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</tr>
</tbody>
</table>
T4.1 SCOPE
This specification sets out the requirements for the provision of all planning and design surveys in particular:
- Survey Control both Primary and Minor;
- Engineering surveys;
- Preliminary Boundary Models;
- Property Surveys;
- Electronic Design Data.

All work shall be carried out in an environmentally sensitive manner and shall not cause damage to property. Any claims for damage associated with the survey work will be the responsibility of the Consultant.

T4.2 OBJECTIVE
The objectives of this specification are to ensure that all surveys meet the minimum standards as defined in this specification in order for DIER projects to achieve the required construction tolerances.

Note:
The Survey Control Network and the linkages from the initial engineering detail survey through to construction set-out are pivotal to the successful installation of the constructed infrastructure to DIER requirements.

T4.3 REFERENCES
All surveys shall be in accordance with this specification and the following:

Legislation
- Surveyors Act

Specifications and Standards
All DIER Specifications & Standards in particular:
- P1 General Provisions;
- P2 Consultancy Management Plan;
- S2 Design;
- S4 Permits;
- T5 Environment;
- T13 CADD Manual;
- G2 Contract Management Plan;
- G3 Traffic Management.

Note:
The NSW RTA Guide NG71 at the ICSM web site http://www.lcsm.gov.au/icsm/tasamm/index.html has been identified as a relevant source of information on specific instrumentation and observing techniques used in engineering and construction surveying to achieve specified levels of measurement accuracy commensurate with DIER’s construction tolerances.

T4.4 DEFINITIONS
The following interpretations apply to terms used in this specification:
- Datum
  - “GDA94” – Geodetic Datum of Australia 1994

“GPS” - The satellite based Global Positioning System developed by the American military in the 1970’s and now used extensively worldwide by civilian users. One of the position products available is the Real Time Kinematic (RTK) system which is capable of providing real time three dimensional measurements with a Local Uncertainty of around 30mm. GPS is the original and most common Global Navigation Satellite System (GNSS) – other systems (existing and proposed) include GLONASS (Russian), GALILEO (European) and COMPASS (Chinese). In this specification where GPS is used it is taken to represent any or all of the GNSS systems, individually or combined.

“G71” and “Guide NG71” – In 2005 the NSW Roads and Traffic Authority (RTA) developed its Quality Assurance Specifications for Road Construction Surveys (G71) and an accompanying set of guidelines Guide to G71, Quality Assurance Specifications for Road Construction Surveys (NG71). In 2007 ICSM and TASAMM (Transport Authorities Surveying and Mapping Managers) commenced a review of those documents to assess their compliance with ICSM’s SP1 which was completed in November 2009. The documents are available at http://www.icsm.gov.au/icsm/tasamm/index.html

“Height of sight lines” – when used in relation to survey procedures it refers to the minimum vertical distance from the sight line to the natural surface.

“ICSM” - The Inter-Governmental Committee on Surveying and Mapping (ICSM) is the body responsible for coordinating Commonwealth and State agencies who contribute to surveying and mapping at a national level to ensure continued cooperation and technical standards. Its role includes developing survey standards and specifications.

“Local Uncertainty” – is the universally accepted measure of the quality of measurement by quoting a confidence interval about derived measurements. The ICSM defines Local Uncertainty in SP1 as: “the average measure, in metres at the 95% confidence level, of the relative uncertainty of the coordinates, or height, of a point(s), with respect to the survey connections to adjacent points in the defined frame”.

Models
  - GENIO – General Input/Output text file,
  - “DTM” – Digital Terrain Model of the ground surface generated from a survey,
  - “MX” – CADD Software, previously known as MOSS.

“Minor Survey Control (MSC)” - MSC points are established as a stable point of reference for all operational survey aspects i.e. the acquisition of ground feature or cadastral boundary information, or the construction set-out survey. It is accepted that MSC points may be destroyed during the construction process.

“Permanent Survey Mark” – a permanently monumented survey control mark with horizontal coordinates and/or height of known accuracy adopted as a permanent mark under Section 14 of the Survey Coordination Act 1944 and included in the online register (SURCOM) maintained by the Office of the Surveyor General (http://surcom.dpiw.tas.gov.au/surcom).

“Primary Survey Control (PSC)” – is a substantial survey control mark that is intended to survive, undisturbed, the entire life of the project– from design to construction,
including all necessary compliance and audit surveys. It will either be an existing Permanent Survey Mark or a mark of an approved form described in Clause T4.9 Survey Control.

- “Sight distance” – when used in relation to survey procedures refers to the length of the sight line
  NOTE: SP1 is currently under review and will be re-issued within 12 months in a totally new format (version 2).
- “Standard Permanent Mark (SPM)” – A common prefix used in the name of many Standard Permanent Marks in SURCOM. In this report the abbreviation SPM is used to generically refer to all of the Permanent Survey Mark types.
- “Survey Control” – a survey peg, bench mark, reference mark, or any other mark used or intended to be used for the purpose of measuring, setting out, or checking the actual or design surface.
- “Survey procedures” – methods to control parameters that affect the accuracy of survey techniques, such as a radiation procedure or height determination procedure.

### T4.5 ACCESS TO PROPERTY NOT OWNED BY DIER

Access to property not owned by DIER is to be under the following Legislation

- Surveyors Act;
- Land Acquisition Act;
- Roads and Jetties Act.

Further to Standard Specification S2 PERMITS, the Consultant will be required to have written authorisation from DIER’s representative prior to entering onto land not owned by DIER.

The Consultant shall, more than four (4) days before the date on which the Consultant enters land, notify the relevant owner of:

- The consultant intention to enter onto the land;
- The purpose of the entry;
- The nature of the activity;
- The planned duration of the entry.

Entry onto adjacent land shall also be in accordance with Standard Specification S4 PERMITS with regard to environmental and other statutory requirements.

### T4.6 CONSULTANCY MANAGEMENT PLAN (CMP)

Further to Standard Specification P2 CONSULTANCY MANAGEMENT PLAN, the Consultant’s Consultancy Management Plan shall include:

- Details of personnel including qualifications, equipment, work procedures and verification surveys to be used;
- All elements as listed in Standard Specification P2 CONSULTANCY MANAGEMENT PLAN and as detailed in Standard Specification G2 CONTRACT MANAGEMENT PLAN in particular
  - Liaison with Service Authorities or Asset Locators to locate and expose underground services;
Liaison with Property Owners to inform them when work is being performed on their property and the nature of that work (ref clause T4.5 above);

- Traffic Management Plans and Schemes in accordance with **Standard Specification G3 TRAFFIC MANAGEMENT**;

### T4.7 EVIDENCE OF COMPLIANCE

#### T4.7.1 General

Evidence of compliance shall include survey reports for each activity i.e. Survey Control both Primary and Minor, Engineering Surveys, Preliminary Boundary Models and Property Surveys.

Evidence of compliance shall be submitted at each hold point.

The Consultants survey work will be considered complete when all errors, ambiguities and deficiencies have been resolved in accordance with this specification to the satisfaction of DIER’s representative.

#### T4.7.2 Verification Surveys

For Engineering surveys, independent verification surveys of the DTM shall be undertaken. That is, after completion of the DTM, additional site visits and new instrument set-ups are to be made to take actual measurements to check the DTM surface. The results of the surface verification survey are to be included with the submitted detail survey information.

#### T4.7.3 Consultancy Records

All survey information and records generated during the consultancy shall be the property of the Principal and shall be included in the consultancy records.

As a minimum the following shall be provided:

- A record of all communications with the owners of property not owned by DIER;
- Field notes of survey to establish and extend survey control networks. If field observations are by electronic means, copies of the raw and adjusted data in electronic format.
- Adjustment of survey control network with verification of Class of survey and an estimate of the Order of survey, in accordance with SP1;
- Electronic copy of raw (field) and reduced survey data generated during collection of feature strings;
- Summary table of all redundant observations, with comparisons, for the control survey to verify the accuracy of the surveys;
- Details of the validation of the ground survey model and certification that the survey conforms with this specification;
- Survey control sheets and survey drawings in accordance with **Clause T4.13 Presentation of Information**.
**T4.8 Surveys Requirements**

**T4.8.1 General**

The general requirements for the various surveys are:

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Surveys</td>
<td>Survey Control</td>
</tr>
<tr>
<td>Engineering Survey</td>
<td>Digital Terrain Model (DTM)</td>
</tr>
<tr>
<td>Preliminary Boundary Model</td>
<td>Model with separate land areas identified by title reference and owner.</td>
</tr>
<tr>
<td>Property Survey</td>
<td>Survey diagrams suitable for registration with the Land Titles Office, Tasmania</td>
</tr>
</tbody>
</table>

Each survey type shall be a separate model as either:

i) GENIO data file;

ii) 3D AutoCAD Drawing.

String labels or layer names shall be in accordance with *Standard Professional Services Specification T13 CADD MANUAL.*

In undertaking all work the Consultant shall ensure that any test pits or excavations required are made and kept safe at all times, backfilled and the finished surface appropriately repaired.

**T4.8.2 Qualification of Surveyors**

All surveys shall be the responsibility of a qualified surveyor as listed in *Table T4.2 Qualifications of Surveyors.* All surveyors are to be able to demonstrate competence in carrying out the required surveying tasks.

<table>
<thead>
<tr>
<th>Survey Element</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Control</td>
<td>A person who holds a Diploma in Surveying, or a recognised equivalent, from a recognised tertiary institution and possess at least three (3) years practical experience as a survey party leader on major roadworks and/or bridgeworks as appropriate.</td>
</tr>
<tr>
<td>Engineering Survey</td>
<td>A person who holds a Diploma in surveying, or a recognised equivalent, from a recognised tertiary institution and possess at least three (3) years practical experience as a survey party leader on major roadworks and/or bridgeworks as appropriate.</td>
</tr>
<tr>
<td>Preliminary Boundary Model</td>
<td>Registered Land Surveyor under the (Tasmanian) Surveyors Act</td>
</tr>
<tr>
<td>Property Survey</td>
<td>Registered Land Surveyor under the (Tasmanian) Surveyors Act</td>
</tr>
</tbody>
</table>
T4.8.3 Survey Standards
The technical survey standards applying to the CLASS of all horizontal and vertical control required under this specification are contained in ICSM SP1.

T4.8.4 Location of Utilities
The Consultant shall be responsible for proving the actual locations and level of all utilities prior to undertaking any work which may affect the utilities. Evidence of Compliance shall include records of “Dial before you Dig” contact.

The Consultant shall liaise with the appropriate Utility Owner to determine the exact location of each utility and any conditions that are required by the Utility Owner.

The Consultant shall adhere to any requirements of the responsible Utility Owner in the execution of the work.

T4.9 SURVEY CONTROL
T4.9.1 Datum
Generally, the horizontal datum for all surveys should be the national datum to ensure seamless integration with all other national and state datasets. Currently this is GDA94, with survey data to be provided in MGA coordinates. Generally, the vertical datum for all surveys should be the AHD (Tasmania).

It is vital that all design and construction documentation clearly indicates that coordinates are MGA since they are coordinates on a map projection. The MGA is a method of displaying a portion of the actual “curved” surface of the earth on a flat “map” surface and distortions in distance must necessarily occur. That is, the distance between these “map projection” coordinates is not necessarily what would be measured on the ground with a tape measure. The distortion in distance varies in relation to the distance from the central meridian of the map zone and the height above sea level of the survey area. The scale factor at the central meridian of a map projection zone at sea level is 0.9996. It increases moving east or west away from the central meridian but decreases as height above sea level increases. The combined effect of these two scale factors is represented by a single Combined Scale Factor (CSF).

A statement of the “average” CSF to be applied to convert from GRID to GROUND distances must be included in a Survey Report Clause T4.10.3 Engineering Survey Report from the engineering surveyor and be clearly shown on all sheets and electronic files, both of the detail survey and design plans, where the survey control coordinates are displayed. This is particularly critical for any designs that include bridge construction, since generally a bridge will include an amount of pre-fabricated elements that will need to be in GROUND distances, not map projection (MGA) distances.

The origin for the MGA coordinates and AHD height must be specified in an accompanying engineering surveyors’ Project Report Clause T4.10.3 Engineering Survey Report.

Where the use of either of these datum’s is not practical an alternative datum proposal shall be able to be submitted to DIER’s Representative for approval prior to the commencement of any survey operations.
T4.9.2 **Primary Survey Control Network**

A Primary Survey Control Network shall be established. As a minimum, it shall consist of at least 3 Primary Survey Control (PSC) marks in the area of the detail of survey.

The prime consideration in the location of a PSC should be the safety of the surveyor and the public, including livestock.

A PSC mark should preferably be located so that it will survive indefinitely i.e. the life of the entire project. However, it is recognised that often during the engineering detail survey the extent of the final construction earthworks is not known sufficiently well to guarantee the PSC longevity. If this is the case the PSC must be positioned on the basis that it would survive intact indefinitely if no construction were to ever take place, with the condition that PSC should never be placed between the centre-line and open road-side drain on a formation without kerb and guttering.

A PSC must either be an SPM or a mark of a form as follows:

- In stable soils a 600mm long star bar or minimum 14mm diameter rod driven so the top is at least 20mm below the natural surface;
- In rocky soils a 600mm long star bar or minimum 14mm diameter rod driven to resistance and cut off preferably 20mm below natural surface or as close as possible to natural surface if this is not achievable;
- A new bolt, screw or bar affixed with a rapid-set grout in a pre-drilled hole in concrete or bedrock;
- Any existing fixing bolt or bar in concrete;
- In areas with unstable (i.e. reactive) soils the PSC should be constructed in a manner that will meet the requirements of this clause;
- A PSC must have a witness mark unless it is not safe to livestock or the public to do so. The PSC should all have a unique identifying label; ideally it should be attached to the physical mark, or alternatively a witness mark, and marked in a permanent way (i.e. the number stamped or engraved on an aluminium tag);
- The maximum distance between adjacent PSC marks shall not exceed 500m with a preference for placement so that they are intervisible;
- A PSC must be located adjacent to all road intersections so that it is possible to define intersection detail, a pair of marks may be needed for large intersections.

The PSC must meet the following standards in relation to survey accuracy:

- **Horizontal Control** - The survey class of the PSC must be CLASS B if using GPS techniques or CLASS C if using traditional surveying techniques, in accordance with Part A of SP1. Part B of SP1 provides suggested survey procedures for achieving these classes. GPS is not to be used where the PSC separation distance is less than 400 metres, due to the difficulties in consistently achieving the required Local Uncertainty between marks with smaller separation distances;
- **Vertical Control** - Height determination must comply with class LC for differential levelling techniques or CLASS C for trigonometrical heighting, (i.e. level difference better than $12\sqrt{K}$ mm). A one way level run between existing SPM’s may be acceptable provided the comparison between the level run and the existing bench marks shows a difference of less than $12\sqrt{K}$ mm, otherwise a 2 way level run is required. GPS equipment is not to be used for measurement of height on the PSC, other than for the transfer of an AHD origin height to one PSC from an off-site SPM;
Final PSC network or traverse coordinates must be derived from some form of adjustment, i.e. the final coordinates must be determined from redundant observations and they must not be field captured radiation / RTK GPS measurements.

The coordinate values of all existing SPM’s used as PSC must only be adopted from SURCOM if their Local Uncertainty is validated during the Primary Control Survey as meeting the required survey CLASS outlined above.

**T4.9.3 Minor Survey Control**

The PSC will generally need to be broken down / extended so that all the information for the engineering survey and other investigation surveys may be measured using traditional surveying techniques. This is achieved with the Minor Survey Control (MSC).

There is no minimum requirement with regards to the number of MSC. The only determinate in MSC provision is if they are required for the engineering detail data capture method to meet the tolerances specified in Table T4.3 Tolerances.

The intention is for the MSC to have the same level of precision as the PSC – only the marking standard, spacing and intended life span is different - so that theoretically they could be used for construction set-out subject to verification.

The prime considerations when placing new MSC for traditional surveying techniques are:

- the safety of the surveyor and public,
- the suitability of the mark for radiate observations,
- the long term stability of the mark,
- to avoid low height of sight lines when observing,

The physical characteristics of MSC are as follows:

- MSC may be physically marked by any of the following methods;
  - star bar,
  - steel spike,
  - wooden peg,
  - nail
  - drill hole in concrete or rock,
  - ramset nail in concrete
  - or with other similar materials

- The maximum spacing between MSC should be 200 metres.
- MSC should generally have a unique identifying label either attached to the physical mark (where possible) or to a witness mark. This label will have the MSC number marked on it in a permanent way (i.e. the number stamped or engraved on an aluminium tag).
- An MSC does not necessarily require a witness mark but one may be placed if it is safe to do so.

The MSC must meet the following standards in relation to survey accuracy:

- Horizontal Control - The survey class of the MSC must be CLASS C using traditional surveying techniques, in accordance with Part A of SP1. Part B of SP1 and Guide NG71 provide suggested survey procedures for achieving these classes. GPS is not to be used for directly coordinating MSC, due to the difficulties in consistently achieving the required Local Uncertainty between marks with smaller separation distances.
Vertical Control - Height determination must comply with class LC for differential levelling techniques or CLASS C for trigonometrical heighting. (i.e. level difference better than $12\sqrt{K}$ mm). A one way level run between existing SPM’s or PSC may be acceptable provided the comparison between the level run and the existing bench marks shows a difference of less than $12\sqrt{K}$ mm, otherwise a 2 way level run is required. GPS equipment is not to be used for measurement of height on the MSC.

Final MSC network or traverse coordinates must be derived from some form of adjustment. I.e. the final coordinates must be determined from redundant observations and they must not be field captured radiation / RTK GPS measurements.

The MSC may be augmented with additional non-substantial temporary marks in order to obtain infill detail. These marks must be clearly differentiated as temporary and must not be included in the Station List of the Survey Report. The temporary marks must be placed with sufficient accuracy to ensure that the Spatial Data tolerances for the feature details specified in Table 1 are met.

**T4.10 ENGINEERING DETAIL SURVEY**

**T4.10.1 General**

Engineering detail surveys shall include all features, ground levels, overhead and underground services where determinable by the lifting of pit covers.

All points that represent a single feature shall be a single string.

Stringlines and select points within each string shall be created to ensure that the surface modelling of existing features will meet the general tolerances in **Table T4.3 Tolerances**. That is, for any point randomly selected on the surface the height difference and horizontal distance between the coordinates within the DTM and their true values must comply with the tolerance specified in **Table T4.3 Tolerances**.

<table>
<thead>
<tr>
<th>Feature</th>
<th>General Tolerance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Horizontal</strong></td>
</tr>
<tr>
<td></td>
<td>Distance</td>
</tr>
<tr>
<td>Nominated special Features</td>
<td>$\pm 0.02$</td>
</tr>
<tr>
<td>Railway, roads and bridges included in the design</td>
<td>$\pm 0.02$</td>
</tr>
<tr>
<td>Roads and bridges located as a natural feature</td>
<td>$\pm 0.05$</td>
</tr>
<tr>
<td>Roads and bridges where pavement overlay is considered</td>
<td>$\pm 0.02$</td>
</tr>
<tr>
<td>Railway lines</td>
<td>$\pm 0.03$</td>
</tr>
<tr>
<td>Drainage structures (Sewer, SW) inc pipe inverts</td>
<td>$\pm 0.05$</td>
</tr>
<tr>
<td>Natural Surface</td>
<td>$\pm 0.25$</td>
</tr>
<tr>
<td>Batters, edge of formation and drains</td>
<td>$\pm 0.10$</td>
</tr>
<tr>
<td>Buildings including floor heights</td>
<td>$\pm 0.05$</td>
</tr>
</tbody>
</table>
Utilities above ground  ±0.10  ±0.05
Utilities below ground  ±0.20  ±0.20
*Trees / edge of vegetation  ±0.25  ±0.10

Note:
*Trees / edge of vegetation may be given null levels if the topography has been accurately defined by other strings.

RTK GPS is NOT to be used to capture information for a building or any feature where the Horizontal Distance or Height Difference tolerance is less than ±0.05.

For the survey of an existing pavement, bridge, or railway, strings shall have points approximately adjacent each other and at even intervals measured along the road centreline. The maximum approximate interval should not exceed 20 metres - a lesser interval may be required. Additional points may be required to accurately represent the changes in pavement shape. Edge and centreline strings shall generally be continuous in the direction of the link chainage.

In addition to all other accuracy requirements, the side lengths of triangles forming the DTM must not be greater than 25 metres on pavement areas and 50 metres in all other areas.

**T4.10.2 Verification Surveys**

The DTM surface must be verified and results included in the Engineering Survey Report.

The following guidelines apply to verification surveys:
- Validation strings must be observed independently of the survey observations;
- The verification strings may be in a separate model and not be part of the detail model;
- The survey control used must be the same control used for the engineering survey. However, do not use the same instrument set-up for ground detail and verification measurements. The instrument must be removed and re-set up completely. The suggested method is to observe the validation observations at the completion of the engineering survey;
- Validation strings must be provided as follows:
  - A minimum of three strings per survey, and
  - Two strings per road intersection, and
  - One string for each 200 metres of surveyed corridor on urban projects, or
  - Rural projects
    - three per kilometre for projects under three kilometres in length, or
    - nine strings plus two per kilometre over three kilometres for projects between three and ten kilometres long, or
    - twenty three strings plus one per kilometre over ten kilometres for projects greater than ten kilometres long,
- Each string should traverse the model at approximately 45 degrees to the nominal centreline.

The DTM surface shall be compared to the verification strings and the height differences reported. The surface is deemed to pass vertical deviation.
requirements if 80% of verification points are within the accuracy range specified in *Table T4.4 Verification ranges*.

<table>
<thead>
<tr>
<th>Table T4.4 Verification Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feature</strong></td>
</tr>
<tr>
<td>Roads and bridges included in the design</td>
</tr>
<tr>
<td>Roads and bridges located as a natural feature</td>
</tr>
<tr>
<td>Roads and bridges where pavement overlay is considered</td>
</tr>
<tr>
<td>Railway lines</td>
</tr>
<tr>
<td>Drainage structures inc pipe inverts</td>
</tr>
<tr>
<td>Natural Surface</td>
</tr>
<tr>
<td>Batters, edge of formation and drains</td>
</tr>
</tbody>
</table>

**T4.10.3 Engineering Survey Report**

A full survey report shall be provided. It should include the following details as a minimum:

- Table of Contents
- Location of survey, type and DIER consultancy number
- Surveyors name(s) and equipment used
- Horizontal Control - a brief description of the closure adjustment and Local Uncertainty achieved.
- Vertical Control - a summary table of the of accuracies (closures) achieved in the two levelling runs and values adopted, datum mark(s) adopted and discrepancies with existing SPMs with published AHD values
- A Station listing of only those marks sufficiently stable and precise for use as construction set-out (i.e. PSC and MSC): sorted according to traverse order, containing station identifier, corresponding SPM number (if applicable), Map Grid of Australia 94 (MGA94) coordinates and AHD height, the CSF at that point, the type of ground mark and witness mark, the source of the mark coordinates (whether adopted from SURCOM or calculated by the survey)
- The “average” CSF value adopted to convert from PLANE to GRID distances
- List of all Models: relevant comments associated with any model included, in particular the estimated accuracy of the boundary model
- Exception Report: details of any abnormalities relating to the survey, e.g. if the “boundary model” has regions of reduced accuracy
- Certification that survey procedures to satisfy required accuracy standards (as per the specification) were employed.
- Results of the DTM verification surveys

**T4.11 PRELIMINARY BOUNDARY MODEL**

The Preliminary Boundary Model shall consist of a model that includes the following clearly identified information:

- property boundaries;
- owners names;
• folio references;
• easements and other encumbrances affecting the land;
• nature of ownership of road corridor including “User Roads”;
• crown land and reservations.

Compilation of existing boundaries shall be made ensuring probable error in position of calculated boundaries does not exceed 0.5m in rural areas and 0.25m in urban areas.

T4.12 PROPERTY SURVEYS
All Property Surveys shall meet the requirements of the Surveyor General and the Survey Direction pursuant to the Surveyors Act. Survey diagrams shall be prepared to the requirements of the Lands Titles Office.

T4.13 PRESENTATION OF INFORMATION
T4.13.1 Drawings
All drawings shall be in accordance with Standard Professional Services Specification T13 CADD MANUAL and the Project Brief.

T4.13.2 Survey Control Sheet
The survey control sheet shall be provided as a separate sheet and shall contain the primary Survey Control network schedule with easy identification and field location of the survey control network.

T4.13.3 Primary Survey Control Network Schedule
The schedule shall list the values of all adopted survey control marks used in the survey as identified in Table T4.5 Primary Survey Control Network Schedule.

<table>
<thead>
<tr>
<th>Table T4.5 Primary Survey Control Network Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>String Label</td>
</tr>
<tr>
<td>---------------</td>
</tr>
</tbody>
</table>

T4.14 PAYMENT
Further to Standard Professional Services Specification P1 General Provisions Clause P1.7 Payment, payment shall be as detailed in the project brief. No payment shall be made until all survey information and reports have been received and accepted.
T4.15 HOLD POINTS AND DELIVERABLES
The following hold points have been identified in this specification:

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description of Hold Point</th>
<th>Nominated Work not to proceed</th>
<th>Evidence of Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4.6</td>
<td>Submission and acceptance of Consultancy Management Plan</td>
<td>All work</td>
<td>Consultancy Management Plan</td>
</tr>
<tr>
<td>T4.6 &amp; G3</td>
<td>Traffic Management Plan</td>
<td>All field work</td>
<td>Traffic Management Plan</td>
</tr>
<tr>
<td>T4.7</td>
<td>Provision of all data and reports</td>
<td>Completion of the project</td>
<td>Survey reports, verification surveys, consultancy records</td>
</tr>
</tbody>
</table>

**T4.7 Deliverables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Timing</th>
<th>No. of Copies in Format Shown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hard Copies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bound</td>
</tr>
<tr>
<td>Survey Control Model</td>
<td>At completion of survey</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Survey</td>
<td>At completion of survey</td>
<td>0</td>
</tr>
<tr>
<td>• Digital Terrain Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contour Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Verification Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Triangles Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preliminary Boundary Survey Model</td>
<td>At completion of survey</td>
<td>0</td>
</tr>
<tr>
<td>Property Survey</td>
<td>At completion of survey</td>
<td>0</td>
</tr>
<tr>
<td>Evidence of Compliance</td>
<td>At completion of each survey</td>
<td></td>
</tr>
</tbody>
</table>

All deliverables shall include the relevant survey report and related information. Deliverables also include hard copy plots, GENIO files for the different model types (triangles, detail, preliminary property boundary, survey control and potentially contours). The survey report may also be provided as a PDF.

The Property Survey Diagrams shall be provided to DIER’s Manager Land Assets a minimum eight (8) weeks prior to the calling of tenders for any construction projects.