B11: Survey Infrastructure

Preservation, Replacement and Construction Details
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10.1 Survey Infrastructure

10.1.1 What is survey infrastructure?
Survey infrastructure includes a variety of structures, monuments, hardware and engraved markings located in the public domain (roads & footpaths) and placed by Registered Land Surveyors for various purposes and as required by State law.

They are generally known within the Surveying profession as either:
- Permanent Survey Marks, or
- Cadastral Reference Marks

10.1.2 Types of survey infrastructure

**Permanent Survey Marks** generally consist of a hardware fitting, set into a foundation, in one of the following forms (as prescribed in Schedule 4 of the Surveying & Spatial Information Regulation 2012 and the Surveying and Spatial Information Amendment (Permanent Survey Mark) Regulation 2015):
- A uniquely numbered brass or stainless steel disc set into concrete in the kerb, gutter or footpath (Type 1, Type 2 & Type 15 State Survey Marks (SSMs));
- A stainless steel pin or brass bolt set into a concrete foundation under steel cover box in the footpath or carriageway, together with a uniquely numbered plate affixed to the underside of the lid (Type 4 Urban (PM)).

The network made up of these items and their spatial positions make up the State Control Survey and also form the basis of the State’s cadastral (property boundary and land titling) system, both of which are key elements of the State’s infrastructure, supporting billions of dollars of investment, property rights and infrastructure projects.

**Cadastral Reference Marks** are generally less substantial than Permanent Survey Marks and may be in one of several forms (as prescribed in Schedules 2 and 3 of the Surveying & Spatial Information Regulation 2012), including:
- A drill hole with or without a chiselled wing placed in a kerb, gutter, footpath or wall;
- A non-corrodible nail with or without a chiselled wing placed in a kerb, gutter, footpath or wall;
- A metal spike, galvanised iron pipe or reinforced concrete block placed below the natural surface (generally within 1m of a property boundary corner);
- A timber peg (usually placed at a boundary corner);
- Alignment pins or stones, set into the kerb, gutter or carriageway;
- Any other approved mark, as outlined in the Regulations.

Cadastral reference marks support the State’s cadastre (property boundary and land title framework) and provide legally traceable evidence of the position of property boundaries.

10.1.3 Acts, regulations and penalties

All items of survey infrastructure (including permanent marks and cadastral reference marks) are protected under Section 24 of the Surveying and Spatial Information Act 2002 and penalties of up to $22,750 per mark may be levied for unlawful damage or destruction. For further details please visit [http://www.lpi.nsw.gov.au/](http://www.lpi.nsw.gov.au/).

In addition to any penalty that may be imposed by the State, the City of Sydney may also levy a reinstatement fee of up to $5,000 for destroyed marks in accordance with our Revenue Policy.
10.2 Procedures for working with survey infrastructure in the City of Sydney

10.2.1 Investigation for survey infrastructure

Early investigation for survey infrastructure is advised. If possible, the information should be available at the design stage of development to enable identification of possible conflicts and to prevent possible delays to the project and/or fines being imposed for illegal mark destruction.

At least four weeks prior to the commencement of any works on site, the service provider must engage a Registered Surveyor to investigate the “works zone” (comprising the site itself and the adjoining public domain within 5m of each side of the site frontages and all other areas where works are likely to be undertaken) for the presence of survey infrastructure.

The investigation must consult all relevant Deposited Plans on public record and include all existing:

- (i) Cadastral reference marks (boundary or reference marks) as defined in Schedules 2 and 3 of the Surveying and Spatial Information Regulation 2012.
- (iii) City of Sydney Alignment Marks (a brass bolt, or a lead plug holding a brass tack, covered by a cast iron box and used to define the alignment of a street), whether or not it is registered as a Permanent Survey Mark in the Survey Control Information Management System operated by NSW Land and Property Information.
- (iv) Walls, buildings or other survey monuments shown on Deposited Plans on the public record.

At the conclusion of the investigation and at least two weeks prior to the commencement of any works on site, the following documentation (in digital or hard copy format) must be supplied to the City’s Surveyors – EITHER:

- (i) A copy of a current detail survey plan clearly showing the extents of the “works zone” and all survey infrastructure within clearly shown in red; OR
- (ii) A line plan prepared and signed by a Registered Surveyor clearly showing property boundaries, the extents of the “works zone” and all survey infrastructure within clearly shown in red;

Together with a letter, signed by a Registered Surveyor, stating either:

- (i) That all existing survey infrastructure has been accurately identified on the plan and collected to sufficient accuracy to enable preparation of a Plan of Survey Information or to recover the marks if necessary; OR
- (ii) That there is no survey infrastructure within the “works zone”.
An exemption from this requirement will be permitted where this information has already been obtained and supplied to the service provider by the City’s Surveyors.
10.2.2 Preservation of Survey Infrastructure

Under Section 24 of the *Surveying and Spatial Information Act 2002*, it is an offence to remove, damage, destroy, displace, obliterate or deface any survey mark unless authorised to do so by the Surveyor-General, remove, damage, destroy, displace, obliterate or deface any survey mark unless authorised to do so by the Surveyor-General, remove, damage, destroy, displace, obliterate or deface any survey mark unless authorised to do so by the Surveyor-General, remove, damage, destroy, displace, obliterate or deface any survey mark unless authorised to do so by the Surveyor-General. Accordingly, all works within the “works zone” must, where possible, ensure the preservation of existing survey infrastructure, undisturbed and in its original state.

Where survey infrastructure has been identified in the “works zone” and may be destroyed or disturbed by the proposed works, the service provider must engage a Registered Surveyor to ensure that:

(i) For Permanent Survey Marks (Non-City of Sydney Alignment Marks) that do not also function as reference marks, a survey under Section 4.1 of the Surveyor General’s Directions No. 11 – Preservation of Survey Infrastructure shall be made and new permanent mark(s) placed in safe locations that will not be affected by the proposed works.

(ii) For Cadastral Reference Marks, including Permanent Survey Marks that also function as reference marks, a survey under Section 4.2 of the Surveyor General’s Directions No. 11 – Preservation of Survey Infrastructure shall be made.

(iii) For City of Sydney Permanent Survey Marks and Alignment Marks, at least 14 days prior to the commencement of any works in the public domain within 1 metre of a City of Sydney Alignment Mark, contact must be made with Council’s Surveyors ([surveyors@cityofsydney.nsw.gov.au](mailto:surveyors@cityofsydney.nsw.gov.au)). If a mark cannot be retained undisturbed and in its original position, then Council Surveyors will determine an acceptable replacement method, including whether the contractor or the City will undertake the replacement work, in whole or in part. A fee must be paid to the Council for the replacement of any such alignment mark removed, damaged or disturbed, in accordance with the City of Sydney’s Schedule of Fees and Charges.

At the completion of works, all documentation required under Surveyor General’s Directions No. 11 – Preservation of Survey Infrastructure is to be submitted to or registered at NSW Land & Property Information and a copy of same submitted to the City’s Surveyors – EITHER:

(i) A written statement prepared by a Registered Surveyor verifying that a survey under Section 4.1 of the Surveyor General’s Directions No. 11 has been carried out and that all required documentation (sketch plan, proof of position documents etc.) has been forwarded to NSW Land & Property Information, together with copies of said documentation; OR

(ii) A registered copy of a Plan of Survey Information to satisfy Section 4.2 of the Surveyor General’s Directions No.11 or other Deposited Plan relating to the designated zone and serving the same purpose; OR

(iii) A letter, signed by a Registered Surveyor stating that all survey infrastructure within the designated zone has been retained undisturbed;
10.2.3 Working near Survey Infrastructure

Due to the nature of survey infrastructure and its sensitivity to disturbance, you must undertake works near any item of survey infrastructure with caution and make every effort to prevent disturbance. Accordingly, the following clearances must be adhered to when excavating or operating plant:

- 500mm when operating pneumatic tools (jackhammers, vibrating plates etc.)
- 1000mm when operating mechanical excavators
10.3 Materials

10.3.1 Permanent Survey Marks

10.3.1.1 Permanent Survey Mark Cover Boxes

Permanent Survey Mark cover boxes are installed over a sub-surface mark to preserve it from damage or deterioration due to traffic loading, impact, weathering and other causes of degradation. They may be exposed to heavy traffic loads including repetitive bus and truck movements and therefore need to be solid, yet remain easy to open with a hammer and cold chisel.

The acceptable design of a cover box is generally flexible and location (carriageway versus footway) will dictate the standard required, however the following specifications must be met (see Diagram 8.1.1):

- The axle holding the lid to the frame should be made of stainless steel to inhibit rusting and must be strong enough to avoid bending under the expected traffic loads.
- The seat on which the lid will rest must be solid enough to withstand the expected traffic loads (carriageway or footway). For lids installed in the carriageway, a minimum of 10mm contact is to be provided all round between the underside of the lid and the frame seat, to prevent the lid sinking into the frame.
- Fit should be reasonably loose to prevent the unit seizing shut. A gap of 2-3mm all round between the lid and the frame should be allowed for in the closed position.
- The top of the lid must sit flush with the top of the frame in the closed position. The lid must have a pattern applied to reduce slip and have “SURVEY” or “COS SURVEY” stamped on the upper face.
- The base of the unit must have a 20-30mm flange to aid stability.
- A lip should be incorporated at the back of the hinge to reduce ingress of dirt.
- A 25-30mm wide slot should be provided in both the base and the lid to enable the unit to be opened with a hammer and cold chisel.
- The internal opening of the unit is to be a minimum of 150mm x 150mm.
- Allowance must be made to enable the fixing of a standard Permanent Mark number plate (approx. 95mm x 20mm) to the underside of the lid with the following specifications:
  - Two 6.5mm drilled holes at 76mm centres, to a depth of 15mm
  - Both holes tapped to 6.5mm Metric gauge to maximum depth possible
- Cover boxes to be installed in the carriageway are to have a fully cured steel reinforced pre-cast concrete collar (of minimum strength 20mPa) with a minimum width of 150mm all round

Existing cover boxes are of various ages and sizes. The two most common sizes (in terms of height) are 70mm, 100mm and 120mm. It is imperative that like be replaced with like where possible to avoid damage to the mark foundations. For marks that don’t match these two sizes, the use of steel packing (in either 5mm or 10mm increments as necessary) or bricks is permitted to ensure that the final surface level of the box matches the surrounding road or footpath level.
10.3.1.1 Permanent Survey Mark Cover Box Suppliers

Any service pit lid manufacturer who can meet the above specifications will be deemed an acceptable supplier.

For cover boxes that are to be installed in the footway and will not be subject to high volume vehicle loading, suitable cover boxes may be obtained from NSW Land & Property Information offices at Queens Square, 1 Prince Albert Road, Sydney.
10.4 Construction and installation of Permanent Survey Marks

This section provides guidelines for the replacement of Permanent Survey Mark cover boxes and for the construction of a new Permanent Survey Mark foundations. Each mark consists of:

- A suitable foundation material, such as a discrete concrete block, a concrete slab or bedrock,
- A brass bolt or stainless steel pin set into this foundation,
- A steel cover box centred over the bolt or pin,
- A brass number plate affixed to the underside of the cover box lid.

In the course of undertaking any works on a Permanent Survey Mark, it is critical that:

- The bolt or pin and foundation is not disturbed
- The number plate remains with the pin (i.e. it is removed from the old box and installed on the new one).

10.4.1 REPLACEMENT OF LID (Existing mark to be retained)

- Contractor will be expected to:
  - Obtain all relevant authorisations, permits & DBYD search etc. necessary to complete the task at each location.
  - Procure replacement cover boxes that meet the supplied specifications.
  - Check that the numberplate specified in the brief matches the installed numberplate and report any discrepancies to the City’s Surveyors.
  - Replace lids and make good surrounds in all surfaces, including but not limited to: bitumen; concrete; granite
  - Ensure lids are seated on a concrete base to ensure stability and prevent ingress of dirt etc.
  - Ensure that the upper surface of installed lids are level with the surrounding surface to prevent trip hazards.
  - Ensure lids are centred over each mark, so that when the box is opened, the mark below remains accessible.
  - Ensure lids are rotated so that the hinge side of the box is nearest to oncoming traffic.
  - Remove the brass numberplate from the old box and affix on the underside of the new box. The contractor should use existing screws where possible or new screws will be supplied by the City’s Surveyors on request.
  - Remove and dispose of existing lids & spoil.
  - Report to the City’s Surveyors contact after each days work with the following information:
    - List of marks successfully replaced
    - Any problems encountered (e.g. bolt/pin missing; numberplate mismatch from supplied information)
  - Report to Construction Services contact for invoicing and contractual matters.
  - Make good any defects at own expense.
10.4.2 Construction of new Permanent Survey Marks

- Contractor will be expected to:
  - Obtain all relevant authorisations, permits & DBYD search etc. necessary to complete the task at each location.
  - Procure cover boxes that meet the supplied specifications.
  - Install footings or foundations that meet the supplied specifications.
  - Install lids and make good surrounds in all surfaces, including but not limited to: bitumen; concrete; granite.
  - Ensure lids are seated on a concrete base to ensure stability and prevent ingress of dirt etc.
  - Ensure that the upper surface of installed lids are level with the surrounding surface to prevent trip hazards.
  - Ensure lids are centred over marked set out point (locations to be marked and identified appropriately by Survey).
  - Ensure lids are rotated so that the hinge side of the box is nearest to oncoming traffic.
  - Remove and dispose of spoil.
  - Report to Survey contact after each days work with the following information:
    - List of lids successfully installed
    - Any problems encountered
  - Report to Construction Services contact for invoicing and contractual matters.
  - Make good any defects at own expense.

10.4.3 Raising a cover box over an existing mark

- Contractor will be expected to:
  - Obtain all relevant authorisations, permits & DBYD search etc. necessary to complete the task at each location.
  - Procure cover boxes that meet the supplied specifications, or if the existing cover box is deemed functional, remove this and set aside for re-use. The number plate on the underside of the lid is a unique identifier and must remain with the same mark. If a lid needs to be replaced, unscrew the number plate from the old box and fit to the underside of the new one.
  - Hand excavate to the concrete block containing the survey mark, taking care that the block and pin remain undisturbed.
  - Place a VERTICAL 150mm diameter plastic pipe on the concrete block so that the survey mark is in the centre of the pipe.
  - Concrete or grout the outside of the plastic pipe to the concrete block.
  - Fill the hole (but not the pipe) with road base or a similar buffer course up to the underside of the cover box and tamp firmly to ensure minimal settling under traffic loading.
  - Trim the top of the pipe to approximately 10mm above the upper surface of the buffer course (or underside of the cover box).
  - Install lids and make good surrounds in all surfaces, including but not limited to: bitumen; concrete; granite.
  - Ensure lids are seated on a concrete base to ensure stability and prevent ingress of dirt etc.
• Ensure that the upper surface of installed lids are level with the surrounding surface to prevent trip hazards.
• Ensure lids are centred over marked set out point (locations to be marked and identified appropriately by Survey).
• Ensure lids are rotated so that the hinge side of the box is nearest to oncoming traffic.
• Remove and dispose of spoil.
• Report to Survey contact after each days work with the following information:
  ▪ List of lids successfully installed
  ▪ Any problems encountered
• Report to Construction Services contact for invoicing and contractual matters.
• Make good any defects at own expense.

CONTACTS

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