.

The project is therefore very much directed at maintaining the professionalism and sustainability of the cadastral surveyor, and keeping the trust and respect from the public. By increasing the quality and integrity of identification surveys, the profession gains more credibility of being the land information and cadastral boundary experts.

3.7 Conclusion

The range of Identification Surveys provided to me by the Department of Environmental and Resource Management did give me a variety of types of surveys completed recently. This included full identification surveys which are identifying all boundaries on a particular lot, and part identification surveys which is only marking and surveying one boundary line of a lot.

Having analysed the marks and occupation used to reinstate boundaries for the identification surveys; the next chapter collates and discusses these results.

CHAPTER 4 RESEARCH RESULTS

4.1 Introduction

The forty five Identification surveys that were provided to me gave a range of results when comparing and analysing them. These plans were from the Brisbane and Gold Coast region in Queensland. The purpose of this chapter is to present the results in a form that maximises the possibilities for analysis and the drawing of conclusions.

By comparing and analysing the Identification Surveys provided they gave me information in the following broad categories:

i. Plans showing occupation
ii. The placement of new reference marks
iii. Number of original survey marks connected to
iv. Strength and Quality of Identification Surveys

These were not the only criteria based on how the identification plans were graded by order of strength and quality. They were also compared to the original surveys and how well the cadastral surveyor has surveyed the lines and proven the boundary lines in relation to where the original cadastral surveyor had intended the boundaries to be.

4.2 Plans Showing Occupation

Boundary reinstatement in areas of lost and confused boundaries depends enormously on the evidence provided by the physical occupation of land parcels. As such it is essential that surveyors collect and demonstrate relevant information regarding this evidence.

Surveyors are also required to show occupation on plans for reasons other than boundary redefinition. Surveyors are required to show occupation information for one or more of the following reasons:

- Demonstration to plan users of boundary redefinition evidence.
- Demonstration to plan users of physical status of subject land boundaries surveyed.
- To assist future surveyors in relocation of reference marks connected.

While surveyors are free to show information about occupation that does not fall into one of these categories, there is no requirement for them to do so. I think that any boundary information or occupation that could be located to help out future surveys should be shown on all cadastral plans, not just identification surveys. It adds to the strength of the cadastre by showing the existing occupation in relation to the boundaries.

The forty-five plans that were analysed gave a range of information to compare. Figure 4.1 shows the percentage of the Identification plans that have been analysed that show occupation.

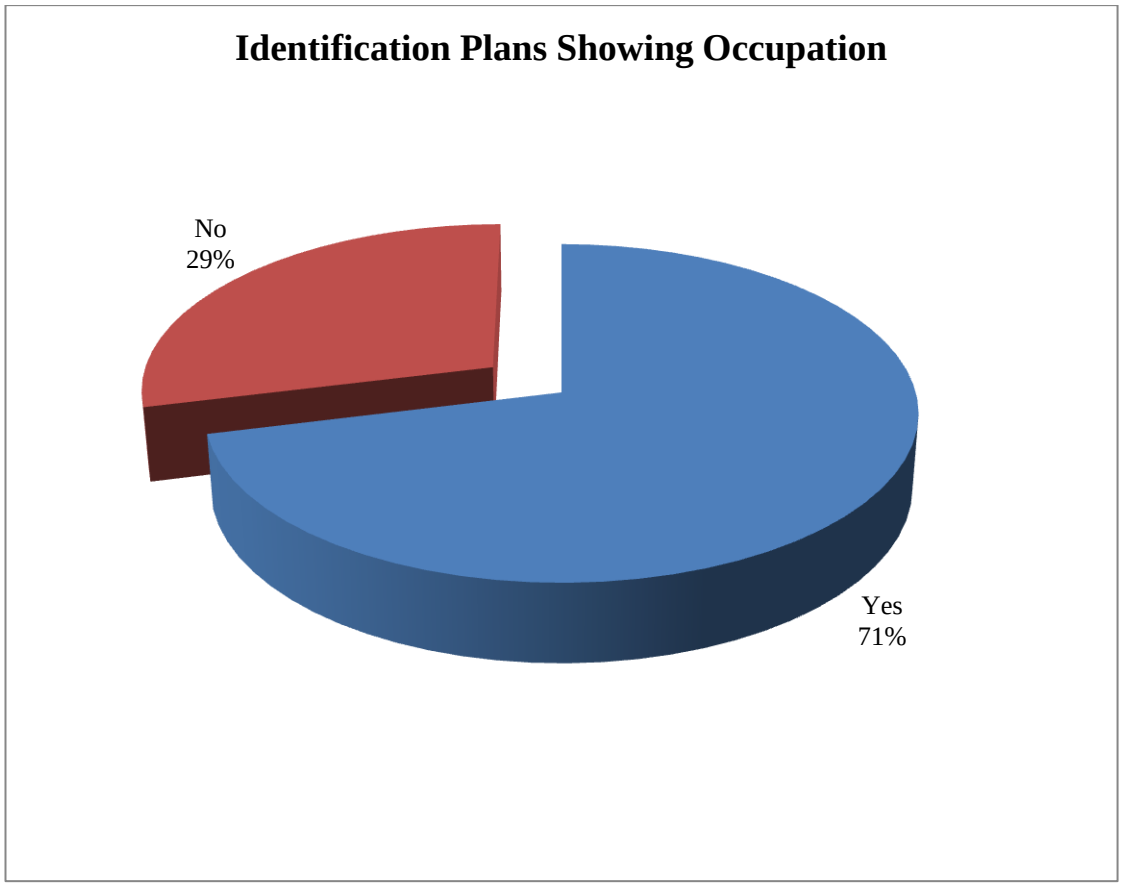

Figure 4.1 Identification plans showing occupation

If there is occupation at the time of survey, then it should be located to help future surveys to find reference marks and to identify boundary corners. And it also adds to proof of field survey in that they actually did perform the said survey and located marks and occupation. The plan was not just compiled in the office with no field component.

But also, the plans that did not show any occupation might be in the case that there actually was or is no occupation at that boundary corner. But every effort must be made by the surveyor to locate any occupation at surveyed boundaries.

4.3 The Placement of New Reference Marks

The results in this section were about the importance of placing additional survey reference marks for future cadastral surveys to support the original survey reference marks as they disappear over time. Seventy one percent of the identification plans I compared placed at least one new reference mark as shown in Figure 4.2.

But that still leaves twenty nine percent that did not place any additional survey marks. But that does not necessarily add to the strength of the reinstatement. For plans which are deemed to be of poor quality it is actually a good thing that there is no more new reference marks placed. As then the new reference marks would be of poor quality and the trend of poor quality reinstatements would continue.

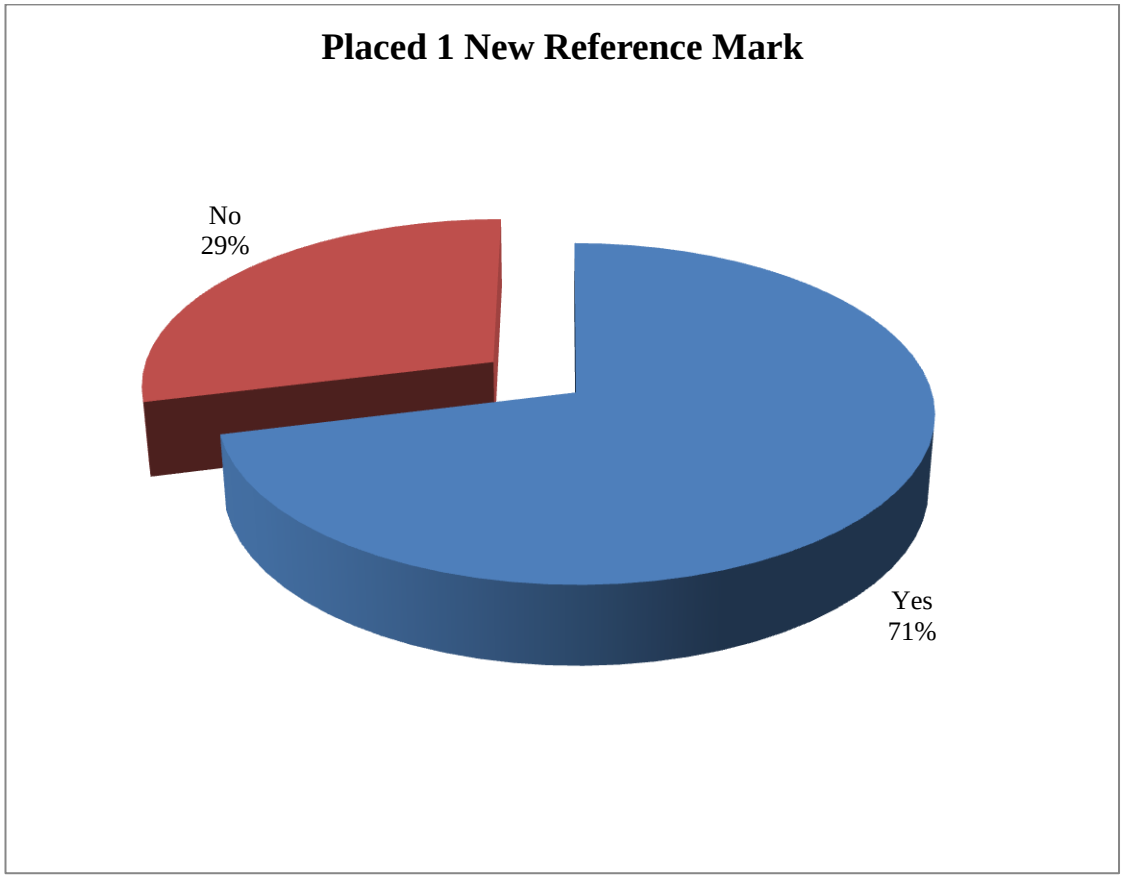

Figure 4.2 Identification plans that placed one new reference mark

Figure 4.3 show the percentage of plans that placed two or more new reference marks. It shows a bigger percentage in plans that did not place more than two marks. It is very important to provide stable boundary control for future reinstatement, and in a perfect world this would be a mix of surface marks and subsurface marks.

The placement of two or more reference marks is a good habit to get into when performing cadastral surveys as it provides evidence for future surveys as other marks get destroyed.

But surveyors should not fall into the trap of not measuring or considering older or original evidence of the originally surveyed boundaries. The older and original survey marks, provided they have not been disturbed, are of the upmost importance in boundary redefinition based upon the hierarchy of evidence. Identification plans, or any cadastral plans in that matter, that have only done the bare minimum to place pegs, should not be placing new reference marks. Although you only need two original survey marks in a cadastral survey for a datum, surveyors should endeavour to connect to more original marks to prove survey lines and add more strength to their reinstatement.

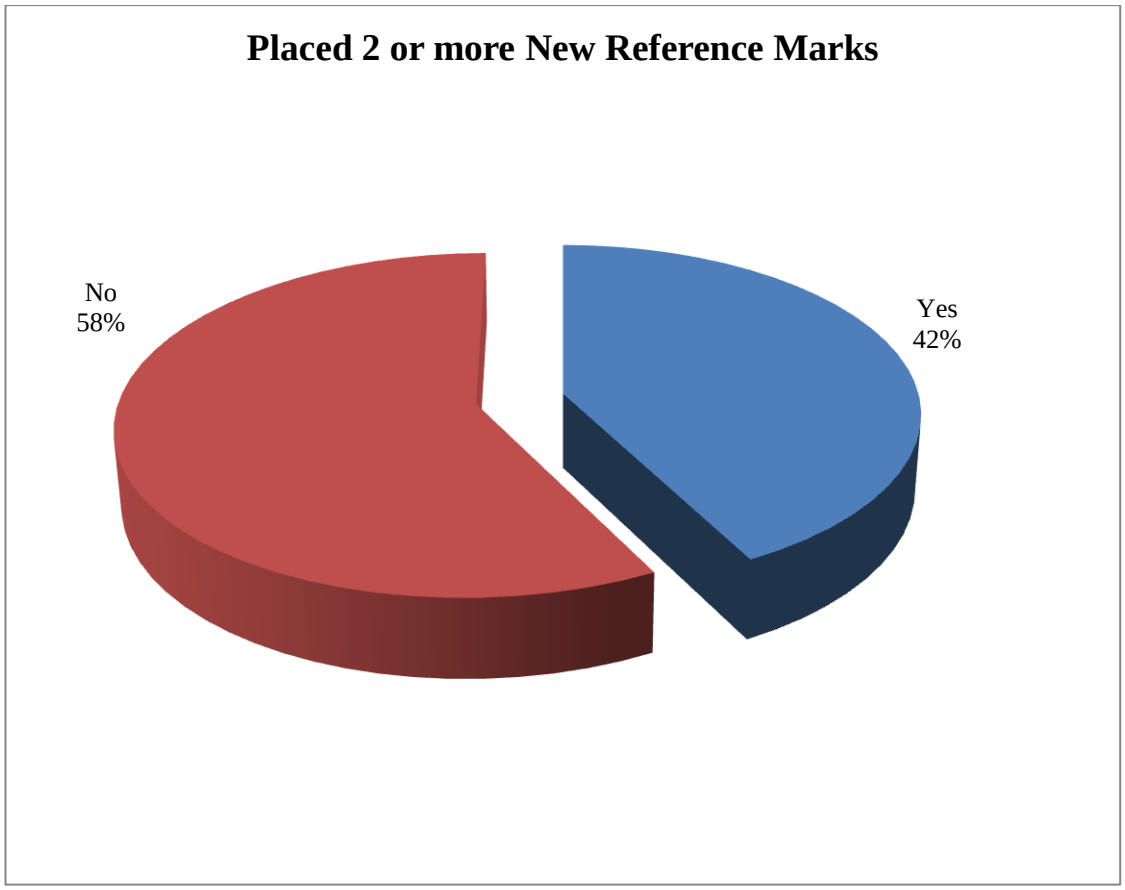

Figure 4.3 Identification plans that placed two or more reference marks

The following marks are specified as reference marks under r10 of the Survey Regulations 2007:

Reference mark means

a) A metal pin, being a length of metal pipe or rod of at least 10 millimetres in diameter and 300 millimetres in length driven at or below ground level; or
b) A steel dropper of at least 300 millimetres in length driven at or below ground level; or
c) A masonry nail or screw firmly secured to a concrete footpath or kerb or a building or other immovable object; or
d) A drill hole and wings in concrete; or
e) A lead core or plastic plug set into concrete; or

f) The corner of a building or other immovable object that may be re-established without ambiguity; or
g) A durable mark on a building or other immovable object; or
h) Any other mark approved as a reference mark by the Surveyor-General.

4.4 Number of Original Survey Marks Referenced

The importance of original survey marks cannot be underestimated. It is the intention of the current cadastral surveyor to consider the intention of the original survey. Figure 4.4 shows all 45 identification surveys and how many original reference marks that each one connected to.

While a surveyor does only need to connect to two original survey marks to define a datum for the survey and to fix one boundary line. Their cadastral survey is strengthened with more original survey reference marks to prove boundary lines. When there is only two original survey reference marks connected to there is no checks or redundancies regarding the veracity of the original survey and essentially has fixed one line only in general.

Any other corners reinstated by these plans that have only connected to the minimum number of original marks must then mathematically calculate these other corners. This ranks very low on the hierarchy of evidence.

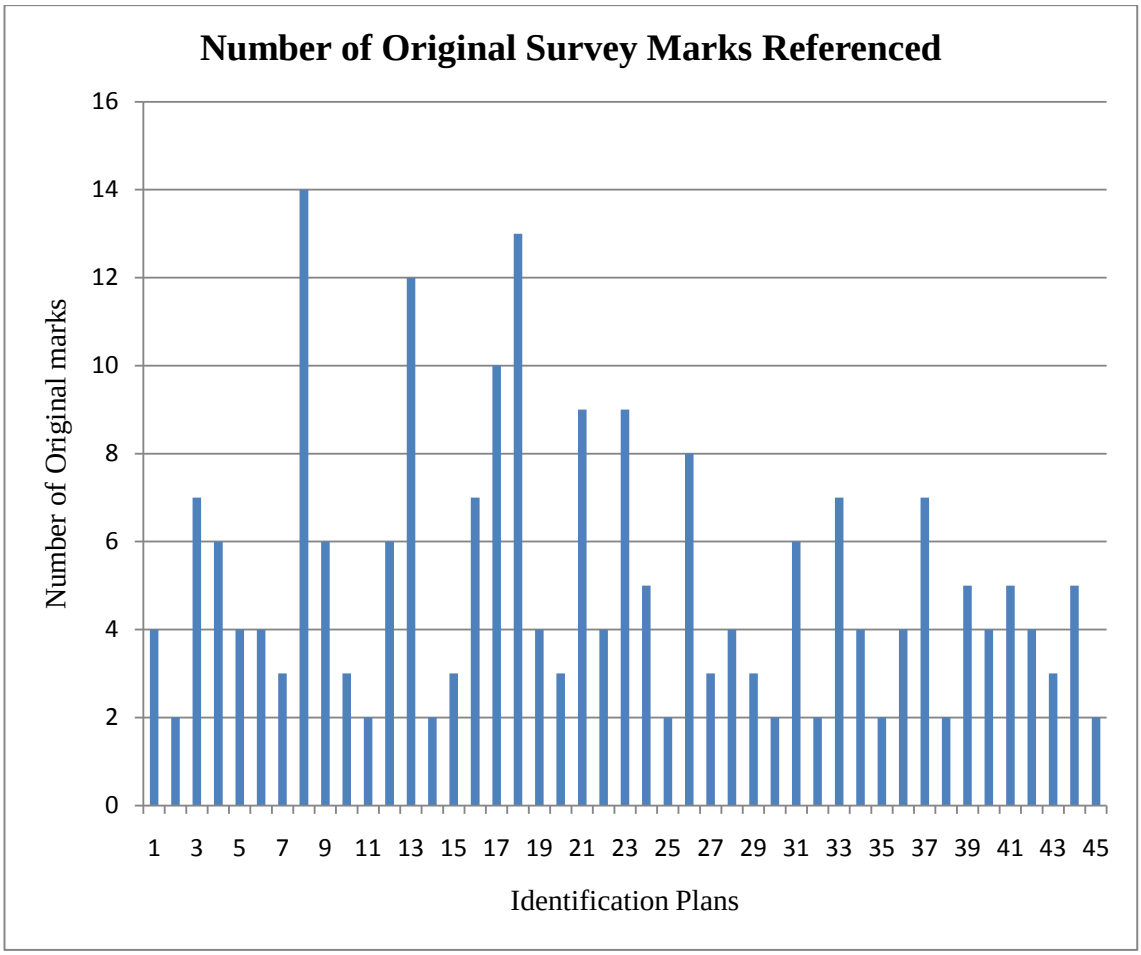

Figure 4.4 Number of original survey marks referenced

4.5 Conclusion

The Identification surveys provided to me provided a good variation in types of surveys performed and quality of survey. There was enough qualitative information gathered from comparing the surveys to assess the strength and quality of the identification surveys. The next chapter will take these results and discuss their relevance in the context of the questions to be answered by the project.

CHAPTER 5 ANALYSIS AND DISCUSSION

5.1 Introduction

The purpose of this chapter is to consolidate the results from the comparison and analysis of the identification surveys, and thereby determine the strength and quality of each identification survey as described in the Research Method.

It is acknowledged that the sample size of identification surveys is relatively small. Meaning the analysis, discussion and any conclusions drawn may be a simple reflection of the sample provided and not of the wider surveying industry. However, this analysis still provides a useful starting point for further investigation using a larger sample to gather a targeted set of information.

5.2 Plan Showing Occupation

The importance of showing occupation on identification surveys cannot be expressed enough. So often in the past, surveyors have ignored occupation at boundaries as evidence of original surveys.

In the absence of acceptable original reference marks, almost certainly the best verification of the correct location of a boundary will be obtained by references to occupations either on the surveyed lot boundary or adjacent boundaries or both.

Of the forty-five identification survey plans, thirteen identification survey plans did not show any occupation, this might be a result of poor survey practice or laziness in not gathering information on occupation at not only the subject boundary, but also adjacent boundaries.

There may also be a case for that there actually is no occupation at the boundaries that have been surveyed. But every effort should be made to locate and record information at the lot boundary. The collection and record of occupation is not a futile exercise. It also helps future surveyors in that area to find reference marks, search for marked boundary information, and demonstrates to plan users of physical status of subject land boundaries surveyed.

In Cooley's essay (1881) he stated that "occupation, especially if long continued, often affords very satisfactory evidence of the original boundary when no other is attainable, and the surveyor should inquire when it originated, how, and why the lines were then located as they were, and whether a claim of title has always accompanied the possession, and give all the facts due force as evidence." This highlights the importance of occupation and why surveyors should make every effort to locate any occupation found in their cadastral survey.

5.3 New Reference Marks

All surveyors should be conscious that measurements are subject to several sources of error and great care has to be taken to make certain that results are correct. The replacement of reference marks as older marks get destroyed over time is very important. But new reference marks should not just be placed in surveyed areas without first some real previous relationship to the subject boundary being reinstated. That is, they must first provide enough information and proof of boundaries by locating enough original survey control before placing or referencing new survey marks.

From these results it can be determined that, thirteen identification plans placed no new reference marks at all. While thirty two identification plans placed at least one new reference mark.

Possible reasons why the thirteen identification plans did not place any new reference marks are:

- The surveyor thought there were already plenty of other reference marks in the area and therefore no need to place any additional marks.
- They actually did put in a reference mark near the subject block but failed to show it on the identification plan.
- Instead of installing a credible mark such as an iron pin or a screw in concrete when completing the surround survey, they only installed a dumpy peg or another inferior mark.
- Laziness or cost to install new marks when old ones are destroyed.

In Figure 4.3 it shows the percentage of identification plans that placed two or more new reference marks. As can be seen only nineteen of the identification plans that were analysed placed two or more new reference marks.

For the ease of future surveys, surveyors should try to get into a habit of placing two or more new reference marks when performing cadastral surveys. These should be a mix of subsurface and surface marks, as long as surveyors don’t ignore the evidence of boundary location provided by occupations and older original marks. They should always measure to and consider the original survey marks and original evidence of the surveyed boundaries.

5.4 Original Survey Marks

The identification plans ranged in value of the number of original reference marks that were shown on the plan. When performing a boundary identification survey, the surveyor must want to prove the lines of the property. This includes all boundary

lines, the street frontage, side boundaries and the rear boundary line. It is the purpose of the current cadastral surveyor to consider the intention of the original survey.

It isn't enough to just survey the street frontage for reference marks, and then just turn deed angle and distance for the back and side boundaries. Because the surveyor has no real proof of those angles or distances, the surveyor really needs to back up his reasoning for turning that angle for that distance by proving the line with original information.

Figure 5.1 shows all 45 identification surveys and how many original reference marks that each identification plan showed on the plan.

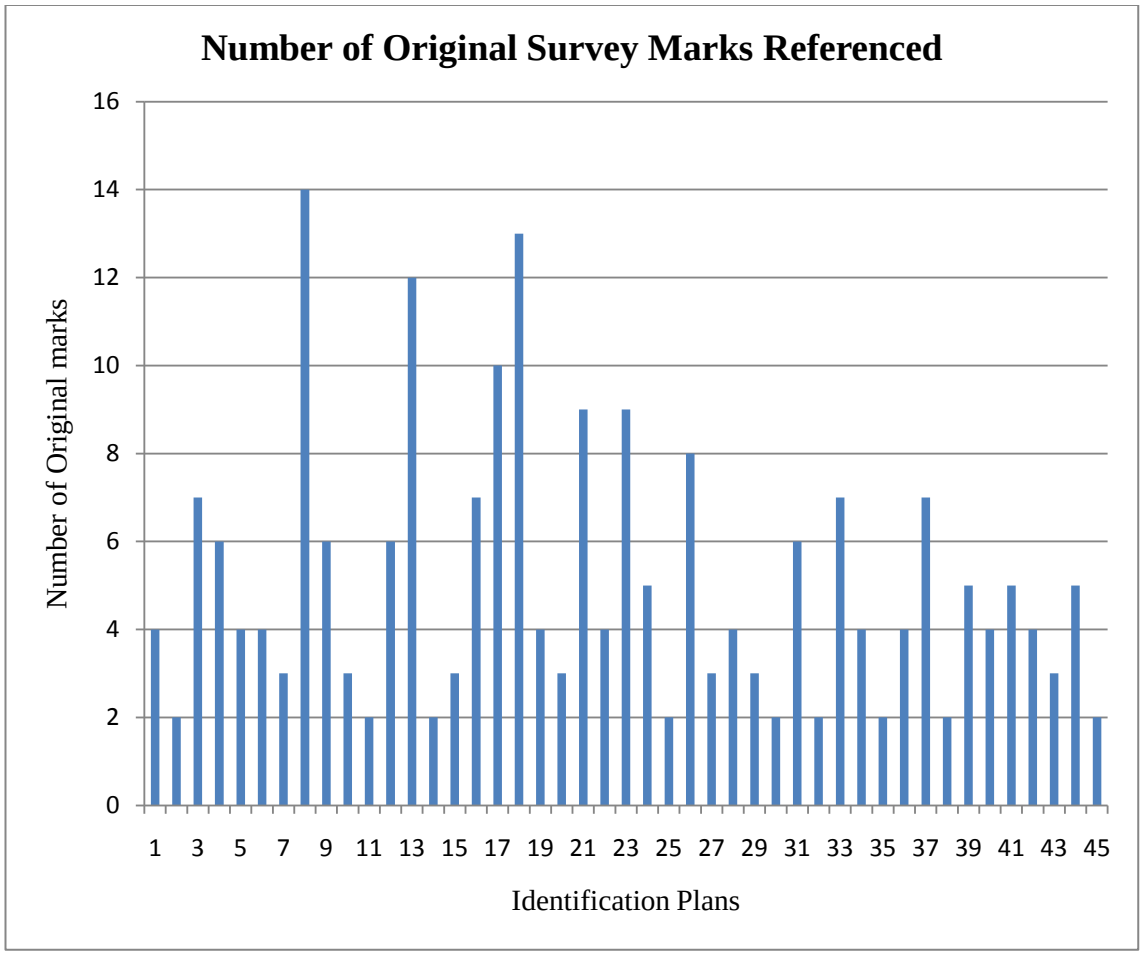

Figure 5.1 Number of original survey marks referenced

Of all the identification plans I analysed, nine of them had only connected to two original survey marks. The task of the cadastral surveyor in reinstating a boundary is to collect evidence about the location of the boundary and, guided by accepted legal principles, to interpret that evidence to draw a conclusion about the more likely place in which a court would determine the boundary to be.

In these nine cases, it could be argued that these nine survey plans have insufficient evidence collected and inappropriate conclusions drawn up from the evidence collected, or lack of evidence collected. Of these nine plans that only connected to two original reference marks, only three of them showed any occupation at the surveyed property boundaries.

Also, five out of the nine plans did place at least one new reference mark. Because they have only connected to two original marks with no other original information as checks or redundancies, they are possibly degrading the cadastre. The other four identification plans that did not place any new reference marks are continuing the trend of a poor survey or reinstatement for that individual plan.

Three of these nine plans that only connected to two original survey marks were only a partial identification survey. Meaning they were only surveying and marking one boundary line, not the whole lot. In these cases two original marks would provide a datum and therefore be able to mark the one boundary line. But again, they have no checks or redundancies for their work.

The identification plans that had only connected to two original marks were not graded as poor straight away, upon examining and comparing to older plans, some of these identification plans had connected to enough original corner information and occupation from the original survey to warrant an average grade.

5.5 Strength and Quality of Identification Surveys

The strength and quality of the identification surveys was then determined by examining all parts that were analysed, this included original reference marks connected to, occupation referenced, how they approached the original survey, and new reference marks placed. From this and also by looking at the plans themselves and seeing how the surveyor went about the identification survey, the plans were graded as good, average or poor.

Figure 5.2 shows the percentage of plans that were classed as Good, Average or Poor.

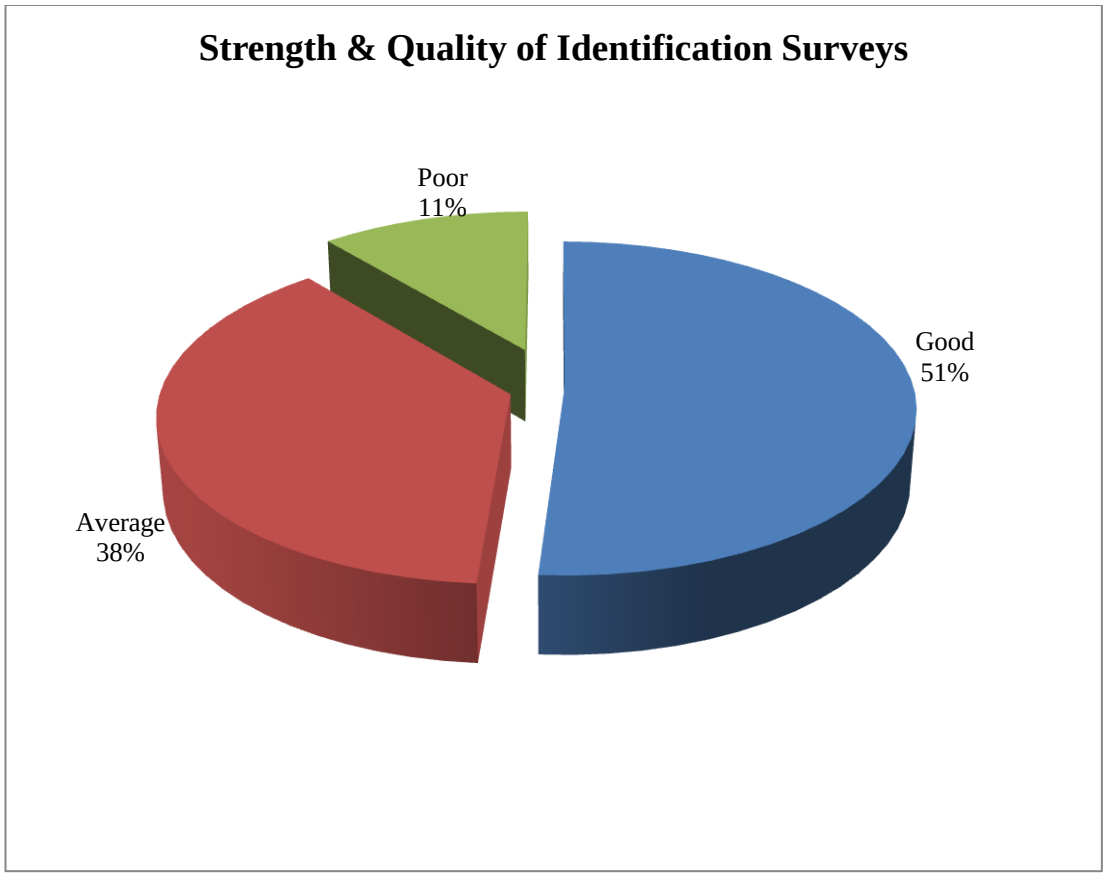

Figure 5.2 Strength and quality of identification surveys

The identification survey plans were rated according to;

- The approach that the surveyor took to the original surveyor during his survey, based on the hierarchy of evidence.
- Investigation of physical evidence of the originally surveyed boundaries, by original survey marks and occupation.
- Provide stable boundary control for future reinstatement, mix of surface and subsurface marks.
- Comprehensive analysis of datum, fixing of corners, and marking of corners.

All of these were considered when rating the identification plans, not just original reference marks, or just occupation. One of the main purposes of the surveyor is to base his survey on what the original intention was.

Appendix D shows an identification plan that was graded as a good quality identification survey. The surveyor has surveyed all boundary lines, connected to all original control, has shown occupation and structures that are close or encroaching on their subject block.

Appendix E shows an identification plan that was graded as a bad quality identification survey. The surveyor has only connected to two original survey reference marks, and it is a full identification survey not just a partial identification survey. He has shown an original iron pin as not searched, with no explanation why he did not search for it. Although he does have some original pegs found at a few of the boundary corners, these are very short boundary lines, and there is no proof of line for the rest of the subject block which is quite big. The surveyor should have gone further and connected to more reference marks and occupation.

Of the plans that were conceived as poor quality identification plans, five in total, four of them had only connected to two original reference marks. This could probably go down to laziness of not surveying enough to prove the boundary lines. Or even too much pressure being applied by the surveying company to pump out plans so therefore quality can drop. This can also mean time or cost constraints on

surveyors to perform surveys within unreasonable parameters. Or also could just be that the surveyor does not know any better.

5.6 Quality Control Form

From the results found, the time came to design a quality control form. The quality control form was going to be aimed at surveyors in the field for them to be filled out while they are still at the site of the survey for the main purpose to be used for identification surveys.

Because it was going to be aimed at field surveyors while they are on site, it would need to be easy to fill out, not take much time, but also try and help the surveyor to improve their identification survey.

If they form is too long to read, or takes too long to fill out, the chances are that the surveyor will not always go to the form for a confirmation that all steps are taken to ensure the good quality of the cadastral survey. So bearing this in mind the Quality Control Form for a field surveyor was created and can be seen in Appendix B.

5.7 Conclusion

This chapter has bought together all the research conducted for this project to discuss the issues for the quality of identification surveys. Cadastral surveyors must be aware of their obligations and responsibilities under legislation and comply with cadastral survey standards. This discussion provides the basis for the following conclusions and recommendations.

CHAPTER 6 CONCLUSION

6.1 Introduction

The aim of this project was to analyse identification surveys in relation to the reinstated boundaries and how the surveyor has fixed the boundaries based on the original survey marks and occupation. This chapter takes all of the preceding analysis and discussion and present the outcomes of my research and recommendations for further work which could be undertaken.

6.2 Research Outcomes

Cadastral boundary reinstatement is an interpretive art form needing exceptional understanding and skills of judgement. The science of measurement, while important to the gathering of proof and information involving boundaries is significant to the facts on the ground when taking into account the reinstatement of original boundaries. This standard is based on hundreds of years of legal precedent and is totally imbedded into the profession of cadastral surveying in Queensland.

After all the analysis and comparison of the identification surveys, it was found that just fewer than fifty percent were graded as either poor or average. The poor identification plans are due to a few facts including:

- Not enough original marks connected to prove surveyed lines.

- No occupation recorded at subject or adjacent boundaries
- Only street frontage actually surveyed and then deed angles and distances turned with no proof of angle or distance.

The good quality identification plans were due to:

- Had enough original survey marks to prove boundary lines
- Recorded occupation at boundaries
- Placed new reference marks
- Followed the original intention of the original survey

To help try and improve the standard of identification surveys a usable standard for reinstatement should be assessed. There is a need to provide more guidelines to surveyors about the correct approach to reinstatement of boundaries, by providing more information to surveyors, and partly by strengthening the standards regarding reinstatement of boundaries.

Identification surveys at the present time have to be lodged with the Department of Environmental and Resource Management upon completion. Although they are lodged they are not examined. This means that no one in the Department is looking at the standard of the survey completed or occupations referenced or even a field audit.

If the Department of Environmental and Resource Management did start examining and analysing identification surveys, I believe that the quality of the surveys will increase and the thought of "it's only an identification survey' within the profession will disappear.

I believe there is a lack of effort put into some identification surveys simply due to the reason that surveyors know that will not be examined on them. Surveyors in general should be proud of their profession and want to do their job at a good professional status.

It is the surveyor's role under the Torrens principle of title to support a cadastral system that saves the State and the public as much as possible from the cost of litigation to prove the location of their ownership rights.

The public and our clients expect cadastral surveyors to reinstate the boundaries of the land correctly in their original positions having due respect for the rights of the adjoining interests.

6.3 Further Work

The conclusions reached in this research have been based on a limited set of identification surveys. For the benefit of the profession this information needs to be expanded and the conclusions re-evaluated. My recommendations for further research in this area are:

- Conduct a similar analysis and comparison with a larger number of identification survey plans.
- Expand the research over more of the state of Queensland, not just the Brisbane/Gold Coast region.
- Compare cadastral surveys over the states of Australia

APPENDIX A Project Specification

University of Southern Queensland

FACULTY OF ENGINEERING AND SURVEYING

ENG4111/4112 Research Project
PROJECT SPECIFICATION

FOR:	**BRENT GOODWIN**
TOPIC:	ANALYSE ORIGINAL MARKS AND OCCUPATION USED TO REINSTATE BOUNDARIES FOR IDENTIFICATION SURVEYS
SUPERVISORS:	Shane Simmons
PROJECT AIM:	To analyse Identification Surveys in relation to the reinstated boundaries and how the surveyor has fixed the boundaries based on the original survey marks and occupation.
PROGRAMME:	**(Issue B, 14 April 2009)**

1) Research a number of Identification surveys lodged recently with the DNR
2) Complete radial searches over each Identification survey and gather original plans.
3) Analyse the original marks and occupation used to reinstate corners, lines (frontage, side, back) for each identification survey.
4) Determine the strength of each reinstatement
5) Look at how Identification Surveys have evolved the purpose of them, what are the problems within them.
6) Submit an academic dissertation on the research.

As time permits:

7) Further analyse more identification surveys to gather a wider range and a better determination of results.
8) Design a quality control form for identification surveys.

AGREED:

_____ (student) Date: 15 / 4 /2009

_____ (supervisor) Date: 16 / 4 /2009

Examiner/Co-examiner: _____ 22/07/09

Figure A.1 Project Specification

APPENDIX B Field Quality Control Form

Field Quality Control Form

1.	Establishment of datum	Y / N
2.	More than 2 original reference marks connected for reinstatement	Y / N
3.	Angles and distances measured	Y / N
4.	All boundary line fixed	Y / N
5.	Reference marks noted if gone or not found	Y / N
6.	Additional reference marks placed	Y / N
7.	Connection to occupation or improvements	Y / N
8.	Non recorded marks noted	Y / N
9.	Anomalies considered and resolved	Y / N
10.	Check calculations	Y / N
11.	Boundary corners clearly marked and referenced	Y / N
12.	All holes filled in and made to look neat	Y / N
13.	All equipment recovered	Y / N
14.	Independent check on all marks found and placed	Y / N

Figure B.1 Field quality control form

APPENDIX C Form 13 v3

Form 13 – Version 3

Survey and Mapping Infrastructure Act 2003

CERTIFICATE FOR CADASTRAL PLANS

1 _____ hereby certify that the land comprised in this plan was surveyed by

2 _____ and that the plan is accurate, that the said survey was performed in accordance with the *Survey and Mapping Infrastructure Act 2003* and *Surveyors Act 2003* and associated Regulations and Standards and that the said survey was completed on

3 _____

4 _____
Cadastral Surveyor

5 _____
Director

Date :_____

5 _____
Director

---

1. I, (full name of Cadastral Surveyor (Individual)) or
(name of the corporation)

2. *If the certificate is signed by an individual, one of the following –*
   me personally or
   me personally and by (full name of registered person), (registration status of registered person) for whose work I accept responsibility or
   (full name of registered person), (registration status of registered person) for whose work I accept responsibility
   If the certificate is signed by a corporation, either –
   the corporation, by (full name of cadastral surveyor), cadastral surveyor, for whose work the corporation accepts responsibility or
   the corporation, by (full name of registered person), (registration status of registered person), for whose work the corporation accepts responsibility, under the supervision of (full name of individual cadastral surveyor), cadastral surveyor

3. Date

4. Cadastral Surveyor Signature (only if Individual)

5. Corporation Signature (only if corporation registered as a Cadastral Surveyor)

Note:- A corporation must sign in accordance with its constitution.

Figure C.1 Form 13 Certificate for cadastral plans

APPENDIX D Good Quality Identification Survey

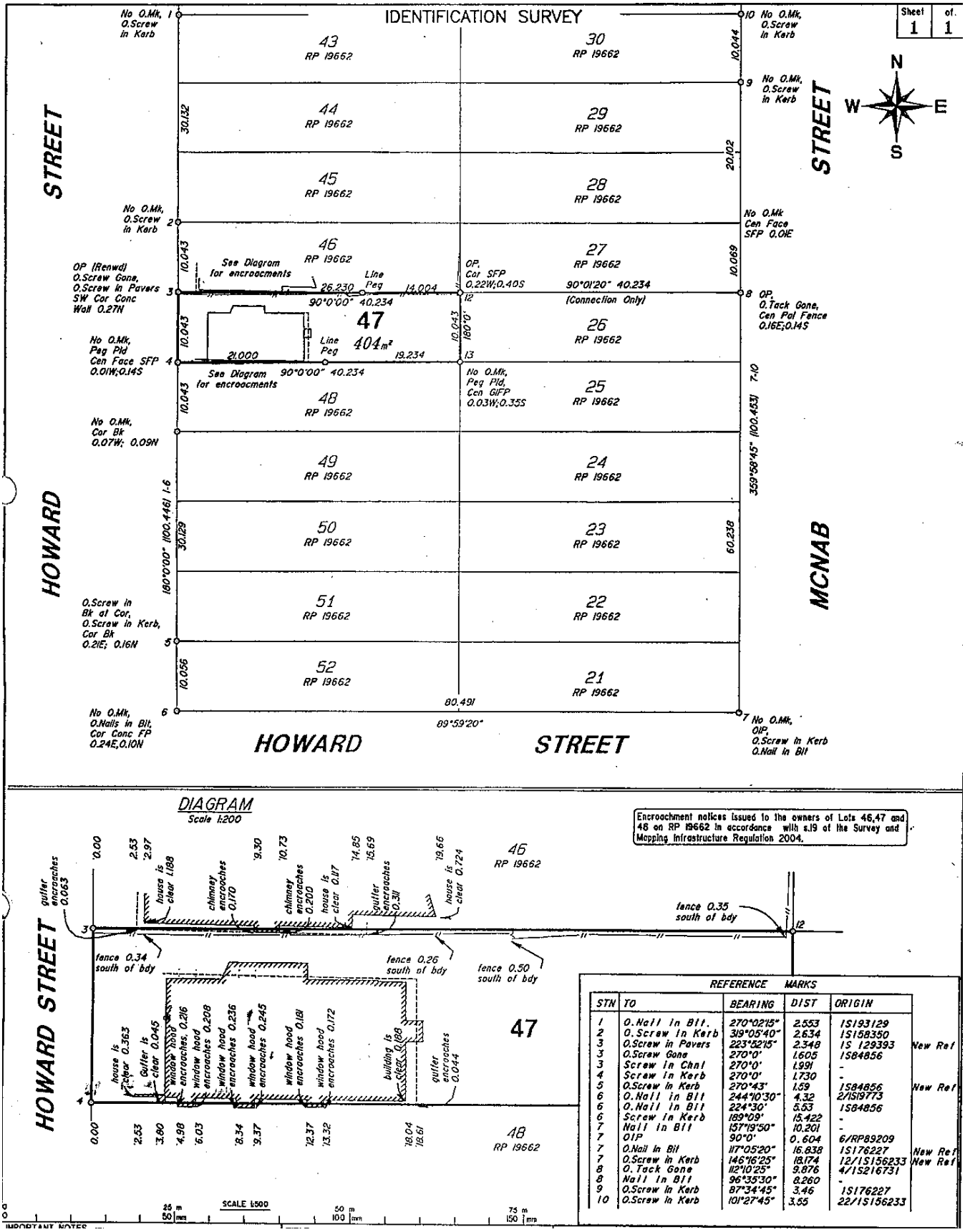

Figure D.1 Good quality identification plan

APPENDIX E Bad Quality Identification Survey

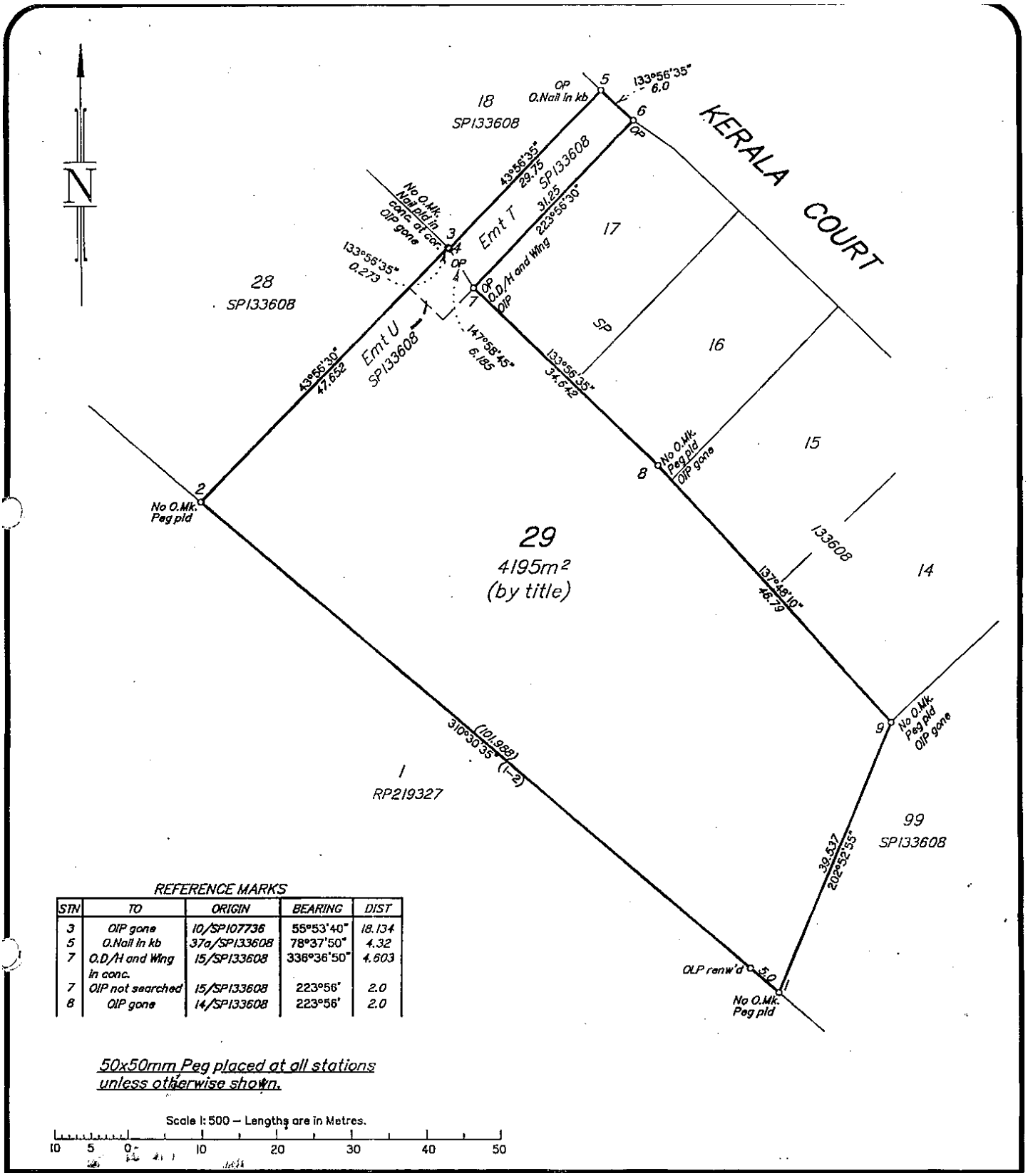

Figure E.1 Bad quality identification plan

REFERENCE LIST

Brown, AG 1980, *Law Relating to Land Boundaries and Surveying*, Brisbane, Association of Consulting Surveyors, Queensland

Cadastral Survey Requirements, Version 5.0 2008

Cook, J 1999, *Boundary Reinstatement Surveying*, Surveying and Mapping Industry – 3rd Level Production Functions, QUT Paper, Brisbane

Cooley, TM 1881, *The Judicial Function of Surveyors*, Supreme Court of Michigan

Labour Economics Office South Australia, DEEWR 2009

Dupuy, BC, *Re-Survey of Freehold Lands*, Queensland Surveyor, 30th June 1915, pp.135-149

Hamer, KE 1967, Some aspects of title boundary location in New South Wales, *The Australian Surveyor*, Vol. 21 No.6

Halsbury, 1931-1940, *Laws of England*, 2nd Edition.

Jensen, G 2007, '*Reinstatement of Cadastral Boundaries*' Paper, Version 1

Ovans, N 2006, '*The Judicial Function of Surveyors*' Essay

Pinkham, D 2004, *Investigation into the Placement and Connection of Permanent Survey Marks for Cadastral Surveys*, Thesis USQ, Brisbane

Priebbenow, R 2008 'What's Happening to the Cadastre?' Part 1 – Reinstatement of Boundaries, Department of Environmental and Resource Management

Queensland Government, Survey and Mapping Infrastructure Act 2003, Government Printer

Queensland Government, Surveyor's Act 1977, Government Printer

Queensland Government, Surveyors Act 2003, Government Printer

1996, *Reinstatement Principles and Practice*, Association of Consulting Surveyors Queensland, Brisbane

Robillard, WG, Wilson, DA & Brown, CM 2003, *Boundary Control and Legal Principles*, John Wiley & Sons, New York

Robillard, WG, Wilson, DA & Brown, CM 2006, *Evidence and Procedures for Boundary Location*, John Wiley & Sons, New York

Rules and Directions for the Guidance of Surveyors, various 1848-1964 under the Surveyor-General's Department, Surveyors Board etc for Crown and Real Property Surveys, Queensland

SIBA Resources, SIBA Australia, Deakin, ACT accessed 28/05/2009, URL: <*http://www.xyz.au.com/public/general_info/details.cfm?info_id=50&sub_cat=16&category_id=2*>

Skelton, RH 1930, *The Legal Elements of Boundaries and Adjacent Properties*, Bobbs-Merrill Co, Indianapolis

Spatial Sciences Institute, South Brisbane, Queensland, accessed 10/05/2009, URL: http://www.spatialsciences.org.au/

Steggall, S 2001, *Evolution of Digital Reinstatement Methods Within Private Cadastral Organisations*, Thesis QUT, Brisbane

Surveyors Board 2009, *The Surveyors Board of Queensland*, Spring Hill, Queensland, accessed 10/05/09m URL: http://www.surveyorsboard.com.au/

Toft, GS 1967 *'Australian Cadastral Concepts'*, The Australian Surveyor, Vol.21 No.6

Weingarth, J *Notes on Identification Surveys*, The Surveyor, Vol.XXVI, No.3, Sydney, March 31, 1913

Willis, RG 1945, *Notes on Survey Investigation*, (Honorary Fellow of the Institute of Surveyors, Registrar-General of the State of New South Wales 1932-1945)