



SABAH, MALAYSIA

Warta Kerajaan

Tambahan Kedua

Diterbitkan dengan kuasa

JIL. LXXII]

KOTA KINABALU, KHAMIS, 13 JULAI 2017

[No. S 5

No. S 6

[No. JKM.PHB. 100-1/2/Jld. 5/(128)

SURVEYOR ORDINANCE 1960

SURVEYORS (CONDUCT OF TOPOGRAPHICAL AND ENGINEERING SURVEYING)

REGULATIONS 2017

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SURVEYORS ORDINANCE 1960

(No. 22 of 1960)

SURVEYORS (CONDUCT OF TOPOGRAPHICAL AND ENGINEERING SURVEYING)
REGULATIONS 2017

In exercise of the powers conferred by section 19 of the Surveyors Ordinance 1960 [No. 22 of 1960], the Surveyors Board, with the approval of the State Secretary, makes the following regulations:

Citation and commencement

1. (1) These regulations may be cited as the Surveyors (Conduct of Topographical and Engineering Surveying) Regulations 2017.

(2) These Regulations come into operation on the date of its publication in the *Gazette*.

Interpretation

2. In these Regulations unless the context otherwise requires:-

“bench mark” means a height control monument established by JUPEM;

“Board” means the Surveyors Board established under section 3 of the Ordinance;

“Director” means the Director of Lands and Surveys Department in the State and includes any officer duly authorised to act on that behalf;

“E.D.M.” means electronic distance measuring equipment;

“E.S.P.” means Engineering Survey Paper containing instruction by the Director to carry out the topographical or engineering surveys by Licensed Surveyor;

“Global Navigational Satellites systems (GNSS) Surveying Equipment” means an equipment for ascertaining the position on the ground by receiving signals from Satellites Systems;

“Intersection Point” means a point of intersection between two straight lines of design alignments;

“JUPEM” means the Jabatan Ukur dan Pemetaan Malaysia;

“Licensed Surveyor” means a registered surveyor licensed in accordance with section 10 of the Ordinance;

“Level instrument” means an optical or digital instrument used to transfer, measure, or set horizontal levels;

“Ordinance” means the Surveyors Ordinance 1960;

“R.S.O.” means Borneo Rectified Skew Orthomorphic projection;

“Survey Technician” means a survey technician registered in accordance with subregulation 4(3) of the Surveyors (Conduct of Title Surveys) Regulations 1962;

“TBM” means temporary bench mark;

“Topographical and Engineering Surveys” means the survey of sites, roads, railways, pipelines, waterways, drainage, irrigations and transmission lines which require the correct interrelation of boundaries or of boundary marks and the making and recording of all measurements and calculations relevant thereto and the drawing and reproduction of plans therefrom;

“Total Station” means an electronic theodolite (transit) integrated with an electronic distance meter.

E.S.P.

3. Every licensed surveyor shall apply for E.S.P. to commence topographical or engineering surveys to the Director and such application shall set out the purpose and extent of the proposed survey.

Personal direction and supervision

4. Every topographical and engineering surveying work shall be made under the immediate personal direction and supervision of a Licensed Surveyor and in strict accordance with these Regulations.

Field equipment

5. (1) Every Licensed Surveyor engaged in topographical or engineering surveying shall make angular observation with a transit theodolite or a total station which is in good adjustment and he shall measure distances with a total station, E.D.M. equipment, or continuous steel tape.

(2) Level instrument shall be utilised to undertake levelling operation.

(3) Notwithstanding subregulation (1), Global Navigational Satellites systems (GNSS) Surveying Equipment may be utilised.

(4) All equipment's utilised for the surveys shall be calibrated at a base or by any other method which meets the Director's approval.

Origin of co-ordinates

6. Topographical and engineering surveying works shall be finalised in terms of R.S.O. system of rectangular co-ordinates.

Datum and closing of traverses

7. (1) Every Licensed Surveyor undertaking topographical or engineering surveying works shall take all responsible care to verify the datum adopted and shall furnish full details thereof in his field notes.

(2) Such datum shall be two marks of a former title survey of adequate technical value proved by measurement (or by traverse and calculation) and by astronomical observation for azimuth, or by angular and linear measurement to a third such mark, to be in their original position.

(3) All bearings shall be closed at intervals of not more than twenty five stations, either on proved marks as for datum above or on a line whose bearing has been determined by astronomical observations.

Angular observation

8. For traverses, angular measurements shall be made by reading both faces of the theodolite or total station at each survey station.

Linear measurement

9. In making linear measurements using total station, E.D.M or steel tape, distances shall be read to the nearest three decimals of a metre.

Location and extent of area to be surveyed

10. The Licensed Surveyor shall obtain all the relevant maps and/or plans showing the location of the proposed site and beyond the boundary of the site to be surveyed.

Programme of survey work

11. The Licensed Surveyor shall exercise care and diligence at all times in the discharge of the duties to be performed by him.

Survey staff, etc.

12. (1) The Licensed Surveyor shall provide such staff, instruments and equipment, tools, materials, tent, transport, etc., as will ensure the completion of the work to the standards and within the time schedules specified.

(2) A party leader shall be a survey technician.

Planimetric control

13. (1) Planimetric control shall be provided and determined by theodolite or Total Station traversing.

(2) The co-ordinates of planimetric control points shall be calculated and finalised in terms of R.S.O.

(3) The permissible traverse linear closing error shall be 1:4000 or better.

(4) All planimetric control points shall be marked using permanent ground markers and shall be clearly and legibly inscribed.

(5) Notwithstanding subregulation (1), in the event of non-availability of Government control points within a reasonable distance from the proposed site, and with the consent from the Lands and Surveys Department, planimetric control points can be established utilising Global Navigational Satellites systems (GNSS) Surveying Equipment.

Height control

14. (1) The height controls shall be established by leveling operations from existing bench marks established by JUPEM. The major leveling network shall start from a minimum of two bench marks. In the case of link leveling, the leveling network shall be closed to a minimum of two other survey bench marks. All TBM shall be established within the major levelling network or connected to it by closed leveling circuit(s).

(2) Vertical misclosures within the leveling network shall not exceed the the following:

$\pm(20vk)$ mm where k is sum of the distances levelled in kilometres.

(3) Bench marks which exceed the above tolerances shall be omitted from the adjustment. The Licensed Surveyor shall inform JUPEM if any bench marks are found to be damaged or in error. All leveling shall be done in sections of approximately 1km in length.

(4) Notwithstanding subregulation (1), height control points can be established using method(s) approved by the Lands and Surveys Department.

TBM monumentation

15. (1) TBM standard monument shall be constructed out of a 1 metre length of 40mm diameter galvanized iron pipe set in concrete of dimension 30cm x 30cm x 30cm. The TBM monument number and the reduced level of the TBM shall be written on the concrete.

(2) Unless it is impractical to do so, TBM shall be established well away from disturbance and/or existing construction limit.

(3) Notwithstanding subregulation (1), TBM may be located on a stable point and established without concreting.

Topographical survey

16. The Licensed Surveyor shall perform all field survey works necessary to capture both natural and man-made features within and beyond the boundaries of the proposed area. Measurements shall be made to determine, with sufficient precision for the purpose of plotting them accurately at the scale of the final plan, the positions of such natural and man-made features.

Features to capture

17. The Licensed Surveyor shall survey accurately the locations and dimensions of the following existing features within the proposed survey area –

(a) buildings and structures, indicate whether dwelling, industrial or other use, type of construction, tanks, sewage disposal works, *etc.*;

- (b) roads, tracks and paths, including pedestrian crossings and bridges, culverts, kerb lines and road furniture;
- (c) manholes and valve markers of water, sewer and gas mains;
- (d) transmission line and supporting towers, telephones and electrical poles;
- (e) land-use and vegetation, playing fields *etc.*;
- (f) slopes and earthworks, including quarries, retaining walls and rock outcrop;
- (g) railway tracks and level crossings;
- (h) water courses, drains and their discharge direction, lakes or mining pools, swamps and coastal features;
- (i) archaeological relics, fences and gates; and
- (j) any other features, either man-made or natural features as required.

Spot heighting and contouring

18. (1) Spot heights shall be taken at spacing not exceeding 20 m at salient points such as hilltops, bottoms of depressions and saddles, along the center and edges of all roads and public accesses, at road intersections and areas where there are significant changes in gradient.

(2) In flat areas, where the horizontal distance between contours generally exceeds 40 m additional spot heights shall be shown at intervals not exceeding 20 m parallel to the contours.

Grid leveling

19. (1) Spot levels by grid levelling shall be obtained at intervals of 5m, 10m, 20m or any other interval as agreed by the client.

(2) Existing features such as listed in Regulation 18 shall be captured.

Strip Survey

20. (1) The Licensed Surveyor shall carry out a strip survey within the proposed corridor together with the detail of the strip as listed in regulation 18.

(2) The Licensed Surveyor shall carry out all field work necessary to accurately determine the contours at the specified intervals and detailed physical features of the terrain. Sufficient control height points and spot heights shall be taken to ensure accuracy of the contour lines.

Road, railway, pipeline, waterways and transmission line surveys

21. (1) In general, the surveys of road, railway, pipeline, waterways and transmission line are carried out in two stages. The first stage is to provide all the necessary data and information for undertaking the engineering design and construction for a proposed project. This stage normally includes control traversing, levelling, detail or strip surveys (locations and dimensions of existing features within the corridor of survey), preliminary setting out, and longitudinal profiling and cross sectioning.

- (2) The second stage concerns mainly on the final setting out and as-built surveys.

Pegging of alignment, longitudinal profiling and cross sectioning

22. The Licensed Surveyor may set out the alignment in the following manner:

- (a) Set out and mark all intersection points (IPs) using 25mm diameter G.I. pipe embedded in concrete and tied to at least 2 reference markers placed at least 20m away from the intersection point. The base of the triangle which they form with the apex shall be at least 15m apart.
- (b) Centre-line shall be pegged painted red at the prescribed intervals using hardwood pegs painted red and projecting not less than 50mm above ground; or for setting out of centre-lines along existing roads, points shall be marked with suitable markers.
- (c) For longitudinal profiling along the proposed route center-line, levels shall be taken at the prescribed intervals. However in rolling and hilly terrain where the ground level changes more frequently, closer intervals for the profile section will be required.
- (d) Once the centre line points are marked out and longitudinal profiling is completed, cross sectioning shall commence with sufficient spot heights taken to ensure accurate depiction of the terrain. The surveyor shall include points of abrupt change in the natural ground surface.

Demarcation of corridor boundaries

23. In demarcating transmission line corridor boundary, setting out shall be carried out by off-setting from the center-line point markers. Hardwood pegs are to be painted at change points of the boundary and jungle roller pegs at intermediate points at a spacing so prescribed.

Survey of water courses

24. (1) The Licensed Surveyor shall survey all streams, rivers and water courses crossing the line of the routes. These include all water courses whether there is water or no water flow at the time of survey. The survey shall extend to distances prescribed on either side of the route center-line (distances measured along the channels), or up to the edge of the survey corridor, whichever is the greater.

(2) The Licensed Surveyor shall survey all top and bottom edges and invert levels of waterways at intervals so prescribed, showing all significant changes of level and direction of flow.

Culvert and bridge crossings surveys

25. (1) For culvert and bridge crossings, normally a plan and a side elevation of the structures showing wing walls, piers, abutments and other related details are required. In this instance, the Licensed Surveyor shall indicate on the plan and longitudinal profile the chainage and reduced level of lowest point of all depressions along the route. In addition the following information shall be surveyed and obtained –

- (a) soffit level of the edge beam at the bridge together with their spans and location of columns/piers;

- (b) invert levels and crown levels of culverts and distances of inlet/outlet structures from edge of road pavement;
- (c) level of water in the stream and date the level was taken; and
- (d) the size, type and location of utility services adjacent and along the span of the bridge.

(2) For cross sectioning and sounding at proposed bridge and culvert sites, the work shall include –

- (a) survey of proposed bridge sites of 30m x 30m of land on both sides of river and 10m x 10m for culvert sites;
- (b) cross-sectioning with sounding spot level at 10m intervals;
- (c) measurement of width and depth of river along the center-line of proposed bridge and along the section minimum 30m upstream and 30m downstream of center-line;
- (d) measurement of width and depth of river, based on waterline at the time of survey.

Flood Information

26. The Licensed Surveyor shall record the maximum flood level at each river crossing. Existing water surface levels shall be taken at suitable points along the channel.

Field recording and record keeping

27. (1) The survey observation may be recorded manually or digitally. Field records must be properly kept in accordance with good practices and shall record truthfully all the survey work carried out.

(2) In the case of manual recording field booking, the Licensed Surveyor shall record all working in proper field books written in ink. Errors in field books shall be stuck off and there shall be no erasure or superimposition of writing on top of existing words of figures.

Survey plans

28. Survey plans shall be prepared in an approved format by the Director. All legends and symbols used in the plans shall be those currently used by the profession. The plans shall where necessary, have an overlap of not less than 50mm width match lines shown.

Location plan

29. (1) The location plan of the survey area shall be drawn for a suitable scale such that the area being surveyed can be accommodated into a single standard sheet of A1 size. Where applicable, the chainage of the center-line shall be indicated to facilitate cross-reference to detail plans.

(2) Notwithstanding subregulation (1), where the surveyed area is relatively small, the location plan can be incorporated in the detail plan.

Detail and contour plans

30. (1) In case where a site is too large to be accommodated in a single A1 size drawing then the plan may be divided into a number of sections with match lines linking them together.

(2) The plans shall contain all the essential details so as to enable the client to make sound decisions pertaining to engineering design.

(3) Survey control stations (planimetric and height controls) shall be shown.

(4) The north point shall be shown R.S.O. grid lines shall be shown at 100 mm intervals together with its co-ordinate values.

(5) All cadastral boundaries within the surveyed area shall be shown.

(6) Where steep slopes are encountered and it is not practicable on the plan to represent each contour fully throughout its length, the Licensed Surveyor may terminate certain intermediate contours.

(7) Any contour which can be brought within this vertical tolerance by moving its plotted position in any direction by not more than 0.5 mm or one-tenth of the horizontal distance between contours, whichever is the greater, shall be considered acceptable.

(8) Contours shall be shown by continuous lines with a thicker line for every fifth contour (prominent contour). Contour and spot heights shall be differentiated from other details. The value of each contour shall be indicated along the contours at intervals not exceeding 200 mm and/or the edges of the mapping area.

(9) Where because of undergrowth, on-going earthworks, swampy areas, or other obstructions, the ground surface is obscured, or access is restricted, contours can be shown by broken lines to indicate that their accuracy cannot be guaranteed.

Longitudinal profile and plan

31. (1) The longitudinal profile shall show details of ground level profile of the route centre line, cross section of the rivers, position of culverts, highest known flood level (if any), swamps and their water level and other features needed for design consideration. The longitudinal profile shall be drawn to a scale of 1:1000 horizontally and 1:500 vertically or at other suitable scale.

(2) The longitudinal profile is normally plotted underneath the topographic plan of the alignment which it represents.

Cross-section plan

32. (1) Drawings of all the cross sections along the centre line of the proposed alignment shall be plotted in consecutive order, to a scale of 1:200 both horizontal or at other suitable scale. The drawings shall details of ground levels and distances from the centre line of the proposed alignment.

(2) The cross sectional plans must be properly referenced to the alignment detail plans it represents.

Submission of survey plans and records

33. (1) Upon the completion of the surveying works, the Licensed Surveyor shall submit to the client the survey plan(s) and records as follows:

- (a) two sets of paper copies at A1 size unless otherwise agreed;
- (b) digital survey data in an agreed media;
- (c) the relevant survey data and computations; and
- (d) all survey plan/s shall bear the name, qualifications of the Licensed Surveyor as well as the name and address of the company.

(2) The Licensed Surveyor shall submit a copy of the survey plan(s) and digital survey data to the Director.

Proposed acquisition plan

34. Preparation of the proposed land acquisition plans shall be done in accordance with Lands and Surveys Department's requirements.

Certification

35. Every survey plan shall bear a certification by the Licensed Surveyor in the following form:

"I, a surveyor licensed under the Surveyors Ordinance 1960, certify that the survey from which this plan has been prepared was carried out in the field in strict accordance with the Surveyors (Conduct of Topographical and Engineering Surveying) Regulations 2017, and that this plan correctly represents the survey completed on the day of, 20"

Dated this . day of , 2017.

.....
Licensed Surveyor".

Made 14 June 2017

HAJI SAFAR BIN UNTONG,
Chairman,
Surveyors Board, Sabah.

I approved the foregoing Regulations.

Dated 28 June 2017

TAN SRI DATUK SERI PANGLIMA HAJI SUKARTI BIN HAJI WAKIMAN,
State Secretary.