

**SURVEY DEPARTMENT**

**MINISTRY OF DEVELOPMENT**

**SPECIFICATION FOR**

**TOPOGRAPHICAL SURVEYS**

**GOVERNMENT OF BRUNEI DARUSSALAM**

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## **CLAUSE 1 AREAS TO BE MAPPED**

1. The areas to be mapped in accordance with the contract are described in the schedule to the Specification and are illustrated in the index map which accompanies it. All map sheets will be complete, except that where partial coverage only is required or possible, the areas to be mapped will be clearly defined in the Schedule to the Specification. Any special priority of execution will be stated in the Schedule to the Specification or in the letter of invitation to tender.

## **CLAUSE 2 SCALE OF MAPPING AND CONTROL INTERVAL**

1. The scale(s) at which the required maps are to be plotted and/or fair drawn will be set out in the Schedule to the Specification.
2. The Standard vertical interval between contours will be set out in the Schedule to the Specification. Variations in the contour interval, e.g. on steep slopes or above a particular altitude will be stated as will also the intervals at which contours should be emphasized.
3. The datum upon which all spot heights and contours are to be based shall be the BRUNEI State Datum.
4. Where mapping of the same area is to be carried out at two different scales, this will normally be achieved by plotting at larger scale and reducing by photographic processes to the smaller scale. Any requirements for re-plotting or variations to the depiction of planimetric detail or contours will be set out in the Schedule to the Specification.

## **CLAUSE 3 PROJECTION, GRID AND SHEET LINES**

1. The projection upon which the plotting shall be undertaken shall be the Borneo Rectified Skew Orthomorphic Projection and the grid shall be the Borneo Rectified Skew Orthomorphic Grid (metric), and the conversion for all non-metric dimensions derived from previous survey data shall be calculated as 20.11676502 metres being equivalent to one English Chain.
2. Where an approved cartographic specification is in existence, the depiction of grid lines and grid ticks will conform to that specification. In other cases, detailed instructions relating to the grid will be set out in the Schedule to the Specification. (Clause 8.2).

3. The sizes of map sheets, the sheets lines and sheet numbers will be specified in the Schedule to the Specification (Clause 8.1). Where the mapping forms part of an established series, the sheet lines and sheets numbers will conform to the appropriate cartographic specification. Exceptional cases where over-sized sheets or plotting beyond the neat-line of the map is envisaged, this will be laid down in the Schedule to the Specification.

#### **CLAUSE 4. ESTABLISHMENT OF SURVEY CONTROL**

1. The Contractor will be supplied with all available information relating to existing framework control including station descriptions, co-ordinates and heights and trigonometric diagrams, Where applicable. (Clause 8.3)
2. All field operations must be undertaken under the direction of a professionally qualified land surveyor who shall approved by the Surveyor General. the Contractor will be free to plan the methods to be used and the programme or field observations, provided always that any scheme or method of observation shall conform to accepted standards of good survey practice. Where maximum standards of accuracy have to be achieved, these will be laid down in the Schedule to the Specification. Unless excluded in the Specification, the Contractor is required to submit a proposed scheme for approval by the Surveyor General before field observations are commenced (Clause 10.1). An up-dated diagram showing the observations actually made and control established must be submitted to the Surveyor General after completion of the field operations. (Clause 11.3)
3. The field survey requirements may call for placing and establishment of permanent ground marks. Details of the design of such marks and intervals at which they should be placed will be set out in the Schedule to the Specification.
4. All original field records, computations and resulting list of co-ordinates and heights must be submitted to the Surveyor General, who will retain all such records. (Clause 9.5). In addition, the party leader will be required to keep a daily dairy of field operations and this must be submitted to the Surveyor General upon conclusion of the field work.

## **CLAUSE 5 MAP ACCURACY**

1. the plan position of plotted detail will be such that no point of well defined detail contains a coordinate error of more than half a millimetre at final reproduction scale. For the purpose of checking the compliance with the Specification, the following criteria shall be taken:

The correct horizontal co-ordinate position of any well defined point of detail shall be its position as determined by theodolite traverse or triangulation from the nearest permanently marked Survey Department ground control point of First-Class order or above.

2. All elevations taken on the contours on any sheet shall be its elevation as determined by spirit levelling from the nearest Survey Department bench mark or such other height control point as may be specified in the Schedule to the Specification.
3. Spot heights, other than those observed as control, shall be accurate to within one quarter of the contour interval.
4. Unless otherwise instructed by the Surveyor General, the Contractor will be expected to match the positions of detail and contours at sheet edges with those appearing on existing published sheets.

## **CLAUSE 6 PLOTTING AND DRAWING**

1. All original plots, drawings and reproduction copies will be made on transparent polyester drafting film possessing high dimensional stability to be approved by the Surveyor General. (Clause 10.2)
2. In the case of map sheets which form part of an existing series, all plotting and drawing shall conform in style and cartographic specification to the sheets already published.
3. In the case of project or township mapping it may not be considered necessary for original plots to be fair drawn for reproduction purposes. In such cases, the final maps will be made directly from the original plots, or from photographic copies of the original plots after the addition of field completion detail, and all appropriate marginal information, etc. The method of plotting and the standard of such plots must be such that in making copies by dye-line or similar process from the original plots by photographic processes shall produce as sharp and well defined image.

For this purpose, plots prepared with high grade graphite or polymer based sheets, which will produce consistent line work will usually be considered suitable. The Contractor may be expected to produce an example of such a plot for approval by the Surveyor General before the commencement of the work and to ensure that the standard and quality of work on all subsequent sheets matches this.

4. For large scale mapping, it may usually be necessary for contours to be plotted separately from planimetric detail in order to permit their depiction on the final map sheet in a distinguishable form. In such a case contours will normally be scribe, the line gauge depending upon whether they will be screened to provide a satisfactory subdued line on a dyeline copy or, if litho-printing is employed, to allow for their being printed in a different colour. Detailed requirements will be set out in the Schedule to the Specification.

## **CLAUSE 7 DETAIL TO BE SHOWN**

1. The amount of man-made detail to be plotted shall include all that normally shown on maps at similar scale, and shall unless excluded in the Schedule to the Specification, include all buildings surveyed to roof line only, drains, ditches, culverts, bridges, roads, tracks, foot-paths, fences, walls, hedges, burial grounds, areas of cultivation, overground pipe lines, overhead electric and telegraphic transmission lines, masts, towers, and any other structure normally mapped at such a scale but shall, unless included in the Schedule to the Specification, exclude all underground pipe-lines, underground electric and telegraphic transmission lines, inspection chambers there to and septic tanks.

The amount of natural detail to be plotted shall include all rivers, streams, swamps, ponds and vegetation classification but shall exclude individual trees unless included in the Schedule to the Specification.

2. Names, building reference numbers and other detail such as permanently marked ground control points and bench marks shall be shown on each sheet in accordance with information obtained during field survey. the Schedule to the Specification will stipulate whether this will be the responsibility of the Contractor or if this information will be supplied by the Surveyor General.

## **CLAUSE 8 MATERIAL TO BE SUPPLIED TO THE CONTRACTOR**

The contract may call for any or all of the following items to be supplied by the Surveyor General to the Contractor. The items which are to be supplied, and which may include others which are not listed below, will be set out in detail in the Schedule to the specification.

1. Index map showing the sheet line system and sheet numbers to be adopted. (Clause 3.3)
2. Instructions as to the showing of the graticule and/or grid on the fair drawings or plots to be supplied, including grid co-ordinates of the sheet corners. (Clause 3.2)
3. Details of any ground control stations which the Contractor may require to use as a framework for his own field surveys. These details may include co-ordinates, heights, descriptions and photo identifications, and available diagrams. (Clause 4.1)
4. List of symbols and conventional signs to be used on the plots or fair drawings.
5. Model sheet layout and Drawing Specification for the series.
6. Names and related information which are required to be shown on the map.
7. Specimen copies of any sheets of the same series which have been published in order to illustrate style and method of presentation. Adjacent sheets, if published, or edge traces, for the purpose of sheet edge comparison.
8. Wording for imprints, copyright acknowledgment, sales note projection which is required to appear in the margin of the map.

## **CLAUSE 9 MATERIAL TO BE SUPPLIED BY THE CONTRACTOR**

The contract may call for the supply by the Contractor of any or all of the following items. The items which are to be supplied, and which may include others which are not listed below, will be set out in detail in the Schedule to the Specification.

1. A draft sheet line scheme if the mapping is not part of a regular map series where the sheet lines are already defined. (Clause 3.3).

2. A draft sheet layout showing proposed arrangements of marginal information etc if the mapping is not part of a regular map series for which a standard sheet layout has been supplied by the Surveyor General.
3. All original plots together with three dyeline copies of the plots.
4. In the case of contracts where mapping of the same area at more than one scale is required, full details will be set out in the Schedule to the Specification of the requirements for enlargements or reductions of the original plots which are to be supplied.
5. Details of any additional ground control established by the Contractor to control the mapping. (Clause 4.4). These details shall include:
  - a. A list of all control points use in the mapping giving grid co-ordinates (except for uncoordinated height points) and heights.
  - b. Descriptions, including diagrams, of all planimetric control points and bench marks established by the Contractor. Should there be a requirement for these descriptions to be entered on standard forms the Surveyor General would arrange for these forms to be supplied to the contractor.
  - c. All original records of field observations and computations in connection with the mapping control.
  - d. A diagram for each contract area showing the approximate locations and reference numbers of all ground control used. This diagram shall indicate how individual planimetric control points were fixed.

On all these documents each control point will be identified by a unique number, allocated to it in accordance with a system to be approved by the Surveyor General, which will always be quoted whenever such point is mentioned in correspondence.

6. All records supplied by the Surveyor General to the Contractor shall be returned to the Surveyor General before completion of the contract.



## **CLAUSE 10 INFORMATION TO BE SUPPLIED WITH THE TENDER**

The following information shall be supplied with the tender.

1. A statement of the techniques it is proposed to employ to establish such additional ground control as may be required in accordance with clause 4. As suggested control diagram should be included so that the Surveyor General can judge whether or not the proposed scheme is strong enough in the design.
2. Details of the stable base transparent media it is proposed to use, if not provided by the Surveyor General. (Clause 6.1)
3. A brief programme showing how soon after the signing of the contract the work would be taken up and an approximate forecast of the completion date. Where appropriate to the contract, the programme should contain estimated dates of commencement and completion of each of the following phases:-
  - (a) Ground control operations. (Clause 4)
  - (b) Submission of draft sheet layout and sheet line scheme. (Clause 9.1 & 9.2)
  - (c) Drawing and / or scribing reproduction material. (Clause 6.2)

## **CLAUSE 11 INFORMATION TO BE SUPPLIED AFTER ACCEPTANCE OF THE TENDER**

The Contractor shall supply the following information to the Surveyor General after the acceptance of his tender and during the progress of the work.

1. Before the commencement of field operations, where these form part of the contract, the Surveyor General shall be informed of the name and qualifications of the land surveyor who will be responsible for the direction of all field control operations. (Clause 4.2)

2. From the date of acceptance of the Tender the contractor shall keep the Surveyor General informed of the progress of preparations for his proposed field operations. Once field operations have started the Contractor shall submit at the end of the each week a brief progress report summarising the state of the work and noting any special circumstances which might affect future progress.
3. After completion of any survey control work required under the contract, the contractor shall submit to the Surveyor General an updated version of the control diagram called for in Clause 10.1. This must show the control stations that have actually been established, and the observations taken.