

Preservation? of Survey Reference Marks

Fred de Belin

Manager Survey, City of Ryde

freddebelin@ryde.nsw.gov.au

ABSTRACT

In July 2009, the annual Capital Works Program planned to construct new concrete footpaths at 25 sites within the City of Ryde. Thinking that any new path may cover or destroy existing underground survey reference marks, it was decided to investigate the impact of these new footpaths on survey marks. Reading of all the Deposited Plans in the affected streets revealed that 60 reference marks had been placed (from 1921 to the 1960s). Field investigation of each mark position concluded that only 22 marks existed in situ. That is... two thirds are gone! Gone through various misadventures: driveways, services, drainage works, land regrading, fencing and retaining walls, or evaporation? It seemed clear that these 22 marks needed to be preserved during the footpath construction phase. How could this be achieved? Maybe through something visible on the ground surface to indicate the presence of a mark? A metal cover box seemed an ideal solution! Because, once placed, subsequent visits require merely the lifting of a lid and not twenty to forty minutes of probing, digging, finding the mark and restoring the ground, only for the next surveyor to repeat the same process when he/she arrives several years later, having no clue that the mark even exists. A depression in the ground only shows that someone else has looked there before! This paper investigates issues such as placing cover boxes, benefits for the surveying industry, involving the surveying industry and the Land Titles Office, and back to the future... from here to where. It also tries to answer the questions "Does anybody actually care?" and "Should we do nothing and let old reference marks go the way of alignment surveys and alignment stones?"

KEYWORDS: *Preservation, underground, reference mark, cover box.*

1 INTRODUCTION

Beginning with Ordinance 32 (23 June 1920) under the Local Government Act 1919, surveyors were required, when creating new roads, to reference mark such new roads with concrete blocks, placed on one side of the road only, at terminal points and bend points and being buried underground to a nominal depth of 4" (100 mm). The prescribed offset distance was 42" = 3'6" (1.067 m). Note that the mark, "concrete block", is quite a substantial thing and requires a mighty effort to be placed correctly. Obviously, it was meant to last!

By 1933 (1 July), the offset distance was reduced to 18" = 1'6" (0.457m), presumably to better preserve reference marks from the scourges of concrete footpaths and service utilities. By 1964 (30 October), the losses of survey reference marks due to telecommunication trenching were shouting out that a new method of preservation be tried. Surveyors were given the freedom to place reference marks wherever they felt that the mark had the best chance to last a long time: "...placed ...so that the mark is not likely to be disturbed by existing or proposed services..." (Ord. 32).

High visibility was considered an advantage and large masses of concrete, close by, in the form of kerb and gutter, suggested stability and permanency, so pairs of drill hole and wing (DH&W) in kerb became the standard. By 2010, wholesale losses of DH&W in kerb have been caused by roundabout construction, replacement of kerb and guttering and drainage upgrades. Thus the search for reference marks is focussed back to the older, underground survey reference marks!

This paper is presented in two parts:

1. Preservation of underground marks by metal cover box.
2. Preservation of marks by re-establishment.

2 PRESERVATION OF UNDERGROUND MARKS BY METAL COVER BOX

In July, 2009, I became aware that, in the annual Capital Works Program, it was planned to construct new concrete footpaths at 25 sites within the City of Ryde. Thinking that any new path may cover or destroy existing underground survey reference marks, it was decided to investigate the impact of these new footpaths on survey marks. Reading of all the Deposited Plans in the affected streets revealed that 60 reference marks had been placed (from 1921 to the 1960s). Field investigation of each mark position concluded that only 22 marks existed in situ. That is...two thirds gone! Gone through various misadventures: driveways, underground services, drainage works, land regrading, fencing and retaining walls, evaporation?

It seemed clear to me that these 22 marks needed to be preserved during the footpath construction phase. How to achieve this? Something visible on the ground surface to indicate the presence of a mark, like a metal cover box, seemed an ideal solution (Figure 1).



Figure 1: Metal cover box indicating presence of survey mark.

Once placed, subsequent visits require merely the lifting of a lid and not twenty to forty minutes of probing, digging, finding the mark and restoring the ground, only for the next surveyor to repeat the same process when he arrives several years later, having no clue that the mark even exists. A depression in the ground only shows that someone else has looked there before!

The metal cover boxes used by Ryde City are stock standard with ‘SURVEY’ embossed on a circular lid. From the foundry the boxes are painted black and this is how they were initially used. It was soon decided to paint the lids white to maintain the survey mark colour convention and to distinguish them from the yellow painted SCIMS marks, stop valves and hydrants. A minor bonus is that little white squares are clearly visible on the Ryde aerial photos, indicating where some of the marks are!

Back to the footpath construction... 18 cover boxes were placed. Proximity to concrete driveways prevented the placement of the other 4. The sites of the marks were noted on the construction plans, with text saying “SURVEY REFERENCE MARK - PRESERVE AT ALL COSTS”. After construction, all 22 had survived (Figure 2).



Figure 2: Metal cover boxes clearly identify the presence of survey marks during construction.

For deeply-buried reference marks, 150 mm diameter PVC tubing allows access from the surface to the top of the mark (Figure 3).



Figure 3: Using PVC tubing to allow access to deeply-buried marks.

The negative... Cover box has a cost. Field inspection required after construction to correct any misadventures that occurred during construction (e.g. concrete spillage onto mark or cover box shift).

The positive... One person operation. Footpath construction adjusts cover box to finished level.

Here I must acknowledge and thank NSW Land and Property Information (LPI) for the generous donation of our first 20 cover boxes. Subsequently, Ryde City has been purchasing cover boxes directly from the foundry and placing them during the course of normal survey work, as the finding of buried reference marks occurs.

2.1 How to Increase the Rate of Preservation?

I thought that the easiest way to locate marks would be via the private sector, with surveyors who worked in the Ryde City area, contacting us with a find and location. It seems so simple:

1. Surveyor locates buried mark during fieldwork.
2. At calculation or plan drawing phase, surveyor sends e-mail to Survey section at Ryde City telling of find.
3. Said mark is promptly cover boxed and preserved by Council.

I should bring to your attention the subdivision of Dobson Crescent in Ryde where the surveyor in 1956 was fifty years ahead of his time. In his Deposited Plan 24598 (Figure 5) he placed 27 concrete block reference marks to define the street, i.e. a mark at every 12.19 m! He obviously foresaw how many marks would be lost, as only 10 survive today!

A suggestion for what to show on plans:
(DP24598)
RM CONC BLK FD (COVER BOX)
41` 15` 0.465
(0.4 DEEP)

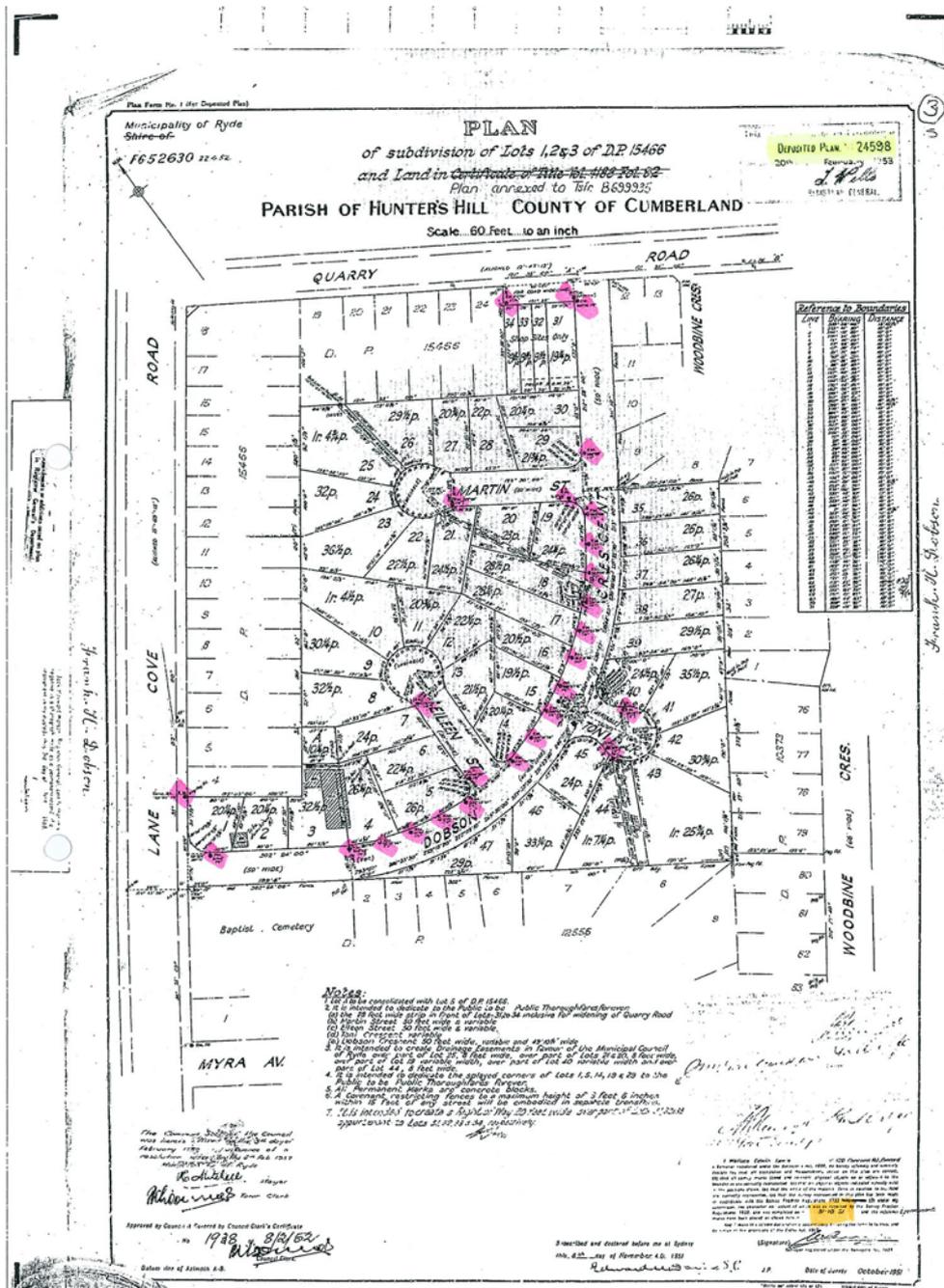


Figure 5: DP 24598, showing 27 concrete block reference marks placed in 1956.

2.3 What is in the Future?

With a couple of years' experience we are now in a position to foresee something of the future. In Ryde we will establish a database which contains information on each found reference mark, such as location, origin (placed by which DP), MGA coordinates, photograph and when recorded. This information can be illustrated electronically in a GIS layer (in our case, on RydeMaps).

Ryde already obtains annual Capital Works programs from the main underground services providers such as electricity. Knowing construction programs in advance, we can access the database and find which reference marks are in danger of disturbance. We know of 4 marks which have gone since being cover-boxed. Undergroundings of the electrical network and telecommunication network were the culprits! The rollout of the National Broadband Network could well be the next big threat!

By having the reference marks cover-boxed and well documented there is a chance that any losses could be subject to Section 24(1) of the Surveying Act 2002 which states that "a person shall not remove, damage, destroy, displace, obliterate or deface any survey mark unless authorised to do so by the Surveyor-General. In addition to a maximum penalty of 25 penalty units (which is currently \$2,750) a person found guilty by a court may be required to pay compensation up to \$10,000 towards the cost of reinstatement plus up to \$10,000 towards loss or damage suffered."

May I end Part I with two unsolicited testimonials:

"In recent years I ...have experienced the pleasure of finding a number of the metal cover boxes over marks – this is a great initiative." (John Higgins)

"...I have been digging up a few blocks and GI pipes in the Parramatta area lately and wondering if they might start putting covers on like in the Ryde Council area. Any chance of convincing your Council neighbours of the benefits of preserving these marks?" (Chris Hill)

3 PRESERVATION OF REFERENCE MARKS BY RE-ESTABLISHMENT

Re-establishment requires locating the reference marks by survey and either

- (a) re-marking, after construction, in concrete footpaths and kerbs, or
- (b) connecting existing marks to the survey control network and preparing a plan for lodgement at LPI.

3.1 Re-marking

This requires the input of a registered surveyor. Essentially, re-marking means the placement of a mark in the same location as the reference mark which is to be destroyed. Registered surveyors are charged with maintaining the integrity of the State's cadastral system, and as such are best placed to oversee this re-marking. Apart from anything else, we are the ones who will be using these marks.

With advanced warning that a footpath or kerb is to be renewed, any threatened reference mark can be well surveyed before reconstruction occurs, and thus be replaced afterwards on

the new footpath or kerb. A drill hole and wing as the replacement mark should suffice, as a new laid kerb or path hardly looks as if it has been there for fifty years, making it fairly obvious that the reference mark is not the original one. Perhaps a drill hole with two wings cut would be more obvious as a re-mark!

Then there is the question of what to do when a service utility lays an underground supply and restores the ground surface with turf! Should a like mark be re-instated, i.e. block for block, pipe for pipe (even re-using the original mark, if retrieved)? Validation comes with subsequent public plans of survey (being lodged for registration at LPI) showing, adopting and referencing the new marks.

A 500 m section of concrete kerbing along Cox's Road was recently removed and replaced. Four survey reference marks (drill hole and wing in kerb) were destroyed. These were the only remaining marks prior to construction. Before construction, and during construction, a survey party was in attendance which enabled those marks to be surveyed several times. After construction I felt almost duty bound to re-mark those drill holes in their previous positions.

The negative... Big investment in time and effort: a double visit by field party, requiring co-ordination with construction. Risk of error in replacement.

The positive... New mark visible in same position as old.

3.2 Connecting

This means surveying the threatened reference marks and preparing a plan which shows the reference marks connected to the survey control network and MGA coordinates. The plans lodged are designated "for survey information purposes only". Shouldn't LPI be accepting such plans free of charge, thereby encouraging the survey fraternity to utilise this system for preservation of mark position?

The negative... Big investment in time and effort: a visit by field party and connection to control marks. No marks visible. Risk of error in connection. The need to prepare a plan for lodgement at LPI.

The positive... Public plan available showing connection to control network and MGA coordinates. A new mark can be re-instated in the future if required.

4 WHO CARES?

All new surveys are connected to MGA. If the reference marks go then the boundaries can be reconstructed from the MGA network. Even losing SCIMS marks... does it really matter... when we've got satellites? Maybe with reference marks it's the comfort of knowing that in some places you are spot-on and in exactly the same place as the original surveyor.

Times change, techniques change, expectations change.

How many trees have you marked recently?

When was the last time you saw an alignment post?

When was the last time you saw an alignment stone (Figure 6)?



Figure 6: Alignment stones.

5 CONCLUDING REMARKS

We, as registered surveyors, should be doing our darnedest to preserve the reference marks which still exist and we should be mindful of placing future reference marks in positions which will last a long time.

Does the surveying industry have a problem with re-instating a drill hole and wing? When we place an underground reference mark, such as a GI pipe, should we be required to place a cover box at the same time? A cover box is visible at the surface and shows the general public and adjacent property owner the existence of a valuable survey reference mark (Figure 7).



Figure 7: Metal cover boxes clearly identify the presence of survey marks.