

City of Sydney Permanent Survey Marks: Historical Context and Management into the Future

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ABSTRACT

The City of Sydney is in a unique position with regards to boundary surveying in NSW. The Sydney Corporation Act 1879 effectively aligned the streets based on kerbs as laid, the geometry of which is maintained today by a network of permanent survey marks which also provide Map Grid of Australia (MGA) and Australian Height Datum (AHD) control for surveyors. Unfortunately, the network has been severely impacted by reconstruction works over the last 30 years but, with the cooperation of DFSI Spatial Services, the network has been restored and indeed enhanced. Local Government has also recently gone through a significant change in reporting requirements, particularly around infrastructure asset management. Internally we have seen this as an opportunity to embed permanent survey marks into the mainstream of infrastructure asset management, like a road or a drain, with an acknowledged financial and community value. The replacement value of the City's permanent survey mark network alone is \$3.5 million. This recognition gives the impetus to gain management support to:

- *Complete periodic inspections of all marks in the Local Government Area (LGA).*
- *Annually review budget for mark maintenance and restoration.*
- *Improve mark retention through development application conditions, sympathetic design and contractor education.*
- *Participate in Dial Before You Dig.*

This paper begins with a brief history of the permanent survey mark network and the related placement, replacement and coordination activities. It then outlines the development of a register and mobile capability in our corporate asset management system to enable effective permanent survey mark asset management. This includes:

- *Creation, modification and historicising assets.*
- *Scheduling and completing periodic inspections.*
- *Raising and completing maintenance jobs and tracking progress.*
- *Updating information in the City's corporate Geographic Information System (GIS).*

The City of Sydney has recognised the importance of the permanent survey mark network and is utilising core corporate technologies and processes to better manage and protect this critical infrastructure.

KEYWORDS: *Permanent survey marks, survey infrastructure, asset management.*

1 INTRODUCTION

The City of Sydney (the City) was established in 1842 and since that time has grown and contracted as state governments have redrawn boundaries. Today, the City covers approximately 26.15 km² (Figure 1), has a population of over 200,000 and has approximately 1.2 million people in the area daily.



Figure 1: The City of Sydney boundaries.

As the City grew in the 1800s, better regulation of the property boundaries was required which led to the establishment of the Sydney Corporation Act 1879. This Act effectively aligned the streets and placed a statutory obligation on the City to establish and maintain a network of permanent survey marks to preserve the alignments. This obligation has presented many challenges to the City's surveyors, particularly the often destructive impact of reconstruction activities including the 2000 Olympic Games footway reconstruction.

The City recognised the critical importance of the permanent survey mark network to the cadastral infrastructure of NSW, which has been emphasised by various sources (e.g. de Belin, 2012; Ward, 2014; DFSI Spatial Services, 2015). Together with Spatial Services, a unit of the NSW Department of Finance, Services & Innovation (DFSI), the City developed a comprehensive program to consolidate and (where necessary) re-establish the network. The coordination of the network followed and finally a City Alignment Recovery Plan was registered at DFSI Spatial Services.

The City's surveyors have reinforced the control network by developing processes and documentation around the preservation of the survey infrastructure that focus on education and incorporation of standard conditions on developments and construction activities. Importantly, survey infrastructure is now considered as a City asset in the same way as a section of road, tree or drainage line. This embeds survey infrastructure in the mainstream of infrastructure activity where an understanding of replacement value, maintenance cost and long-term renewal planning is required in order to gain budgetary support to ongoing funding.

To facilitate the capture of the necessary data, the City has developed an asset register, inspection regime and defect and job tracking process for permanent survey marks using the Corporate Asset Management System (CAMS) provided by Confirm (Pitney Bowes Software, 2017). The solution uses desktop and mobile technology, interfacing to the corporate Geographic Information System (GIS) to allow City staff to view and track activity against permanent survey marks in the same way as other infrastructure.

This paper outlines the historical significance of the permanent survey mark network and the related placement, replacement and coordination activities in order to consolidate the survey infrastructure. It then describes the use of standard corporate applications to enhance both the protection and management of this critical infrastructure.

2 CITY OF SYDNEY SURVEY INFRASTRUCTURE HISTORY

Although the City of Sydney as we know it today came into being in 1842, land development of the area had been going on for some 50 years or so before this date. With respect to survey infrastructure, particularly within the CBD, the first significant legislation of note is Act 4 Wm IV No. 7, which (amongst other things) provided for the appointment of a Town Surveyor or Surveyors whose duty it was to approve and supervise footway improvements, the opening of footways and carriageways and several other items relating to development in and about roads. This legislation also required the Surveyor General to survey and mark the town, marking with posts the corners and intersections of the streets (Cadogan, 1997).

In 1835 came new legislation, Act 5 Wm IV No. 20, “an Act for better regulating the alignment of streets in the Town of Sydney”. This Act makes reference to the alignment posts placed under Act 4 Wm IV No. 7 and made it unlawful to build within 12’ of the curb-stone of the footway. It also required the Surveyor General to “lay before the Governor a plan of the carriageways and footways set out as part of the alignment process”.

1842 saw the first of several Incorporation Acts before the Sydney Corporation Act of 1879. The 1879 Act repealed all previous road and alignment legislation and gave Council full control over the streets within its boundaries. Importantly, it also declared that the City’s sandstone kerbs in existence at the time were monuments, meaning that numerous streets became defined by measurement from the kerb line.

As kerbs were replaced and alignment posts lost due to age and attrition, the recovery of alignments became increasingly troublesome. In the late 1920s, City Surveyor Victor Waine floated the idea of defining alignments with a system of permanent survey marks rather than from kerbs. The idea faced significant opposition, partly due to the Great Depression limiting works to essential maintenance and partly from people who were of the opinion that the alignments could only ever be defined from the monuments (Cadogan, 1997).

Eventually reason prevailed, and City of Sydney PM 1 (a brass tack set into a lead plug in a concrete foundation) was placed on Parramatta Road “3’ south of the northern kerb line of Parramatta Road on City Boundary at Orphan School Creek” (Figure 2).

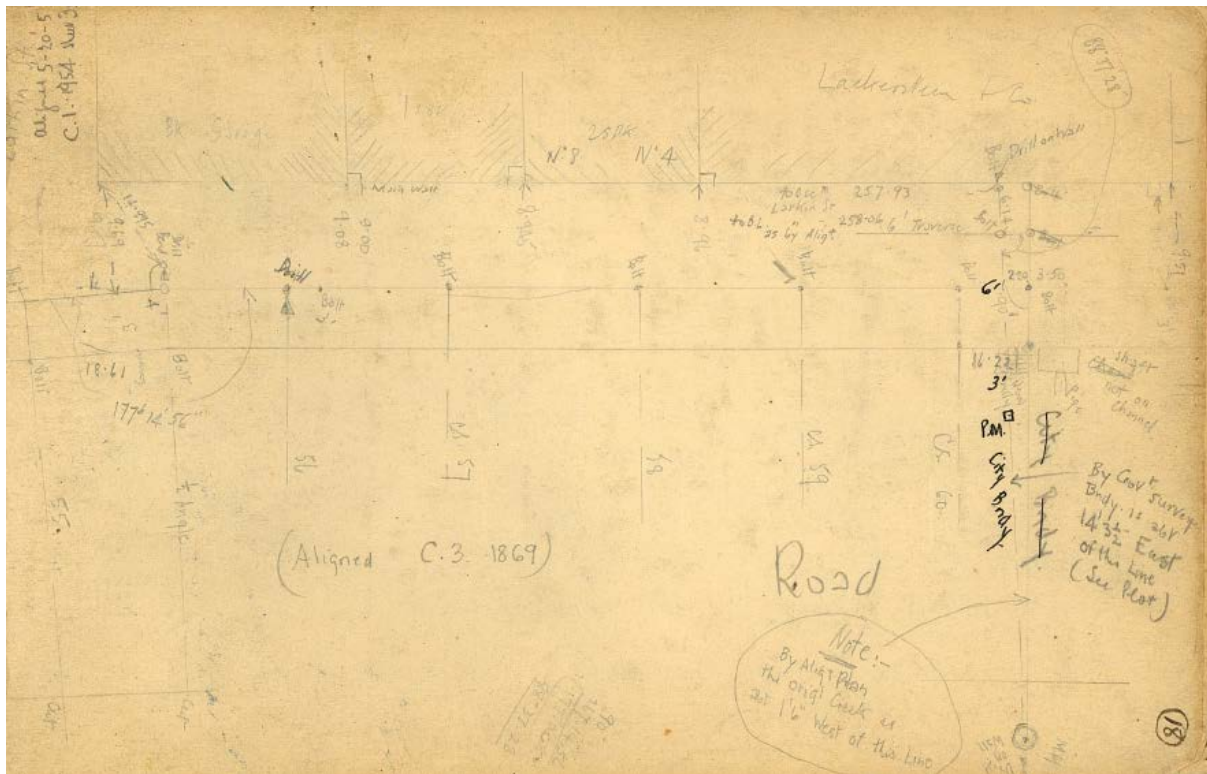


Figure 2: Field Book 160 Fol. 18, showing the marking of City PM 1.

In 1986, City Surveyor Thomas Clarke replaced the original mark with a brass bolt and renumbered it PM56546 (Figure 3) in order to enter the mark into the Survey Control Information Management System (SCIMS – see Kinlyside, 2013). Incidentally, as of June 2015, the mark was still in situ (although Orphan School Creek is not), despite the best efforts of road resurfacing crews (note the gouge marks on the lower edge of the box in Figure 3).



Figure 3: PM56546, formerly City PM 1.

Of course, within the City there are now a significant number of Permanent Marks (PMs), State Survey Marks (SSMs) and Cadastral Reference marks (CRs) placed by various people and organisations. At present, there are approximately 2,000 'live' SCIMS marks, around 1,000 City of Sydney alignment PMs not yet in SCIMS and an (as yet) unknown number of CRs, although we are in early discussions with DFSI Spatial Services about the cadastral back capture as a way of identifying and preserving this information as well.

3 CITY ALIGNMENT RECOVERY PLAN

After Sydney won the right to host the 2000 Olympic Games, then Lord Mayor Frank Sartor initiated a major City beautification program, including the widening of footways and major pavement upgrades. As a result of these works, numerous permanent survey marks were lost.

In the years following the Olympic Games, the City's survey team under Mr Peter Godfrey Harris (OAM) redefined the alignments and replaced around 650 missing permanent survey marks (Cadogan, 2012). This involved relocating the original position of each mark from field notes, followed by construction of new permanent survey marks, many of which now lie in the widened footway, improving accessibility and (hopefully) lifespan – although recent works in the City are again placing the alignment marks under threat.

The new marks helped re-establish the alignments of many City streets, however they still lacked high-accuracy Map Grid of Australia (MGA) and Australian Height Datum (AHD) values to further increase their utility. In a collaborative effort between the City and DFSI Spatial Services, the entire network of CBD permanent survey marks was levelled and traversed over the period of 10 years – a great example of governmental cooperation. DFSI Spatial Services surveyors collated all of the data that was collected and carried out a least squares network adjustment that resulted in MGA coordinates and AHD values being determined for a large number of marks within the network.

It was also decided that the information should be collated and put on public record as a way of making the alignment information easily accessible. The end result of all these efforts is a 71 page Plan of Survey Information, DP1196090, showing the network of marks and their relationship to the boundaries of the City's streets and the 1879 kerb lines (Figures 4-7). The plan took four years to draft and was lodged at DFSI Spatial Services on 30 April 2014.

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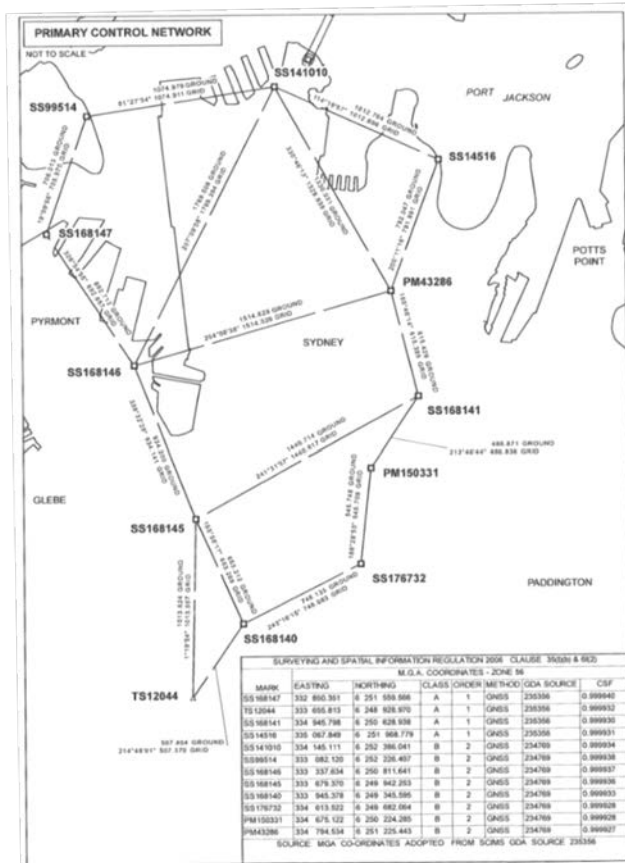


Figure 5: The control network for DP1196090.

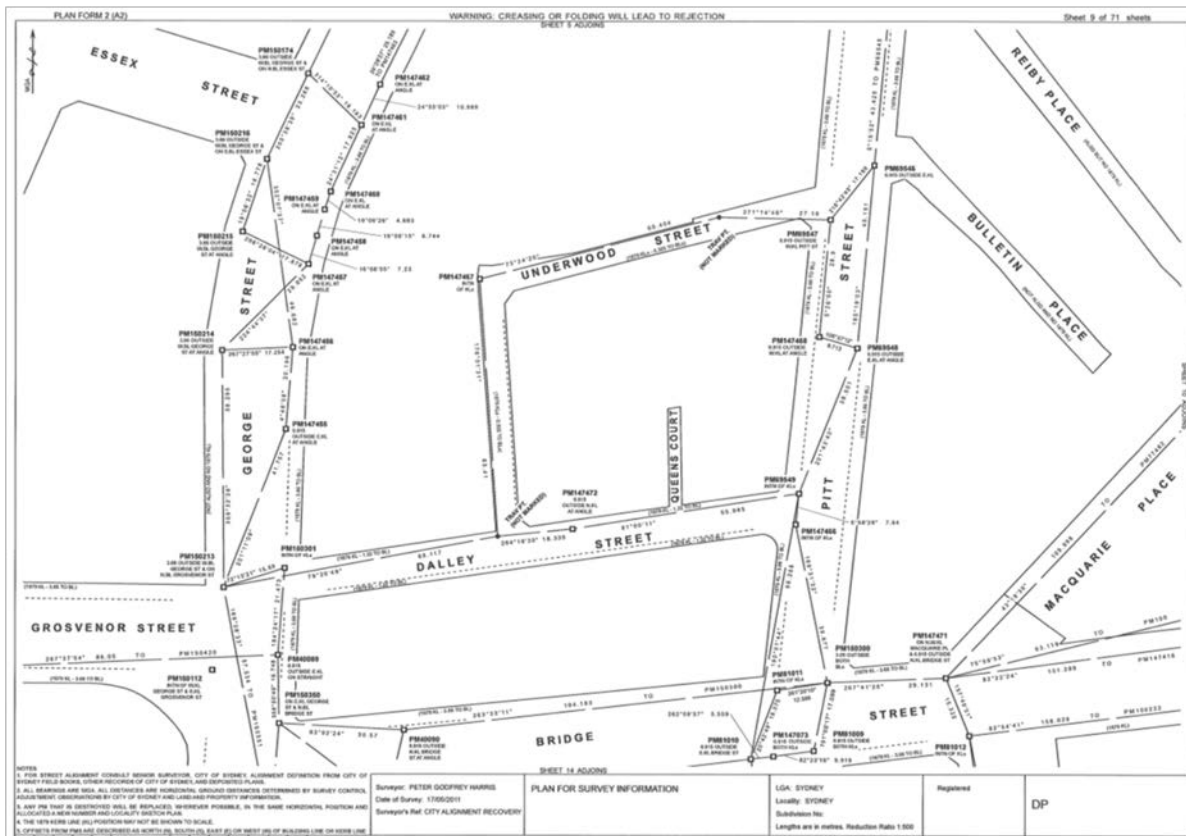


Figure 6: DP1196090, showing part of the alignment of George Street.

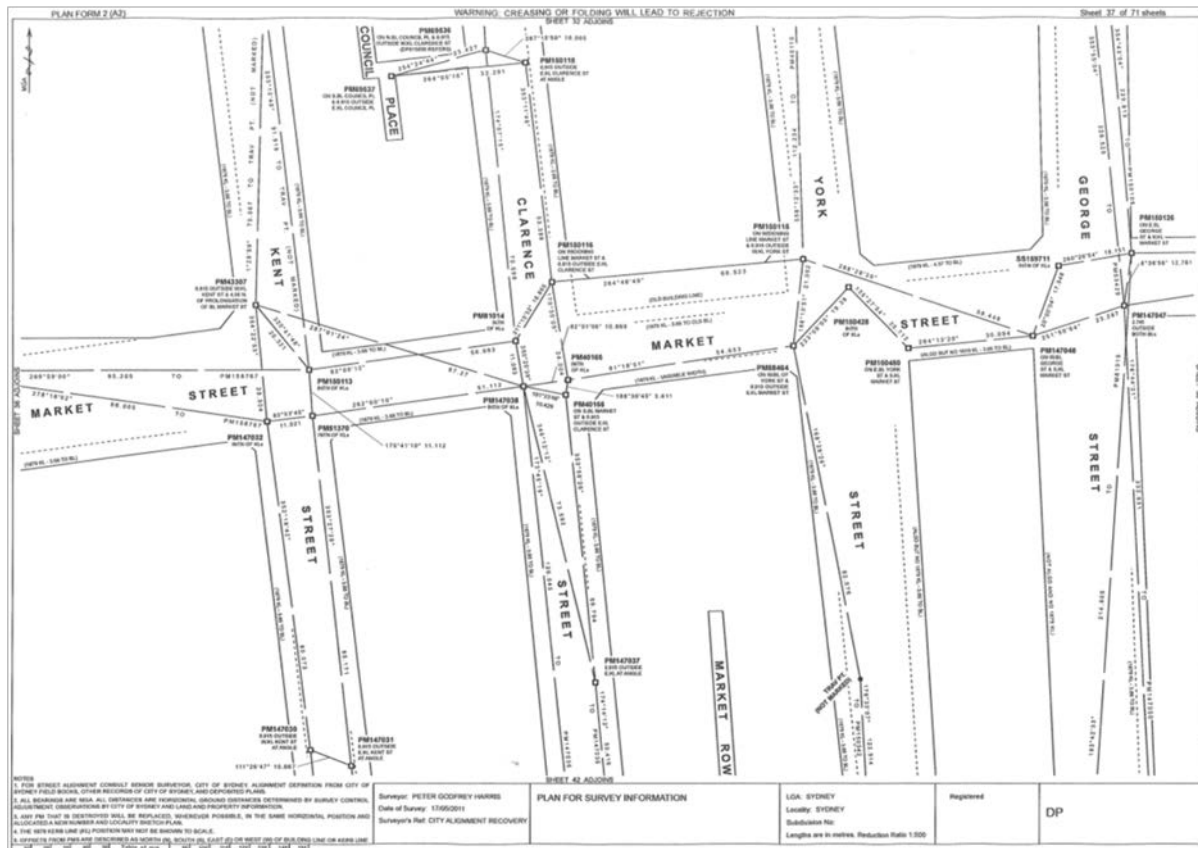


Figure 7: DP1196090, showing road widening in Market Street, with reference to 1879 kerb lines.

4 PRESERVATION OF SURVEY INFRASTRUCTURE & DIAL BEFORE YOU DIG

In a quantum leap of thinking about management of survey infrastructure, the City has within the past 3 years identified survey infrastructure as an ‘asset’ that should be managed and cared for as any other asset. This has involved a three-pronged approach:

1. Education – Through better education (of internal teams as well as construction contractors and the general public) it is believed that we can slow the attrition of survey infrastructure or at least ensure that the information is adequately preserved or replaced.
2. Funding – Recognising that marks will suffer attrition as well as wear and tear and hence allocating budget and resources to maintain and replace marks as needed.
3. Programmed asset inspections – Through regular inspections of mark functionality, we can identify problem areas, schedule maintenance or replacement works, and maintain and eventually improve network functionality.

To this end, the City has a number of initiatives currently under way:

- Standard charge for the replacement of survey infrastructure that can be levied on private developers, other government bodies and on our own internal teams.
- Conditions placed on Development Applications (DAs) relating to the preservation of survey infrastructure.
- Meet with and present regularly to internal teams and contractors about the importance of survey infrastructure to encourage sympathetic design.
- Seek funding each year for renewal and replacement, in keeping with asset management principles.

- Instated a rolling program of asset condition assessments, with the aim of ensuring that each known mark is inspected at least once every 5 years.
- Uploaded the permanent survey marks into Dial Before You Dig (DBYD) with information on the end user's responsibility under the Surveying and Spatial Information Act and information about how to proceed with survey infrastructure.
- Added the DBYD response as a condition of obtaining a Road Opening Permit, which will allow us to monitor works and recoup costs if and when marks are destroyed.

The experience with DBYD has been both challenging and encouraging. Initially, the manual processing of enquiries (i.e. each one was read, an appropriate map selected and individual email responses issued) proved problematic. We were receiving around 150 enquiries per week and each one was taking an average of 5 minutes to process, meaning we were spending 12.5 hours each week just on this task!

Armed with this information and the 'carrot' that other asset classes could be added for no additional cost, we successfully applied for funding for an automated reply service. Our DBYD service now has the City's survey, stormwater and electrical infrastructure uploaded and, as of January 2017, has handled in excess of 25,000 enquiries over 19 months.

Anecdotally, we believe that our initiatives are working. Certainly we have received plenty of enquiries and feedback from the public regarding DBYD searches, DA conditions and other survey infrastructure matters. Changes are also noticeable in the field, e.g. service trenches diverted, sections of kerb and gutter with marks in situ being retained, and much closer cooperation with our construction crews.

5 ASSET MANAGEMENT AT THE CITY

An asset is defined as "a resource controlled by a Council as a result of past events and from which future economic benefits are expected to flow to the Council (NSW Government, 2013). The term 'asset management' is defined in the City's Asset Management Strategy 2011-2021 as "the combination of management, financial, economic, and engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner" (City of Sydney, 2012). Asset management is a 'whole of life' approach that includes planning, purchase, operation, maintenance and disposal of assets.

The City of Sydney is responsible for some \$8.8 billion in infrastructure, land, property, plant and equipment and spends about \$250 million on maintenance, renewal, upgrade and expansion of critical infrastructure per annum. The replacement value of the City's permanent survey mark network is \$3.5 million. The introduction of the Integrated Planning and Reporting legislation in 2009 placed a much greater responsibility on Councils to account for and plan for all existing assets under their control. The Integrated Planning and Reporting framework is shown in Figure 8.

The Resourcing Strategy supports the framework and includes the Asset Management Plan where the obligations of good governance are detailed. Figure 9 shows the Resourcing Strategy framework at the City together with the supporting asset management policies and strategies. All asset management activity at the City is overseen by the representative Asset Management Program Control Group.

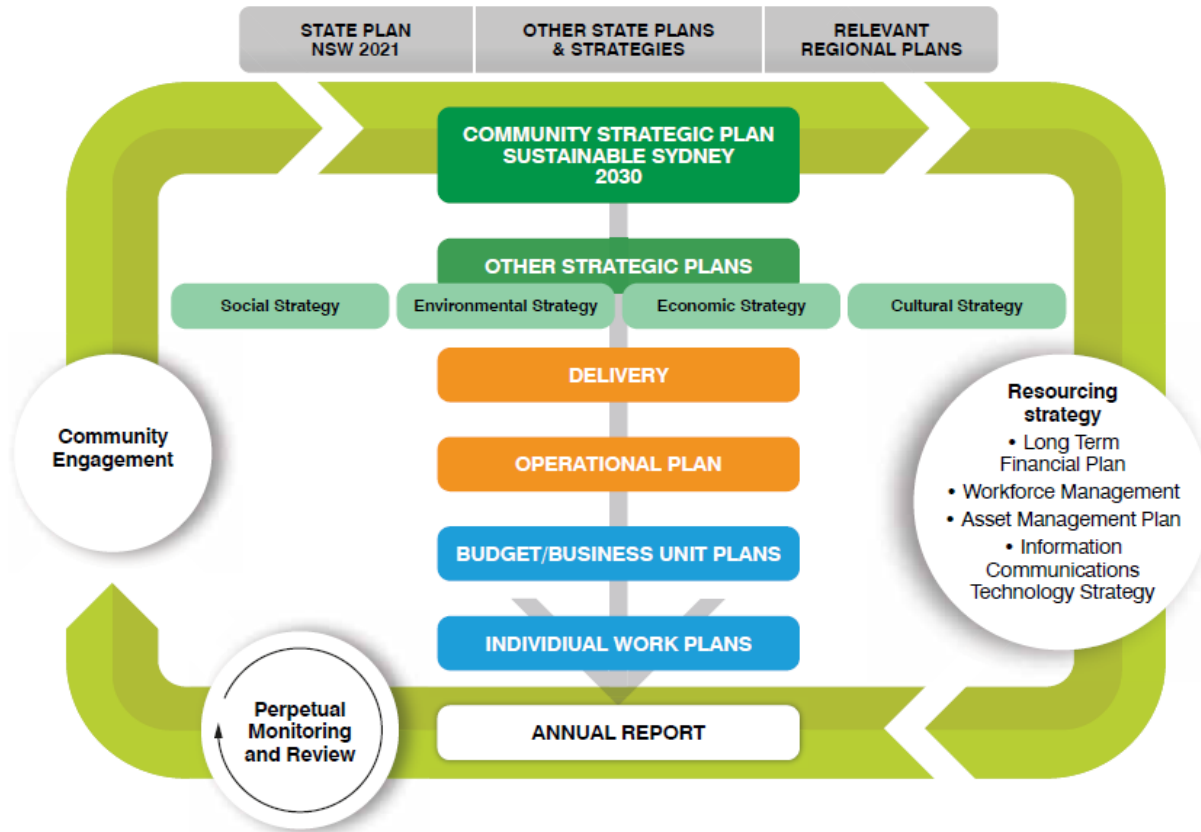


Figure 8: Integrated Planning and Reporting framework.



Figure 9: Resourcing Strategy framework.

The need to consolidate asset related information into a corporate single register and to integrate and manage that corporate information was clearly identified as a priority in the City's asset management policy and strategy. In response, the City issued a tender and subsequently purchased and progressively implemented the enterprise Confirm Corporate Asset Management System (CAMS) under contract with Pitney Bowes Software (2017).

CAMS is now an integral part of the City's suite of corporate applications and represents a long-term and ongoing commitment (over the next 10-20 years) of time, money and resources to improve knowledge and capability, develop analysis tools and meet our Integrated Planning and Reporting requirements. Figure 10 shows a schematic of the modules of CAMS. The system contains some 270,000 assets and is supported by a mobile application called ConfirmConnect.

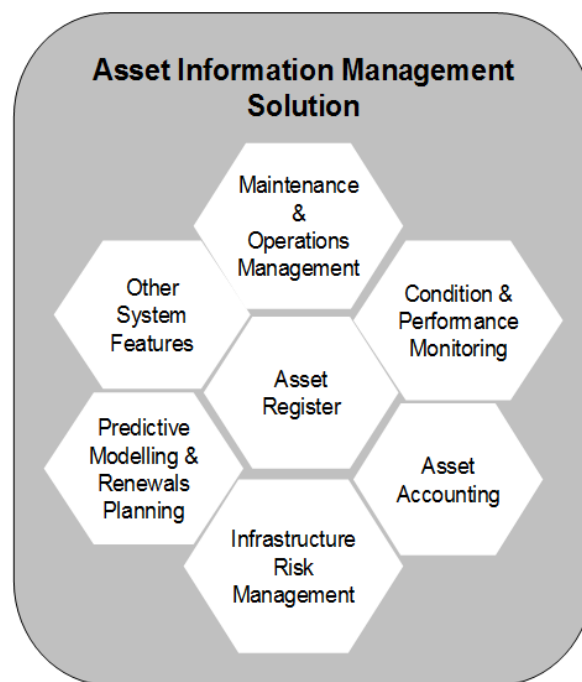


Figure 10: CAMS modules.

6 MANAGING PERMANENT SURVEY MARKS USING ASSET MANAGEMENT PRINCIPLES

In the last 2-3 years the use of CAMS has moved rapidly from a primarily desktop application to an integrated mobile solution using the ConfirmConnect application. The City has successfully implemented a full mobile solution for contractors managing street trees, which includes asset collection, inspections, maintenance management, job completion and transfer to the corporate GIS to monitor progress. It became apparent that this type of application was ideally suited to the management of permanent survey marks with the full work history and costing capability.

6.1 Asset Register

The process of developing an asset register structure was commenced by a group including the City's surveyors, asset system and GIS staff. Importantly, as not all permanent survey marks in the City are recorded in SCIMS, the register needed to be flexible enough to include

all marks that the City surveyors wanted to monitor. The register needed to include:

- Unique numbering and address information.
- SCIMS detail where appropriate.
- Specific City of Sydney data such as field books and audit areas.
- Valuation and asset condition information.

Following significant discussion, a structure was agreed and the difficult task of formatting the existing data into import files completed. The data was initially loaded into a training system so that any issues relating to the look or content could be ironed out. The task of formatting the data for import was completed by Pitney Bowes but the import itself was performed by City staff. An example of the register is shown in Figure 11.

Attributes	Additional	Valuation	Geography	History	Referenced by
NO	.00 Number				
PSM-SCIMS Status	N - Not Found		Notes		
PSM-PM Cover Box Depth	120mm		Notes		
PSM-Easting	334177.215				
PSM-Northing	6250488.074				
PSM-Horizontal Class	C-Cadastral control surveys		Notes		
PSM-Horizontal Order	4 - Moderate rel.		Notes		
PSM-AHD Height	22.702				
PSM-Vertical Class	LC - 3rd Order levelling <12		Notes		
PSM-Vertical Order	L3 - Level - high rel.		Notes		
PSM-Mark Owner	Unknown		Notes		
PSM-Mark Significance					
PSM-Alignment Position					
PSM-Audit Area	N Zn 10 - Centrepont		Notes		
PSM-CoS Field Book					
PSM-Register					
PSM-Comments					
PSM-DP Connections					
PSM-AMG Zone	Zn 56		Notes		

Figure 11: Survey mark asset register.

6.2 Condition Assessment

A key aim of the project was to develop condition assessment criteria and track the changes to those conditions over time. Again, the condition types and criteria were developed in-house and configured through Pitney Bowes. A general asset condition using standard asset management 1-5 scaling (i.e. 1 being very good, 2 good, 3 fair, 4 poor and 5 very poor) was included to allow analysis of the permanent survey mark network as a whole against other asset classes.

The City surveyors developed five specific condition types that represented the most important aspects of the permanent survey mark. These were box, foundation, number plate, pin and sketch plan observations, using a pass/fail basis and not any number scale. An example of the condition assessment configuration is shown in Figure 12.

The screenshot shows the 'Feature Condition' window with the following details:

- Record 1 of 1** (Navigation buttons: Back, Forward, Home, List, Restore, Update, Close)
- Site:** 4140 George Street, 516577
- Asset Id:** PM147050, **Address:** PM147050 - 4140 George Street - SYDNEY
- Asset Number:** 13,000,001.00, **PS-Permanent Mark**
- Condition Assessments Table:**

Observation Type	Grade	Score	Weighting
PSM-Box Condition	Not Applicable	.0000	.0000
PSM-Foundation Condition	Not Applicable	.0000	.0000
PSM-Number Plate Condition	Not Applicable	.0000	.0000
PSM-Pin Condition	Not Applicable	.0000	.0000
PSM-Sketch Plan Condition	Not Applicable	.0000	.0000
General Asset Condition	2 - Good	2.0000	1.0000
- Condition Rating:** 2.0000, **Failure Rating:** .0000
- Observe Type:** PSM-Box Condition, **PSBC** (dropdown)
- Grade:** Not Applicable (dropdown), **Score:** .0000
- Notes:** (empty text box)

Figure 12: Survey mark asset register – condition assessment.

6.3 Defects and Schedule of Rate Items

Permanent survey mark defects are a list of things that can be damaged or missing from a mark. A Schedule of Rate (SOR) item includes the remedies for those defects and generally has a cost associated with them. Tables 1 and 2 show the configured defects and SOR items relating to permanent survey marks, respectively.

Table 1: Defect types.

defect_type_code	defect_type_name
PM01	PSM-Missing/damaged numberplat
PM02	PSM-Illegible number plate
PM03	PSM-Missing/damaged pin
PM04	PSM/SSM-Disturbed/pos.uncertai
PM05	PSM/SSM-Sketch plan outdated
PM06	PSM/SSM-Plot error
PM07	PSM BOX-Broken lid; seized
PM08	PSM BOX-Missing lid;out of pos
PM09	SSM-Illegible number
PM10	SSM-Damaged nipple/centre pt.
PM11	SSM-Missing mark (alignment)
PM12	SSM-Missing mark (other)
PM13	SSM-Damage mark seat/bedding
PM14	TS-Any defect

Table 2: Schedule of Rate (SOR) items.

sor_item_code	sor_item_name	sor_item_full_name	Unit	Quantity	Price
PSM001	PSM-Stamp new plate; install on site.	PSM - Stamp new plate; install on site.	HOURL	2	180
PSM002	PSM-Remove plate; re-stamp or stamp new plate; reinstall	PSM - Remove old plate; re-stamp or stamp new plate; reinstall on site.	HOURL	2	180
PSM003	PSM-Survey to reposition; replacement pin; notify LPI	PSM - Survey to reposition; place recovery marks; drill and set replacement pin; calculations; prepare new sketch plan; forward original plan to LPI	HOURL	10	250
PSM004	PSM or SSM-Survey to confirm coordinates	PSM or SSM - Attend site and undertake Survey to confirm position/coordinates	HOURL	4	250
PSM005	PSM or SSM-Update sketch; notify LPI	PSM or SSM - Take sufficient measurements on site; draft updated sketch plan; forward original plan to LPI	HOURL	4	250
PSM006	PSM or SSM-Estimate correct coordinates; notify LPI	PSM or SSM - Estimate correct coordinates from GIS digitisation or surveyed measurements; notify LPI of updated coordinates to appropriate level of accuracy	HOURL	1	200
PSM007	PSM BOX-Remove box; replace; make good; reinstall number	PSM BOX - Remove box & replace with new; make good pin, footing & surrounding surface; reinstall or replace number plate	EACH	1	2500
PSM008	PSM BOX-Survey to reposition; make good; reinstall number	PSM BOX - Survey to reposition; place recovery marks; saw cut surround and hand excavate; inspect for pin; place box in correct location; make good pin, footing & surrounding surface; reinstall or replace pin and/or number plate	EACH	1	2500
PSM009	SSM-Grind down and re-stamp number in situ	SSM - Grind down and re-stamp number in situ	HOURL	2	180
PSM010	SSM-Re-drill in situ	SSM - Re-drill in situ	HOURL	2	180
PSM011	SSM-Survey to reposition; set new mark; notify LPI	SSM - Survey to reposition; drill & set new mark; calculations; prepare new sketch plan; forward original plan to LPI	HOURL	10	250
PSM012	SSM-Place new mark; survey; notify LPI	SSM - Place new mark in suitable location; survey to locate/coordinate; calculations; prepare new sketch; notify LPI	HOURL	5	250
PSM013	SSM-If mark stable, repair; if unstable remove and notify LPI of mark removal.	SSM - If mark is stable, clean seating; inject cement into gaps; make good surrounds. If mark is unstable, remove and notify LPI of mark removal.	HOURL	2	180
PSM014	TS-Refer to NSW LPI	TS - Refer to NSW LPI	EACH	1	1

6.4 Inspection Routes

The main priority of the project is to update assets, complete inspections and register defects in the field using the mobile application ConfirmConnect. This is achieved by placing all assets on an appropriate inspection route and transferring that route to the mobile device. The inspection routes are developed from the Audit Area attribute as shown in Figure 11.

6.5 Jobs

The last part of the process is to create and complete a job to rectify any permanent survey mark defect by application of the appropriate SOR item(s). Job creation can be either through a desktop or mobile process with the preference being mobile. An example of a job screen is shown in Figure 13.

Job Item No.	SOR Item Code	SOR Item Name	Item Quantity
1	PSM008	PSM BOX - Survey to reposition; place recovery marks; saw cut surround and hand excavate; inspect for pin; place box in correct location; make good pin, footing & surrounding surface; reinstall or replace pin and/or number plate	1.00

Figure 13: Job screen for a Permanent Mark.

6.6 Completing Inspection and Work using ConfirmConnect

The City surveyors can either send a complete audit area or a number of identified permanent survey marks directly to the mobile device via the desktop. The link is in real time through the 4G network. Figures 14-18 provide a number of screenshots of the mobile device screens to give the reader an idea of how the asset, condition, defect and job functionality is shown.

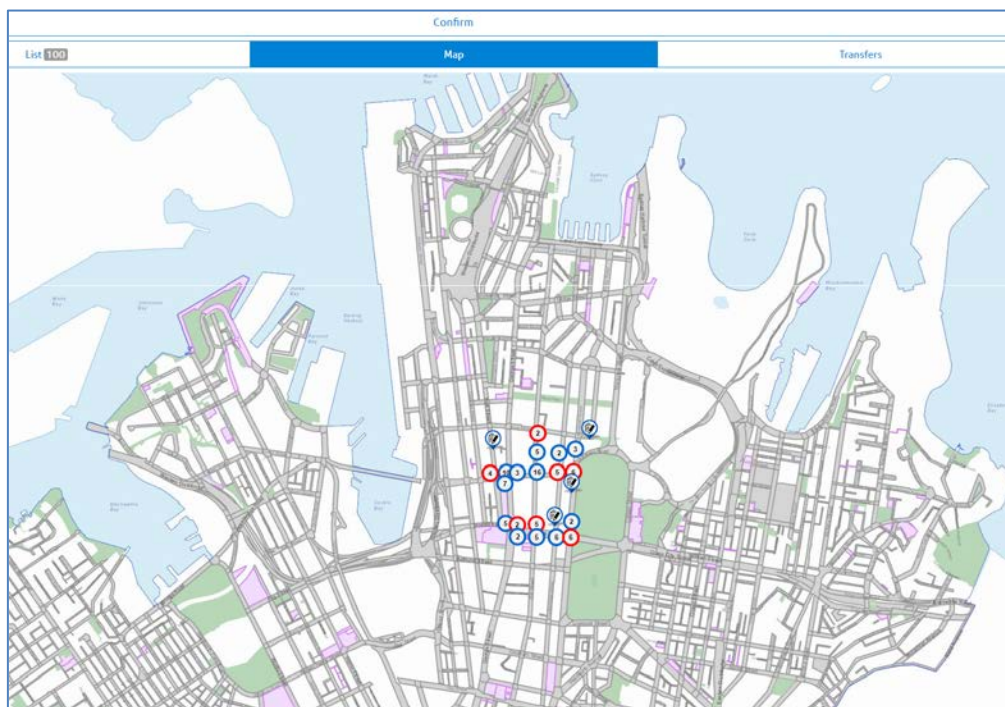


Figure 14: ConfirmConnect map.

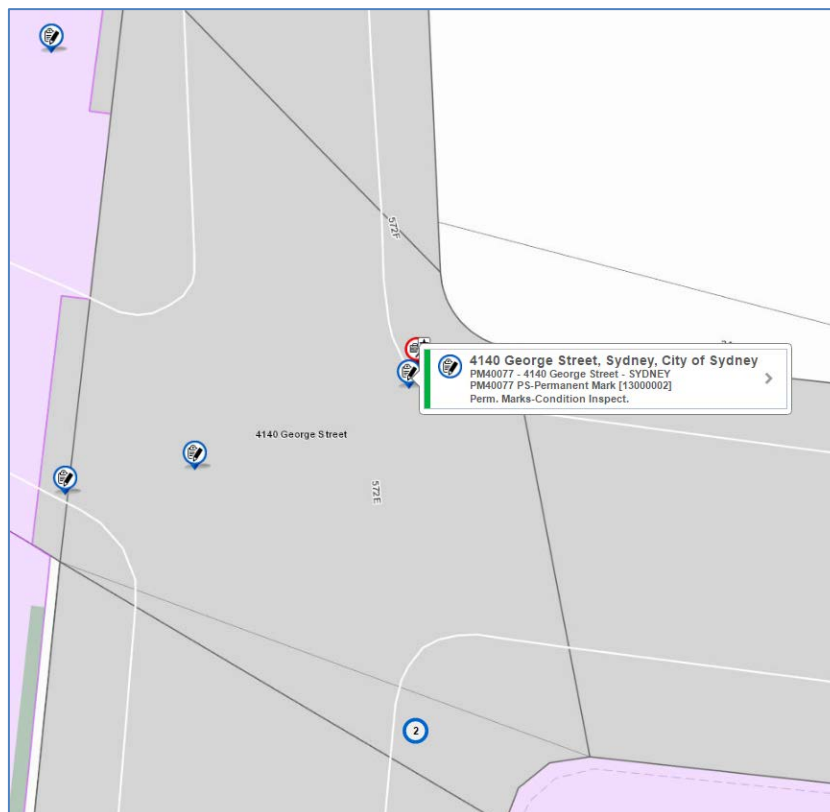


Figure 15: PM identified for inspection.

4140 George Street, Sydney, City of Sydney [13000002]	
Perm. Marks-Condition Inspect.	
PM40077	
PS-Permanent Mark (PSPM)	
Dead	<input type="checkbox"/>
R-Regional (RREG)	
PM40077 - 4140 George Street - SYDNEY	
notes...	
▼ Photo	
<input type="text"/>	
<input type="text"/>	
▼ Attributes	
NO	0
PSM-SCIMS Status	D - Destroyed (D)
PSM-PM Cover Box Depth	120mm (120)
PSM-Easting	334174.408
PSM-Northing	6250489.28

Figure 16: PM attributes – updateable in the field.

PSM-Number Plate Condition	Not Applicable (NA)
	► Defects
	notes...
PSM-Pin Condition	Not Applicable (NA)
	► Defects
	notes...
PSM-Sketch Plan Condition	Not Applicable (NA)
	► Defects
	notes...
General Asset Condition	2 - Good (2) Not Assessed (NA) 1 - Excellent (1) 2 - Good (2) 3 - Average (3) 4 - Poor (4) 5 - Very Poor (5)
Save Draft	
Complete	

Figure 17: Condition assessment and defect logging.

4140 George Street, Sydney, City of Sydney

PM58411, PS-Permanent Mark, PM58411 - 4140 George Street - SYDNEY [13000006]

NE corner of George and Park

broken lid, hit by truck (PSM BOX-Broken lid; seized)

Due: 20 Jul 2016 10:01

PSM - No Approval Required (PSNA)

No Code Allocated (NCA)

Job Committed
Donald Urquhart
Updating Job Status to Committed

► Status History

► Linked Documents

▼ Job Attributes

Add Attribute

▼ Photos

Camera icon

File icon

⚠ An initial photo has not yet been taken

Start

Other Status

Figure 18: Job completion screen.

7 CONCLUDING REMARKS

The City of Sydney has been responsible for the determination and reproduction of the alignment of the City's streets since 1879, a responsibility that is taken very seriously by the City's surveyors. The importance of the City of Sydney's permanent survey mark network to the survey infrastructure fabric of NSW is well known by surveyors at large and DFSI Spatial Services. Unfortunately, the general public and some sectors of industry do not share this understanding, and the physical existence has been threatened on a number of occasions.

This paper has detailed the history and challenges of maintaining the control network, both from a physical and organisational perspective, and the fantastic work done to replace many permanent survey marks and coordinate the network. To ensure the ongoing protection, management and improvement of the network in the future, the City has incorporated the use of modern technology and standard asset management practices to embed the permanent survey mark network into the mainstream of Council activity. The history of the permanent survey network is rich, and recognition and management of these assets using the City's normal infrastructure processes is a significant step in the continued protection and improvement of the control network.

ACKNOWLEDGEMENTS

The preservation and enhancement of the permanent survey mark network at the City of Sydney would not have been possible without the continued support of DFSI Spatial Services. The development of the mobile solution was a joint effort involving:

- City of Sydney Technical Services in City Operations.
- City of Sydney Asset Strategy and Systems in Chief Operations Office.
- City of Sydney Spatial Systems in Information Services.
- Pitney Bowes Software business support.

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