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FAIR MAPPING

SEVENTH EDITION

(CORRECTED UP TO 1ST JUNE, 1935)



This pamphlet forms Chapter VI of the Handbook of
Topography

Published by order of Brigadier H. J. Couchman, D.S.O., M.C.,
Surveyor General of India

Printed at the Photo-Litho. Office, Survey of India
CALCUTTA
1935

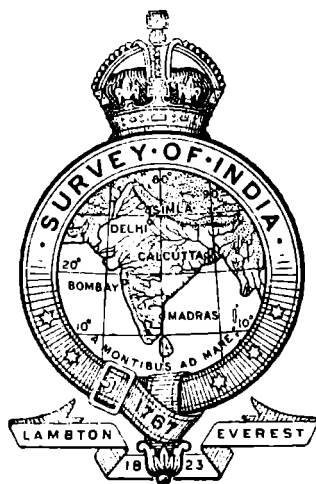


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LIST OF CHAPTERS OF THE
HANDBOOK OF TOPOGRAPHY.

- CHAPTER** I. **Introductory.**
- „ II. **Constitution and Organisation of a Survey Party.**
- „ III. **Triangulation and its Computation.**
- „ IV. **Theodolite Traversing.**
- „ V. **Plane-tabling.**
- „ VI. **Fair Mapping.**
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CHAPTER VI
FAIR MAPPING

SEVENTH EDITION

(CORRECTED UP TO 1ST JUNE, 1935)

When any correction to this Handbook is considered necessary the DIRECTOR, MAP PUBLICATION, should be addressed.

Subsequent procedure will be as laid down in Chapter I, (1932), para. 3.

Important alterations and additions to the 1928 Edition are shown by a vertical line in the margin.

CHAPTER VI
FAIR MAPPING

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FAIR MAPPING

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SECTION I.

GENERAL

1. Introductory remarks.—In a properly constituted topographical party the area surveyed each field season should be fair mapped during the following recess, the fair sheets being finally examined and submitted to the circle office before the party again takes the field; every endeavour must be made towards this end, for the efficiency of a party is gauged to a great extent by the absence of all arrears of fair mapping.

2. Batching of sheets.—In order to insure a steady flow of work through the Photo.-Litho. Office all drawing offices will divide their sheets into four batches marked A, B, C and D (preceded by the year) for submission during the 1st, 2nd, 3rd and 4th quarters of the official year respectively. Similarly field parties will divide their fair sheets into four batches marked I, II, III and IV (preceded by the year) for submission on such dates as may be specified by the Director.

3. Independent parties.—For the purposes of fair mapping the Director, Map Publication, will perform the functions of a Circle Director to Nos. 6 and 10 Parties in all matters in which a Circle Director's authority is required.

4. Sheet file.—Every fair sheet should have a separate file the title of which will be the number of the sheet, or, in the case of special maps, the name of the map. This file should be opened as soon as the survey of the sheet is commenced, and in it will be kept all correspondence and extracts from letters from other files, which refer to the sheet.

5. Training.—As draftsmen are not ordinarily attached to field parties, it is important that all officers and subordinates should be trained in fair drawing, and a certain number in typing and hand-printing. The instruction of young officers and subordinates is one of the most important duties of the supervising officers, and, in order that they may carry out this duty in the most efficient manner, it is desirable that all officers of Class I and Class II should have practical experience of fair mapping in its various stages.

6. Recess establishment.—The recess establishment should include not only the surveyors required for fair mapping the results of the field season, but also, for instructional purposes, all the

pupils and a certain number of the less experienced surveyors. A surveyor who is an efficient draftsman will produce much better field work than an equally good surveyor who is an indifferent draftsman.

7. Supervision.—For convenience of supervision and control, survey parties are, during recess, divided into sections. The officer in charge of the party exercises a general supervision and control, and is responsible for the final examination of the fair sheets. Section officers are, as a rule, fully employed in the supervision of their men, in the examination of the work in progress, in the completion of plane-table sections, in the preparation of guides for draftsmen and typers, and in the final examination in the section, all other members of the party present during recess are required to take their share, according to their qualifications, in the actual preparation of fair sheets and in computations.

8. Magnifying and minifying glasses.—All section officers and draftsmen should be provided with magnifying glasses, and the former also with minifying glasses with rests of the proper length to suit the proportion which the published sheet bears to the fair sheet. Draftsmen whose sight is failing will find it easier to draw if they do so under a magnifying glass; this method is also very helpful when blue prints are indistinct, or when the detail or contours are intricate. Magnifying glasses with stands are obtainable from the Mathematical Instrument Office.

9. Drawing paper.—The best available hand-made drawing paper should be used for fair mapping; the several sheets required for any one fair map should be selected from the same consignment, and should be kept throughout under the same conditions; much of the success in heliozincographing a fair sheet depends on the paper being perfectly smooth, clean, and free from creases and blemishes of all kinds.

10. Treatment of drawing paper.—Paper with a highly glazed surface is objectionable on account of its gloss, which tends to interfere with the photographic operations; such paper does not stand scratching or erasing well, and, moreover, owing to its want of "bite", causes the lines to thicken. Drawing paper can, however, be obtained slightly rolled, in which state it is sometimes preferred. When any part of the surface of drawing paper is found to be greasy, the greasiness may be removed to a certain extent by the application of benzole, which should be applied with a light touch by means of a large clean camel-hair brush, care being taken not to have the brush too full. It is very important that only pure benzole, obtained from a reliable chemist, should be used, as drawing paper may be badly stained by the use of impure benzole. Application of magnesia powder to a freshly supplied drawing blue print

dries the blue ink quickly and prevents smudging. The powder should not be removed for 24 hours. This is equally useful for drying typed names when double banking is resorted to.

11. Necessity for cleanliness.—The necessity for keeping fair sheets clean throughout their preparation cannot be too strongly insisted on; this applies not only to the face but also to the back of the sheet.

12. Aids to cleanliness.—The following aids to cleanliness are recommended:—

The use of envelopes of brown or canvas-backed paper provided with edge protection of some strong material about 2 inches wide (it is necessary to remove the fair sheets from these envelopes every morning and to dust out the latter); the provision of apron flaps to drawing tables; the supply of linen smocks or sleeved aprons to draftsmen; the provision of basins, soap, and towels in all drawing offices; pasting a sheet of thin paper on the slab or plate over which sheets are typed.

13. Cleaning fair sheets.—If careful precautions are taken, it should seldom be necessary to clean a fair sheet after it has been completed, but, if cleaning is indispensable, it should be done with stale bread crumbs. If only a small portion of the drawing is dirty, it may be cleaned with a piece of very soft india-rubber, but care should be taken to examine the line-work afterwards through a magnifying glass, and to repair all breaks in the drawing and typing with a fine mapping pen.

14. Use of pencils.—The use of black pencils on a fair sheet should be strictly prohibited; if the draftsman requires to make marks to assist him in fair mapping, only light blue pencils or cobalt should be used.

15. Pens.—Fair sheets may either be drawn with a mapping pen, or crow-quill, or with a ruling or swivel pen. Although very fine work can be done with any of the various varieties of mapping pens, it takes longer for a draftsman to acquire facility in their use than is the case with the ruling pen or the swivel pen; with both the latter there is less danger of breaks, unevenness and uncertainty in the line work than with the former, and it must be borne in mind that, in order to get the best results from heliozincography, it is essential that the line work should be black, unbroken, and sharp. Although, therefore, it may be necessary to allow some of the old draftsmen, who have been accustomed to the use of the mapping pen, to continue to use it, all the younger men should be trained in the use of the ruling pen, as well as of the swivel pen, which will be found very useful for contouring. Draftsmen should be supplied with hones, and should be taught how to "set" their pens.

16. Use of rulers.—When straight roads, railways, canals, &c., are being drawn, a ruler should invariably be used.

17. Double road- or dotting-pens.—It is seldom that good results can be obtained from double road- or dotting-pens, but they can be used with cobalt so as to obtain uniformity in spacing, the blue lines and dots or bars being gone over again in indian ink with an ordinary pen.

18. Stylographic pens.—A fine stylographic pen is useful for dotting purposes.

19. Ink.—It is important that the indian ink, which is used for fair drawing, should be of the best quality. It should be rubbed slowly, with a gentle pressure, on a plate or saucer having a smooth surface; if ground quickly and on a rough surface, it will be gritty and will give constant trouble with the pen. When sufficiently thick to give black (not brown or grey) lines, the saucer containing it should be protected by a loose cover to prevent dust getting into it, or the ink should be kept in a bottle. Liquid indian ink as prepared by the Photo.-Litho. Office gives good results. If the ink in the saucer is absolutely free from dust or grit it is not necessary to clean it off the saucer at the end of a day's work; new ink may be added to it and it may be rubbed up afresh next day, but if grit is present fresh ink must be prepared.

20. Treatment of clogged pens.—Draftsmen who find their pens not working well occasionally dip the points into water or rub them on a wet sponge; this practice is objectionable, for, although it answers the purpose of making the ink flow more freely, it makes it pale and unsuitable for photography: when pens are clogged or dirty, they should be wiped with a piece of damp chamois leather or with a soft rag.

21. Erasures.—Erasures should be avoided as far as possible, and should never be made except under the orders of the officer in charge of the mapping; they are best carried out with a very sharp pen-knife, the portion to be erased being placed over a thick sheet of smooth glass, and care being taken to remove the ink with as little damage to the surface of the paper as possible. The erased surface should be cleaned with a piece of soft indiarubber and then burnished under tissue paper with a clean piece of bone or ivory. When large patches have to be erased, very fine glass paper may be employed, the rubbed surface being afterwards treated as described above.

The "Ariel" electric erasing machine, made by B. J. Hall & Co. Ltd., is also useful for erasing large areas, headings, &c.

22. Pasting.—There should be no pasting on any fair sheet except with the specific sanction of the Director, who will reserve

such sanction for very exceptional cases. In cases of doubt, the Director, Map Publication, should be consulted.

23. Completion of sheets to edge.—All one-inch, half-inch and quarter-inch sheets in the neighbourhood of the frontier should be completed to edge, even when it is necessary to use old small scale surveys for the purpose. The material available will generally be of different degrees of reliability, and it should be differentiated on the fair sheets in accordance with the rules laid down in Section XI.

24. Despatch of fair sheets.—Fair sheets intended for despatch by post or rail should be carefully rolled and packed in a tin tube which should, for further protection, be enclosed in a stout wooden case. Large consignments and all shaded drawings should be sent packed flat in tin-lined cases. All consignments of fair sheets or plane-table sections, whether despatched by post or rail should be insured. (See Appendix C.).

25: Colours for one-inch and half-inch sheets.—The one-inch and half-inch sheets will be published in black and colours as follows:—

- (a).—*Black*: all outline, lettering, prominent surveyed trees, live or barren dead moraines (lateral, medial or terminal), scree, rock-falls, fans, and symbols not mentioned below.
- (b).—*Red*: roads, tracks and paths; milestones on roads and their mileage; arrows indicating coincidence of road, track, or path with single-line streams; road bridges; masonry dams, road tunnels, fords and ferries (symbols only); towns, villages, deserted villages, huts, and buildings; buoys, beacons, steamer signals, navigation marks, &c., if lighted; border square letters and numbers. Metalled roads, towns, and villages (except huts and ruined villages) have a red tint between the red lines, but metalled roads will not have a red tint in the areas of towns, cantonments, or large villages, nor when they pass between tinted sites at other places, *vide* para. 461 (c).
- (c).-(i) *Blue*: lines of high- and low-water; fathom-lines and their lettering; mud on foreshore; submerged sand, rocks, &c.; limits of double-line rivers, and of the perennial water in them, from the sea as far as the tides reach; single-line streams which generally contain water; perennial canals (see para. 88); steamer services; falls and rapids; locks, weirs, siphons, distance-stones and their distances, of perennial canals; canal bench-marks and their heights;

sluices along perennial canals; aqueducts; pipe-lines; marshes; reed symbol in perennial water; springs; wells; used *kārezes* (with depth of shaft); limits of all areas of permanent snow or glaciation; all ice features; water features, whether on or off ice; contours across ice and permanent snow including those across live moraines; contours above permanent snow-line; contour values of blue contours.

(ii) *Blue tint* will be used over sea areas (except fore-shore), and over the water areas of rivers and canals which are too wide to be shown by a single line, and of lakes and tanks, (*vide* also paras. 95—99); very small perennial tanks which would receive inadequate prominence if printed in blue tint, should be blocked in and printed in solid blue.

(d).—*Green*: trees, except prominent surveyed trees, other vegetation including tea bushes, grass, scrub, &c., and the riband denoting the external boundary of reserved and protected forests.

(*Note*.—An external boundary is that separating reserved, &c., forests from land which is not reserved; a green riband will therefore be entered round exclusions, but not along the common boundary between two reserved, &c., forests: the common boundaries between forests under entirely different ownerships, e.g. between British reserved forests and state forests, should be considered as external ones).

(e).—*Yellow*: cultivated areas.

(f).—*Brown*: mounds; rock cliffs whether above or below the snow-line; broken ground which is not on the outline sheet (for which see para. 58(c)); contours and contour values except those mentioned in sub-para. (c)(i) above; rocks and sand except in the beds of rivers, lakes or tanks, or on the foreshore; stony waste; dead moraines if under vegetation (grass, scrub, or trees).

(g).—*Grey*: hill-shading.

26. Colours for quarter-inch sheets.—The colouring on quarter-inch sheets will be the same as that for one-inch and half-inch sheets, except that cultivation limits and the yellow tint will be omitted. In Nepal the cultivation limits and yellow tint will be shown.

27. Corrections during publication.—If it should be found necessary to make any obvious additions or corrections to any fair sheet of the one-inch, half-inch, or quarter-inch maps of India, while under publication, such additions or corrections will, be

carried out in the head-quarters office, and the Director, Map Publication, will inform the Director of the topographical circle concerned. In cases of doubt or if a reference to the plane-table sections should be necessary, the Director, Map Publication, will return the fair sheet to the Director of the topographical circle concerned to have the corrections or additions carried out in his office. No additions or corrections will be made on the body of the plane-table sections, but a note regarding any additions or corrections, which may be decided on, will be made in the margin of the plane-table section under the countersignature of the Circle Director.

28. General Staff corrections.—When corrections and additions to maps of military importance are suggested by the Chief of the General Staff, they should, as a general rule, be accepted by the Survey of India. If, however, for any reason the officer responsible for the drawing of a sheet considers that it would not be advisable to accept any particular correction or addition, he should refer again, through his Director, to the Chief of the General Staff explaining his objections. Such correction or addition should only be omitted when the Chief of the General Staff agrees. There are special rules for frontier sheets, for which see Appendix D.

29. Corrections by hand.—Corrections by hand will not be made on any already printed maps, except under the following circumstances:—

- (a) if an error is discovered in a published sheet, the Director, Map Publication, may have it corrected by hand, correction slip, or appliqué slip, in order to avoid reprinting the sheet.
- (b) if a correction, such as the entry of a new railway, is specially asked for by an authority who is entitled to receive maps free of charge, *e.g.* a Secretary to the Government of India, it will be made on the particular copies supplied.
- (c) if a correction is specially asked for by an applicant not entitled to receive maps free of charge, the Director Map Publication, is authorized to have it made on the particular copies supplied, if he considers this advisable, at an extra charge depending on the amount of work involved, but in no case less than annas four per copy.

In all cases where extra-departmental information is added under the above rules the following footnote should be entered:—

“Alterations and additions made by hand on this copy of the map are based on information that has not been verified by the Survey of India.”

SECTION II.

PREPARATION FOR FAIR MAPPING

30. Scale of fair drawing.—As the line work of drawings reproduced by the heliozincographic process has a tendency to thicken on the zinc plate, fair sheets intended for publication by this process will, in order to counteract the inartistic effect of any coarseness in the original drawing, be drawn on a larger scale than that of the resultant published sheet; the scale ordinarily adopted is one and a half times that of publication.

31. Drawing paper required.—Four sheets of drawing paper will be required for each sheet drawn on the $1\frac{1}{2}$ -inch scale (or in the case of half-inch maps on the $\frac{3}{4}$ -inch, or quarter-inch maps on the $\frac{3}{8}$ -inch scale), one for the outline sheet, one for the contour sheet, one for the green tree sheet, and one spare in case of accidents; an extra sheet is required for the special contour sheet of each half-inch sheet for use in the fair drawing of a quarter-inch sheet (*vide* para. 382). For sheets without hills, only three sheets of drawing paper will be required.

32. Photographic enlargements or reductions.—As soon as the plane-table sections comprising a sheet have been completed, they should be sent to the nearest reproducing office to be reduced or enlarged to the scale of fair drawing. Care should be taken that all blue details are darkened by going over them with a soft black pencil to ensure their photographing properly. The exact dimensions to which the surveyed area should be reduced or enlarged should be clearly recorded on Form O. 143. One copy of this form should accompany the invoice and another should be fixed to the back of the sections, by pasting it *lightly* at each of the four corners; if heavily pasted it is apt to distort the sections. It is most important that this form should be accurately and completely filled in: the dimensions are not checked in the reproducing office, and they should invariably be checked and initialled, with date, preferably by an officer, before the plane-table sections are despatched for reduction or enlargement. As the form is not required for permanent record it may, after the dimensions recorded thereon have been checked with the reductions or enlargements, be removed and destroyed.

33. Transfer of details from plane-table sections to fair sheets.—Details may be transferred from the plane-table sections to the fair sheets either by (a) photography, or (b) from traces by hand.

34. Transfer by photography.—Uniform expansion or contraction of the plane-table sections can be adjusted in the reproducing offices, but only very slight distortion (that is, expansion or contraction which is neither uniform nor symmetrical) can be so adjusted. With the above proviso, light blue prints on drawing paper can be prepared from the plane-table sections for the fair drawing, and, in addition, black or blue prints on rag-litho., bank-post, or tracing paper for accessory work, such as outliner's guides, typer's guides, &c., or for supplying information to assist the drawing for the half-inch and quarter-inch sheets (*vide* para. 327).

35. Distortion.—It is impossible to lay down any hard-and-fast rules regarding the procedure to be observed in transferring the details from either plane-table sections or their enlargements or reductions to the fair sheets. It must be recognised, however, that in some cases more or less adjustment is necessary to compensate for the expansion or contraction of the paper, though by the use of Bristol-boards or of drawing paper mounted on straw-boards for plane-table sections, distortion has been very largely reduced.

36. Number of blue prints &c., to be ordered.—The number of each kind, required as in para. 34, should be limited according to the scale given below; variations as regards paper or colour of prints are permissible but the total number of prints should not be exceeded except for special reasons which should be given in each case:—

(a) Sheets with contours:—

4 blue on 210 lb. drawing paper.

4 black or grey on rag-litho., bank-post, or hollingworth.

2 blue on rag-litho.

2 black or blue on tracing paper.

(b) Sheets without contours:—

3 blue on 210 lb. drawing paper.

3 black or grey on rag-litho., bank-post, or hollingworth.

2 blue on rag-litho.

1 black or blue on tracing paper.

(c) For preparation of mosaics:—

2 black prints on rag-litho. of each plane-table section required to be reproduced; in cases where drawing on the plane-table section is bad, and touching up is necessary, an extra blue print may be asked for.

37. Preparation of mosaics.—When a sheet has been surveyed on several plane-table sections, all the sections, irrespective of scale, are photo-zincographed to the scale of fair drawing and black prints are pasted in position on to a projected sheet of thin drawing paper, which is then photo-zincographed to the same scale. Trigonometrical stations should be plotted on the projected sheet,

and the prints should be pasted on to the sheet so that the positions of the stations on the prints coincide with their plotted positions. In this method, all the black prints should be either on rag-litho. or on bank-post, or on tracing paper, (only one kind of paper, preferably rag-litho., being used on the same sheet), and they may be pasted in position in entire plane-table sections, or cut up and pasted on in 5-minute squares or even smaller pieces. Plane-table sections which are only slightly distorted, as is usual, may be treated by this method, but it is advisable, however, in such cases that the prints should be pasted in position in 5-minute squares or in smaller pieces. When any portion of a sheet cannot be treated by this method, even by means of adjusted traces, this method should be adopted for the remainder of the sheet, and the area left blank should be dealt with by the party concerned, by transferring the detail by hand on to the fair sheet.

38. Lithographic combination of plane-table sections.—The reproducing office may find it possible to combine plane-table sections lithographically so as to save the preparation and rephotography of paper mosaics as described in para. 37; therefore, when sending in plane-table sections for photography to the scale of fair drawing, the number of blue and other prints (*vide* para. 36) that will eventually be required should always be intimated.

39. Alternative method for undistorted plane-table sections.—If the plane-table sections are not appreciably distorted, they may be treated by either of the two following methods:—

- (a) When a sheet has been entirely surveyed on one plane-table section, the section is photo-zincographed to the scale of fair drawing.
- (b) When a sheet has been surveyed on several plane-table sections, the most suitable section, which will usually be the largest, is selected; the other sections, irrespective of scale, are photo-zincographed to the scale of survey in position on to the selected section, which is then photo-zincographed to the scale of fair drawing. When pasting the prints on to the selected plane-table section, care should be taken to use a thin paste (gloy is recommended) sparingly, and only along the edges of the prints in order that they may be easily removed from the section later on. In this method all the black prints should be either on rag-litho. or bank-post paper, (only one kind of paper should be used on the same sheet), and they may be pasted in position in entire plane-table sections or cut up and pasted on in 5-minute squares or even smaller pieces.

40. Care required by draftsman.—Any of the above methods requires considerable care and intelligence on the part of the draftsman, as all errors on the plane-table sections, or differences of style between adjoining surveyors, are reproduced on the blue prints and have to be corrected or adjusted by the draftsman while drawing the fair sheet; careful guides as described in paras. 57 to 61 are all the more necessary.

41. Cases where considerable adjustment is necessary.—Cases occur where, generally either owing to a coarsely drawn or dirty plane-table section, or to considerable adjustment being necessary between plane-table sections, or to excessive distortion which cannot be adjusted by photography, the following procedure may be found necessary:—

- (a) The fair sheet is projected on a sheet of thin drawing paper on the scale of survey and the stations and points referred to in the next para. plotted thereon. The graticule lines of the 5-minute squares with the stations and points are then traced off each square separately on tracing paper, and the work traced in appropriate colours from the plane-table sections. In doing this all necessary adjustments are made and each square is carefully examined, so that after examination they will contain all work which is to be entered on the fair sheet. These traces are then pasted in position on the projected sheet which is then photo-zincographed to the scale of fair mapping.
- (b) These traces themselves form an excellent guide for the draftsman.

42. Transferring detail by hand.—Transferring by hand will only be used when transferring by photography or vandyking is unsuitable. It will rarely be necessary for a whole sheet, but may sometimes be used to complete a sheet as mentioned in para. 37. Adjusted traces will be prepared as in para. 41 (a) above, and after enlargement or reduction, where necessary, transferred square by square by means of transfer paper (prepared by rubbing fine powdered blue chalk on tracing paper) on to a sheet of drawing paper prepared as follows:—

On a preliminary sheet the following data should be plotted, and, after examination, pricked through on to the sheet selected for the outline drawing, *i.e.* (a) the graticules, (b) all triangulation stations, and the intersected points of geodetic-triangulation, which are to be entered on the fair sheets, (c) important traverse stations (when traverses form the "control" of the work) and such intersected points as fall on or close to graticule lines, and which are to be entered on the fair sheets. Other

intersected points of minor triangulation will not be plotted. Stations of minor value which would be shown in the triangulation pamphlets as intersected points should be similarly treated on fair sheets.

43. Plotting with rectangular co-ordinates.—If many points to be plotted are in terms of rectangular co-ordinates the rectangular values of the corners of the sheet should be computed, rectangular graticule lines drawn in blue and the points plotted with respect to them; if, however, only a few such points are required to be plotted it may be quicker to convert their rectangular into spherical values, on Form 9 Trav.

44. Note regarding origin.—In the case of all fair sheets based on rectangular co-ordinates and on which rectangular graticules have been drawn, the origin of the survey must be entered in blue in some convenient position. When, however, rectangular graticules are not shown on the fair sheet this need not be entered.

45. Scales.—Diagonal scales of latitude and longitude are obtainable from the Mathematical Instrument Office; when these are in agreement with the projected sheet they may be used for plotting purposes, otherwise scales of latitude and longitude must be constructed on the sheet of drawing paper on which the points are originally plotted.

46. Guide lines for names.—Guide lines for names may be drawn on the traces or black prints before the blue prints are prepared.

47. Examination of prints on receipt.—When the blue prints on drawing paper have been received for fair drawing the graticule should be checked and triangulation and traverse stations and intersected points plotted on the prints. If, when checked, the limiting parallels of the sheet have an error appreciably disproportionate to that of the limiting meridians, new blue prints should be called for. If the errors are proportionate or only slightly disproportionate no correction should be made to the blue graticule, which should be used without correction, as the slight error of scale will be automatically corrected in the Photo.-Litho. Office on reproduction. The position of a station or point obtained by plotting should be used instead of its position in blue; when there is an appreciable disagreement, or even when there is only a slight but noticeable disagreement, as might occur if the station or point falls on or close to a graticule line, the work in the neighbourhood of the station or point should be adjusted.

48. Distortion.—In practice it has been found that where the preparation of the mosaic has been defective nothing is gained by supplying the new blue prints mentioned in the second sentence of para. 47. If the original is defective, the Photo.-Litho. Office

endeavours to correct the top and bottom parallels and lets the meridians conform as best they may. Owing to climatic changes between circles and Calcutta, quite serious errors, as they appear in circles, may often be found amenable to photographic adjustments. Expansion or contraction, provided it is regular, can be corrected in the Photo.-Litho. Office by photography. Irregular distortion, beyond certain limits, cannot be completely so corrected. Drawing paper if kept flat does not appreciably distort irregularly; for example, two sheets required for a fair original, selected from the same batch of paper, if kept together under the same conditions, can generally be brought to the correct dimensions in the Photo.-Litho. Office, provided the original mosaic was correctly made.

49. Maximum distortion which can be corrected.—The Photo.-Litho. Office can correct distortion up to a maximum limit of about 0·3 per cent. It is obvious that by mere enlargement or reduction one side can always be brought to correct dimensions, and, provided that the maximum distortion of any of the other three sides does not exceed 0·3 per cent. the Photo.-Litho. Office can generally make all four sides correct.

50. Quality of blue prints.—It should be noted that if the blue of the print is not a pure blue it will reproduce. If therefore the blue appears at all grey, fresh blue prints should be called for. Blue prints that have not been prepared by the correct process are liable to turn grey or green a few months after they are printed; when such cases occur the matter should be brought to the notice of the reproducing office from which the prints were received.

51. Inking up graticules.—After the graticule has been checked, or in the case of hand-transferring of detail, when the corners of the graticule have been pricked through, the lines connecting them will be inked up; care should be taken to draw the lines finely and firmly with one sweep of a well-filled pen. The parallels of latitude on maps on the 3 miles to one inch and larger scales will be inked up as straight lines and on maps on the scale of 1/250,000 and smaller, as projected.

52. Graticule intervals.—On one-inch and half-inch sheets the graticule lines will be drawn at 5-minute, and on quarter-inch sheets at 15-minute intervals.

53. Inking up stations and points.—The stations and other points will then be inked up in their proper symbols. The graticule lines will not subsequently be broken for detail or names, but trigonometrical points which coincide with boundary pillars, temples, &c., may be removed during the preparation of the fair sheet to make room for the latter.

54. Transferring of contours.—When the normal method, or either of those mentioned in para. 39 (*a*) or (*b*) has been used, the contour sheet will usually be drawn on a duplicate blue print on drawing paper, and it will only be necessary to transfer contours by hand in small areas where the contours on the blue prints are indistinct. Sometimes in case (*a*) in para. 41 and in the case of hand-transfers it will be necessary to prepare contour traces. These will usually be prepared on black prints on tracing paper of the vandyked outline, as in this case the outline on which the contoured trace is prepared is identical with the outline on the fair sheet, but they may also be prepared on traces from the original fair outline sheet or on enlargements or reproductions, as the case may be, of the adjusted tracings.

55. Contours drawn on vandyke prints.—If the contours are drawn on vandyked copies of the original outline sheet it is usual to ask for two blue prints on drawing paper, and for black prints on tracing, bank-post, or rag-litho. paper as required. In order that the contour sheet may be started as soon as possible it is not necessary to complete all the outline drawing but only such as in any way affects the contours.

56. Omission of detail.—It should rarely be necessary to omit from the fair sheets detail that has been surveyed on the plane-table sections on the scale of publication. Such omissions should be confined to cases where information is unnecessary or valueless; as for example, that of a cart-track leading from a village across the fields to no particular destination, and used merely for agricultural purposes, or minor canals in heavily canalised area, (see also paras. 88—93); or to cases where information is not important and crowds out the entry of important information.

57. Guides for draftsmen and typers.—The following four guides should be prepared:—

- (*a*) Outliner's guide.
- (*b*) Typer's guide for outline sheet.
- (*c*) Typer's guide for contour sheet.
- (*d*) Green tree guide.

These guides are prepared on blue or grey prints obtained by photo-zincography (*vide* paras. 34 and 36), if necessary, pasted together. All the edges of these four guides should be adjusted with adjoining sheets for thickness of lines, widths of roads, density and class of vegetation and be signed and dated by a responsible officer.

58. Outliner's guide.—The following items should be emphasized or specially marked on the outliner's guide:—

- (*a*) Main drainage, and those rivers which should be shown by double lines.

(b) (i) Classification of roads should be decided on in cases where the surveyors have disagreed, or the classification on the plane-table sections requires alteration. Roads and paths in hilly country should, and main routes may, be marked to be emphasized (see para. 108).

(ii) Double-line roads, metalled and unmetalled, will be classified as roads of first, second and third importance. There will be no definition of "importance", but the Director, Map Publication, will decide for the whole of India what roads are to be classed as of first importance, and other Directors and Officers in charge of independent parties will decide, for their own areas, which roads are to be classed as of second and third importance. The Director, Map Publication, will prepare and maintain an index of roads of first importance, and other Directors and Officers in charge of independent parties will prepare and maintain indexes of roads of second and third importance for their areas in consultation with officers responsible for adjoining areas.

(iii) Any one of these three classes of roads may contain metalled or unmetalled portions. The words "Motorable" or "Gravelled" should be entered along unmetalled portions when appropriate, and may be qualified by a brief remark as to period. The widths of the above three classes of roads will be as laid down in para. 110.

(c) (i) Cliffs and broken ground, when they are stream or river features, are shown in black and therefore drawn on the outline sheet; otherwise they should be drawn on the contour sheet, and will appear in brown on the published map. To apply this rule correctly, the question of emphasis must be considered. In hilly country precipitous banks near watercourses are not abnormal, and the necessary emphasis is given to such features by the symbols being drawn in brown. But, as the country flattens out, steep banks gain in importance as these form very considerable obstacles, and it is necessary to call attention to them. This can only be done by showing the symbol in black.

(ii) To judge where the colour should change, or if it is better to make no change, will occasionally be difficult, more especially in country where the change from precipitous hills to more or less level plain is sudden and abrupt. In a mass of high hills black

symbols look incongruous, but in the plains brown gives no emphasis. Where the broken ground extends from the plains into low hills, and does not penetrate these very far, it is probably best to show all in black, as it is advisable to give the necessary prominence to the obstacle in the plains, even if this entails giving it rather too much prominence in the hills. Arbitrary changes, particularly along the edges of sheets, should be avoided, and the broken-up area should be considered as a whole; in cases where there is any room for doubt as to what colour should be employed to show broken ground on a sheet, executive officers should consult the director of the circle.

(d) Boundaries, after careful examination and comparison.

59. Typer's guide for outline sheet.—The following should be shown on the typer's guide for the outline sheet:—

- (a) (i) The positions of all names and heights, which are to appear on the fair sheet, should be carefully selected with a view to ensure that, while detail is not unduly obliterated, the typing is not rendered obscure or illegible by the detail or contouring. In hilly country names or heights can often be made clearer by typing them on the non-shaded portions (*vide* para. 468(c)(ii)). The green trees for wooded areas, the grid lines (*vide* paras. 420(b) and 423, and the ribands along boundaries should also be considered in this selection of positions.
- (ii) The selected position should be carefully marked on the guide, and the name or figure neatly written as close as possible, with the correct fount number of the type to be used, alongside each entry. Care must be taken that each name is compared with the corrected lists and is correctly spelt with all accents inserted.
- (iii) The spelling, including accents, of names of streams, villages, &c., near the edges, should be compared with those which have already appeared on the adjoining published sheets; if the latter be wrong, attention should be drawn to them in the History Sheet and for necessary correction to be carried out on the office copies of the published sheets kept in the circle office as per paras. 472 to 482.
- (b) Lettering of names of subdivisions, hill ranges, large rivers, and other spaced names in their proper positions (see paras. 250 to 265).

- (c) (i) Heights are of great importance from a military as well as from an engineering point of view. All heights entered on a fair sheet should be those of the ground level. The heights of all triangulation stations and permanent intersected points should usually be entered, but if two stations occur on the same hill top the height of the higher only may be entered. A selection of trigonometrical and clinometric heights should be entered at important and easily recognisable places, such as road and river junctions, isolated hillocks, ferries, fords, bridges, milestones, isolated trees, saddles, passes, and villages. At least one height should be entered within the area of a town or place of importance.
- (ii) Occasionally, where other heights are not available, heights from sources such as Irrigation, Railway, &c., may be entered, even if they are not attached to any particular points. These will afford some indication of the general height of an area above sea level, and should be shown as clinometric heights but without dots.
- (iii) Relative heights should be entered on the banks of streams at about two-inch (on the published sheet) intervals, or wherever great changes occur, at cuttings and embankments on roads and railways, and in broken ground at suitable places. The relative heights of sand hills, isolated rocks, and rocky scarps should also be entered. Relative heights of less than 5 feet should not usually be entered, unless they are of distinct value, as for instance, to show the shallowest part of a *nāla*, and they can be conveniently inserted.
- (iv) Relative heights should usually be omitted from quarter-inch sheets, except in cases where no maps of the sheet in question have been published on a larger scale, or in sheets containing very flat areas where the relative heights of small isolated mounds may be of great importance.
- (v) On all sheets showing spirit-levelled bench-marks to which the G. T. heights have not been adjusted, the following foot-note should be added:—
- The triangulation heights (and contours) on this sheet have not been adjusted to the heights of the spirit-levelled bench-marks, and may not be strictly in accordance with them.
- (vi) The trigonometrical height type (upright type) will be used for the heights of all trigonometrical stations of

observation, and for those intersected points, where, either the actual ground level has been observed, or the height above ground level of the signal observed has been *accurately* measured. The approximate height type (slanting type) will be used for all clinometric heights, and for points where the ground level height has not been accurately determined.

- (d) (i) The heights of all Survey of India primary protected bench-marks should be entered to the nearest foot in accordance with the list given in each levelling pamphlet.
- (ii) The heights of other Survey of India bench-marks and heights of P. W. D., Railway, Canal, &c., bench-marks may be entered when heights would otherwise be wanting, subject to the proviso in the case of extra-departmental bench-marks that they do not disagree materially with Survey of India bench-marks.
- (iii) Survey of India bench-marks should be entered in the type appropriate to trigonometrical heights preceded by the letters BM. Extra-departmental bench-marks should be entered as clinometric heights without the letters BM. Canal bench-marks and their heights will appear in blue on published sheets.
- (e) Destinations (see paras. 318 to 320), border names, graticule figures, square letters and figures.

60. Typer's guide for contour sheet.—Whenever possible it is advisable that this should be prepared after the outline sheet has been completely typed, or after the typer's guide for the outline sheet has been prepared, as care must be taken to avoid superimposing any type on the contour sheet over type or detail of the outline sheet. In practice, however, this is not often possible in field parties. Extra care must in such cases be taken in the examination and in superimposing the contour sheet over the outline sheet, (*Vide* para. 447). To effect the same end it may be convenient to enter contour values on the typer's guide for the outline sheet.

- (a) It is difficult to lay down hard-and-fast rules regarding the number of contour values which should be shown on sheets, but as a rule on one-inch sheets 15 to 20 contour values in each 5-minute rectangle are sufficient in undulating country and in low hills, while for mountainous regions 10 to 15 will usually suffice.
- (b) Contour values should be entered in series where appropriate, as on long continuous or high steep slopes, so as to show the configuration of the ground in figures at a

glance. As far as possible contour values should not be shown on slopes which are likely to be shaded.

- (c) Contour values are not usually required on the ring contours of summits if the height of the summit is typed.
- (d) In flat country where contours are few, values should be given to selected fine contours as well as to the thickened ones, both in the body of the sheet and in the border.
- (e) The values of all thickened contours should, as a rule, be typed in the border of the fair sheet, but where the slopes are very steep a few of these values may be omitted.

61. Green tree guide.—In jungle-clad country a green tree guide should be prepared. On this the limits of different classes of forests, "Dense", "Fairly dense" and "Open" are marked, and the description of tree growth inside these is also given. The edges should be compared with adjoining sheets and signed and dated.

SECTION III.

FAIR DRAWING

A.—GENERAL

62. Emphasis of certain features.—Before the fair drawing is commenced it is necessary to consider the sheet as a whole, and to select the important details to which it is desired to give special prominence. Main drainage and the principal lines of communication should be drawn so as to make them stand out prominently in the sheet in comparison with the rest of the detail. Care should be taken, however, not to overdo this exaggeration, and it should be remembered that it is relative, and not absolute, thickness of line which gives prominence.

63. Fineness of drawing.—The drawing should be as fine as is consistent with the importance of the detail, care being taken that it is sufficiently firm to reproduce properly; it should also be borne in mind that details which are printed in colours, especially in blue, have a tendency to thicken in printing, and should therefore be drawn more finely than if intended for printing in black. Special care should be taken to draw small and unimportant irrigation channels as finely as possible.

64. Symbols.—The latest table of “Conventional Signs” should be strictly adhered to; executive officers must see that all authorised additions or corrections are entered on all copies in their offices. No departure from the table above mentioned, nor employment of new symbols is allowed without the sanction of the Surveyor General. If any new symbol is used, its use must be noted in the “Publication Instructions” with an explanatory footnote. The Director, Map Publication, will advise how best it can be explained. When the meaning of a symbol, which is not entered in the tables at the bottom of the map, is doubtful, a description of the same should be typed against the symbol, if this can conveniently be done, (see also paras. 225 and 246—249).

65. Symbol cards.—Engraved symbol cards have been prepared and issued for the use of draftsmen. They may be used whole or they may be cut up so that each symbol is on a separate piece of card; these should be kept in an envelope when not in use. In either case they are invariably to be on, or beside, the table on which the draftsman is working. They have been so prepared that they can be used by new and inexperienced draftsmen for marking off the spacing and size of bars and dots. Experienced draftsmen should find it quite easy to draw the symbols accurately by eye with the symbol card close at hand as a guide.

66. Symbol Stamps.—Huts, wells, and other symbols, which occur frequently on a sheet, may be inserted by the employment of symbol stamps; care must, however, be taken that they are not worn down or irregular. (For symbols for which dies are obtainable from the Director, Map Publication, see foot-note to the Table of Conventional Signs).

B.—RIVERS AND STREAMS

67. Water features.—The principles on which water features have been depicted on the plane-table sections are given in Chapter V. In order that these principles may be followed in the drawing of fair sheets and that differences in style of drawing of different surveyors may be assimilated, certain portions of Chapter V are reproduced below, with the wording slightly altered, when necessary, to make them applicable to fair drawing.

68. Rivers, streams, *nālas*, &c.—It is difficult to lay down hard and fast rules as to how streams should be shown, but as a general rule all rivers, streams, channels and *nālas*, if not less than a quarter of an inch in length on the scale of publication, should be shown, if one twentieth of an inch in width or over, by two lines, and if narrower, by a single line graduated according to the distance from its source.

69. Streams emerging from hills.—A stream emerging from hills may spread out into numerous small channels, some of which are clearly visible and others not, and of which the main one varies with each spate. In such cases bars of varying lengths (to distinguish them from unsurveyed streams) should be drawn to represent the more prominent channels as actually surveyed.

70. Streams, &c., from photo-surveys.—Streams, etc., incorporated from photo-surveys should be drawn in accordance with the rules laid down in Section XI.

71. Single-line streams.—The course of a stream, not wide enough to be shown by two lines, should be shown by a single continuous line. When a perennial water-channel within a double-line *nāla* is in continuation of a single-line blue stream, the width of the former may be exaggerated so as not to be in marked contrast with the latter.

72. Double-line streams.—The banks of all rivers and streams, the courses of which are shown by two lines, should be shown by continuous lines, or if more suitable by the broken ground or high bank symbol. Where the perennial water-channel is wide enough to be shown on the map by a blue stipple, and not by a single blue line, the limits of this stipple must be drawn on the fair sheet in fine continuous lines, except in tidal areas (see para. 83), and except where these limits are already sufficiently indicated by the drawing of the banks. The names of water-forms should be printed in black.

73. Junction of dry and tinted streams.—In the case of a dry double-line stream joining a river or other tinted sheet of water, in which the blue-tinted water, (*a*) does not reach the bank, (*b*) is shown up to the bank, no line will be drawn across the mouth of the dry double-line stream, unless a definite bank or drop is known to exist.

74. Representation of perennial water.—The Survey of India is not required to make elaborate or special researches to ascertain whether there is perennial water in any particular portion of a river or stream. It will be sufficient if this is indicated as correctly as possible in the course of survey operations from local information.

75. Change of colour.—The points in the courses of streams at which the colour of a stream is to change should be denoted on the outline sheet by a dumb-bell mark drawn finely in vermilion at right angles to the course of the stream. This should be drawn free-hand so as not to waste time. These dumb-bell marks are not necessary when the change of colour occurs at any point which is otherwise clearly marked, such as a stream junction, road crossing, &c. When the greater part of a stream is to be blue, small portions at the head, unless they exceed one mile in length should not be left black.

76. Arrows.—Whenever the nature of the country is such that the direction of flow of streams and important canals is doubtful, arrows, firmly drawn in black, should be drawn close to single-line or in the centre of double-line streams to indicate the correct direction of flow. These arrows should preferably be drawn near the name of the river or stream concerned and may also be drawn just inside the sheet edges, if space permits, or they may be drawn in the border if there is no suitable position in the body of the sheet.

77. Waterfalls, islands, &c.—Waterfalls and their heights, rapids, rocks, islands, sluices and weirs should be shown.

78. Sand.—Sand in rivers and streams, and in all dry beds of non-perennial rivers should be shown by dots or a tint printed in black. The dots or tint should not, however, be shown in very narrow streams or ravines. Shaded sand will always be drawn by hand. Sand in dry tanks and river-beds and on the foreshore will be drawn on the outline sheet except when sand in the former is to be tinted by the Photo.-Litho. Office, *vide* para. 99; for instructions in style, *see* para. 192. Sand dotting should always be completed round and inside such lettering as appears in river beds or dry tanks, except in the case of small type where there is a danger of its blocking up in reproduction.

79. Broken ground, &c.—The following may be taken as a useful guide in depicting banks of rivers and double-line streams.

and broken ground generally, but where, over large tracts of country, this guide would be unsuitable, Directors may authorise departures from it. These instructions apply to rivers passing through flat or undulating ground and not to those river banks which are essentially part of a hill-side.

A shelving bank of a double-line stream should be shown by a fine line.

A steep bank of a double-line stream, which is less than 10 feet in height, should be shown by a fine line, but if the bank is so steep that it is impossible for country carts to go up and down at intervals of every half a mile at least, then it should be shown by a thick line, provided that this thick line can be employed for a continuous length of at least one inch on the published sheet.

A steep bank of a double-line stream, which is 10 feet or more in height, should be shown by a thick line.

A steep bank of a double-line stream, which is 20 feet or more in height, should be shown by hachuring applied to the inside of the thick line, provided the banks of the river, &c., are sufficiently far apart to admit of the hachuring being conveniently entered.

The broken ground symbol should only be used for broken ground which is at least an average of 2 to 3 chains in width and at least half an inch in length on the published sheet.

The drawing of the broken ground symbol should vary according to the ground depicted. It should not be more conspicuous than its nature justifies, — that with relative height under 10 feet being drawn fine and that with height 10 feet or more shown by a thicker line (also see para. 58 (c)).

In interpreting these orders the Table of Conventional Signs should be carefully consulted.

80. High mountain features.—Glaciers, moraines, and all ice, snow, and rock features will be shown as surveyed. See Section X for the colours of the different items of high mountain features on published maps. See Section XV for the form of special foot-note to be used for sheets containing glaciated regions.

C.—COAST LINE, FORESHORE, STEAMER ROUTES, &c.

81. Coast line.—The coast line, *i.e.* the line corresponding to high water, and the line of low water, both at ordinary spring tides, will be shown by a continuous line, and by a dotted line respectively, both printed in blue, with the words "High water line" and "Low water line", in black, entered at convenient places above and below their lengths respectively. The low water line symbol, with the words "Low water line", should be omitted below rocks and sand-banks on the foreshore of the sea or tidal rivers.

82. Foreshore.—The foreshore is defined for India as the zone between the high and low water lines, both along the sea front and up tidal rivers; this zone will not be tinted blue as for perennial water; important detail on the foreshore should be entered. Sand and rocks on the foreshore will be printed in black, and trees in green. Mud may be shown by broken blue horizontal lines thinning out gradually towards the high water line and the nature of the ground typed at intervals. Sand on the foreshore should be lightly shaded along the edge next the sea.

83. Streams passing through foreshore.—A single-line stream passing through the foreshore will be shown by a continuous line, whether perennial or not. Double-line streams will show limits of water channels by fine dotted lines. In both cases the lines will be printed in blue. Important permanent features on the foreshore will be shown in black.

84. Tidal limits in streams.—Up a double-line river or stream the banks will be shown, as far as the high spring tides reach, by continuous blue lines; in the case of a single-line stream a single continuous blue line should be used. A tidal arrow should be drawn just below the highest point reached by the high spring tides, and at other suitable points.

85. Junctions of dry and tidal streams.—In the case of a dry double-line stream joining a tidal river or creek, in which the blue-tinted water (*a*) does not reach the bank, (*b*) is shown up to the bank, no line will be drawn across the mouth of the dry double-line stream unless a definite bank or drop is known to exist.

86. Steamer services.—Steamer services will be shown by the prescribed symbol in blue, with the words "Steamer service" entered in black at suitable intervals along the symbol. No symbol will be shown along single-line streams, but the words "Steamer service" will be typed in black along the stream or in the border if necessary. Distances and destinations of steamer services will be entered in the border to the nearest important steamer station. Routes for ocean-going steamers in sea areas will not be shown.

87. Bathymetric contours.—The five- and ten-fathom bathymetric contours should be taken from Marine Survey charts and shown by dotted lines on sheets which include sea areas, but should not be shown in too much detail as they are liable to change. They should be lettered "5 fathoms" and "10 fathoms" respectively, the lines being broken for the lettering. As these bathymetric contours and the lettering referring to them will be printed in blue, they should be drawn on the outline sheet and not on the contour sheet.

88. Canals.—All canal systems (other than field distributaries, which should be omitted, also see para. 56) should be shown by their proper symbols which will be printed in blue or black, according as to whether the canals are perennial or non-perennial. In the case of canals emanating from rivers the term perennial indicates that the supply of water is normally available at all times, being ensured by a dam or weir and regulator, while non-perennial or inundation canals are those which can only deliver water when the parent river rises above a certain flood level. Reservoir or tank-fed canals should be considered as perennial if the water supply normally lasts for the full year. The whole of any canal system from main branches downwards should be shown either in blue or in black as the case may be. Locks, weirs, siphons, distance stones and their distances, &c., occurring in canal systems, will be printed in the same colour as the canal symbols.

89. Double-line canals.—Canals, of which the width of clear water-way is one chain or over, should be shown by fine double lines. The interval between the lines, when drawn for reduction by one third, should not be less than 1/40th of an inch but may be greater, if the actual width when drawn to scale exceeds this interval.

90. Single-line canals.—Canals and village distributaries, of which the width of clear water-way is less than one chain, are to be shown by single lines in varying widths in accordance with their relative importance, the entire canal system being considered as a whole.

91. Embankments.—Embankments along canals should not, as a rule, be shown, but they should be indicated by a liberal use of relative heights (*i.e.* the heights of the top of the embankments above the adjacent country) with a footnote in the form given in para. 493(*j*)(*ii*). In exceptional cases, where other detail is light, embankments as well as relative heights with foot-note may be shown.

92. Roads on canal banks.—Along canals, roads suitable for wheeled traffic, and avenues of trees, should be shown where possible, but on crowded sheets the limitations of scale will necessitate the use of foot-notes, see para. 493(*j*)(*iii*).

93. Order of omission of detail.—On crowded sheets the order of omission of canal detail should be—

(*a*) Embankments, (*b*) Avenues, (*c*) Road on one side of the canal or the other, and (*d*) Roads on both sides of the canal.

On most sheets, owing to the limitations of the scale, these omissions will be necessary either in part or as a whole.

E.—LAKES, TANKS, WELLS, &c.

94. Lakes, tanks & ponds.—The margins of all lakes, tanks and ponds should ordinarily be shown by a continuous fine line. The edges of all excavated tanks should be thickened, and of other tanks, only the edge along which there is an embankment. For an excavated tank with embankment, only one line should be shown to denote the common edge of the excavation and the embankment. The addition of hachuring on the outside of the thick line is necessary where the embankment or *bund* is 10 feet or more in height: where the outside of the embankment is very steep and its outside top edge is sharp, a fine line should be drawn along the top of the hachuring. Other *bunds* will be shown by the embankment symbol in black.

95. Level of perennial water.—The level of perennial water in all lakes and tanks, where it does not coincide with the margins of the lakes and tanks themselves, should be shown by a fine continuous black line, but where the level of the perennial water fluctuates or can only be entered approximately, the changeable level should not be shown by a line either on the fair sheet or on the published sheet.

96. Very small perennial tanks.—Very small perennial tanks, which might be inadequately represented if printed with blue tint, should be blocked in and printed in solid blue.

97. Junctions of streams and lakes.—In the case of a dry double-line stream joining a lake or other tinted sheet of water, in which the blue-tinted water (*a*) does not reach the bank, (*b*) is shown up to the bank, no line will be drawn across the mouth of the dry double-line stream, unless a definite bank or drop is known to exist.

98. Low-lying land.—Low-lying land usually flooded for a considerable period every year will not be shown as a lake, but will have the words "Usually flooded from.....to....." printed across it.

99. Non-perennial tanks.—All non-perennial tanks and the non-perennial portions of tanks, if they do not show Marsh, grass, cultivation &c., will have a black tint. When a sheet contains any large areas for this tint, the necessary black tint will be applied in the Photo.-Litho. Office, and all areas for tinting will be shown by a yellow wash on the red and blue colour pattern. When a sheet contains small areas only for tinting, the black tint may be drawn by hand on the outline fair sheet, and it will not then be necessary to show the areas on the colour pattern. The hand-drawn tinting should resemble the Photo.-Litho. Office tinting as closely as possible, but on no account should part of a sheet be tinted by hand and the remainder left for the Photo.-Litho. Office. (See para. 78).

100. Salt Lakes.—When the water of a perennial lake or tank is found to be salt or brackish, a note to this effect should be entered against the name or site of such lake or tank.

101. Marshes.—All marshes should be shown by their proper symbol which will be in blue on the published map. Reeds in perennial water will be shown by the high grass symbol printed in blue. The horizontal lines used in the ordinary marsh symbol will be omitted in such cases.

102. Kārezes.—*Kārezes* should be shown by the proper symbol with, at intervals, the depth of shaft in feet, thus—20r; disused *kārezes* and the depths of their shafts will be printed in black.

103. Pipe-lines.—Main pipe-lines should be shown by the symbol for a *kārez* with the words "Pipe line" printed alongside. Name and symbol will be printed in black and blue respectively. Oil pipe-lines will be shown by the same symbol in black, with "Oil pipe Line" printed alongside.

104. Wells and springs.—Important wells and springs should be shown by their appropriate symbol. In arid country all wells and springs are important and should be shown; when the symbol for a well or spring is liable to be overlooked, owing to the presence of contours, hill-shading, &c., or when it is necessary to emphasize its importance, the word "Well" or "Spring" ("Spr" if space is cramped) may be entered alongside the symbol and the symbol itself drawn slightly larger and heavier. The lettering will appear in black on the published sheet. If the water in any well or spring is known to be salt or brackish, this fact should also be noted alongside the symbol.

F.—ROADS, PATHS AND FIRE-LINES

105. Roads.—The classification of roads as settled, *vide* para. 58(b), should be carefully followed.

106. Metalled Roads.—Metalled roads will have a red tint applied between the double lines by the Photo.-Litho. Office, except in the areas of towns, cantonments or large villages, and when passing between tinted sites at other places, when the roads should be left white.

107. Main routes through towns.—Main routes through towns will be emphasized by being shown slightly wider than other streets.

108. Roads and paths in the hills.—Roads and paths in the hills or in wooded areas should be drawn less finely than similar roads and paths in the plains, in order to give them due prominence. Main trade-routes should be drawn more heavily than other less important roads of the same description.

109. Road names.—Road names will not be entered on maps of the one-inch, half-inch and quarter-inch scales without the express approval of the Director who will limit his sanction to names generally accepted by the public outside the area served by the road, (subject to the proviso that names which consist of names of destinations will never be shown,) and to the names of military roads, where desirable, on the North-Western and the Eastern Frontiers of India.

110. Width of double-line roads.—The width of roads shown by double lines should be as follows, measured between the inner edges of the lines:—

If drawn for reduction by one-third:—

Roads of first importance	$1\frac{1}{2}/40$	of an inch
" " second "	$1\frac{1}{2}/50$	do.
" " third "	$1\frac{1}{2}/60$	do.

If drawn for reduction by half:—

Roads of first importance	$1/20$	of an inch
" " second "	$1/25$	do.
" " third "	$1/30$	do.

Guide cards for the drawing of certain conventional signs containing engraved symbols of the correct width, printed in black either on stiff paper or on tracing paper, can be obtained from the Director, Map Publication. Draftsmen engaged in drawing double-line roads should be instructed not to obtain the widths of these roads by measurement between the inner edges of the lines but to follow the symbol card accurately.

111. Milestones.—As a general rule every milestone should be shown on the one-inch, half-inch and quarter-inch sheets, so long as this does not interfere with the entry of more important information. In town or village sites, or where the sheet is very crowded, it will frequently be advisable to omit a milestone. They should be shown in their correct positions as surveyed, and not entered arbitrarily on one side of the road.

112. Numbering of milestones.—It will suffice if one milestone in every inch of road on the published sheet is numbered with its mileage. In accordance with this general rule every milestone should be numbered on the one-inch sheets, every even number on the half-inch sheets, and every fourth on the quarter-inch sheets. The numbering should, however, give way to other detail; thus, on a quarter-inch sheet, if the 4th milestone were difficult to number clearly, the 3rd or 5th milestone, or both, should be numbered instead of the 4th.

113. Double numbering of milestones.—When the mileage is recorded on the plane-table section from two or more places, the executive officer will decide what mileage numbers

should be entered along the road throughout its length. Usually, only one set of mileage numbers will be recorded, but, if two are employed, they should be entered in the form of a fraction, thus— $\frac{2}{14}$. Initials of places from which mileage is numbered should not be entered. Mileage numbers on roads of first importance should normally be entered from the nearest well-known and important town along the route.

114. Embankments and cuttings.—Embankments and cuttings in connection with roads, railways, &c., should be drawn in accordance with the following general rules:—

- (a) An embankment or cutting which is less than 5 feet in height or depth, should not be shown.
- (b) An embankment or cutting, which is 5 feet or more in height or depth, should be shown by hachuring.
- (c) An embankment or cutting, which is 10 feet or more in height or depth, which is very steep and the top edge of which is sharp, should be shown with a fine line along the top of the hachuring. The fine line may, however, be omitted if it would give to the symbol more space than is desirable, and would cause the displacement of village sites or other symbols, as would occasionally happen where a double-line road traverses an embankment or cutting.
- (d) To avoid overcrowding of detail, embankments along roads and railways may be omitted in those areas where embankments would occur as a matter of course. An occasional relative height may be inserted to indicate an embankment.

115. Roads in stream beds.—When a road, track, or path is coincident with the bed of a single-line stream, or of a double-line stream which is not wide enough to enable the road, &c., symbol to be entered conveniently, the symbol for the stream only should be entered, that for the road, track, or path being omitted.

When the fact that the road, track, or path, is coincident with the bed of the stream is not sufficiently obvious to a map reader, one or more arrows, not more than half-an-inch apart, (pointing down stream), which will be printed in red, may be inserted, and in cases where the coincidence is lengthy, the words "Road, track, or path (as the case may be) follows bed" may also be typed along the coincidence.

116. Bridges of boats, ferries and fords.—When a road crosses a river by a bridge of boats, ferry or ford, explanatory words "Bridge of boats" and "Ferry" should be added wherever such exist, and the word "Ford" should be typed at important cross-

ings of double- and single-line streams and rivers. If these means of crossing are only periodical, the explanatory words should be further qualified by adding the limit of that period, thus:—"Bridge of boats (March to June)", "Ferry (March to June)", or "Ford (March to June)". The information should only be entered on the fair sheet if it can be done without obscuring more important information.

117. Description of bridges.—Descriptive wording as to the construction of a bridge, *i.e.* whether it is of "Iron", "Wood", or "Masonry", and its name, may be entered. Bridges which are submerged during exceptional floods should be shown by the ordinary symbol and have the words "Low level" typed against them, and "Causeway" will be entered against raised or paved crossings.

118. Roads on special maps.—On topographical maps on which the roads and water features are printed in black, the following symbols will be used:—

- (a) Cart-tracks will be shown on the map, and also in the foot-notes, by the present symbol for unmetalled roads (*i.e.* bars $3\frac{1}{2}/60''$ long, with intervals $1/60''$ long, on the scale of publication).
- (b) Unmetalled roads will be shown on the map, and also in the foot-notes, by the same symbol as at present, but with bars twice as long as at present (*i.e.* bars $6\frac{3}{4}/60''$ long, and intervals $1/60''$ long, on the scale of publication), and to be drawn distinctly heavier than for cart-tracks.

119. Fire-lines.—All important forest fire-lines will be surveyed and shown on topographical maps so far as the scale permits.

120. Symbol to be used for fire-lines.—The symbol to be used will be the same as for unmetalled roads, but with very short bars and printed in black, except when the fire-line is in regular use as a line of communication, in which case only the appropriate road or track symbol will be used and printed in red. In either case, if space permits, and the fact is important, the word "Fire line" may be typed in black at intervals along the symbol. The symbol itself should not be explained in any way in the foot-notes to topographical maps.

121. Racecourses.—Racecourse tracks may be shown by the black symbol for fire-lines

G.—RAILWAYS

122. Railways.—As railway, tramway and mineral lines are shown on plane-table sections by different symbols to those employed on fair sheets, care should be taken that the correct symbol for the gauge (and whether the line is single or double) is used.

123. Interpretation of "Broad gauge".—In maps which extend beyond India the term "Broad gauge" should be interpreted broadly, and not in its limited Indian sense; and for all gauges wider than the metre gauge, the broad gauge symbol should be used. In all such cases, however, the gauge should be typed along the symbol, thus :—4' 8½" gauge, 5' gauge, &c.

124. Different gauges alongside each other.—Where lines of different gauges run alongside each other, both will be shown by their respective symbols. When, however, a smaller gauge is laid on the same sleepers between the rails of a broader gauge, the symbol for the broader gauge only will be shown, with the words "One track for both gauges" typed alongside.

125. Double lines at Stations.—The ordinary short lengths of double lines at railway stations on single-line railways should not be shown, but important sidings will be shown as in the Table of Conventional Signs.

126. Railway station enclosures.—The limits of railway station enclosures will be shown as surveyed by fine continuous lines in black. Where no enclosure exists, the railway station will be shown by the conventional symbol.

127. Milestones.—Milestones on railways should be shown in their correct positions as surveyed, and not entered arbitrarily on one side of the line.

128. Embankments, cuttings and bridges.—For rules regarding embankments, cuttings and bridges on railways, see subhead F, paras. 114 and 117.

H.—TELEGRAPH LINES, &c.

129. Telegraph and telephone lines.—All overhead telegraph and telephone lines outside towns will be shown, except those along railways.

130. Omission in towns.—In towns, owing to crowded detail, both telegraph and telephone lines may be omitted, but when the main lines can be shown terminating at the main telegraph or telephone office, without confusing the map, this should be done.

131. Telephone lines, ropeways and power lines.—The symbol for telegraph lines will be used for telephone lines, ropeways and power lines, with the addition of the appropriate designation typed at intervals along the symbol. When used for a ropeway or main power line, this symbol will be drawn distinctly heavier. The terminal points of a ropeway will be shown by small red blocks inside black enclosures as for railway stations, with the words "Ropeway terminus" or "Terminus" typed against them

where there is room; destinations should be entered in the border when necessary. Power lines should be drawn slightly heavier according to importance.

132. Submarine cables.—Submarine cable lines in sea areas will not be shown, but at their terminal stations, the words "Submarine cable", with destination and approximate distance, will be typed in the general direction of the line.

133. Cables under rivers.—Short lengths of cable lines under a river may be shown by the usual symbol for a telegraph line, with a typed description.

I.—SITES AND BUILDINGS

134. Sites and buildings.—The limits of buildings and blocks to be tinted should be drawn with thickened lines as in the Table of Conventional Signs.

135. Undue prominence of solid segments.—Undue prominence may be given to small villages if printed in solid segments or with partly solid and partly tinted segments. Small villages should therefore be drawn as far as possible with open blocks.

136. Size of blocks which can be tinted.—The Photo-Litho. Office will apply a tint to all buildings and village blocks not in ruins which, if oblong, are not less than $1/60'' \times 4/60''$ and, if square, not less than $2/60'' \times 2/60''$ (inside dimensions) on the scale of publication. Buildings and blocks which on reduction to the scale of publication will be smaller than the dimensions given above cannot conveniently be tinted and should be filled in solid at the time of fair mapping. In hilly or wooded areas where such very small tinted sites would not show up well, sites of the minimum size and slightly larger on the scale of publication should be filled in.

137. Buildings to be shown.—The sites of *dāk* or travellers bungalows, post offices, *kyaungs*, &c., need only be shown when the buildings are isolated. Hospitals, dispensaries, markets, post offices, telegraph offices, police stations, &c., should be shown in villages; in towns it may generally be taken for granted that they exist, and they should only be shown if there is room, and with due regard to their relative importance to other buildings and names. Schools should not be shown.

138. Important buildings.—Important buildings in towns should be blocked in.

139. Aerodromes and landing grounds.—Aerodromes and landing grounds should not be shown on a sheet issued to the public in areas prohibited to civil aircraft.

140. Boundaries to be shown.—The following boundaries are to be drawn by their appropriate symbols, and will be printed in black:—

- (a).—The external boundary of British India: this includes those between British India and foreign possessions in India. This symbol is to be reserved exclusively for the furthest limits of the Indian Empire and its dependencies; for boundaries such as those between India proper, and Kashmir, Bhutān, &c., the provincial boundary symbol will be used.
- (b).—Boundaries of Indian states, tributary states, and of tribal areas.
- (c).—Boundaries of provinces, civil districts, and major partitions of districts. The subdivision, *tahsīl*, *tāluk*, or township will generally be the major partition of the district, but with the approval of the Local Government and the Surveyor General, boundaries of minor partitions may be substituted as provided for in para. 251.
- (d).—Boundaries of cantonments and civil stations, or areas leased or assigned to the Government of India, which, being British territory, form enclaves in Indian states. These boundaries should be shown by the state boundary symbol.
- (e).—If of sufficient importance, boundaries of estates, such as *jāgīrs* and *zamīndāries* in British India, may, with the permission of the Local Government, be shown by the symbol for a *tahsīl*, boundary. A descriptive remark should be typed along the symbol at intervals.
- (f).—Boundaries of reserved, &c., forests in British India.
- (g).—The limits of military camping grounds will, when demarcated, be shown by dotted lines as for cultivation limits.
- (h).—When two boundaries coincide, as for instance those of a reserved forest and a *tahsīl*, the more important (in this case the *tahsīl*) boundary only will be entered.

141. Boundaries not to be shown.—The following boundaries should not be entered, except as stated below:—

- (a).—Boundaries of subdivisions of Indian states, except when cleared, and clearly defined.
- (b).—Boundaries of reserved forests in Indian states, unless cleared and demarcated; and then only at the request of the state officials, and with the permission of the Circle Director.

- (c).—Boundaries of municipalities or cantonments, except as laid down in para. 140 (d) above.
- (d).—Boundaries of private estates and plantations, except as laid down in para. 140 (e) above.
- (e).—Village, *kwin*, and other similar boundaries, except when required for special village boundary editions, or when, as in parts of the country such as Malabar, where villages consist of huts or houses scattered over the area, they may be required to be shown on ordinary editions.
- (f).—A separate symbol will not be used for boundaries of divisions.

142. Boundaries to be shown by province boundary symbol.—The following special boundaries will be shown by the province boundary symbol:—

- (a) between Burma and Karenni,
 (b) between Karenni and the Southern Shan States.

143. Boundaries to be shown by district boundary symbol.—The following special boundaries will be shown by the district boundary symbol:—

- (a) between the different districts of Travancore State,
 (b) between Kashmir and Janmu as well as between other so-called provinces and districts of the state,
 (c) between the Central Provinces and Berar,
 (d) between Agra and Oudh,
 (e) in Burma between—
 (i) Burma and the Shan States, and Burma and the Chin Hills,
 (ii) the Northern and Southern Shan States,
 (iii) the different Shan States,
 (iv) the different Karen States.
 (f) the Madras Agency Tracts boundary.
 (g) the "Inner Line" in the Sadiya Frontier Tract, where it does not coincide with any other boundary,
 (h) between the primary sub-divisions of large Indian states, even if their names appear in the District Heading, when such sub-divisions are known as, or have the status of, districts.

Colour ribands will not be printed along (f) and (g).

144. Inter-tribal boundaries.—Inter-tribal boundaries, and the boundaries between tribal and British areas in the same district, will be shown by the district boundary symbol, with the words "Tribal boundary" typed in one or more places along the symbol.

145. Boundaries to be shown by the tahsīl boundary symbol.—The following special boundaries will be shown by the *tahsīl* boundary symbol :—

- (a) between Lakhimpur district and the Lakhimpur Frontier Tract.
- (b) between sub-states of the Shan States,
- (c) between the secondary sub-divisions of large Indian states, when shown, and between the primary sub-divisions of petty Indian states when such sub-divisions have the status of a *tahsīl* or *tāluk* or equivalent sub-division of a British district.

146. Special rules for Coorg.—In Coorg, the boundaries of *tālukes* will be shown by the district boundary symbol, and the boundaries of *nāds* will be shown by the *tāluk* boundary symbol, the name of the *nād* being printed across the area in type No. 23, and in the borders, when required, in type No. 7, (the type quoted is for 1½-inch drawing). The symbol tables for the Coorg sheets will, therefore, require alterations, which should be described fully in the Publication Instructions.

147. Boundaries in Dīr, Swāt and Chitrāl Agency.—Special orders have been issued for the treatment of these boundaries and these orders should be consulted.

148. Boundaries along streams, &c.—The symbol for a boundary will be entered :—

- (a) In its proper position, when the boundary runs along the bed of a river or stream shown by double lines wide enough apart to admit the symbol conveniently.
- (b) Alternately on each side of a road, river, stream, &c., when the boundary runs along the middle of the road, &c., or along the bed of the river, stream, &c., and cannot be shown conveniently as in (a). In this case when the boundary symbol consists of crosses or dots in combination with bars, one cross or dot with one bar should be placed alternately on each side of the road, river, stream, &c.
- (c) Close outside and parallel to the symbol of a road, river, stream, &c., when the boundary runs along the edge of the road, &c., or bank of the river, stream, &c. The symbol will be entered on the correct side, *i.e.* if the boundary is along the north edge or bank then the boundary symbol will be entered on the north side of the symbol for the road, river, stream, &c.

149. Undemarcated external boundary of India.—

The undemarcated symbol for the external boundary of British India will not be entered on sheets issued to the public; if, therefore, the demarcated symbol cannot be used, the boundary symbol should be omitted on sheets for public issue. There is no objection to the undemarcated symbol being shown for the external boundary of India on such maps as are "For official use only".

150. Undemarcated province or state boundaries.—

The undemarcated boundary symbol should only be used for such province or state boundaries as are known to be undetermined, or in dispute. For province or state boundaries that, though not demarcated, are unlikely to change, the ordinary province or state boundary symbol should be used.

151. Undemarcated district, tribal, or tahsil boundaries.—

District, tribal, and *tahsil* boundaries that are undemarcated should be shown by the ordinary symbols for these boundaries, with the word "Approximate" typed along the boundary when suitable.

152. Doubtful cases to be referred.—In all doubtful cases reference should be made to the Surveyor General for orders.

153. Boundary pillars.—The following rules govern the insertion of boundary pillars:—

- (a).—(i) All boundary pillars with their numbers (*vide* para. 269) marking the external boundary of India (including those between British India and foreign possessions in India), and international boundaries in transfrontier areas, will be entered on fair sheets to be published on the one-inch, half-inch or quarter-inch scale, whichever is the largest scale map of the area. Exceptional cases, where there may not be room, will be referred to the Surveyor General for orders.
- (ii) Publications on scales smaller than the largest will show all the boundary pillars, but all the numbers need not necessarily be entered. This is left to the discretion of Directors.
- (iii) The source of information from which international boundaries, other than the external boundary of India, has been obtained, should be fully stated in a special foot-note.
- (b).—No boundary pillars other than those in (a) will be entered on quarter-inch sheets.
- (c).—When clearly demarcated all boundary pillars, with their numbers, marking boundaries between provinces, or between British India and Indian states,

or between important Indian states, will be entered on the one-inch and half-inch sheets. If, however, carrying out this order would result in overcrowding a sheet, Directors may authorize the omission of some of the pillars or their numbers, care being taken not to omit those pillars which mark an important change of direction in the boundary.

- (d).—Boundary pillars on district, *tahsil*, and minor boundaries, will not be entered on one-inch and half-inch sheets, unless they are conspicuous *pakka* marks or have been used for the control of the survey.
- (e).—Forest boundary pillars will not be entered on the one-inch and smaller scale sheets unless they are *pakka* and conspicuous.
- (f).—(i) Only those village trijunctions which are conspicuous *pakka* marks or which have been fixed by the triangulator or theodolite traverse and found at the time of survey should be shown on one-inch and half-inch sheets, the symbol used being a solid black square with sides of $1\frac{1}{4}/60$ -inch on scale of publication.
- (ii) When survey is based on village traverses of the cadastral survey all trijunctions found at time of survey will be shown as in (i) above. Trijunctions not found will not be shown.

154. Reduction of boundaries from larger scales.—

When boundaries reduced from larger scale surveys have to be inserted on previously published sheets, it may be found that they will not exactly follow, if rigidly applied, the same topographical features on both sheets. In this case either the sheet must be corrected, or the boundary be placed correctly with reference to the natural features shown on the sheet, or as per boundary notification, if available, as it is more important that the boundary should be correct with regard to the topography than that it should be strictly in position with regard to the graticule.

155. Ground beyond boundary to be shown.—

It must be remembered that it is very difficult to check a boundary unless some details beyond it are shown, and it is therefore laid down that whenever a watershed forms a boundary the reverse slope should be shown on the fair sheet as far as possible, and the boundary line should never form the actual limit of any sheet, unless that line is inaccessible and nothing beyond it is visible. Both the high banks of all rivers forming boundaries should invariably be surveyed, unless there is any valid reason for not doing so, and everything that it may be possible to fix accurately beyond boundaries should be recorded in order to assist identification in future.

K.—CULTIVATION AND OTHER LIMITS

156. Cultivation limits.—The limits of cultivation, including areas liable to be cultivated but lying fallow for the time being, will be shown by dotted lines, which will be omitted where a road, field-bund, path, boundary, stream, canal, or building forms the limit; if considered necessary, the limits of cultivation may be drawn along the edges of ravines or broken ground, when these latter are printed in brown. When patches of fallow land and field-bunds less than 5 feet in height occur in areas of permanent cultivation, but are not worth showing, a special foot-note on the following lines should be entered:—

“Periodical cultivation dependent on rainfall occurs in the southern half of the sheet, with numerous field-bunds of less than 5 feet in height.”

157. Field-bunds.—Field-bunds not less than 5 feet in height should be shown by the usual embankment symbol.

158. Other limits.—The limits of village enclosures, orchards, gardens, camping grounds, and burial grounds will be shown by a dotted line if open, and by a fine continuous line if enclosed by a wall or permanent fence.

159. Wooded areas.—When wooded areas are enclosed by a wall or artificial fencing, it will be shown by a fine continuous black line; when wooded areas are not enclosed, the limits will not be specifically denoted on the fair sheet, but see para. 167.

L.—TRIGONOMETRICAL STATIONS AND INTERSECTED POINTS

160. Symbols for trigonometrical stations, &c.—Trigonometrical stations and intersected points of geodetic triangulation and, normally, those of topographical triangulation, should be shown by the appropriate symbols on one-inch, half-inch and quarter-inch sheets. (See para. 59 (c)(vi)).

161. Stations and points of subsidiary triangulation—Stations and intersected points of subsidiary triangulation should not normally be entered on one-inch, half-inch, or quarter-inch sheets, but if their heights are required to be entered, they should be shown by the symbol and type laid down for approximate heights.

M.—TREE SHEET

162. Ornamentation.—As the general appearance of a sheet depends greatly on good ornamentation, care must be taken to depict the vegetation on a sheet in an artistic manner.

163. Density of symbols.—The number of tree symbols should vary with the number of the trees. In an avenue of trees the distance between the tree symbols should vary with the prominence of the avenue. In a dense wood or jungle the tree symbols should be drawn distinctly more close together than in an open wood; this applies both to hills and plains. Care should be taken, however, not to overdo the density of the trees. In country where scattered trees are numerous, the number shown should be sufficient to convey a correct impression. This applies to areas under cultivation as well as to waste areas and areas of forest growth. Specimens showing density of vegetation should be adhered to.

164. Use of circles and dots.—In thickly wooded areas to save time in drawing, small rough circles may be substituted for tree symbols which should be slightly narrow and tall rather than round, and scrub and undergrowth may be indicated by dots of varying size at the discretion of the Circle Director. Small groves and gardens will have these symbols massed closely together to give them prominence.

165. Obscuring detail to be avoided.—Care should be taken that trees do not fall on small typing and detail such as milestones, relative heights, contour values, &c., and that they do not fall on surveyed trees, nor cut streams in densely wooded areas. The size of the tree symbols should be varied but should not be larger than as shown in the Table of Conventional Signs, except for conspicuous isolated trees which should be drawn decidedly larger on the outline sheet. Time should not be wasted over individual symbols, but the general effect should be an artistic and true representation of the character of the vegetation, and the symbols should be drawn with firm and uniform lines.

166. Tea bushes and planted trees.—Dots should be used for tea bushes and straight lines of planted trees or tea bushes should be shown as surveyed.

167. Edges of wooded areas.—If it is specially desirable to show an edge to a wooded area, the symbols should be definitely lined up along that edge and drawn slightly heavier.

168. Colours in which trees are to be printed.—Trees and other vegetation will be printed in green but prominent surveyed trees will be in black.

169. Green tree original.—As a rule a separate green tree original will be necessary. If the symbols are few, however, the Circle Director may order them to be drawn on the outline sheet, in which case a green colour pattern will be necessary, but where scrub or trees fall on sand or scree a separate green tree original must be prepared.

170. How tree symbols should be drawn.—Tree symbols should be drawn with absolutely uniform lines of medium thickness, *i.e.*, without shading on one side (though they may have horizontal shadows). Full tree symbols and rough circles should be kept small but varied in size. The lines of bamboo and grass symbols should be spaced sufficiently to prevent a tendency to blocking up as this immediately renders the symbol conspicuous. In forest areas it is unnecessary to emphasize individual species of trees.

The tendency in cultivated areas is for green trees to be overpowered by detail in other colours, especially in sheets which contain forest and which on that account have to be printed somewhat lighter. In cultivated areas trees, which are either isolated or in small groups, should therefore be drawn stronger and with more careful draftsmanship than is required for jungle trees.

171. Examination of green tree original.—Except when drawn on the outline sheet the tree symbols should be printed over all detail and lettering other than that mentioned in para. 165. The green tree original should, however, be examined over both the outline sheet and the contour sheet separately and any symbol which particularly interferes with lettering or figures should be erased. In clearing trees and vegetation from contour values, care should be taken that the minimum of clearing necessary to ensure the legibility of the contour values is done. Attention should be paid to the question of legibility when proofs are examined and to the fact that there should be no bare patches around figures and lettering.

N.—ADJUSTMENT OF EDGES

172. Adjustment of edges.—The edges of outline and green tree sheets should be adjusted with those of all adjoining sheets of the same series by a responsible officer, and a note in light blue, that this has been done, should be entered against each edge and initialled and dated by the officer. The traces of edges of adjoining sheets which have already been published or sent for publication should be obtained from the Circle Director.

173. Adjustment of railways, roads, &c.—In adjusting railways, rivers, roads, &c., great care should be taken that the adjustment does not alter the main features, such as the straightness of a road or railway or the bends of a river. If the differences are so great that this is impossible, the edges at these points must not be adjusted; the reasons for non-adjustment must, however, be entered on the plane-table by a marginal note and on the History Sheet. In cases where the courses of large rivers have changed so greatly since the previous survey as to make edge adjustment impossible, a special foot-note will be entered on the sheet concerned as provided for in Section XV.

174. Adjustment with sheets of different series.—

If the adjoining sheets belong to a different series and have already been sent for publication, they should be carefully examined to ensure that the common edges are, as far as possible, in agreement.

175. Completing sheets to edge.—

In completing sheets to edge from inferior material the outline of the areas concerned should be drawn in accordance with the rules laid down in Section XI.

176. Blank areas.—

Areas which have to be left blank as regards outline, because even approximate information regarding them is not available, should be marked "Unsurveyed". This should be done whether hill shading has been applied to such areas or not.

177. Explanatory foot-note.—

An explanatory foot-note or diagram, describing the sources of the inferior material used to complete the sheet, will be added, *vide* also para. 427.

O.—CONTOUR SHEET

178. Methods of showing hill features.—

The three methods of showing vertical relief on paper are by contours, shading, and by differently coloured layers. In India, topographical maps will be contoured and shaded but *not layered*.

179. Definitions.—

The terms *hill sheet* and *hill original* have been departmentally used in the past to define the original drawing from which the contours of a sheet are to be printed. As the hills of most sheets are depicted by a combination of systems, *e.g.* a combination of contours and hill-shading, the use of the term *hill sheet* may cause confusion and should be abandoned. The more definite terms *contour sheet* and *hill-shading sheet* should always be used when applicable.

180. Contour sheets.—

A contour sheet should be prepared for every sheet in which contours or sand-hills appear; but in flat country, where sometimes occasional sand-hills, &c., occur, these may be shown on the outline sheet, but in this case special mention of the fact should be made in the Publication Instructions, so that the Photo.-Litho. Office may prepare a brown plate.

181. Preparation for drawing contour sheets.—

It is usually the practice, in order to secure good registration, to draw the contour sheet, in cases of direct mapping, on a duplicate copy of the blue print on drawing paper which was used for the drawing of the outline; or, in other cases, on a blue print on drawing paper from a vandyked reproduction of the outline sheet. In the former case, care must be taken to see that all detail on the blue print, which affects the contouring, agrees with the black outline sheet when inked up. Before the drawing of the contour sheet is commenced, the corners of the graticule should be drawn in fine black

lines extending about a quarter of an inch in either direction, so as to coincide with the corners of the outline sheet. Nothing will be drawn or typed outside the graticule limits of the contour sheet except the contour values in the border.

182. Contour intervals.—The normal contour intervals for one-inch, half-inch and quarter-inch sheets will be 50 feet, 100 feet and 250 feet respectively. In the Himālayas and certain mountainous regions the Surveyor General has sanctioned a departure from the normal interval in the case of one-inch and half-inch sheets, and indices showing these sheets have been prepared and supplied to circles and independent units concerned for guidance. No departure from the normal interval is permissible in the case of quarter-inch sheets.

183. Drawing of contours.—Contours must be drawn firmly enough to show clearly through both trees and shade; the hill features are more important than the trees.

184. Thickened contours.—On sheets with contours at 50, 100, and 200 feet intervals every fifth, and on those with 250 interval every fourth contour will be thickened. They should be drawn of just sufficient thickness to allow of their being distinguished at a glance from the other contours; in the plains or in undulating country these thickened contours should be drawn slightly thicker than in hilly country.

185. Contours in steep ground.—Even in steep ground all contours should be shown by continuous lines whenever possible. Vertical lines in connection with contours should only be used to indicate rocky precipices or ground which is precipitous or impassable. In ground of this nature short broken lengths of thickened contours look incongruous and should not be drawn.

186. Form-lines.—Where the contours at the prescribed vertical intervals do not adequately represent the features of the ground, these should be indicated, where necessary, by form-lines, *i.e.* intermediate contours (fine broken lines printed in brown); they are particularly useful at marked changes of slope or to define the summits of peaks and ridges, and should not be at any fixed interval or height. Even when the correct height of a form-line is known, no height should be entered along it on the map. Contours at smaller intervals than those prescribed in para. 182 are not to be employed.

187. Photo-survey contours.—For instructions regarding contouring of areas compiled from photo-surveys see Section XI.

188. Breaking of contours.—Contour lines should be broken at sites which are not blocked in, cliffs, precipitous ground,

cuttings and embankments, double-line streams, canals, lakes and tanks and also at places selected for typing contour values.

189. Bathymetric contours.—The five- and ten-fathom bathymetric contours should be taken from Admiralty and Marine Survey charts and shown by dotted lines on sheets which include sea areas, but should not be shown in too much detail as they are liable to change. They should be lettered “5 fathoms” and “10 fathoms” respectively, the lines being broken for the lettering. As these bathymetric contours and the lettering referring to them will be printed in blue, they should be drawn on the outline sheet and not on the contour sheet.

190. Contour values in borders.—In order to ensure that contour values in the border are equidistant from the edge, a fine blue line should be drawn in light cobalt, parallel to and at the correct distance from each edge of the contour sheet according to the Border Specimen.

191. Sand and sand-hills.—All sand, sand-hills, and boulders, except in river-beds, tanks, &c., or on the foreshore, will be drawn on the contour sheet.

192. Shading of sand.—Provided it is well executed, sand that is shaded greatly improves the appearance of a sheet. In the shading of sand-hills and sand-banks, which have been surveyed in detail, if the draftsmen are competent, the flanks may be made darker than the summits, the dots being larger and closer together where the slopes are steep, and becoming smaller and wider apart as the slopes get less. Flat sand may be shown by small dots of a uniform size, uniformly spaced; but the dots along the margin of water can, with advantage, be made slightly larger and placed closer together than the others. Sand on the foreshore should be lightly shaded along the edge next the sea.

193. Completion to edge.—In completing sheets to edge from material of an inferior nature the hill features of the areas concerned should be shown in accordance with the rules given in para. 436 of Section XI.

194. Comparison of edges.—Edges of contour and of hill-shading sheets should be compared in the same manner as described in para. 172 for the edges of outline sheets.

195. High mountain features.—Glaciers, moraines, and all ice, snow, and rock features will be shown as surveyed. See Section X for the colours of the different items of high mountain features on published maps. In sheets containing areas where snow and ice features have not been accurately surveyed, the special foot-note in para. 493 (*l*) regarding the height of the snow line should be inserted.

SECTION IV—TYPING

A.—GENERAL

196. Introductory.—The appearance of a map depends to a very great extent on the quality of the typing, which, in order to get the best results from photozincography, should be black, clear, and sharp. Full instructions on the subject are included in Appendix I, and if these are carefully followed there should be no difficulty in getting good impressions.

197. Type table.—A table showing the type to be used on one-inch, half-inch, and quarter-inch sheets has been issued for general guidance, but it is hardly possible to lay down hard-and-fast rules which will meet every case, and officers in charge of parties must use their own judgment when they consider the type prescribed is not suitable for particular cases.

198. Type, how obtained and kept.—Type of the various descriptions now used for topographical maps is obtained from the Director, Map Publication. Indents for type should be submitted one year ahead of requirements on the 1st May of each year to the Circle Director, who will, after including his own requirements, and providing a margin for emergencies, forward a combined indent to the Director, Map Publication, on the 1st June. On receipt of type, a proof should be taken of each fount as it lies in block; it is well to remember that type when wetted holds together better than when dry. The number of letters, spaces, and quadrates should be counted and noted alongside the print of the fount. The knowledge that a proper list is kept will go far to prevent petty theft by menials. Strong trays of equal dimensions and of sufficient size to hold the largest fount in stock, and space for not less than seventy divisions, should be constructed. The type should be sorted into them carefully, each fount in a separate tray, and a print of the letter or whatever is contained in the division, impressed distinctly on the upper side of the space. The capital alphabet, or upper case, should be kept separate from the lower case. There is an established proportion with respect to the number of each letter in any fount; it follows, therefore, that the space required for each letter in the tray is in the same proportion. Special type cabinets are prepared in the Mathematical Instrument Office, and can be obtained on indent.

199. Spelling of names.—Vernacular lists of all village names must be obtained from the district officials (*the English lists in the district offices are not to be trusted*), and the transliteration should be made in party and drawing offices from these lists according to rules given in Appendix B.

200. The Imperial Gazetteer.—The primary authority for the spelling of Indian names is the Imperial Gazetteer, which must be followed unless a change is authorized by the Surveyor General, *vide* para. 201. The spelling of all names in the Survey of India is based on the Hunterian system. It frequently happens however that the Imperial Gazetteer spelling is at variance with the Hunterian.

201. Departure from spelling given in the Imperial Gazetteer.—When an executive officer, after consulting the local officials, considers that the spelling in the Imperial Gazetteer is wrong, he should inform his Circle Director at once. The latter will consult the Local Government concerned, and, if the correction is not accepted, the spelling, if used on any maps that are in the course of being drawn, can be corrected back to that of the Gazetteer when the sheet arrives at the Circle drawing office. In all cases in which Local Governments agree that the correct spelling of a name is different from that given in the Imperial Gazetteer, Directors of Circles should, as early as possible, forward copies of the correspondence on the subject to the Director, Map Publication, who will submit the amended spelling to the Surveyor General for approval. A reference to such correspondence should also be made in the History Sheets of the sheets concerned, if the matter is still *sub judice*. The Director, Map Publication, will maintain a list of all changes of spelling approved by the Surveyor General in order that these may be available for future editions of the Imperial Gazetteer.

202. Minor spelling lists.—For names which are not to be found in the Imperial Gazetteer, the District Gazetteers and minor spelling lists may be consulted as a guide; such lists as are available can be obtained from the Director, Map Publication.

203. Special lists of names.—An alphabetical list of villages in the *tālūks* and districts of the Madras Presidency has been published by the Superintendent, Government Press, Madras. Accents on “e” and “o” given in that list should, however, not be used, *vide* foot-note to Appendix B, para. 3. Various other provinces have somewhat similar lists which should be consulted. For spelling of names outside India, see Appendix B.

204. Burmese and Shan names.—The authority for the transliteration of Burmese and Shan names is contained in “Tables for the transliteration of Burmese into English” and “Tables for the transliteration of Shan names into English” published by the Superintendent, Government Press, Rangoon.

205. Doubtful cases.—In doubtful cases a reference should be made to the local authorities, but as these officials are not necessarily bound by the same spelling rules as are in force in the department, it may not always be possible to accept their suggestions.

206. Accents.—Accents must be used in the spelling of names on maps. Accents will not, however, be entered on a final “a”, “i”, or “u” even though used in the Imperial Gazetteer or other authorized lists. Accents will be drawn at a distance above each letter approximately one-fourth the height of a capital letter of the type concerned.

207. Horizontal accent to be used.—In many cases the minor lists agree, except in the accents used, with the Imperial Gazetteer: in the latter the horizontal accent (—) has replaced the acute (´) and grave (`) accents, and this practice is to be followed in the spelling of all Indian names on maps.

208. Accents in Burmese, Tibetan, and Andamanese names.—In the case of Burmese, Tibetan, (see para. 5 of Appendix B), and Andamanese names the circumflex (ˆ) and the modification (¨) may be employed where their use is supported by good authority, or appears requisite in order to indicate the correct pronunciation.

209. Names ending in “pur”.—In the case of village names ending in “pur”, no accent should be used on the “u” of that termination, except in areas outside India where its use is authorized by Gazetteers and other authorities mentioned in Appendix B.

210. Full stop.—Full stops after abbreviations, initials, &c., are never to be used on the body of a sheet, but should be used when appropriate in the borders or margins.

211. Spaces between initials.—When initials are used in combination with a name, the space between the name and the initial next to it and the space between the initials should be equal, but care should be taken that the initials are not so entered as to appear part of the name. (See para. 225).

212. Hyphens.—Hyphens will not be used in compound names either in India or in transfrontier countries, except in the following cases:—

- (a) Where necessary to ensure correct pronunciation, *e.g.*, *Maz-ham, Pa-ngam.*
- (b) In the case of single letters, as the Persian “i” or “o” *e.g.*, *Āb-i-Panja, Mandab-o-Mandarab.*
- (c) When a compound name is typed in two lines, a hyphen may at discretion be inserted at the end of the first line.
- (d) In Burmese, Shan, Chinese, Indo-Chinese and Siamese names, for which there are special rules.

213. Compound names.—The component words of compound names should stand apart except in rare cases such as

Nizamuddin. The initial letters of these component words will be in upper case and of the connecting particles in lower case.

214. Commonplace terminations.—As regards commonplace terminations, such as ‘*gaon*,’ ‘*nāla*,’ ‘*darrāh*,’ ‘*talao*,’ &c., which differ in form in different places, it will be found that, in most cases, the Imperial or District Gazetteers, or accepted spelling lists contain instances of the spelling required, or clues thereto; where, however, no examples occur, the commonly accepted local rendering must be transliterated according to the rules.

215. Descriptive vernacular names.—When a descriptive vernacular name (generally the name of a natural feature), *e.g.* *Khwar*, *Darra*, &c., (for stream beds), *Ghundi*, *Ghar*, &c., (for hills), is a component part of a name and the local inhabitants generally couple the descriptive word with the name, the latter, when entered on a sheet, should include the descriptive word. The usual practice is to separate the two words when the name is applied to the natural feature for which the descriptive word is given, and to combine them in one word when the name applies to a village or other feature; *e.g.* (chaung is the Burmese word for a stream),

Pedda Chaung ... (Name of stream).

Peddachaung ... (Name of village).

216. Translations of descriptive names.—Translations of descriptive vernacular names should not be entered when their meaning is sufficiently clear, either from the use of a symbol or by a study of the neighbouring topography, or when the descriptive vernacular name is well known, as for instance, in Tibetan, such names as *La*, *Tso*, *Dzong*, *Gompa*, &c. It is, however, permissible to enter such descriptive terms as “Rope-bridge”, the vernacular names for which might not be well known. When, however, the local words for pass, river, fort, &c., might not be readily understood, their meaning should be given in a foot-note on topographical maps on the $\frac{1}{4}$ -inch and larger scales.

217. Fiscal names.—It frequently happens that the fiscal name of a village, as given in the list, differs from the name by which the village is best known and commonly called by the people of the country; the latter appellation is obviously that which is required on a topographical map; the discrepancies, therefore, should be carefully elicited by field surveyors and noted by the entry of both names on the plane-table section, and the well-known name on the fair sheet (the less important name being entered in brackets after or below the more important name).

218. Fiscal names liable to change.—Fiscal names of village areas of which the site names are liable to frequent change, or which contain no permanent site, such as the “*dehs*” in Sind, may be

entered on one-inch and half-inch sheets in the type prescribed for unimportant localities.

219. Positions of names.—Site names should be typed, as a rule, horizontally, close to, and to the east of the site; but if, to do this, it would be necessary to break important detail, the name may be placed further away or in another position. (See para. 59 (a) (i). Names of railways, roads, canals, streams, hill ranges, and (in special cases) administrative units, long slanting ferries over wide rivers, long viaducts or bridges, steamer service routes, submarine cables, high- and low-water lines, and fathom-lines may be typed out of the horizontal (see also para. 253); but these names should be typed close to and parallel with the symbol in a position as nearly horizontal as possible. The typing of small names and heights in positions where they are likely to be obscured by hill shade should be avoided, regard being paid to the fact that shading north of latitude 16° now has a southerly incidence of light.

220. Breaking detail for names.--

- (a) Boundaries must sometimes be broken for lettering, but only when absolutely necessary.
- (b) Lettering should be typed clear of detail as far as possible, but, when it cannot be avoided, detail, whether it is to appear in black or colours, should be broken on the fair sheet where there is any likelihood of its obscuring the lettering. The clearance in the case of detail to be printed in black should be very small as no duffing is involved, both the name and the detail being on the same plate. Breaks in detail to be printed in black will not be joined up by the Photo.-Litho. Office. The clearance in the case of detail to appear in colour may be somewhat greater but should not be excessive. Breaks in detail which is to be printed in colour must be joined up on the colour patterns and by the Photo.-Litho. Office, and must be completed in blue on the fair sheet during drawing.

221. Emphasizing names by spacing letters.—Certain classes of type as used for names of railways, administrative towns, heights, contour values, &c., stand out with additional emphasis and character if fine spaces of tin, or paper, are inserted. Such type in the smaller founts is often difficult to read without spacing. This should not be overdone.

222 Examination of names.—Names on the sheet must be in agreement with those in the reference list on the plane-table section. (See Chapter V, para. 82 (b)). The only names which will possibly not appear on this list will be spaced names, and they will appear on the typer's guide (para. 59).

223. Symbols not in foot-note tables.—When a symbol is used in the body of the sheet which does not appear in the table of symbols printed in the standardised foot-notes, provided space admits, an explanation of the symbol may be typed alongside it, or a special foot-note explaining the symbol may be added. Similarly when the nature of the ground cannot be suitably expressed by any existing symbol, a brief description may be typed across the area.

224. Use of capitals and hyphens in descriptive remarks.—When descriptive remarks are entered on a map, hyphens should not be used between component words. The type employed (upper and lower case) should be that prescribed in the type table. Descriptive remarks should not be spread out at the expense of legibility, merely to cover an area, but should be repeated, if necessary. These orders do not apply to the words “Reserved (Protected, or State) Forest”, whether used in conjunction with a name or not, as such are not considered as descriptive remarks.

225. Abbreviations.—When it is considered necessary to use abbreviations which are not explained in the ordinary foot-notes, *e.g.* JM for jute mill, IF for indigo factory, &c., the abbreviations should be explained either by typing the unabbreviated words in a few prominent places on the map, or else by adding a special explanatory foot-note.

226. Rules for maps in black.—On topographical maps, on which roads and water features are printed in black, mines and passes should have the words ‘Mine’ and ‘Pass’ typed against their respective symbol on the body of the map and in the foot-notes; and whenever there is any possibility of wells being confused with unnumbered boundary pillars, such wells should have the word ‘Well’ typed against them on the map but the word ‘Well’ need not be typed in the foot-notes. The type to be used in these cases should be the same as that used on the maps for place names (miscellaneous). *Vide* Chapter IX para. 58(*h*).

227. Hand-printing.—Several draftsmen in each party and drawing office should be taught hand-printing. Reinhardt’s “Lettering for Draftsmen, Engineers and Students”, published by Archibald Constable & Co., London, also the departmental “Copy-book of Lettering” and “Hand-printing Copy-book”, are recommended as practical guides to the art. The lettering known as ‘one-stroke lettering’ is the easiest to carry out and reproduces best. All such lettering should be sharp with clean corners and the lines should be of uniform strength.

228. Separate typing sheet not to be used.—As difficulties have sometimes arisen in the Photo.-Litho. Office in giving suitable exposure for heavy typing and for the fine lines, a trial

has been made of typing on a separate sheet; it has, however proved a failure and is not to be carried out in future.

229. Typing in borders and margins.—For typing in the borders and margins see Section V.

B.—LAKES, TANKS, RIVERS, AND STREAMS

230. Initial R for River.—The initial letter R for River should be entered after the name, not before.

231. Names of lakes, tanks, rivers, &c.—Names of lakes, tanks, rivers, &c., should preferably be typed within the water area. Names of small lakes and tanks may, however, be typed horizontally outside their limits.

232. Names of rivers and streams.—Names of rivers and streams should be typed parallel to their courses in such positions that they may read from west to east. The size of type selected for river names should vary with the importance and length of the river, and be gradually increased from the source towards the mouth.

233. Positions for stream and river names.—The positions for stream and river names must be carefully selected so as to stand out clearly and interfere as little as possible with the detail and contours.

C.—RAILWAYS

234. Railway station names.—The spelling of names of railway stations should not be taken from railway lists; they must, as for other names, be correctly spelt. The initials R S without the name should only be entered against a railway station when there can be no doubt whatever as to what the name is.

235. Flag, Pick-up, and Halt stations.—The names of 'Flag', 'Pick-up', and 'Halt' stations should be entered as '—R S (flag)'; the names of 'Reversing' stations should be entered as '—R S (reversing)'; the names of other subsidiary stations, such as Siding, Crossing, Passing, Block-house, and Cabin, being of doubtful utility, should usually not be shown.

236. Names of railways.—The name of a railway with, if necessary, the branch name should be typed along the line and, unless the railway is broad gauge, the size of the gauge; the size of the gauge should also be entered along the line or, if more convenient, under the centre of the railway and branch names. Abbreviations may be used. There should be a space between the railway and branch names, and the size of the gauge should be in brackets, *e.g.*, SOUTH INDIAN RAILWAY Arkonam Branch (Metre gauge). When the name of a railway is different from that of the

railway system which operates the railway, the system name will be entered in brackets in abbreviated form after the name of the railway, *e.g.*, SHORANÜR COCHIN RAILWAY (S I R).

237. Type for branch names and gauge.—Branch names and size of gauge should be typed in the lower case of that type which is used for the name of the railway. When two different gauges of railway run together, the smaller being laid on the same sleepers between the rails of the broader gauge, the words "One track for both gauges" will be typed alongside, *vide* para. 124.

238. Authority for names of railways.—The names of railways, with the words "Main Line" (in the lower case of the type) when necessary, and the names of branches and sections of railways should be taken from the current 'History of Indian Railways' published biennially by the Railway Board, in which this information (previously given in the annual 'Administration Report on the Railways in India') is now incorporated. They should, as in the case of station names, be correctly spelt. In taking names from the History of Indian Railways technical names, such as "N. E. Line, commercial section", or superfluous information when a railway has no other section, such as the names of terminal stations entered with the name of the railway, may be ignored.

D.—TOWNS AND VILLAGES

239. Village names.—The size of type used for village names must depend on the importance of the village. In densely populated country in the plains, where village names are numerous, the smallest type prescribed in the type table for village names should be used for all except large and important villages. Where, however, the villages are not numerous the intermediate size type prescribed should generally be used, the smallest being kept for small hamlets. In the hills, where the smallest type does not show up well, names of villages should, almost invariably, be printed in the intermediate size type. In the case of very large villages the largest type laid down in the table should be used.

240. Use of upright type.—Names of a few important villages, market towns, and railway junctions on a sheet may be typed in the upright type laid down in the type table; this, if the selection is carefully done, will greatly improve the appearance of the map.

241. Tribal villages.—In localities where villages often consist of several distinct parts, each inhabited by a different tribe, or where it is important for political or military reasons that the name of the tribe inhabiting a village should be given, the tribal name should be added either below or to the right of the village name or names (see also para. 217). The name should be printed

in the upper case of italic type, but one size smaller than that used for the village name. Where the same tribal names are repeatedly used on a map, the initial letter may be occasionally used in place of the full name, if no ambiguity is caused and the use of the full name would injure important detail.

242. Sites falling in two sheets.—When a town or village site or other feature falls across the common edge of two sheets and is not completed in the border in accordance with the orders in paras. 314 and 315, the name should be typed in the body of the sheet in which the larger portion falls and in the border of the sheet containing the smaller portion. The style of type used in the border should be the same as that in the body of the adjoining sheet but may be in a smaller fount if desirable. In the north and south borders the name should be typed parallel and close to the edge of the map opposite the town or village. In the east and west borders the name should be typed horizontally, but when the name cannot be fitted into the border it may be typed parallel and close to the edge of the map. Names in the border should not be spaced.

243. Numbers for names.—In the case of large towns, cantonments, &c., where numerous names would obscure detail, the Director of the Circle may authorize the use of numbers on the body of the sheet in place of the less important names, with a reference table outside the border. See para. 299. The names or abbreviations for the more important sites, such as CH, IB, Hospital, PTO, should be typed in the body of the map.

244. Names within city and cantonment areas.—Specimens of type for names of the details within a city or cantonment area are shown in the latest type table. The small types mentioned therein are to be used in exceptional circumstances only.

245. Description of special buildings, &c., to be typed.—In the case of buildings, &c., for which no symbol is prescribed, it is better to type a description than to introduce a new symbol, e.g. “ziārat”, “sarāi” &c.

246. Abbreviations.—Certain abbreviations are shown in the foot-notes but their use is not compulsory, and, where prominence is desired and there is room, the full name may often be usefully added to the abbreviations of names of bungalows, e.g. “RH (Canal)” or “Canal Rest House”; “RH (Forest)” or “Forest Rest House”.

247. Markets.—The day of the week on which a market is held should be entered in brackets after the word market, using the following abbreviations:—

Mon, Tues, Wed, Thurs, Fri, Sat, and Sun.

248. Ruins.—The words "In ruins", in brackets, should be entered against the sites of ruined towns and forts.

249. Fairs.—Important fairs, with period in brackets, should be entered on fair sheets.

E.—SPACED LETTERING

250. Major partitions of districts and states.—The names of the major partitions of districts and states which appear in the district heading will be typed across the area of the partition. Where such state or district has no partitions, its name will be spaced across the map as well as entered in the district heading: no administrative compartment shown on the map shall be left without a name spaced across it or in the border. Each name will be typed horizontally across the centre of its area, which may cover more than one sheet. Except in the cases referred to in para. 253 below, one or two letter spaces should be left between the boundary and the initial or final letter. Also *see* section XVII.

251. Substitution of minor partitions.—Subject to the Surveyor General's approval, the names of the minor partitions of districts, &c., may be substituted for those of the major partitions in any administrative areas for which directors, after consultation with the Local Governments, consider the minor partitions to be of comparatively greater local importance than major partitions.

252. Spaced names extending over more than one sheet.—When a spaced name extends over more than one sheet, care should be taken to get the same alignment, spacing, and size of letters in each sheet. To ensure this, adjoining published sheets should be consulted, and where adjoining sheets have not been published the orders in para. 452 should be carefully complied with.

253. Names of small or isolated areas.—The names of small or isolated areas should be typed in the most suitable positions and may extend slightly beyond the limits of the areas to which they refer, and in exceptional cases, to avoid the use of references, may be typed on a slant or in a curve. If, however, it is impossible to type the name, the initial letter or a pair of letters should be typed in the body of the map and explained in a foot-note. In explaining the reference, the foot-note should not mention the locality or the map square in which the area falls, but should give full information as to its administrative connection, so that it will be unnecessary to show such an area in the administrative index. (See para. 289(b)). Initial letters should be used as references rather than figures which might be confused with the reference figures of the administrative index. (See para. 298).

254. Position of spaced names.—The position of each spaced name should be carefully chosen so as to fall once only across the centre of the area to which it refers, and each letter should be equally spaced. Reference should be made to small scale maps, or the local administration, if adjoining sheets of the same scales are not available to cover the whole area. If, however, it is known that the whole of such an area will not be covered by adjoining sheets on the same scale, then its name should be typed in the most suitable position across the sheets that are to be published.

255. Names in the border.—When only a portion of a *tahsīl*, &c., or of a large Indian state containing no internal subdivisions, falls within a sheet, the name will be typed in the border or borders adjoining the area, except when the name, or one or more letters of the name, has already been entered in the body of the sheet in accordance with paras. 250 and 254. The name may, however, be inserted in the border when by its omission there would be any doubt as to the particular *tahsīl*, &c., to which a small area on an edge belongs. Even when they refer to large areas, such border names must not be unduly spaced out; the letters forming the names should not be more than three quarters of an inch apart when reduced.

256. Size of type.—The size of type to be used will depend on the spaces between the letters. *Vide* Type Table.

257. Letters in border.—Such letters as do not appear in the body of a sheet will be added in a smaller type of similar description in the border so as to have the complete name on each sheet, the bottom of all the letters being in the same horizontal line.

258. Indian states.—The above rules also apply generally to Indian states. Indian states whose names appear in the central title of a sheet will be treated, as regards typing of districts and smaller subdivisions, in the same way as British territory. (See also Section XVII and Border Specimen).

259. Tribal names.—

- (a) The rules laid down for the typing of *tahsīl* names apply generally to tribal names, but when the tribal area consists of a long narrow strip running north and south or nearly so, the name may be typed horizontally several times in the body of the sheet. To avoid unnecessary repetition, however, the name may be typed out of the horizontal, care being taken that the letters do not cross or intermingle with letters of other spaced names.

- (b) The letters of tribal names which are not typed in the body of the sheet may be typed in the border in the same way as *tahsil* names, as long as they do not interfere with the latter. Tribal names, however, should not be spaced along the border, and should always be in the singular.
- (c) As a rule one tribal name only should be typed over an area; the officer in charge of the party or drawing office responsible for drawing the map, under the orders of the Director, should use his discretion as to whether the section, subdivision, clan, or tribal name should be shown. If necessary a second name can be given below within brackets.
- (d) If considered desirable such names may be typed out of the horizontal, but the horizontal position should not be departed from without good reasons.
- (e) The tendency to spread out spaced names to cover large areas should be checked; the principle of repeating the names should be followed.
- (f) Officers in charge of units should consult the military and political officials as to what tribal names should be shown on our maps.

260. Names of localities and other areas.—Apart from administrative and tribal names which have been dealt with in the foregoing paras., names that apply to *areas* as distinguished from points or sites, such as localities, reserved forests, large areas of water, &c., should always be spaced provided that this can be done without extending them beyond the area to which they apply. It is better to use smaller type, spaced, if there is not room to space the larger type. Names consisting of more than one word should be typed in two lines if there is not room to type them, spaced, in one line. Such names should not be typed with wide spaces between the letters; they should as a rule be typed entirely within the body of the sheet, and may be repeated in the same and adjoining sheets if necessary.

261. Reserved, &c., Forests.—In order that there may be no doubt as to which is the forest side of a forest boundary, care must be taken to put the words "Reserved Forest", "Protected Forest", or "State Forest", as the case may be, on each forest area. Where there is not sufficient room to enter these words the initials R F, P F, or S F may be used instead, or the name may be entered in the border if the area to which it refers extends beyond it. (See also para. 210).

262. Spelling of Reserved Forest names.—The names of reserved, &c., forests must be spelt correctly according to the

authorized rules; should a forest name be derived from some adjoining feature, the spelling of both names must naturally agree.

263. Use of the word "Range".—The word "Range", as applied to forest ranges, should not be used, since its application in this way is a purely technical one. Instead of designating forests as "Ranges" they should be entered as Reserved, Protected or State Forests. On forest maps on the two-inch and four-inch scales, the word "Range" may be entered to denote a forest range, if the forest officers use it as such; but whenever used, it must invariably be preceded by the word "Forest".

264. Names in blank areas.—

- (a) If the blank portion of a sheet falls in a different province (or corresponding administrative area) to the remainder of the sheet, then the name of the province, &c., should be typed across the blank space; but if the blank portion does not fall in a different province, &c., and falls in a different district, state, &c., then the name of the district, state, &c., should be typed across the blank space.
- (b) The name typed across the blank space on a sheet should not be entered in the title or heading, or in the Administrative Index of the sheet. (See Section XVIII, para. 515(c)).
- (c) The following note when applicable will be typed in the blank space in a sheet:—

"The area left blank on this sheet will be published on the -inch scale as part of sheet No.....".

If this publication will not be undertaken in the near future then the words "at some future date" should be entered in the note after the word "published".

F.—HILL NAMES AND CONTOUR SHEET

265. Names of hill ranges.—Names of hill ranges should be spaced and typed along the range in such positions as to read from west to east, presuming the bottom of the map to be south; the letters forming such names should not be more than three quarters of an inch apart when reduced. Sharp curves should be avoided as much as possible. When hill ranges extend to two or more sheets their names should be typed on each sheet. The letters of the name should lie near but need not necessarily be on the crest line of the range. The word "Range" should be reserved for such ranges as appear on the 32-mile map of India; the local names, e.g. "Dhār", "Ghar", "Koh", should be used for the shorter stretches of such hill features.

266. Personal names for mountains.—The numerous personal names by which the mountains of Northern Tibet are designated in maps, such as Richthofen, King Oscar, Humboldt, Nain Singh, &c., should be omitted from all maps prepared in future by the Survey of India, whether new publications or new editions of published sheets. Until suitable native names for such ranges have been ascertained, the mountains should be shown on Survey of India maps as nameless. Provisional designations such as K 2 and N 53 should, however, be preserved.

267. Contour values.—The selected contour values will be typed, if possible, in the gaps left in the contour drawing, but if it has not been feasible to leave these gaps, spaces must be carefully erased. Care should be taken that no contours (either thick or fine) are drawn within or touching the lettering of the contour values; there should be a clearance all round of about $\frac{1}{8}$ th of an inch. Contour values should not be typed upside down, but so that they can be read from the bottom edge of the sheet. As far as possible contour values should not be typed on slopes of hills likely to be shaded.

G.—MISCELLANEOUS

268. Aerodromes and landing grounds.—Aerodromes and landing grounds in areas prohibited to civil air-craft will not be shown on a sheet issued to the public.

269. Boundary pillars of external boundary of India.—The numbers of the boundary pillars of the external boundary of India and international boundaries in transfrontier areas will be typed on the sheets of the one-inch, half-inch, and quarter-inch maps of India in Roman or Arabic numerals, in accordance with the numerals used for the numbering of the pillars in the authoritative description of the boundary. Directors of Circles should ascertain from the Director, Map Publication, the description of numerals to be used for the numbers of boundary pillars on each of their sheets which include portions of such boundaries. Where space does not permit owing to the pillars being too close together, the numbers of selected pillars may be omitted at the discretion of the Circle Director.

270. Names of geodetic, &c., stations.—Names of geodetic and other trigonometrical stations should only be entered on the map if they have been verified by the surveyor as locally recognised; they should be correctly spelt.

SECTION V.

BORDERS, HEADINGS, AND MARGINAL WORK

A.—GENERAL

271. Border Specimen to be followed.—The title, borders, headings, foot-notes, scales, &c., will be in accordance with the latest Border Specimen.

272. Sharp typing essential.—The typing of marginal items should be very carefully done, because sharpness of definition tends to decrease appreciably towards the edges of the field covered by the lenses in the reproducing offices. For example district headings and sheet numbers, being in large bold type, reproduce satisfactorily, unless erasures have been made; on the other hand such items as seasons of survey, magnetic declination note, sheet numbers in the index to sheets, and district names in the administrative index, owing to indifferent typing or erasures, often necessitate considerable cutting and touching up on the negative. The greatest care should therefore be taken to insure in these matters the minimum of erasures and the highest quality of typing. Particular care should be taken to see that such items as district headings, sheet numbers, magnetic declinations &c., are truly horizontal.

273. Sheet numbering.—For the method of numbering one-inch, half-inch, and quarter-inch sheets see Chapter I (1932), paras. 31 and 32.

B.—CENTRAL AND DISTRICT HEADINGS

274. Central and district headings.—The names to appear in the central heading are given in para. 514. These and the district heading should be arranged in accordance with the following rules:—

- (a) If more names than one occur in the central heading they will be entered in alphabetical order. The central heading will be hand-printed in blue on the fair sheet.
- (b) The order in which all names are entered in the district heading should follow that of the provinces to which they belong, as entered in the central heading; the names of districts, tracts, states, &c., within each province should also be arranged alphabetically in separate groups by provinces, the names of districts preceding the names of tracts and states. In the case of compound names such as

West Khandesh District, Upper Chindwin District, &c., the name proper, and not the qualifying word or words, should decide the alphabetical grouping in the district heading.

- (c) Where two groups are to be connected the word 'AND' should be used, the 'short and' or ampersand, '&', being left for connecting the different names of each group, *e.g.*

GURGAON & ROHTAK DISTRICTS AND
DUJĀNA & PATAUDI STATES.

The ampersand, '&', is not to be used at the beginning or end of a line.

- (d) If, in a district heading, alternative names have to be included, the less important name should be entered, preceded by the word 'OR' in the type laid down for such heading, in brackets after the more important name, thus:—

JODHPUR (OR MĀRWĀR), SIROHI
AND UDAIPUR (OR MEWĀR) STATES.

- (e) The names entered in the district heading should be arranged in as many lines as may be necessary and no line should exceed five inches; a clear space of at least half an inch (on the scale of drawing) must be left between the words of the district heading and those of the seasons of survey.
- (f) In order to save time such headings and border or marginal information as are common to several sheets may often be typed on these sheets at the same time, to avoid more than one setting up of type.

C.—SEASONS OF SURVEY

275. Wording of "Seasons" heading.—The seasons of survey shown in the headings of departmental maps should refer to the operations of the Survey of India only. If the survey occupied more than one season consecutively, the information should be expressed thus—'Surveyed 1905-07'; if the seasons were not consecutive, thus—'Surveyed 1905-06, 1910-12'. Other operations, the results of which have been utilized in the preparation of the map, should be mentioned in a foot-note, thus:—

"With additions from surveys executed by the Land Records Department in 1904-05".

276. Procedure when varied material is used.—In cases where preliminary editions or other topographical sheets have been compiled from such varied material that a mere statement of

seasons of survey will not meet the case, the following statement should be typed in the upper margin in place of the statement showing seasons of survey:—

Compiled from various sources.

(See foot-note).

277. Correction surveys.—

- (a) When a sheet is “generally” corrected in the field, *i.e.* when surveyors have been sent out with instructions to go over the whole sheet and correct it where necessary, the original date of survey will not be altered but the following will be added below it in smaller type:—

(Corrected 19 -):

In the case of compiled mapping, when only some of the primary sheets have been “generally” corrected in the field, no reference to the correction surveys will be made; the dates of the correction surveys will be given only when all the primary sheets have been corrected.

- (b) When only particular items are corrected on, or added to, a sheet in the field no entry as in para. 277 (a) above will be made and the sheet will merely be classed as a revised edition on reissue.
- (c) When the whole of a sheet is *resurveyed* or *revised* in the field (*vide* Chapter I, para. 19) the date of surveys will be altered to that of the date of resurvey or revision.
- (d) When only part of a sheet is *resurveyed* or *revised* the date of resurvey or revision will be added to the date of survey.

D.—MAGNETIC DECLINATIONS

278. Wording of note.—The note in the top margin of one-inch, half-inch, and quarter-inch sheets referring to the magnetic declination will be worded thus:—

Magnetic Declination about $2^{\circ} 10'$ $\frac{\text{East}}{\text{West}}$ in 1925.

($\frac{\text{Increasing}}{\text{Decreasing}}$ by about 4' annually).

or ‘(No annual change).’ when there is no annual variation in declination.

279. Wording when declination is zero.—When the declination is zero, and there is an annual change, the heading should be worded as follows:—

Magnetic Declination about $0^{\circ} 0'$ in 1925.

(Increasing by about $4' \frac{\text{West}}{\text{East}}$ annually).

280. Notification of declinations for half-inch and quarter-inch sheets.—The values to the nearest 10 minutes for all half-inch and quarter-inch sheets will be recalculated and notified by the Director, Geodetic Branch, from time to time; and these values shall continue to be printed on all sheets and new editions published, until new magnetic observations enable the Director, Geodetic Branch, to notify fresh values. No attempt should be made to adjust these authorized values for intermediate years. Where there is insufficient modern data to justify more accurate figures, the Director, Geodetic Branch will supply values to the nearest 30 minutes only.

281. Value shown to nearest 10 minutes.—The magnetic declination is shown to the nearest 10 minutes on one-inch, half-inch, and quarter-inch sheets, except where there is insufficient magnetic data, when it will be shown to the nearest 30 minutes only.

282. Values for one-inch sheets.—For one-inch sheets the values will not be tabulated, but will be calculated for particular sheets whenever units submit their requests.

283. Procedure when no values are available.—If the Director, Geodetic Branch, can supply no value for a certain area, then the value may be calculated from the mean of the compass declinations on the field sections, and the word "Approximate" entered before "Magnetic" in the heading.

E.—ADMINISTRATIVE INDEX

284. The Administrative Index should be drawn on the fair sheet by the office in which the sheet is drawn.

285. What the index is intended to show.—The Administrative Index is intended to explain at a glance the connection between the names given in the district and central headings and the subdivisional names spaced on the body of the map, or appearing within the border; but, if this connection is already explained on the body of the map, or in the border, it is not essential to repeat the information in the index.

286. Underlying principle.—The underlying principle is, when there is insufficient space to show the connection on the index, it should be given on the map; if, furthermore, it cannot be explained on the map, then it must be indicated by means of a reference letter on the map with a foot-note in the lower margin.

287. Simple cases.—The names of *tahsils*, subdivisions of states, and of minor states, are spaced on the map or appear in the borders, and, in the simplest cases, all that is necessary is to reproduce on the index the district boundaries shown on

the map, and to type within them the district names which pertain to them; when such names, however, appertain to more than one province, then the names (or initials) of the respective provinces, as given in the central heading, should also be typed on the index below the district names.

288. Maps with many small states.—When a map contains many small states, or isolated portions of states and *tahsils*, it is quite impossible to show their connection within the limits of a small index; in such cases the index must be utilized to illustrate only the larger administrative areas of the map, and the information regarding the smaller areas must be given on the map itself.

289. Treatment of very small areas.—

(a) Very small areas may be slightly exaggerated on the administrative index, and if they are still too small to contain the names, reference numbers should be employed, the same number being used for all areas of one and the same administrative unit. When the name of the administrative unit to which such isolated areas belong is typed elsewhere on the index, the reference number given to the isolated areas should be repeated above the typed name on the index, and no explanatory foot-notes about the number need be given. A reference number on the index relating to some administrative unit, the name of which does not appear on the index, must, however, be explained in a foot-note to the index, and these will be the only cases when foot-notes to the administrative index are required. When there is no room to type the reference number within the area to which it refers, it may be typed alongside, provided no doubt is created.

(b) If, however, the area is too small to be clearly marked by a numeral of the type prescribed in the Type Table for reference numbers in the index, the area should be omitted altogether from the index. In such cases, each area must show, either in the body of the map, or in the border, or by means of a reference letter on the map with a foot-note below (*vide* para. 253), the name of the district or state and the province of which it forms part. It will seldom be necessary to type both these items of information across the small areas on the map, as the connection between the district or state name and the province name will generally be explained in connection with some larger area of the same district or state, either on the map, or in the border, or on the administrative index; but should it be essential to type the province name as well as the district or state

name across a small area, an initial or abbreviation may be substituted for the full province name. When two or more portions of the same boundary enter a sheet along an edge, the use or repetition of reference numbers in the index can be avoided by joining up the detached portions by lines outside the index. Such junctions can be quite diagrammatic, but should be drawn with broken lines and should not extend more than one-eighth of an inch beyond the index.

290. Central heading boundaries to be thickened.—

The boundaries of the administrative areas named in the central heading of the map should be drawn on the index with a thicker line than is used for the boundaries of their internal subdivisions.

291. Boundaries not shown in the body of the map.—

The approximate positions of boundaries not shown in the body of a map are ordinarily indicated in the administrative index by broken lines, except in the case of the external boundary of India when the information is omitted altogether.

292. Names to be typed horizontally.—

Arrows are not to be used in the index, and names should, whenever possible, be typed horizontally, but the same latitude as is allowed for spaced names of administrative areas (*vide* para. 253) is permitted for similar names in the index. Such names, however, should not extend beyond the limits of the index, nor should their extension beyond the areas to which they refer be so great as to introduce any ambiguity in the index.

293. Use of upper case.—

Both the district and province names, when used either within the diagram of the index or in the explanatory foot-note, will be in upper case. In the foot-note a full stop will be shown after the name of the district if there be only one province in the sheet; in all other cases a comma will be used after the district name and a full stop after its province name.

294. Use of initials.—

In the case of B. & O., C. I., C. P., N. W. F. P., S. W. I., and U. P., the initial or abbreviation should always be used instead of the name in full; in other cases initials or abbreviations may be used, but names in full are preferable.

295. Brackets.—

In the index and its foot-notes, neither the names in the central and district headings, nor the initials of the former, should be enclosed within brackets, except in the cases provided for in Section XVII, para. 511.

296. Tinting of sea areas.—

The names of sea areas will be omitted from the index, but such areas will be tinted blue on it. The line representing land limits will be in black.

297. Outriggers, how shown.—When an outrigger is added to a fair sheet, it should ordinarily be shown as such on the index, but where the outrigger embraces the whole length or breadth of the map neither the form nor the size of the index should be altered.

F.—FOOT-NOTES AND REFERENCE LISTS

298. Arrangement of foot-notes and reference lists.—Foot-notes should not be serially numbered. Explanatory notes which contain abbreviations or reference letters appearing in the body of the map under the rules in para. 225 or 253 must be separated from the foot-notes and bear a heading "REFERENCES". The arrangement of these references is shown in the Border Specimen for Topographical Maps.

299. References to towns.—References to towns in the side margins should include the name of the town in the heading, e.g. "REFERENCES TO DELHI", so that when sheets are combined and the references are cut out and pasted on to an outer margin, there will be no doubt to what they refer. See para. 243.

G.—AREA STATEMENT

300. How taken out.—The area of each district and state comprised in a sheet will be entered in red in the tabular form below in the lower margin of the outline sheet. These areas should include the foreshore and all areas of water up to the sea face and all islands, but not the actual sea. The sea face should roughly follow the low water line, but should follow the most convenient line across the mouths of estuaries and other channels. The areas thus recorded will not be published on the map, but will be written up in area registers maintained by No. 1 Drawing Office.

District or State.	Area in square miles.		
	Land including foreshore.	Sea.	TOTAL.
GRAND TOTAL	...		

301. British enclaves in Indian states.—If a British enclave in an Indian state is a unit, or forms part of a unit, of which the name appears in the district heading, such as 'Anjengo'

in Travancore, its area should be extracted and entered separately in the area statement under its proper heading; but if its name does not appear in the district heading the area should be extracted and entered under the state name, thus :—

Indore (including Residency, x sq. miles) ... y sq. miles.

302. Adjustment of areas.—The area should be recorded to two places of decimals, and the areas of the various districts, &c., in any sheet should be adjusted so that their sum shall agree with the areas given in the Auxiliary Tables (5th Edition, Part III Tables 13 and 14 Sur.). The area will be taken out on form O. 9 R. (a).

303. Required for areas not already available.—An area statement is required for each sheet for which the whole area is not already available. It is therefore not necessary for sheets drawn from component larger scale sheets, the areas of which have already been taken out; but if the area of a portion of a sheet is required, the area of the whole sheet should be taken out in order to make use of the check value of the area of the whole quadrilateral of the sheet.

304. Areas of outriggers.—In the case of a sheet with an outrigger the areas in the outrigger should be excluded from the main area statement, and a separate and special small area statement for the outrigger should be entered below the main area statement.

305. Compilation of areas of districts and states.—The Director, Map Publication, will be responsible for taking out the areas of all districts and states, as soon as their modern survey has been completed, and will have them published in the Gazette of India, and communicated to :—

Circle Directors and Officers in charge Nos. 6 and 10 Parties,

Local Governments and

Departments of the Central Government of India.

The area statement of each sheet should, however, be corrected up to date at each reissue, and changes noted in the register, though the published area should not be corrected except for important changes.

306. Copy to be pinned to each outline sheet.—A copy of the area statement should be pinned to each outline fair sheet for use in No. 1 Drawing Office.

H.—INDEX TO SHEETS

307. Index to sheets.—The index to sheets should be drawn on the fair sheet in accordance with the Border Specimen.

308. Adjoining sheet numbers to be shown.—All adjoining sheet numbers will be shown in the index whether the sheets are surveyed or not. The only exceptions to this are that, in sheets falling in areas entirely covered by sea, the number will be omitted and the word "Sea" typed in lieu; and in sheets the northern limit of which is the 40th parallel of latitude, no northern adjoining sheet numbers will be shown in the index to sheets.

309. Outriggers.—When an outrigger is added to a fair sheet the limits of the outrigger should be marked on this index and its area shaded.

I.—OUTRIGGERS

310. Numbering of sheets.—When it is necessary to add part of an adjoining sheet as an outrigger, the sheet numbers should include the number of the sheet in which the outrigger falls, if no further publication of the latter sheet on the same scale will take place, thus:— $58\frac{D}{14}$ and $\frac{D}{10}$ (not $58\frac{D}{10 \& 14}$, which is the usual way of describing the old style one-inch sheet of that area), or $58\frac{B}{2}$ and $49\frac{N}{14}$ would signify that the one-inch publication of the areas covered by those sheets is complete (the full sheet number should appear first). Instances of half-inch and quarter-inch sheets are as follows:— $48\frac{L}{N.E.}$ and $\frac{L}{S.E.}$, and 85 E & A. On the other hand an outrigger of a portion of a sheet which will later on be published separately on the same scale does not require the entry of its sheet number. Also see Chapter I (1932), para. 21 (e).

311. Borders to be completed.—All outriggers will have the border extended round them, excepting only in the case of those which do not go beyond the normal border of the parent sheet. In cases where the North border has been extended eastwards or westwards to include an outrigger the central and other headings should be placed in their correct positions with reference to the whole border and not to that of the parent sheet alone.

312. Arrangement of headings and foot-notes.—The approval of the circle director should be obtained to any departure from the normal arrangement of headings and foot-notes that may be required to give a balanced appearance to the map. All printing including grid foot-notes and co-ordinate gauge, F. O. U. O. and edition legends, should fall within limits $20\frac{1}{2}'' \times 26\frac{1}{2}''$ in order to fit into M. R. I. O. shelves; outriggers that will not permit this should not be allowed.

313. Border letters and numbers.—

- (a) All graticule squares or parts of squares, including any outriggers, will be lettered and numbered in the borders in the manner explained below. In the case of

incomplete squares, the border letter or number will be placed midway between the extension of the line marking the edge of the sheet and the nearest graticule line, *i.e.*, exactly as if the square were a complete one.

- (b) On the part containing the parent sheet the border letters and numbers will be those normally used. (*Vide* Border Specimen).
- (c) On the part containing an outrigger, if the outrigger is on the west side, the border letters on one-inch sheets will be AA for the first square to the west. Should the outrigger extend beyond this square the lettering for the next one westwards will be BB and so on. If the outrigger is on the east, the border letters will be CC and DD for the first and second squares respectively, and so on.
- (d) Similarly, the border figures for outriggers to the north would be 11, 22, &c., and for those on the south 33, 44, &c.
- (e) In the case of outriggers to half-inch sheets the border letters would be AA, BB, &c., on the west, and FF, GG, &c., on the east, and the figures 11, 22, &c. on the north, and 66, 77, &c., on the south.
- (f) Similarly, in the case of quarter-inch sheets they would be AA, BB, &c., DD, EE, &c., 11, 22, &c., and 44, 55, &c., respectively.
- (g) Such double lettering and numbering will serve to show at a glance which portions of a map have been drawn as outriggers to the parent sheet, and as every square or part of a square will be lettered and numbered, no special foot-note concerning the outrigger is required.

314. Completion of details and names in borders.—

Only such detail should be drawn as will fulfil the purpose, and if, in the opinion of the officer responsible for the fair drawing of a map, its value would be enhanced by completing within the border some important detail, *e.g.* the site of a town or important village, a boundary, a coastal feature, an important river, road, or railway leaving the sheet and re-entering it a short distance away, &c., &c., the Director of the Circle should be consulted, and, if he agrees, such detail may be entered, provided it does not seriously interfere with other information, such as *tahsil* names, &c. If such detail cannot be drawn correctly to scale within the limits of the border, it may be shown therein diagrammatically by dotted lines, but the dotted lines should be confined to short lengths of very simple detail. Boundary ribands should not be carried over portions of boundaries entered in the border.

315. Military stations and civil towns.—Similarly, in the case of a military station or important civil town, lying on the common edge of two sheets, the whole of such station or town may be completed in an outrigger on both sheets, the border being broken where necessary and completed round the external portion of the station or town. In such cases care must be taken to see that the arrangement of typing on both sheets is identical, so that if the two sheets are joined the names will read correctly. The rules for sheet numbers, indexes, area statements, &c., for sheets with outriggers will not apply to these special cases.

J.—INSETS

316. Insets.—

- (a) Insets may be shown on guide maps or other special maps under the orders of the Circle Director, but should not be drawn on other departmental maps without the formal approval of the Director, Map Publication, and then only on a coastal sheet to show an area of departmental survey that could not well be shown in any other way, or to give clear information about a congested area.
- (b) The inset should contain sufficient information as to latitude and longitude to locate the area, and should, if possible, overlap the main map, with some prominent feature or name common to both. If the inset forms an extension to the main map, a suitable reference should be entered in the border of the latter.
- (c) All insets with their titles, scales, and notes should be enclosed within a narrow border or firm line, separating them entirely from the main map and its graticule or grid.
- (d) It is not essential that insets, other than extensions of the main map, should be drawn in strict accordance with the rules in this Chapter.

K.—LONGITUDE

317. Longitude.—On maps of all scales on which the meridians are drawn according to the latest determination of the longitude, there will be no foot-note on the subject, but the words 'E. of GREENWICH', (see Border Specimen) will be typed in the lower border, immediately to the right of the number defining the longitude of the western edge of the sheet.

L.—DISTANCES AND DESTINATIONS

318. Distances and destinations on roads.—Distances and destinations of roads are only required for the more important

roads, and are given generally to the nearest town or important village. The more important the route the more advantageous it is to give destinations to large and important centres; in such cases double destinations are sometimes useful, one to the nearest important town and the other to the terminus of the route, but such double destinations should be sparingly used. Destinations should not be repeated unnecessarily in the case of convergent roads which lead to the same place.

In the case of single destinations, the names and distances should, wherever possible, be in one line in the direction of the road where it leaves the sheet, except in the case of winding roads when it is sometimes more suitable to type the destination in the direction of the locality. When the mileage along a road is shown on a sheet, the name of, and the distance to, the place from which the mileage is measured, if it does not fall within the area of the sheet, should be entered in the border as the destination of the road; exceptions to this rule will occasionally be necessary as in the case where the mileage of a road is measured from the boundary of a district, or from some particular cross-roads, and not from a town or village. When the destination of the road is situated less than a quarter of a mile from the point where the road reaches the edge of the sheet, only the name of the destination will be shown without the distance. When the distance is less than a mile it will be shown to the nearest quarter of a mile, and when over one mile it will be shown to the nearest mile. In the case of double destinations, that of the nearest should be given first.

319. Distances and destinations on railways.—Distances and destinations of a railway should be entered in both borders to the nearest important town or railway junction, and not necessarily to the place from which the mileage is measured.

320. Distances and destinations on canals.—Distances and destinations in the borders are not usually required for canals. If entered, however, they should conform to the rules for road distances and destinations, except that distances along canals are often measured in multiples of 1,000 feet and not in miles, and commence not from a town or village but from some point on the canal. In these cases, and in the case where a road with distances and destinations follows a canal, neither the distances nor destinations along the canal should be entered in the border.

M.—BORDER CONTOUR VALUES

321. Border contour values.—The border contour values will be typed on the contour sheet (see paras. 60, 190 and 447(*d*)).

SECTION VI.

SPECIAL RULES FOR HALF-INCH SHEETS

NOTE:—All matters not dealt with in the special rules for half-inch sheets should be treated in the same way as laid down for one-inch sheets.

322. Two classes of half-inch sheets.—Half-inch sheets fall under two distinct classes:—

- (a) Those drawn from original surveys on the same scale.
- (b) Those compiled from reductions of one-inch and larger scale maps.

323. Scale of drawing.—Originals for both classes are drawn on the three-quarter-inch scale, for reduction by one-third, on blue prints on 210 lb. drawing paper of either (a) the combined original plane-table sections or (b) the combined component larger scale maps.

324. Original half-inch surveys.—In the case of sheets drawn from original surveys on the half-inch scale, the rules given in Sections II to V apply generally, and as much information as is possible within the limits of the scale should be given, *provided always that what is shown is clear and legible.*

325. Compiled half-inch sheets.—In the case of sheets compiled from larger scale maps, very considerable elimination of detail and typing shown on the larger scale is not only desirable but essential. If minor detail is needed reference can always be made to the larger scale map.

326. Elimination of detail and typing.—It must be remembered that the same area of paper has to show four times as large an area of ground; consequently, in normal cases, only about one-fourth of the information given on any one-inch sheet should appear in the corresponding area of the half-inch one. This applies to detail as well as to names, but as names occupy much space on a map, it applies more forcibly to them; the more crowded the larger scale map is, the more closely should this rule be followed. Where the whole country is very open and not much detail appears on the larger scale map, little information need be eliminated from the half-inch sheet. Such cases will, however, be rare, for, where these conditions prevail, it is unlikely that survey on the larger scale will have been made.

327. Information required from parties.—In order to give effect to the principles enunciated in the preceding paragraph, it is necessary for the officers concerned in the drawing of the larger scale sheets to supply information as to what should or should not be omitted from the half-inch sheets. The sooner this is done the better, as it will enable the work to be undertaken when most of the officers responsible for the plane-table sections concerned are present. This information may be entered on black prints of the component sheets, using red and blue pencils,—blue being an indication that detail is to be omitted and red that it is to be retained,—supplemented by notes where necessary.

328. Information of military importance.—Although the half-inch series is no longer the general military tactical map, it will be much used for many military purposes and careful attention should be given to the inclusion of information of military importance.

329. Office copy corrections of component sheets.—Before the drawing of a half-inch sheet is put in hand the office copies of the component larger scale sheets, both those kept by the Director of the Circle, as well as those maintained by the Director, Map Publication, must be examined for any corrections or additions that have been noted on them.

330. Unverified information.—Under the provisions of para. 481, all additions and corrections made on the modern topographical sheets should, if possible, be verified in the field by the Survey of India. If the Director of the Circle is unable to have the new information verified in the field, but if it can be entered from extra-departmental sources with the probability of a fair degree of accuracy, the new information should be entered on the half-inch fair sheets, and the fact that it has been obtained from extra-departmental sources should be explained in a special footnote on the lines of the following examples:—

"The.....railway branch has been entered from information supplied by the Railway Board."

"The road from.....to.....has been entered from information supplied by the Public Works Department."

"The boundary between.....and.....has been entered from information provided in.....notification."

331. Preliminary procedure.—The prints required for drawing a compiled sheet should be demanded by the circle or unit concerned at the time that the last component larger scale sheet is submitted for publication. The necessary mosaics will ordinarily be prepared by No. 1 Drawing Office.

332. Blue prints, &c., for fair drawing.—In addition to the blue prints required on 210 lb. drawing paper, blue, or black

and brown prints, or both, on rag-litho., hollingworth or tracing paper can be supplied, but the total number of prints called for must be kept as low as is consistent with the requirements of efficiency; *vide* para. 36. When applying for blue prints care must be taken to specify exactly what is required, and to state whether the prints are to show outline and contours combined or separately. Usually combined blue prints should be used for fair drawing of both outline and contours, but where hills are very heavy or broken, separate blue prints may be called for.

333. Draftsman's and typer's guides.—A draftsman's guide and a typer's guide must be prepared on suitable prints (*vide* para. 332), use being made of the information furnished by the officer responsible for the original survey (*vide* para. 327). This is a most important step and must on no account be omitted. These guides should be prepared by an officer and passed by the officer in charge of the party or office before fair drawing is started. As mentioned earlier, great care must be taken not to overcrowd a sheet with detail and typing, and no attempt must be made to include everything shown on the larger scale sheet.

334. General principle.—In deciding what to retain and what to omit, the general principle should be that, though important details should not be obscured by unimportant ones, the main features of the country must be distinctly shown.

335. Names to be clear and legible.—Every name typed should be clear and legible, and detail may be sacrificed to that end if necessary.

336. Detail to be omitted.—The following should normally be omitted:—

Names of unimportant villages, tanks, and hills; markets, dispensaries, footbridges, *kyaungs*; bench-marks as such, but their heights may be shown if necessary; relative heights under 10 ft.; unimportant embankments under 10 ft. in height; shallow depressions, especially when generally dry; minor streams and canal distributaries; unimportant springs, wells, temples, mosques, pagodas, *idgahs*, *chhatris*; unimportant footpaths and tracks, especially those of a temporary nature; unimportant camping grounds or deserted sites; unimportant reserved, &c., forests, one square mile or less in area.

337. Detail to be shown.—The following should, as a rule, be shown:—

Names and sites of important ruins, shrines, fairs, hills, &c., of more than local interest; names of ferries, bridges,

rest houses, &c., along important roads; *pukka* wells of particular importance, and other wells and springs in arid regions; embankments 10 feet and over in height, especially those of a permanent nature and those constructed to prevent the flooding of the country; descriptive names, such as police stations, post and telegraph offices, &c.

The following will invariably be shown :—

Features specially important on small scale maps, such as :— aerodromes, landing grounds, and wireless stations when near them. See para. 446(*l*) as regards omission of aerodromes and landing grounds in prohibited areas.

338. Main features to be emphasized.—Main features, *e.g.* drainage and through paths and tracks, should be selected for emphasis and drawn slightly heavier than the other information in order to make them stand out. In this connection the principle enunciated in para. 62 should be adhered to.

339. Generalization of detail.—A very fair amount of generalization in drawing the drainage, sites, &c., is necessary and a few hints are given in the following paras. by way of illustration and exposition of the principles involved. It should, however, be carefully understood that no hard-and-fast rules can be laid down on the subject, as much depends on local conditions and the experience and intelligence of the officers and draftsmen concerned in the preparation of the half-inch fair originals.

340. Generalization of rivers and streams.—

- (a) Small bends should, as a rule, be flattened out especially in the hills and in areas compiled from two-inch or larger scale surveys.
- (b) Streams shown double-lined on a larger scale map should not necessarily be drawn double-lined on the half-inch sheet; as a general guide, no stream should be shown double-lined unless its surveyed width measures at least $1/20$ th of an inch on scale of publication.
- (c) Where a narrow river bed is shown on the larger scale map with a stream of water flowing through a sandy bed it is not necessary to indicate this temporary condition on the small scale sheets. The river bed may be shown as entirely sand, or entirely water, as appears most suitable.
- (d) In large rivers with wide channels, the main channels should be shown; minor ones should be omitted or generalized.

- (e) The rules given in para. 79 about steep banks may be applied for lengths of one inch and over on the published map.

341. Marginal destinations.—Marginal destinations should be given to important towns, even if remote, rather than to neighbouring villages.

342. Sites.—

- (a) Even though many village and most hamlet names are omitted, their sites should be shown on the half-inch sheets. Isolated huts, if unnamed on the larger scale map, should be omitted. Groups of scattered huts should be indicated, but individual hut symbols as given in the larger scale map should be thinned out; congested huts and small sites should be joined up as a tinted site, but the character of the area should be indicated as well as the scale will permit.
- (b) In reducing village and town sites from larger scale maps, they should be generalized to show clearly the main thoroughfares and general lay-out. Small blocks should be merged together, and minor roads and lanes omitted.
- (c) It should be remembered that typing shows up more clearly over a tinted area than over solid blocks and huts.

343. Cultivation limits.—Limits of cultivation should also be generalized and very small or narrow patches omitted altogether.

344. Corrections to forest names and boundaries.—Corrections and additions to Reserved, &c., Forest boundaries and names should be obtained from the Officer in Charge, Forest Map Office, Dehra Dūn, and incorporated in the half-inch sheet.

345. Omission of small isolated areas.—Small isolated portions of any of the areas mentioned in paras. 140 and 142—146 may be omitted if they cannot be shown clearly on the half-inch scale.

346. Ornamentation.—The drawing of trees, sand, broken ground, &c., should be in the same style as on the one-inch sheets. The tendency to draw such ornamentation more crowded, and very much smaller and finer, because of the smaller scale, must be avoided.

347. Contour sheets.—For general instructions regarding contour sheets see paras. 182, 183 to 190. In drawing contours on the compiled sheets it is not sufficient to reproduce accurately the course of the contours as reduced from the larger scale maps. These contours must be generalized with intelligence, with the particular object of showing clearly on the smaller scale map all the main hill features and spurs of the larger scale one. Unless the

contours are smoothed out, the hills on the smaller scale maps will probably appear a meaningless mass of wriggling lines that do not harmonize together to form definite ridges and spurs. Small hill tops, where close together, may with advantage be joined up.

348. Isolated hills and rock-outcrops.—In undulating or flat country there are often small isolated hills or rock-outcrops that are prominent land marks. It is probable that the contour interval of the compiled sheet will fail to show these as prominently as they should appear. Care should be taken to pick out the more important of these with hachures.

349. Special contour sheets.—In order to obtain the 250-, 750-, &c., foot contours (required for the quarter-inch sheets) none of which are shown on the half-inch sheets, a special contour sheet should be prepared for every half-inch sheet. These should be prepared on blue prints on 210 lb. drawing paper and should show the following:—

- (a) The corners of the graticules and 15-minute lines.
- (b) Every 250-foot contour line generalized in the manner described in para. 347, every fourth or 1,000-foot contour line being thickened.
- (c) All form-lines, rock-outcrops, &c., which will be required on the quarter-inch sheet.
- (d) A few contour values in the body of the sheet, but only as many as will be necessary to prevent mistakes in entering contour values on the quarter-inch sheet.
- (e) All symbols and detail which will be printed in brown on the quarter-inch sheet.
- (f) All items of high mountain features on the half-inch contour sheets which will be required for the quarter-inch sheet.

350. Fine drawing not necessary.—Inferior draftsmen or pupils may be employed on the preparation of special contour sheets; fine drawing is unnecessary and the contour values may be written in, or typed, or hand-printed by men practising this work.

351. Sand on special contour sheets.—Where there are considerable areas of sand to appear in brown, they should not be drawn on the special contour sheet, but rag-litho. black prints of the contour sheet should be asked for together with other fair drawing material, and the sandy areas should be cut out and pasted in correct positions on the special contour sheet. This will facilitate generalization and true representation of such areas in the drawing of the compiled quarter-inch sheets. In the case of small areas of sand, where the procedure detailed above would not be justified, sand features should be drawn in full on the special contour sheet, leaving generalization to be done on the quarter-inch sheet.

352. When special contour sheets are unnecessary.—With the permission of the Circle Director special contour sheets need not be prepared for half-inch sheets of the following nature:—

- (a) Sheets which contain large areas of rigorously surveyed rock in high mountains.
- (b) Sheets which are entirely covered by high hills, in which 250- and 500-foot contours can well be interpolated when preparing the $\frac{3}{4}$ -inch sheet.

353. Storage of special contour sheets.—Special contour sheets should be stored by the circle offices until the corresponding quarter-inch sheet is being put in hand when they should be sent to the Director, Map Publication, for necessary action.

354. Above orders also applicable to sheets drawn from half-inch surveys.—The orders regarding special contour sheets apply also to half-inch sheets drawn from original surveys on the same scale.

355. Colours.—The half-inch sheets of both classes will be printed in the same colours as are prescribed for one-inch sheets.

SECTION VII.

SPECIAL RULES FOR QUARTER-INCH SHEETS

NOTE:—All matters not dealt with in this section are to be treated in the same way as prescribed, in the first instance, in Section VI, for half-inch sheets, and secondly, in the instructions for the one-inch series.

356. General.—Ordinarily, quarter-inch sheets will be compiled from already published half-inch sheets. In rare cases quarter-inch sheets will be drawn from surveys on the same scale.

357. Compilation of frontier sheets.—When quarter-inch sheets in frontier and trans-frontier maps are compiled from various sources, the selection of material should be made with the same precautions as are laid down in Chapter XI for Geographical Maps.

358. Compilation from one-inch sheets.—Occasionally, when the component half-inch sheets are not available and the preparation of the quarter-inch sheet is urgently required, it may be compiled from the published one-inch sheets.

359. Completion to edge.—In all cases a quarter-inch sheet should be completed to graticule limits using material of inferior value if necessary.

360. Scale, symbols, and type.—All quarter-inch sheets are fair drawn on the scale of 1 inch to $2\frac{1}{2}$ miles, for reduction by one-third, symbols and type being the same as laid down for the half-inch sheets in Section VI, except that cultivation limits are omitted.

361. Rules in Section VI apply.—As quarter-inch sheets will seldom be prepared except from reductions of the half-inch or larger scale maps, all that has been said in Section VI about compiled half-inch sheets will apply with even greater force to the compiled quarter-inch sheets. No attempt should be made to include everything which has been entered on the component half-inch sheets. The orders in the last sub-para. of para. 337 apply with greater force to quarter-inch sheets.

362. Preliminary procedure.—The prints required for drawing a compiled sheet should be demanded by the circle or unit concerned at the time that the last component half-inch sheet is submitted for publication: the indent should give clearly the details of prints required (see para. 332). Mosaics of the above will ordinarily be prepared by No. 1 Drawing Office.

363. Blue print reductions from large scale maps.—In rare cases, when it is decided to prepare quarter-inch sheets from larger scale maps before the component half-inch sheets have been drawn, the Director, Map Publication, will supply blue print reductions on the $2\frac{2}{3}$ -mile scale of the larger scale maps, for the preparation of mosaics by the drawing office or party concerned. Only such details and contours as are necessary for the scale will be inked up and the mosaics returned to the Director, Map Publication, who will supply drawing blue prints, &c.

364. Procedure for congested areas.—In exceptional cases if the larger scale maps are so congested that reductions to the $2\frac{2}{3}$ -mile scale would be unreadable, blue prints on the same scale as the component sheets will be supplied instead. Details and contours required will be inked up on these in the same way, and they will be returned to the Director, Map Publication, who will supply drawing blue prints, &c., by photographic reduction, on the $2\frac{2}{3}$ -mile scale.

365. Alternative method.—As an alternative to this latter method, published copies of the component one-inch sheets may be used. On these all detail and contours required for the quarter-inch map should be heavily, but accurately, inked up in black. By suitable manipulation in photography the green and yellow tints and the detail not required can be subdued. This method is, however, unsuitable if the component sheets contain hill-shading.

366. Village sites.—For instructions regarding generalization of sites, see para. 342. The process should be applied even more stringently on the quarter-inch scale than on the half-inch.

367. Selection of names.—The selection of names for quarter-inch sheets requires very careful consideration. It is essential that the sheets should not be overcrowded with names and at the same time nothing of real importance should be omitted.

368. Large locality, &c., names.—The names of important localities, mountain ranges, &c., which cover so large an area that they are unsuitable for the one-inch or half-inch scales may be introduced on the quarter-inch scale at the discretion of the compiling officer. Examples: Kumaun, Tirhut, Sundarbans.

369. Gazetteer names.—The general guiding principles in selecting names should be, firstly, all names mentioned in the Imperial, and district gazetteers should, if possible, be entered, and secondly, a selection of other names appearing in the component sheets should be made.

370. Total number of names.—Where accurate and detailed census figures are available a fair guide for the total number of names in a 15-minute square is the number laid down in Chapter XI for the one-degree squares of the 1/M sheet. But

as census figures for small areas are seldom obtainable, the general rule of selection of about one-fourth the number of names appearing in the same area on the half-inch scale, or one-sixteenth of that on the one-inch scale, should be followed. In trans-frontier areas, names appearing in the military route books should be shown, as well as the details of military importance, such as camping grounds, wells, springs, &c.

371. Procedure for selection of names.—The selection of names will be made either in the circle drawing office or in the office of the party concerned in the preparation of the component sheets. In the latter case the Director will give the necessary orders to the officer in charge of the party, providing him with black outline prints on the $2\frac{3}{4}$ -mile scale for the purpose. The names for inclusion should be marked on one of these prints and returned to the Director.

372. Fiscal names of village areas.—Fiscal names of village areas, such as "dehs" in Sind, which may be important enough for maps on the one-inch and half-inch scales should not be shown on quarter-inch sheets.

373. Wooded areas.—Wooded areas will be indicated on quarter-inch sheets by green symbols as on one-inch and half-inch sheets.

374. Reserved, &c., forests.—The order contained in para. 473 should be carried out as regards the component sheets. In this connection it should be borne in mind that the common boundary between two adjoining Reserved Forests is not shown on the quarter-inch sheets and, consequently, no steps need be taken with reference to these. Small Reserved, &c., Forests of 4 square miles or less in area should be omitted. Names of small Reserved, &c., Forests may be omitted.

375. Wells.—Wells should be shown only when very important. They are, as a rule, important only if they are of a permanent nature, that is if masonry lined or sunk in rock, but in arid or semi-arid regions, even an unlined temporary well may be of importance, as indicating that water has been obtainable.

376. Heights.—A very careful selection of heights should be made. These should only be given for such hill tops as will be readily identified on the ground and recognisable points along rivers and streams such as road and railway crossings, junctions, &c., &c. Large towns should have a height conspicuously typed, clear of detail, which should be sacrificed rather than that a height should be difficult to read. Bench-mark heights should be entered without the letters BM, and to the nearest foot, if these are the best available. Relative heights should usually be omitted from quarter-inch sheets, except in cases where no maps of the

sheet in question have been published on a larger scale, or in sheets containing very flat areas, such as parts of 'Irāq, where the relative heights of small isolated mounds may be of great importance.

377. Lettering.—The lettering will be in accordance with the latest edition of the Type Table. It may sometimes happen that the type prescribed in the Type Table is not suitable in a particular case; officers must use their discretion and may use a larger size of type when special emphasis is required to be given to a name, and recourse may be had to smaller type in order to give as much information as possible without overcrowding the sheet, provided the names are clearly legible.

378. Accessory work.—The title, headings, borders, foot-notes, &c., will conform to the latest edition of the Border Specimen. A name should be inserted under its sheet number for every quarter-inch sheet; these names are given in Chapter I, Appendix IV.

379. Boundaries.—All boundaries except the common boundary between Reserved, &c., Forests shown on the component sheets will, as a general rule, be shown on the quarter-inch sheets,—a common boundary, however, between forests under entirely different ownership (*e.g.* between a British Reserved Forest and a State Forest) should be considered as an external one and be shown on the quarter-inch sheets with the usual green riband applied to it. Boundaries in Indian States which correspond to those of partitions of British districts may, however, be omitted, with the sanction of the Director, even when they are shown on the component sheet, if their entry would affect its clearness. A continuous green line will be printed along the exterior boundaries of Reserved, Protected, and State Forests.

380. Boundary pillars.—No boundary pillars except those of the external boundary of India and other international boundaries will be shown on quarter-inch sheets.

381. Omission of small isolated areas.—Small isolated areas may be omitted, as permitted in para. 345 for the half-inch scale.

382. Contour sheet.—The contour sheet of the compiled quarter-inch sheet will be prepared on $2\frac{2}{3}$ -mile reductions of the special contour sheets described in para. 349. The Director of the Circle will send the special contour sheets to the Director, Map Publication, along with his requisition for the supply of material for fair drawing. These will be pinned up together in the Photo.-Litho. Office to produce the plate for the necessary combined blue, &c., prints on the scale of 1 inch = $2\frac{2}{3}$ miles.

383. Preliminary proofs.—The Director, Map Publication, should be asked to supply the following proofs and impressions:—

- (a) 3 preliminary proofs in black, brown, and green on rag-litho. paper. One of these will be scrutinized and corrected as the press order proof and another will be coloured as the pattern for boundary ribands. The respective widths and colours of these ribands should be clearly noted in red on the latter proof.
- (b) 2 outline grey prints on Hollingworth paper for the preparation of colour patterns with an extra print for a green colour pattern if necessary.
- (c) 1 contour grey print on Hollingworth paper for sheets in which glacier features, that are to appear in blue on published maps, have been drawn on the contour fair sheet (see note at end of Section X). This print will be used for preparing a special blue colour pattern for glacier features.
- (d) 2 blue prints, on 130 lb. drawing paper, of the complete outline plate, to prepare a grid original, if required. (*Vide* Section IX).
- (e) 1 combined black, brown, and green proof for recording edges of colour patterns.
- (f) 1 black proof on tracing paper, of outline sheet only, for grid original.
- (g) 1 black proof on tracing paper, of contour sheet only, for grid original.

384. Hill-shading originals.—Hill-shading originals will be prepared, where necessary, in No. 1 Drawing Office.

SECTION VIII.

GUIDE MAPS

385. General.—The orders regarding the preparation of guide maps as laid down in this section should be generally followed, but a certain amount of elasticity is permissible in special cases. The drawing office or unit concerned should carefully fill in the schedule of information as given in para. 407 below and submit it to the Surveyor General (through the Director, Map Publication) for orders, before the preparation of the guide map is taken in hand. Any proposed departures from these orders should be clearly stated in the schedule. Special styles, such as the layered Simla guide map will be permitted in exceptional cases.

386. Reissues.—It is not intended that these orders should be embodied as a matter of course when existing guide maps are reissued, but when revised editions are taken up, circles or units should submit proposals, with schedule as laid down in the preceding para., for bringing them into accordance with these orders.

387. Classes.—Guide maps may be divided into two classes:—

- (a) Those whose main purpose is to show the roads and buildings of large towns, hill stations and other places visited by tourists. These maps will usually show little ground outside the town limits.
- (b) Those whose main purpose is to give better facilities for military training than the one-inch scale provides. These maps will usually be of the largest size that can conveniently be printed in one sheet.

388. Scale.—The scale of the former category of guide maps must depend on the size of the area to be dealt with and on the amount of detail it is desired to show. For hill stations, where it is necessary to show individual houses, scales as large as 6 inches or even 8 inches to a mile will be desirable, but for ordinary towns, scales of 3 inches or 4 inches to a mile will usually be suitable. As these maps are intended for popular use, scales of inches to a mile are preferable to those of a decimal nature. For maps of the latter category, the Army require a scale of 1/25,000, and this will therefore be used.

389. Guide maps to have grid edges.—Guide maps should conform to grid edges, and references should be in terms of the grid. See Section IX (The Lambert Rectangular Grid) for further instructions. At least two spherical cutting lines should be drawn in each border.

390. Contour intervals.—The normal contour interval should be 20 feet, but in the case of a particularly large scale map an interval of 10 feet may be adopted. In the case of hill stations an interval of 25 feet or more may be adopted with the sanction of the Surveyor General.

391. Symbols.—Topographical symbols and conventional signs should be adopted for guide maps, but they may be slightly modified or drawn heavier and bolder to suit the larger scale. A few variations from topo. conventions are laid down in the following paras.

392. Trees and other vegetation.—The principle of green trees should be adopted, using the symbols laid down for topographical maps, but drawing the symbols firmly and carefully. Conspicuous surveyed trees should be drawn on the outline fair sheet to appear in black.

393. Buildings.—Limits should be in fine black lines with a medium pink tint inside. Important buildings will have a further grey or neutral tint surprinted. Important buildings should include all public buildings (Government and other) *e.g.* Government offices, hospitals, schools, principal hotels, important clubs, cinemas, churches, mosques, temples, post offices, police stations, markets, &c. A feature such as a temple, church, mosque, &c., when shown by its topographical conventional sign, and not in plan as surveyed, should be printed in black.

394. Small buildings.—Important buildings which are too small to receive a tint may be exaggerated to the required size. Unimportant buildings may also be slightly exaggerated, or several buildings may be combined into one site, or may be omitted altogether, whichever is most suitable. Such buildings are not to be blocked in in red or black, nor left white. The minimum sizes for tinting on the scale of reproduction are $2/60'' \times 2/60''$ if square or nearly so, and $1/60'' \times 4/60''$ if oblong.

395. Roads.—Roads and paths are to be printed in black, all double-line roads being left white inside, except the cart-track which will be shown by the unmetalled road symbol drawn very much narrower and carrying the adjoining tint over it. These rules will not necessarily apply to hill stations which usually have double-line symbols for all except footpaths.

396. Width of roads.—The width of double-line roads may be exaggerated according to their importance; suitable widths on the scale of publication are $7/60''$, $5/60''$, $3/60''$ and $1\frac{1}{2}/60''$. Such roads may be drawn fine in congested areas of towns, but in open or rural areas they may be drawn somewhat heavier to give them sufficient prominence. Camel paths, mule paths and footpaths should be drawn about 50% heavier than on topographical maps.

397. Names of roads.—It is better to enter road names inside the symbol for double-line roads wherever possible, and always in congested areas.

398. Destinations.—Destinations of railways, roads and steamer routes should be entered as on topographical maps.

399. Type.—It is not advisable to lay down hard and fast rules as to the type that should be used. The following fount numbers are given, indicating style, not necessarily size, on the scale of publication in order to assist officers in making a suitable selection of type. For items not mentioned in the list, founts prescribed for topographical maps should be used.

Title	...	...	Nos. 1, 2, 22 &c., (U.C.)
Heights	...	...	Nos. 24 & 27.
Barracks, lines, &c.	...	...	Nos. 65 & 66 (U.C. or L.C.)
Buildings	...	...	Nos. 8, 24 & 35 (U.C. or L.C.)
Descriptive remarks	...	...	Nos. 12 & 27 (L.C.)
Mohallas and localities	...	...	Nos. 14, 15, 16 & 44 (U.C.)
Villages	...	...	Nos. 7, 8 & 24 (L.C.)
Railways and railway stations	...	...	Nos. 8 & 24 (U.C. & L.C.)
Road names	...	...	Nos. 44, 28 &c., (U.C.)
Hills, rivers, canals	...	...	Nos. 15, 16, 44, &c., (U.C. or L.C.)
Range and peak names	...	...	Nos. 15, 16, 44, &c., (U.C. or L.C.)
References	...	...	Nos. 44 & 28 (L.C.)
Boundary pillars	...	...	No. 27.
Parks, gardens, cemeteries, &c.	...	...	Nos. 85 & 87 (U.C. & L.C.)
Forts	...	...	Nos. 85 & 69 (U.C. & L.C.)

400. Boundaries.—

(a) Cantonment and municipal boundaries should be shown by the following symbols:—

Cantonment -----

Municipal -.-.-.-.-

The bars in each case should be the same length and thickness as the district boundary on topographical maps.

(b) District, state and province boundaries seldom occur on guide maps, but when they do they should be shown

by the same symbols as on topographical maps, but drawn 50 per cent. bigger both in length and thickness of bar.

(c) Colour ribands will not be printed along boundaries.

401. Buff and yellow tints.—A tint original for each of these colours should be carefully prepared at proof stage on zinc-mounted blue outline prints; the limits must be clean and sharp. The buff tint should be of a pale cold shade. The yellow tint should be printed strong.

(a) The buff tint will be printed over all areas inside the edges of the sheet except the following:—

Marshes, swamps, and areas carrying other tints.

Double-line roads except cart-tracks.

Sand-dotting or grey stipple.

Title, references, foot-notes and insets, which should have a black line drawn round them.

(b) The yellow tint will be printed over all cultivated areas.

(c) Lawns, gardens, or grass-covered land will have buff or yellow tint at the discretion of the Director.

402. Colour Patterns —To enable the map to be printed in the required colours, the following colour patterns should be prepared at proof stage on grey hollingworth prints of the outline sheet:—

(a) A pattern should be prepared showing in appropriate colours all buildings (including important buildings) &c., which are to receive a red stipple, and all areas which are to receive a blue stipple, as well as all blue line detail.

(b) A pattern should also be prepared showing in neutral tint all areas which are to receive a grey or neutral tint, *e.g.* important buildings and dry beds of rivers and tanks.

403. Hill shading.—If a shade original is required, it will be prepared in No. 1 Drawing Office as usual.

404. Reference list.—A reference list should appear on the map and should include all necessary names whether falling in urban or rural areas.

(a) A grid reference should not exceed six digits for scales of 1/20,000 and less, except when great precision is required when eight digits may be used; for scales larger than 1/20,000 eight digit references are necessary.

(b) The first column of the list should give the grid co-ordinates and the second column should show the names arranged in alphabetical order, followed by a reference number when one is entered in the body of the map.

- (c) A grid reference permits of accurate location of a feature on a map, so that it is not essential to insert a reference number. Such numbers are, however, desirable for buildings, &c., where there is no room to type the name and these should be allotted in serial order down the list, the numbers being printed in the list at the end of each name, and in the body of the map against the feature.

405. Explanatory tables.—Particular care should be taken to see that clear and complete symbol tables are inserted as foot-notes, explaining, as far as possible, the meaning of the symbols, lettering, colours and tints appearing on the map.

406. Doubtful cases.—All doubtful cases should be referred to the Director, Map Publication, for orders, preferably when submitting the schedule described in para. 407.

407. Schedule.—Whenever possible, before taking up the survey for a guide map, the schedule of information referred to in para. 385 should be submitted, but it should in any case be submitted before taking up the drawing. A list of some of the principal heads under which information should be supplied is given below. Any other doubtful points not shown in the list should be included in the schedule for orders:—

- (a) Scale of survey and contour interval. Whether it is a new map or a revised edition.
- (b) Number and date of Surveyor General's sanction.
- (c) Scale of publication.
- (d) Title of map.
- (e) Area covered by map, illustrated by a diagram if necessary, showing positions of title, accessory work and insets.
- (f) Scale of drawing, and whether fair drawing will be in more than one sheet.
- (g) Size of originals, including borders, heading, foot-notes and reference list.
- (h) Number of originals (outline, contour, green tree, tint, hill shade).
- (i) Size of map on publication, inclusive of borders, heading, foot-notes and reference list, and whether the map will be published in more than one sheet. The over-all dimensions, including all printed matter, that can be printed by the Photo.-Litho. Office in one sheet in colours is 43 inches by 31 inches; this size can at present be printed on one machine only, the maximum convenient size being 40 inches by 30 inches.
- (j) Style of map (refer to any existing map).

- (k) Colours in which the map will be published (specify briefly the features to be shown in the different colours).
- (l) Material from which map is to be prepared, *i.e.*, new or existing surveys; scale; date.
- (m) If published in more than one sheet, whether sheets should be sold separately.
- (n) Method of references it is proposed to employ.
- (o) Special features.
- (p) Full description of any special symbols, especially roads, tracks and paths or railways. Method of showing important buildings.
- (q) Description of any special size and style of type.
- (r) Whether the map is to be layered.
- (s) Description of size and scale of insets,* also materials from which the insets will be prepared.
- (t) If any boundaries are to be shown, describe the symbols to be used.
- (u) Number of copies to be printed.
- (v) Date by which it is required that publication should be completed.

408. Submission for publication.—In submitting guide maps for publication the positions for headings, foot-notes, reference lists, etc., which are submitted separately should be clearly marked in blue on the outline original. The only work left to be done in the reproducing office should be the setting up of the reference list.

* These may include small scale maps showing routes to places of interest, panoramas of snowy ranges, &c.

SECTION IX.

LAMBERT RECTANGULAR GRID

409. Introduction.—The Lambert rectangular grid was adopted by the Survey of India in 1929 and is described in Indian Army Order 105 Maps. The grid system employed is the modified British system, a description of which is given in Chapter VII, Section 45 of the Manual of Map Reading, Photo. Reading and Field Sketching, 1929.

410. Computations.—Instructions regarding computations necessary for the rectangular grid have been issued by the Director, Geodetic Branch.

411. Drawing.—Instructions for the drawing of the grid are contained in the "Guide for the preparation of Grid Originals".

412. Sheets to be gridded.—Instructions as to the sheets which are to be gridded are given on a special "Index to sheets to be gridded".

413. Overlapping grids.—Owing to the large area covered by the maps of the Department, it has been necessary to lay out a series of overlapping grids, an index to which is included in the instructions referred to in paras. 410 and 411.

414. Limits of gridded maps.—

- (a) Maps of the 1/M India and Adjacent Countries Series, and of the 1", $\frac{1}{2}$ ", and $\frac{1}{4}$ " Topographical Series will retain their spherical limits even when gridded: and all lettering will be parallel to those limits, except the figures and letters appertaining to the grid.
- (b) On the other hand special maps on scale larger than one inch to a mile, such as maps prepared on military service, manœuvre and radius maps, and guide maps, will be drawn with edges conforming to the rectangular grid, and should have lettering parallel to those edges. Such special maps should not, as a rule, have any special ungridded edition.

415. Spherical position to be shown on gridded maps.—Maps constructed on a rectangular lay-out should show their spherical position by two marks on each border. These should be given as close to sheet corners as convenient, and should either be lines drawn right across the border or ticks, $\frac{1}{4}$ inch long, drawn immediately outside the edge; spherical values should be entered against these marks.

416. Grid to be in black.—Until 1930 the grid was drawn on the scale of publication and surprinted in purple. In future the grid is to be printed in black.

417. When grid is drawn on fair sheet.—In areas where the whole edition is gridded (100% area), the grid should be drawn on the original fair outline sheet instead of the usual spherical graticules, retaining only the spherical limits of the sheet, *vide* para. 414 (a) and 420 (a) (i).

418. When separate grid original is drawn.—In areas where an ungridded edition is required, as well as the gridded edition, the usual spherical graticule will be drawn on the fair outline sheet, and a separate grid original will be drawn on the scale of publication. In this case the Photo.-Litho. Office will prepare special black and red plates for the gridded edition, on which the spherical graticule and its necessary numbers and letters will be omitted and replaced by the grid.

419. By whom to be drawn.—

- (a) When drawn on the original fair outline sheet, the grid will be drawn by the party or office which draws that outline sheet.
- (b) When drawn on the scale of publication the grid original will, as a rule, be drawn on blue prints of the sheet in the Circle Drawing Office.
- (c) No. 1 Drawing Office will draw grids for reissues other than revised editions.

420. Rules for sheets in 100% gridded area.—The following detailed instructions apply to sheets in the 100% area referred to in para. 417 above.

- (a) The only spherical lines and values to be drawn are:—
 - (i) The sheet edges with spherical values at corners.
 - (ii) Black ticks, $\frac{1}{2}$ inch long, marking the position of intermediate 5 or 15 minute lines, should be drawn in the margin, projecting from the outer edge of the border. Spherical values should be entered in black. These ticks will not appear on the published map, but will be retained on the complete outline plate for the purposes of compiled mapping.
- (b) Grid lines will be ruled up in black before typing is commenced, and care should be taken that typing is not obscured by them. The fine lines should be drawn as fine as possible consistent with being absolutely continuous and black. The thick lines should be just sufficiently thick to give clear contrast with the fine lines; on no account should they be broken for typing other than grid values.

- (c) Before typing it will be necessary to rule lines of latitude across the sheet in blue, to ensure that typing is kept parallel to those and not to the grid lines.

421. Plotting of grids.—The following procedure will be adopted for the plotting of grids for 1-inch sheets both inside and outside the 100% area.

- (a) If a mosaic is prepared,
- (i) Project the spherical graticule, subdivide and rule up the 5' lines.
 - (ii) From table 9 Grid plot (by arcs) the distances in yards of the nearest 1,000 yard grid lines in both directions from the four corners of the sheet.
 - (iii) By interpolation in table 9 Grid plot the distances of the 1,000 yard grid lines nearest to the four internal 5' lines.
 - (iv) Rule up the eight grid lines (four east and west, and four north and south), two arcs fixing each of which have been obtained in (ii) and (iii) above.
 - (v) Subdivide between the lines already drawn, for the remaining grid lines.
 - (vi) Check subdivision for equality along the full length of each side, and for position from other appropriate grid tables, and rule up the remaining lines.
- (b) If there is no mosaic, the procedure detailed in sub-para. (a) above should be carried out on the fair sheet before drawing is commenced.
- (c) In exceptional cases owing to inequalities in the internal graticule lines proceed as in (a) (ii) above; rule up the four grid lines and subdivide for the remaining grid lines instead of plotting them as in (a) (iii).

422. Plotting grids on small scale maps.—In cases where table 9 Grid is not available, and for all sheets on scales smaller than 1 inch to 1 mile, the cutting points of the nearest 10,000 yard grid lines (100,000 yard lines in 1/M sheets) will be plotted from the sheet corners from appropriate grid tables.

423. Sheets outside 100% area.—In the case of sheets outside the 100% area, the thick grid lines will be ruled across the fair sheet in blue, and the grid square letters typed in blue in correct positions before typing is commenced, so that typing may be kept clear of them. The portions of all the grid lines, both thick and thin, that fall in the border will be drawn in black and the thick grid lines will have their values entered in black so as to reproduce on the blue print that is used for the drawing of the grid original. Care should be taken that the thin lines

do not foul any typing in the borders. They may be partially drawn or, in extreme cases, drawn outside the border and quite close to it. All that is needed is a small tick—even $\frac{1}{8}$ " long. In cases where no thick grid line appears on a sheet, full figure values should be entered for at least one fine line near the corners.

424. Sharp drawing and typing essential.—Typing and line work on grid originals drawn on scale of publication should be particularly clean and sharp as there will be no reduction of scale to eliminate imperfections.

425. Reissues.—

- (a) Within the 100% area, when possible, the internal spherical lines, and accessory letters and figures, should be erased from the outline sheet, which should then be completed with grid drawn in black. But if the state of this outline sheet does not admit of such extensive erasures and redrawing, the procedure described in (b) below should be followed.
 - (b) Outside the 100% area the spherical graticule should be left on the outline sheet. Before correcting the outline and contour sheets for reissue, action as regards entry of the grid lines should be taken as in para. 423. Any typing that is fouled by the thick grid lines and their border figures should be shifted. The duffing out of the grid line ticks and of the internal spherical lines, and accessory letters and figures will be done by the reproducing office. A separate grid original on the scale of publication should be prepared on a drawing blue print of the outline sheet after it has been corrected for reissue.
 - (c) Reprints from standing plates prepared previous to these orders will have the grid surprinted in purple, but when photography is necessary the grid will be printed in black.
 - (d) Special maps, in areas of military importance, should have the grid changed from purple to black at the first opportunity, but it will not be necessary to change sheet edges from spherical to rectangular. The ungridded edition of such maps may be abandoned if the Surveyor General approves.
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SECTION X.

REPRESENTATION OF GLACIATED REGIONS

426. For definition of the various high mountain features see Topo. Handbook, Chapter V, Appendix V.

TABLE SHOWING COLOURS OF DIFFERENT ITEMS OF HIGH MOUNTAIN FEATURES ON PUBLISHED MAPS.

	Features.	Colours on published maps.	REMARKS.
i	Limits of all areas of permanent snow or glaciation, and all ice features.	Blue	Limits of all areas of ice and permanent snow will be shown by a dotted line, which is omitted below rocks having a definite edge. The rock cliff symbol will never be drawn in blue to represent ice-falls or ice walls. These features have special symbols. The dotted line will not be shown except round the lower parts of glaciers where these extend below the snow line in areas where snow and ice features have not been accurately surveyed.
ii	Water features whether on or off ice.	..	.....
iii	Live, or barren dead moraines, (lateral, medial, or terminal); scree, rock falls and fans.	Black	Care should be taken to avoid the appearance of sand. The rocks comprising moraine are of all sizes; so also should be the dots. Scree, on the other hand, are usually uniform and regular and should be represented by uniform dots generally in fanwise lines.
iv	Dead moraines if under vegetation (grass, scrub, or trees).	Brown	.....
v	Contours across ice and permanent snow including those across live moraine.	Blue

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	Features.	Colours on published maps.	REMARKS.
vi	Contour values pertaining to the above, across ice, permanent snow, and live moraine.	Blue	The contour values should break the contours as in brown contours.
vii	Contours across hill-slopes below the snow-line, across dead moraines, scree, fans, etc.	Brown	<i>Brown contours should seldom be shown above the snow-line. Bare ground above this line is usually cliff, which should be shown in the appropriate style. Brown contours will always have brown contour values.</i>
viii	Cliff above or below the snow-line.	„	.....
ix	Tracks & routes, over glaciers & permanent snow; club huts.	Red	.....
x	Passes and names ...	Black	.....

NOTE.—In fair drawing, items I, IV, V, VI, VII and VIII will normally be drawn on the contour sheet, items II, III, IX, and X on the outline sheet. In exceptional cases all may be drawn on one sheet.

The different colour plates will be prepared in P. L. O. from patterns to be supplied by the Circle concerned.

SECTION XI.

COMPLETION OF SHEETS TO EDGE FROM
OTHER THAN NORMAL MODERN SURVEYS

427. Compilation foot-note or diagram.—In every case in which any topographical map has been completed to edge from material other than normal modern surveys, a special compilation foot-note or diagram must be added to indicate the material which has been used to complete the sheet. For example, if the style of drawing of that part of the map is in sufficient contrast to the rest of the map, a special foot-note like the one given below would be sufficient:—

The tribal area in N. W. part of the sheet has been enlarged from half-inch reconnaissances, 1894-97.

428. Compilation Index.—When the material from which the sheet has been completed has been derived from more than one source and is difficult to describe in a simple foot-note, then a diagram entitled "Compilation Index" (see Border Specimen) should be drawn showing the limits of the different material used with brief descriptive notes.

429. Descriptive notes.—The descriptive notes referred to in paras. 427 and 428 above, should give the origin, nature, scale, and date of survey when these are known, but should not, as a rule, mention the names of individual officers of the Survey of India. References to published maps should only be given when no better information is available, and should give the full title of the map, with scale and date. References to map squares should be avoided.

430. Preparation of index and references.—The index should be drawn and the references typed on a separate piece of drawing paper for submission with the original fair sheet, and will be pinned up in position by the Photo.-Litho. Office. For size, &c., of the index see Border Specimen. See also paras. 175 to 177.

431. Perennial water in old surveys.—In the case of sheets which are completed to edge from old surveys which do not distinguish between dry river beds and those which generally contain water, application for the necessary information should be made to the Chief of the General Staff's Branch, and the following foot-note should be entered on the sheet:—

The accuracy of the information regarding perennial water is not guaranteed and must not be accepted without further investigation.

432. Longitude foot-notes on old sheets.—The footnote regarding longitude on old sheets should always be carefully noted, as a correction of longitude may often be necessary in adjusting old and new work.

433. Differentiation of reliability.—The material available for the completion of sheets to edge will generally be of different degrees of reliability and should be differentiated on the fair sheets by different styles of drawing.

434. Degrees of reliability.—

- (a) Modern contoured sketch surveys on larger scales than the scale of publication or on the same scale, when these are known to approach the accuracy of rigorous survey.
- (b) Photo surveys, air or otherwise, in accordance with reliability.
- (c) Modern contoured surveys on smaller scales down to quarter-inch.
- (d) Old style regular surveys between 1890 and 1905 on the same or larger scales.
- (e) Old style regular surveys prior to 1890 on the same or larger scales.
- (f) Work inferior to the above, in which broad facts are certainly known. The old half-inch and quarter-inch surveys will come under this category for purposes of inclusion in larger scale maps.
- (g) Areas depending on inference or guess work.

435. Method of drawing—Outline (sub-paras. correspond to those in para. 434).—

- (a) All detail on outline sheet should be drawn by firm lines using the prescribed symbols for the different kinds of detail, but streams which are shown by broken lines on the original survey should be similarly shown on the fair sheet.
- (b) If based on adequate control and compiled with the aid of a stereo-plotter or other such accurate method, should be treated in exactly the same way as modern surveys on the scale of publication. Otherwise, will be shown like item (c) or (f) according to degree of reliability.
- (c) As in (a) above.
- (d) Ditto.
- (e) Ditto.

- (f) Drainage should be shown by broken lines, queries being placed against village sites, roads, and other detail, when the position of such is doubtful.
- (g) Should be drawn like item (f), but with streams drawn more or less finely and liberally generalized in accordance with the reliability of the information available.

436. Method of drawing—Contours (sub-para. correspond to those in para. 434).—

- (a) Hill features should be shown by broken thick and thin contours with contour values.
- (b) If based on adequate control and compiled with the aid of a stereo-plotter or other such accurate method, should be treated in exactly the same way as modern surveys on the scale of publication. In other cases hill features should be shown either by fine continuous lines with no thickened contours (*i.e.*, when contours correspond with available heights)—contour values where desirable being inserted at the discretion of the officer compiling the sheet—or otherwise like item (a) or (e) in accordance with the reliability of the photo-survey.
- (c) The same as (a). Where possible, contours should be interpolated so as to conform to the interval of the remainder of the sheet.
- (d) Fine continuous form-lines.
- (e) Fine broken form-lines.
- (f) Ditto.
- (g) Like item (e) but hills should be liberally generalized in accordance with the reliability of the information available.

437. Form-lines.—When form-lines are used the vertical intervals should, so far as the available data permits, approximate to that of the remainder of the sheet. In areas where little or no information regarding hill features is available, the form-lines should be deliberately spaced more widely, so as to give an additional impression of vagueness.

438. Photo-surveys.—Orders regarding photo-surveys detailed in paras. 435(b) and 436(b) will apply to all cases in which such material is incorporated in any sheet, either for original compilation or for correction of existing ground surveys.

439. Departure from these rules.—In exceptional cases the rules contained in this section may be departed from under the Surveyor General's orders.

SECTION XII.

EXAMINATION OF FAIR SHEETS

440. General remarks.—The examination of fair sheets is one of the most important duties of officers responsible for fair drawing, and nothing reflects more discredit on the department than errors and omissions which a careful examination would have brought to light. Although all fair sheets are scrutinized in the circle office before being submitted for publication, it must be borne in mind that the officer in charge of the party or office in which any fair sheet is prepared is responsible for its examination. This examination may be divided into two parts:—

- (a) General examination.
- (b) Examination in detail.

441. General examination.—The general examination should deal with the following points:—

- (a) Details outside borders or marginal details.
- (b) Border details.
- (c) General scrutiny.

442. Details outside borders or marginal details.—

- (a) Headings, and title, whether in accordance with the most recent Border Specimen. That the batch number of the fair sheet is entered and the sheet, if preliminary or provisional, is correctly classified. (*Vide* paras. 43 to 46, Chapter I, 1932).
- (b) Index to Sheets, correctness of numbering and thickness of lines.
- (c) Administrative Index, whether in agreement with the headings and with the boundaries as shown on the sheet
- (d) Seasons of survey.
- (e) Magnetic declination and annual change to be compared with values received from the Director, Geodetic Branch. See paras. 278 to 283. In cases of gridded sheets the grid convergence legend to be checked.
- (f) Area Statement to be checked and total compared with areas of quadrilaterals in Auxiliary Tables.
- (g) That all necessary special foot-notes have been entered in the Publication Instructions and that the History Sheet is complete and clear.

443. Border details.—**(a) Outline sheet.**

- (i) Graticule values and degree, minute, and second symbols.
- (ii) Destinations, see paras. 318 to 320.
- (iii) Tahsil, &c., names.
- (iv) Lettering and figures of squares.
- (v) Border.

(b) Contour sheet.

Corners of graticule.

(c) Edges.**(d) Edges of grid lines, whether drawn on the sheet or on a separate original, should always be compared against adjoining sheets, when these are also gridded, to ensure that the grid lines join up correctly.**

The comparison of edges of the outline, contour, and green tree sheets with those of adjoining sheets should be examined at this point, care being taken to see that the section officer or draftsman responsible for the examination has signed his name in blue in each case and also that traces have been prepared where necessary.

444. General scrutiny.—A general scrutiny should then be made as regards the following points:—

- (a) Typing, whether sharp and black; whether the names and figures are well placed and in correct alignment; whether the spaced names of subdivisions are properly arranged and in agreement with adjoining sheets.
- (b) Drawing, whether black, unbroken, and sharp.
- (c) Drainage, whether due prominence has been given to main streams.
- (d) Roads, whether due prominence has been given to main lines of communication and to important roads and paths in the hills.
- (e) The outline, contour, and green tree sheets should be alternately superimposed over a tracing glass with direct or reflected light from helios, and the following note be entered in blue in the left hand bottom corner of the outline sheet:—

“The outline, contour and tree sheets have been superimposed and examined over a tracing glass and the contours and trees agree correctly with the detail.”

This should be signed and dated by the examining officer.

- (f) The green tree original should be examined over both the outline and contour sheets separately to see that the lettering and figures are legible.

445. Examination of outline and green tree sheets in detail.—

- (a) Examination in detail should be carried out in the first place by the officer in charge of the drawing section who may depute an assistant to examine certain items.
- (b) It is a great help to make rigorous examination of certain specified items at various stages of drawing, and a register should be kept up on form O. 141, or on some more detailed form, on which is recorded against separate items the signature both of the draftsman and the examiner.
- (c) The officers in charge of the drawing section and of the party will each make their own independent examinations, and the amount of time they will be required to spend will largely depend on the thoroughness of the stage-by-stage examination.
- (d) When examining detail it is best to take one square at a time and to take the detail in each square in regular sequence.
- (e) The examiner should look first to the exact agreement of the fair sheet with the field section; he will be greatly helped in this by the blue detail of the drawing blue print which should normally be entirely inked up.

446. Tabular guide for examiners.—The following is a useful guide to examiners detailing what points they should look to :—

Head.	Nature of detail.	Points needing attention.
(a)	(i) Streams	<p>Whether dumb-boll marks have been inserted at all necessary points of change from non-perennial to perennial.</p> <p>Whether a suitable gradation of thickness of line has been made in the case of single-line streams.</p> <p>Whether the sinuosities of the streams on the fair sheet exactly correspond to those on the P.T.</p>

Head.	Nature of detail.	Points needing attention.
		<p>Whether, in the case of double-line streams, the width at all points exactly corresponds to that on the P.-T.</p> <p>Whether streams have been broken at bridges, except "Irish bridges".</p> <p>Whether arrows indicating direction of flow and alignment of tracks in single-line stream beds are correctly shown.</p> <p>That where no bridges exist the steep banks of dry beds are broken at crossings of roads and tracks.</p>
	(ii) Sand ...	<p>That the gradation in the size of the dots is correct, and that the dots are all round and black.</p> <p>That the finer dots are not too fine to reproduce clearly.</p> <p>That the larger dots are not too close together, and consequently liable to block up on reproduction.</p> <p>That in dry streams the dots representing sand do not touch any details that will appear in colours and that no blank spaces are left between lettering of names.</p>
	(iii) Shingle and rocks in stream beds.	<p>That they do not cover larger areas than on the P.-T., that the drawing is fine, and that none is omitted.</p>
	(iv) Broken and precipitous banks and cliffs in streams.	<p>That none is omitted.</p> <p>That the drawing is fine and does not extend further back from the edge of the stream than is shown on the P.-T.</p> <p>That the lines are sufficiently far apart to avoid blocking up on reduction.</p> <p>That steep banks of 10 feet or more in height, and very steep ones of less height but of such a length that they will be at least one inch in length on the scale of publication, are shown by a thickened line.</p> <p>That all river bank features are drawn in accordance with the approved symbols as shown in the latest Table of Conventional Signs.</p>
	(v) Islands ...	<p>That none is omitted and that all conform exactly to the shape shown on the P.-T.</p>

Head.	Nature of detail.	Points needing attention.
	(vi) Fords, ferries, waterfalls, and rapids.	That none is omitted, that the drawing is fine and the dots and lines sufficiently far apart to avoid blocking up on reduction.
	(vii) Arrows denoting flows.	That they are firmly drawn and that they appear wherever there is a chance of doubt as to the direction of flow, preferably near the name of the river or canal.
	(viii) Bathymetric contours.	That they correspond with the Admiralty and Marine survey charts and are finely drawn.
	(ix) Glacier features, e.g. live or barren dead moraines, scree, rock falls, fans, contour values across moraines, &c.	That none is omitted, that all conform exactly to the features shown on the P.-T., and that such features are not duplicated in both the outline and the contour sheets.
(b)	Canals ...	That none is omitted and that all bridges, locks, sluices, dams, weirs, aqueducts, and distance-stones are entered and finely drawn, (see para. 320).
(c)	(i) Lakes, ponds, tanks, and marshes; mud on foreshore.	That all those shown by the surveyor appear on the fair sheet, that they are finely drawn with a view to reduction. That when the limits of perennial water in any of them fluctuate the margins are not defined by a line on the fair sheet. That all dry tanks, other than those to be tinted in the P. L. O., and those that are too small, are sand dotted finely.
	(ii) Springs and wells	That all the more important ones appear in the fair sheet.
(d)	(i) Roads, metalled and unmetalled, and trade routes.	That none is omitted, and that they are firmly drawn in accordance with the symbol. That they are drawn slightly heavier than the prescribed symbol in hills and wooded areas. That the width of double-line roads is reduced at bridges.
	(ii) Cart- and camel-tracks, mule-paths and foot-paths.	That they are finely drawn in accordance with the symbol, and that, as far as space will permit, none is omitted. That they are drawn slightly heavier than the prescribed symbols in hill and wooded areas.
	(iii) Avenues of trees	That, as regards interval and variation in size of symbol, the drawing be made to appear natural.

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Head.	Nature of detail.	Points needing attention.
		That the tree symbols are drawn as near to the road which the avenue follows as is compatible with avoiding blocking up.
	(iv) Roads and paths through towns and villages.	That in the case of double-line roads the width in the clear is not decreased, and that in that of single-line roads and paths they are drawn right up to the towns or villages.
	(v) Milestones and mileage.	That the main routes through towns have been duly emphasized. That these are entered in accordance with existing orders, (see paras. 111 to 113).
	(vi) Cuttings and embankments.	That none is omitted except those that are less than 5 ft. in height or depth, and that the width is varied to accord with the degree of relief, and that it is kept as narrow as possible. Also that the extent of the cutting or embankment is not greater than that shown on the P.-T. That the drawing is fine and the lines open, (see also para. 114).
	(vii) Bridges, viaducts, and passes.	That none is omitted, and that the drawing is firm and in accordance with the latest Table of Conventional Signs.
(e)	(i) Towns, villages, ruins.	That no sites or buildings are omitted, and that, where several sites on the P.-T. are joined into one block, the block corresponds to the general outline of the group of sites.
	(ii) Deserted sites, scattered huts, markets, post offices, police stations, hospitals, dispensaries, dak bungalows, circuit houses, rest-houses, mills.	That none is omitted if space permits of its entry.
	(iii) Forts, watch-towers, churches, mosques, temples, pagodas, kyaungs, idgahs, shrines, lighthouses, monuments, satis.	That none is omitted, and that all are finely drawn in accordance with the prescribed symbol in each case.

Head.	Nature of detail.	Points needing attention.
(f)	<p>Telegraph lines, power-lines, water mains, graves, battle-fields, mines, rifle-ranges, buoys, anchorages, light-ships, beacons, steamer signals, navigation marks, oil-wells, salt-pans, tidal arrows, wireless stations, telephone lines, karezes, steamer service routes, *aerodromes, landing grounds.</p>	<p>That none is omitted, and that all are finely drawn in accordance with the prescribed symbol in each case.</p> <p>That the sites with names and dates of battle-fields have been entered.</p> <p>That the orders regarding omission of aerodromes and landing grounds in areas prohibited to civil aircraft, have been complied with on sheets issued to the public.</p>
(g)	<p>(i) Railways ...</p> <p>(ii) Mineral lines and tramways.</p>	<p>That the name of the line and, when necessary, the gauges are suitably typed along the railway, in accordance with the rules laid down in paras. 284 to 288.</p> <p>That station buildings, enclosures, tunnels, bridges, cuttings, and embankments are all entered and finely drawn in accordance with the prescribed symbols.</p> <p>That the drawing of roads passing under the railway is broken at the bridges by which they pass, and that the drawing of the railway symbol is similarly broken in the case of an over-way bridge, and that both road and railway symbol are drawn in the case of level-crossings.</p> <p>That the gauge is suitably typed along the lines.</p>
(h)	<p>Ornamentation ...</p>	<p>That the nature of the growth on grass and forest lands, and in orchards and topes, is correctly shown by the use of the different tree and grass symbols prescribed.</p> <p>That, in the case of forest growth, the density of the growth is shown by the frequency of the tree symbol.</p> <p>That no gardens whose size justifies their entry are omitted, and that the nature of their growth is discriminated as far as the symbols prescribed permit.</p> <p>That all symbols are correctly and finely drawn.</p>
(i)	<p>Limits of cultivation</p>	<p>That these are finely and uniformly drawn, and that they are continuous, except along natural features, roads, tanks, boundaries, canals, or buildings, so that the colourist shall have no difficulty in determining the area for coloration.</p>

* Information regarding public aviation stations is available in the publication "The Air Pilot, India and Burma."

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Head.	Nature of detail.	Points needing attention.
(j)	Boundaries	<p>That the symbol for these is correctly drawn and in accordance with the rules laid down in paras. 140 to 155, and that it exactly corresponds to the changes of direction of the boundary on the ground as shown on the P.T., or on such other authority as is accepted.</p> <p>That the position of the boundary, where not disputed, agrees with all notifications at the time in force.</p> <p>That boundary pillars and their numbers are entered in accordance with existing rules, see paras. 158 and 269.</p> <p>That care has been taken to discriminate between pillars surveyed and those not found at the time of survey.</p>
(k)	<p>(i) Trigonometrical, traverse, clinometric, and bench-mark heights.</p> <p>(ii) Canal and other bench-marks.</p> <p>(iii) Relative heights and heights of water-falls.</p> <p>(iv) Symbols for positions of heights.</p>	<p>That all ground heights of trigonometrical stations and bench-marks are entered; as also a selection of ground-level heights of other trigonometrical points, theodolite traverse stations, and of plane-table fixings and intersections; and, where no other heights are available, heights, such as Irrigation, Railway, &c., even if they are not attached to any particular points, are occasionally entered.</p> <p>That the correct symbols for triangulation stations and intersected points and proper types for their heights are used in accordance with the instructions contained in paras. 180 and 181. (Also see para. 58).</p> <p>That height values accord with the contours on the contour sheet.</p> <p>That height values accord with the natural fall in streams and rivers.</p> <p>That the heights in hilly country are typed on the non-shaded slopes, special attention being paid to the selection of positions with regard to the ribands along boundaries.</p> <p>That as many as possible of these having heights in accord with the Survey of India are entered</p> <p>That as many as possible of these, both maximum and minimum, and intermediate, are entered without causing undue crowding, and having regard to the position of the contours next above and below them.</p> <p>That these are in correct position, plotted from the graticules, in the case of all trigonometrical stations and of all intersected points of geodetic series, and traced or blue printed, and if necessary adjusted, in the case of others.</p>

Head.	Nature of detail.	Points needing attention.
(1)	(v) Lettering heights. Names and other lettering.	<p>That the symbols are finely drawn in accordance with the prescribed symbols.</p> <p>That every height has a symbol indicating its exact position, except such heights as are not attached to any particular points [<i>vide</i> para. 59 (c)].</p> <p>That the prescribed type has been used.</p> <p>That the spelling (including accents) of all names is in accordance with the corrected list on the P.-T. ; or, in the case of spaced names, with the typer's guide (para. 59) and also rules laid down in Section IV.</p> <p>That names of streams, villages, etc., near the edges agree with those which have already been published on the adjoining sheets, and that where the latter are wrong, attention is drawn to them in the History Sheet, for necessary corrections being noted in the office copy of the sheets kept in the circle office.</p> <p>That in hilly country names in small type are made clearer by typing them on the non-shaded slopes, ribands along boundaries being also considered in the selection of positions for them.</p> <p>That each name is most suitably placed, having regard firstly to the identity of the object to which it refers and secondly to avoidance of, or interference with, detail which will ultimately appear in black. (See paras. 219, 220 and 242).</p> <p>That the type used is that prescribed for each particular class of name.</p> <p>That the rules governing spaced names have been complied with, and especially that any name spreading over more than one sheet preserves continuity of alignment, spacing and size of letters.</p> <p>That the orders regarding omission of aerodromes and landing grounds in areas prohibited to civil aircraft, have been complied with on sheets issued to the public.</p>

Note (i).—The examination of each nature of detail may be carried out throughout the whole sheet as that nature of detail is completed, the sheet being withdrawn from the draftsman for the purpose and another issued to him in the meantime, or the drawing of several natures of detail may be completed before their examination is taken up, or the examination may take place as all the detail in any square is completed.

(ii).—It is, however, preferable that the drawing and examination of Heads (a) (i), (v), (vi), (b) (i), (c) (i) (except marshes and mud on foreshore) and (ii), (d) (i), (ii), (iv), (v), (vi) and (vii), (e) (i), (ii) and (iii), (f) (i), (g) (i) and (ii), (j) (i), and (k) (iv) should be completed before typing on the face of the sheet is commenced.

447. Examination of contour sheet in detail.—The contour sheet should be examined in the following respects:—

- (a) Registration of outline, contour, and green tree sheets for streams and contours and legibility of lettering and figures.
- (b) Contours correctly broken (see paras. 188 and 267).
- (c) The same broken ground is not shown on both contour and outline sheets.
- (d) Border contour values avoiding typing on outline sheets, (see also para. 190), and marginal grid figures.
- (e) Contouring, whether in agreement with heights on outline sheets. This may be done by making a height trace from the outline sheet containing the graticule lines, each height (other than relative), and the dot or other symbol marking its position. This trace placed over the contour sheet gives a thorough check.
- (f) Contour values, whether correct and clear of lettering and detail on outline sheet and vegetation on green tree sheet; that they are not entered on the slopes of hills which are likely to be shaded; they should be checked against the heights mentioned in (e).
- (g) Glacier features in the contour sheet, whether in agreement with glacier features in the outline sheet.

448. Discrepancies between plane-table sections and fair sheets.—It is very important that officers in charge of parties should see that there are no material discrepancies between the plane-table sections and the fair sheets before submitting the latter to Circle Directors. Small streams and other minor details which have been intentionally omitted or generalized when drawing the fair sheet need not be deleted or corrected on the plane-table section; but any amendments in the values of heights or corrections in the spelling of names should always be corrected on the plane-table sections, and attention should be drawn by a note on the plane-table section to those important details and names which have been purposely omitted from, or drawn on the fair sheet different to what they are on the plane-table section.

449. Responsibility for accuracy.—

- (a) It should be clearly understood that the officer in charge of a party is responsible for the correctness of the original fair sheets in every respect. No proofs will be supplied to officers in charge of parties, and after a sheet has been sent to the reproducing office for publication, the party which prepared it will have no further opportunity of comparing it with the original plane-table sections.

- (b) The Circle Director is responsible for final scrutiny, the correctness of the publication instructions, and for the colour patterns.

450. Final scrutiny.—The scrutiny of the fair sheets in the Circle Director's office should be a strict one. Special care should be directed to the examination of titles, headings, important boundaries, spaced names, border destinations and distances.

SECTION XIII.

SUBMISSION OF FAIR SHEETS
FOR PUBLICATION, SUPPLEMENTARY
DOCUMENTS, GRID ORIGINALS.
HILL SHADING. SPECIAL
EDITIONS.

451. Colouring of P.-T. sections.—As the colour patterns have to be prepared in the circle office, generally during the field season and in the absence of the party concerned in the drawing of the fair sheet, it is essential that the plane-table sections should be fully and correctly coloured up, so that the circle office in preparing the colour patterns should merely have to copy the colours from the plane-table sections. The examination of the colouring of a plane-table section, both in the body and along the edges with adjoining plane-table sections or traces, is therefore as important as any other examination of the fair sheet. The plane-table section should be the complete original record.

452. Traces of edges.—After the final examination, traces of the edges of both outline and hill sheets where they adjoin unmapped areas should be carefully prepared; those of the outline sheet should be drawn in the appropriate colours and a sufficient number of the letters of spaced names also included to enable the remaining letters to be placed and spaced correctly on the adjoining sheet of the same series.

453. Preparation of Publication Instructions.—

- (a) The form for the Publication Instructions should be carefully filled in in triplicate, a definite reply to each query being given on the form. Any special foot-note (*Vide* Section XV), which may be required in addition to the standardized foot-notes should be entered on the back of the form; and when any change (for instance if the contour interval varies from the normal laid down in para. 182) or when any omission is required to be made in the standardized foot-notes, a clear explanation should be similarly entered. Any omission of a standardized foot-note usually necessitates a fresh set-up in the Photo.-Litho. Office and should therefore be avoided if possible, and only asked for if the foot-note is wrong, and not because it is only inapplicable to the particular sheet. In the case of sheets containing high mountain features, if an additional printing in blue is necessary, the fact should be mentioned in item No. 4 of this form. When,

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FOR PUBLICATION

however, no contours appear on a sheet, the foot-note giving the contour interval and that stating that contours are approximate, should invariably be omitted, (*Vide* Chart for Foot-notes and Symbol Tables, which can be obtained from the Director, Map Publication).

- (b) In filling in the number of preliminary proofs required, the number should be kept as low as is consistent with actual requirements. The usual number should be 4 combined black, brown, and green proofs on rag-litho. paper (one for corrections, one for colouring administrative and reserved forest boundaries, one for recording edges of colour patterns, and one spare), 2 grey outline proofs on hollingworth paper (one for the preparation of the colour patterns for red and blue, and one spare, with an extra grey print for a green pattern, if necessary), 1 grey print on hollingworth paper for sheets containing high mountain features (for preparation of a separate blue colour pattern for glacier features, if necessary), 1 blue print on drawing paper, cut the same way as the original fair sheet (for the preparation of the original for the yellow tint, with an extra print for the green tint original if required), also 2 blue prints, on 130 lb. drawing paper, of the complete outline plate, and one black print on tracing paper of each of the complete outline and contour plates separately, for preparation of the grid original, if required. In special cases a larger number of preliminary proofs will be supplied if required. (See para. 461 (g)).
- (c) If the sheet includes hilly country and is to be shaded, one "dust-on" blue combined print of the contour and outline fair sheets and two combined black and brown prints on tracing paper should be asked for. This blue print should be on ordinary drawing paper if the shading is to be executed by brush work, or on specially prepared paper if it is to be executed by stump work.
- (d) In cases where a special edition showing village boundaries is required, a zinc-mounted blue print of the complete outline plate on drawing paper, together with such black or blue prints on bank-post or tracing paper as are wanted, should be asked for.
- (e) If there is any matter, such as the correct location of, or symbol for a boundary, regarding which there is any room for doubt, the Circle Director should make a note

of it on the back of the form and should also refer the question by letter to the Director, Map Publication.

454. History sheet.—

- (a) A History Sheet should be prepared in triplicate for every departmental map, and this should be brought up to date for each revised edition. One copy should be filed in the office in which the map was drawn, one in the circle drawing office, and one in the Map Publication Office; if a sheet is drawn in a circle drawing office or independent party then only two copies are required. The information should be typewritten on foolscap size paper of good quality, so that the required number of copies can be typed at one time. The History Sheet for sheets prepared in No. 18 (Air Survey) Party should be in quadruplicate as one copy is required in the office of the unit responsible for the area, to whom the 4th copy should be sent by the O. C. 18 Party under intimation to the Circle Director.
- (b) The History Sheet should contain a complete statement of the G. T. triangulation and levelling pamphlets consulted (the dates of the editions to be quoted), and of the sources from which the sheet has been compiled, with, if necessary, an explanatory diagram; it should also be stated if the triangulated heights have or have not been adjusted to those of the spirit levelling net. In the case of special departmental maps, the number and date of the Surveyor General's authority should be quoted.
- (c) The following headings should be considered:—
- (i) Class and scale of survey. If a sheet, or any portion of a sheet is based on photo-surveys the History Sheet should clearly state the methods used in the survey and the comparative reliability of the results. (*Vide* (x) below).
 - (ii) Framework or data on which based.
 - (iii) Compilation.
 - (iv) Comparison with old surveys.
 - (v) Boundaries, including forest boundaries.
 - (vi) Adjustment of edges (reasons for any non-adjustment to be recorded).
 - (vii) Names—sources of verification, or unusual procedure, *e g. vide* para. 201.

(viii) Responsibility.

(ix) Authority for any departure from normal rules such as special contour interval, addition of outriggers, insets, &c.

(x) In the History Sheet for sheets compiled by Air Survey the class of survey will be "Compilation from either vertical or oblique photographs", the latter being subdivided into "Oblique photo.-survey" and "Oblique photo.-reconnaissance sketches." This paragraph will include the following information:—

Photographic agency (unit and station).

Camera type and number and lens.

Dates of photography.

Scale of photography for verticals; height of aircraft and aspect for obliques.

Method of compilation used.

The reliability of the survey will be defined by the maximum error expected in the geographical position and height of main detail where this is possible, and in general terms with regard to the accuracy of detail relative to surrounding detail (*e.g.* of the standard of rigorous ground survey, rapid ground survey, reconnaissance survey, sketch work, &c.).

(d) The information given should be brief and concise, but where procedure departs from the normal it should be full and complete.

(e) The statement regarding boundaries must always be most carefully prepared and should expressly state whether boundary notifications are available and have been consulted; when a boundary separates areas of British territory only a brief report will suffice, but in the case of boundaries between British territory and Indian states, or between two Indian states, or between British and foreign territories, full details on the points noted below should be given, with copies of any correspondence which has taken place:—

(i) Whether the boundary was demarcated at the time of survey, and surveyed as demarcated, any pillars missing or destroyed being noted.

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FOR PUBLICATION

- (ii) Whether the demarcated line as so surveyed has been compared with that shown on previous maps and descriptions of boundaries, and with what result.
- (iii) What action has been taken in case of disagreement, with references to correspondence with both parties concerned.
- (iv) Whether, in the case of there being no demarcation on the ground, the boundary has been entered from (a) local information, (b) Government notification, (c) previous maps, and that the boundary as shown on the sheet has been compared with that shown on previous maps or against the Government notification, and if so, with what result.
- (v) Where boundaries are marked “approximate” particular care should be taken to state clearly what portions are approximate and why.
- (vi) It must be distinctly understood that the Circle Director is responsible for the boundaries and explanations supplied, and that the Director, Map Publication is merely responsible for seeing that these orders are carried out. In the case of the external boundary of India and other international boundaries, however, Circle Directors and officers in charge of independent units should not correspond with Local Governments until they have obtained the views of the Director, Map Publication, who alone will make any reference to the Foreign and Political Department which may be necessary.
- (vii) Sheets in which any portion of the external boundary of India appears are to be treated as confidential until approved by the Foreign and Political Department.

455. Fair sheets to be signed and dated.—

- (a) All fair sheets, with History Sheet, and Publication Instructions, should be signed *and dated* by the section officer and the officer in charge of the party or drawing office, and should be countersigned *and dated* by the Circle Director. Such signature and dating is again necessary after revision or correction.
- (b) The following information should also be entered in the southern margin of every fair map, outline or contour sheet :—

Drawn in No..... $\frac{\text{Party}}{\text{D. O.}}$ (.....Circle).

456. Press Imprint.—The press imprint of sheets will indicate the party or office in which the sheet was drawn and the scale of drawing, thus:—

Reg. No..... D' 13 (E. C. 4-1½")..... or,

Reg. No..... D' 34 (10-1½")..... or,

Reg. No..... D' 20 (D. O. 6-¾").

For topographical maps the scale of fair drawing in the press imprint will be shown in terms of inches to a mile thus:—

1½", ¾", ¾" &c.

457. Submission of fair sheets to Circle Director.—The fair sheets, with the plane-table sections and subsidiary papers, are then submitted to the circle director. The subsidiary papers will be disposed of in accordance with para. 470, but all original correspondence together with a copy of the History Sheet and of the Publication Instructions will remain in the party office.

458. Despatch of fair sheets.—The fair sheets, carefully packed, and insured, should be forwarded with the Publication Instructions and History Sheets to the Director, Map Publication, Calcutta, in whose office they will, after publication, be permanently stored; (see Appendix C).

459. Storage of plane-table sections &c.—The plane-table sections and all other documents connected with the sheet will be stored in the office of the Circle Director.

460. Supply of proofs.—On receipt of a fair sheet for publication, the Director, Map Publication, will prepare and despatch to the circle office the number of proofs asked for.

461. Preparation of colour patterns.—

- (a) From the material in his office (the parties being then usually in the field), either fully coloured up plane-table sections or colour guides supplied by the parties, the circle director will then prepare the colour patterns necessary to enable the Photo.-Litho. Office to prepare the colour plates, strong colours being used. For correct colours to be used see Chapter I (1932), para. 54. A grey proof will be used for the black, red and blue pattern; everything that is not coloured will be published in black, and it is therefore most essential that this pattern should be carefully examined in the circle office, especially those symbols which depend on colour for their appropriate signification. A separate grey proof will be used for the green colour pattern if necessary. Foot-note symbol tables need not be coloured up.

- (b) It is not necessary to follow the symbols very closely. Villages, buildings, mosques, &c., should be shown in red. In towns and big villages, wherever there is superimposition of typing over coloured details, the typed letters or figures, which might be obliterated by the details, should be inked up in black on the "red and blue" pattern along with the coloured details which are inked up in red or blue. Roads should be coloured in burnt sienna as follows:—

Metalled road—thick continuous line of approximately the width of the road, but see para. (c) below.

Unmetalled road—thick bars as above.

Cart-tracks—thin continuous line.

Camel-tracks—thin long bars.

Mule-tracks—thin short bars.

Footpaths—dots.

- (c) When preparing colour patterns of sheets which contain towns, cantonments and large villages, the thick continuous burnt sienna line for metalled roads should be discontinued at the outer limit of the town or village. Inside this limit both sides of the road will be inked up with fine burnt sienna lines except where coincident with the edge of the site.
- (d) The alignment of roads, except in town and suburban areas, need not be followed with meticulous accuracy; nor is it necessary to colour up every road bar and dot, so long as there is no doubt as to its alignment and classification.
- (e) A black proof will be coloured up in accordance with Section XVI to show all boundaries including reserved forest boundaries, the foot-note symbol tables also being completed as regards boundary ribands. Care should be taken that the boundary ribands follow accurately the boundary symbols. As all boundary ribands are machine-printed their widths and appropriate colours should be clearly noted in red on this proof to serve as a guide to the Photo.-Litho. Office.
- (f) In the case of sheets containing high mountain features a special blue colour pattern will be prepared, if necessary, on a contour grey proof. (See note at the end of Section X).
- (g) A brown colour pattern may occasionally be necessary when a separate contour sheet has not been prepared.

462. Yellow tint original.—

- (a) The original for the yellow tint is required for direct photography and should be prepared on a blue print on drawing paper. The grain of the paper should correspond with that of the original fair sheet: in other words, the longer sides from north to south should be parallel to the longer side of the drawing paper before it was cut.
- (b) All cultivated areas should be coloured in dark orange, care being taken to bring the colour well up to but not over the limits. The colour should be carried across all roads even if double-lined, except in cantonments, towns and large villages; over all railways, including their cuttings and embankments; over all fire-lines, wells, other conventional signs, and blocked-in sites, but not over sites to be tinted or water forms which will have a blue or black stipple. No special care need be taken to produce an even wash as there is no objection to hard uneven lines inside the colour-washed areas. The colour should not be so opaque as to hide detail and lettering, but it should be solid and continuous with no holes or excrescences. It should be put on as dry as possible. A mixture of yellow and red litho. ink diluted with turpentine gives good results. The litho. ink can be obtained from the Photo.-Litho. Offices at Calcutta on indent.
- (c) At the discretion of Directors, "reverse" tint originals may be submitted for sheets which, except for tinted sites and water forms, are to be yellow throughout. The small areas of tinted sites and water forms, which would be left white in a "normal" tint original, will be coloured, and the remaining area will be left uncoloured. On such originals the word "Reverse" should be entered prominently in the upper margin.
- (d) The corners of the tint original should be marked by black lines in the same way as the corners of contour originals are marked.

463. Press order proof.—A black proof is also supplied for examination and is known as the press order proof, or P. O. P.; additions should be noted in red and deletions in green. If a sheet has been carefully examined before submission corrections should be few and of a trifling nature. Serious errors, which may necessitate re-photographing the sheet, or many minor corrections, reflect discredit on all concerned in the fair drawing. For the method of

showing corrections see the published diagram "How to correct maps and proofs".

464. Unnecessary corrections.—The plate from which the preliminary proofs are printed is not used for the final printing of the map; such corrections as "touch up", "clear", &c., are therefore not necessary.

465. Adjustment of edges.—Edges of all colour patterns should be adjusted with those of adjoining colour patterns of the same series by a responsible officer, and a note that this has been done should be entered against each edge and initialled *and dated* by the officer in light blue.

466. Grid originals.—When required, a grid original should also be prepared on a blue print on 130 lb. drawing paper, of the complete outline of a map, (see Section IX).

467. Signatures on colour patterns, &c.—All the patterns, guides, tint originals, and proofs described in paras. 461 to 466 should be signed *and dated* both by the section officer and by the officer in charge of the party or drawing office responsible.

468. Hill-shading.—

(a) All hill-shading will be done in No. 1 Drawing Office, which will be supplied with the following material on the scale of publication for the purpose:—

(i) One combined dust-on blue print on paper coated with plaster of paris.

(ii) Two combined black and brown prints on tracing paper.

(b) Shading will be carried out with a stump and lamp black.

(c) There are three systems of hill-shading, (i) with vertical light, (ii) with horizontal light from a definite direction, and (iii) with a combined vertical and horizontal light.

(i) With vertical light all flat ground and the crests of ridges appear white, whilst the slopes are shaded, the shading being darkest where the slopes are steepest.

(ii) With horizontal light, the common convention has been to assume a light from the north-west, veering to north-east to suit the lie of the ground. From 1932 a southerly light has been adopted, which may be varied between south-east and south-west.

Such lighting makes the map easier to read from the air, as it conforms with the natural conditions of sunlight. Sheets south of Lat. 16° will continue to have a northerly incidence of light. A horizontal light is probably the most suitable for topographical maps and layered sheets.

- (iii) A combined light, which is a combination of (i) and (ii) above, where all slopes are shaded, those on the illuminated side being less darkly shaded than those on the unilluminated side. This system is probably the best for unlayered geographical maps.
- (d) A general direction of light should be chosen to suit the direction of the main hill ranges of the locality, but slight changes of direction may then be made to bring out minor features and preserve their continuity.
- (e) The light should be regarded as somewhat diffused, and about 30 degrees above the horizontal; this will give a soft edge to the shading, except for knife edge crests and abrupt declivities, and will show up the minor features on the shaded sides of main ridges.
- (f) Shading should be graduated on the following principles:—
 - (i) The darkest shade should be on the reverse slopes of the higher ranges. As a rule, the upper slopes of a range should be darkest, to give contrast to the light side, and the shading should be lighter on the lower slopes.
 - (ii) The main ranges of the sheet should be shaded first, and extra shade should then be added for exceptionally steep slopes, and for the minor features on both shaded and illuminated slopes of the main ranges.
 - (iii) A great deal of the effect of the shading is lost in the half-tone process of reproduction, and fine gradations will not reproduce. The shade original must be boldly executed.
 - (iv) There should not, on the other hand, be too strong a contrast between the darkest and lightest shade in one sheet, otherwise they cannot both be reproduced successfully. Either the darkest shade will kill the contours and other detail or the lightest shade will fail to appear at all.

- (g) Shading should not be carried over glaciers and snow beds, except when they are very small in area and lie steeply.
- (h) Shade originals with the same general incidence of light must have their edges adjusted against adjacent sheets, as in the case of other originals.
- (i) The reproduction office is responsible that the tint, the screen, and depth of printing are suitable, and that the shade is not printed so dark as to obliterate the detail and lettering of the map.

469. Village boundary editions.—

- (a) Village boundaries will never be entered on the ordinary editions of one-inch sheets of important frontiers or other areas of military importance in India. The same restriction applies to areas where either the detail or the village boundaries, or both, are so complex that the inclusion of the boundaries will seriously complicate the map.
 - (b) (i) In areas not debarred under the above rules, village boundaries may be entered in black on the ordinary editions, if the local governments desire it and are prepared to meet the full extra cost.
 - (ii) If the local government is unable to supply up-to-date information as to village boundaries in convenient and accurate form, the boundaries may require to be checked in the field.
 - (iii) In the case of such areas, the director should enquire from the local government before-hand whether it is prepared to pay for the inclusion of village boundaries.
 - (iv) The boundaries should be drawn on the fair sheet in the symbols prescribed and will be printed in black, and a special foot-note, explaining the boundary and trijunction pillar symbols, should be entered.
- (c) (i) If village boundaries are required to be shown on sheets lying in the restricted areas mentioned in sub-para. (a) above, if only a few copies are required, they may be entered by hand; or, if large quantities are required, a special edition may be prepared. In the latter case the village boundaries should be fair drawn on a zinc-mounted blue print from the complete outline plate of the sheet. When the special village boundary edition has been asked for before the ordinary edition of the map has been

published, the blue print, which should be on the scale of reproduction, should be applied for with the preliminary proofs in the Publication Instructions of the sheet, see para. 453; the village boundaries will be printed in black and the other detail of the map in the ordinary colours.

- (ii) When application is made for a special boundary edition of a map which has already been published, the above procedure, in so far as it is applicable, will be followed; but the village boundaries will be printed in black on stock copies.
- (iii) The village trijunction pillars will be shown by blocked squares, $\frac{2}{60}$ th of an inch on the $1\frac{1}{2}$ -inch scale, unless they have neither been surveyed topographically nor plotted from their traverse co-ordinates, in which case the squares should be left open.
- (iv) Any special information which is only required for the village boundary edition, and which is to be printed in black, may always be added in the body or borders of the blue print on which the village boundaries are drawn.
- (v) When the boundaries have been drawn and examined, the blue print should be sent to the Director, Map Publication. This should be done at an early date, if possible in time to allow of their being printed with the normal edition, in order to reduce the cost.
- (vi) The words "Special Edition showing Village Boundaries" should be entered before the sheet number in the right-hand top margin; and if they have not been surveyed on the ground, a note should be added below the standardized foot-notes, explaining the symbols used for village boundaries and trijunction pillars, and that the village boundaries have been entered from information supplied by the local Government.
- (vii) Both these operations will be carried out in the Photo.-Litho. Office and no accessory work should be drawn or typed on the village boundary blue print, but the special foot-note should be drafted by the officer in whose office the village boundaries are drawn and entered in the Publication Instructions of the sheet.

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FOR PUBLICATION

470. Instructions for the disposal of records.—

Serial No.	Description of Record.	Disposal as regards Party.	Disposal as regards Circle Office.
<i>(a) Records brought in by surveyor.</i>			
1	Plane-table section ...	Accompanies fair sheet	Filed in Circle office.
2	Village register ...	Ditto	Destroyed when sheet is published.
3	Colour trace ...	Ditto	
4	Height trace ...	Ditto	} Filed in Circle office with the copy of the History Sheet.
5	Clinometer height book ...	Ditto	
6	Note book, if any ...	Ditto	} Destroyed when sheet is published.
<i>(b) Records prepared in office.</i>			
7	Working plan or guide ...	Accompanies fair sheet	} Destroyed when sheet is published.
8	Typers' guide ...	Ditto	
9	Contour value guide ...	Ditto	
10	Green tree guide ...	Ditto	
11	Examination register ...	Ditto	Filed in Circle office.
12	Sheet file ...	Remains in party office	.....
13	Publication Instructions, and History Sheet, with copies of all correspondence, traces, &c., relating to the boundaries and referred to in the History Sheet.	One copy remains in party office.	One copy filed in Circle office, one copy to Director, Map Publication, with fair sheet.
14	Edge traces ...	Accompany fair sheet	Filed in Circle office.
15	Area statement on from O. 9 R. (a).	Ditto	One copy filed in Circle office, one copy to Director, Map Publication, with fair sheets.
16	Copy of area statement as entered on sheet.	Ditto	To Director, Map Publication, with fair sheets.

(c) *Old Records.*

Plane-table sections of previous surveys, unless of historical importance, may be destroyed under orders of directors when the area in question has been covered by modern surveys on the same or larger scale.

(d) *Records appertaining to boundaries.*

- (i) Notwithstanding anything to the contrary in the above paras., all records dealing with an exterior boundary of India will be kept indefinitely in the circle office.
 - (ii) In addition, if the plane-table section is damaged or in any respects illegible, such records as the circle director may think necessary should also be kept.
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SECTION XIV.

OFFICE COPIES AND REISSUES

471. Office copies.—The following detailed orders regarding the maintenance of office copies supplement para. 48 of Chapter I, Topo. Handbook (1932).

472. Corrections to be repeated on maps of the same area.—

- (a) Corrections made on a map of one scale should be repeated on all maps of the same area, as suitable to their scales, though a simple reference to the corrections on the larger scales may be sufficient in some cases.
- (b) Additions or corrections to detail on small scale maps should not be enlarged for entry on larger scale maps without very careful consideration as to their probable accuracy after enlargement, and should then only be accepted on the approval of the head of the office or of a responsible officer specially deputed for the purpose.
- (c) For new or revised editions, the office copies of all scales covering the area should be consulted.

473. Corrections from forest maps.—The Circle Director will be responsible for incorporating into reissues of topographical maps of his circle all changes in forest names, boundaries, and other detail collected by the Forest Map Office. To this end the Chief Draftsman, Forest Map Office, should pass his office copies to the Circle Director concerned, whenever they are corrected by important changes notified by forest officers. As regards the provinces of Assam, Bihar & Orissa, Punjab and Burma, which do not correspond with the Forest Map Office, Circle Directors or field parties should keep direct touch with the forest departments concerned.

474. Corrections from cantonment and guide maps.—The Circle Director will also be responsible for correcting his office copies against cantonment maps and guide maps published subsequent to the topographical survey.

475. No. 1 Drawing Office office copies.—

- (a) On the office copy of each sheet kept in No. 1 Drawing Office, will be noted all additions and corrections that have been brought to notice by gazettes, and by communications from the Public Works Department, Railway Board, &c.

- (b) For this purpose the Office Copy Section of No. 1 Drawing Office maintains maps, generally on the one-inch scale, made into sets by "districts" or "Irrigation Circles". These sets are sent annually to the Public Works Department authorities in each province (in the case of Indian States to the Political Officers), and are returned by them in due course with corrections and additions entered thereon. The information thus received is entered on the office copies maintained in No. 1 Drawing Office, and the sets are returned to the Public Works Department, &c., authorities for the next year's corrections and additions.
- (c) It is important to advise Circle Directors as early as possible of any important changes brought to notice by this system. No. 1 Drawing Office should therefore send its largest scale office copies which show such changes to the Circle Director interested, as soon as the corrections have been marked up. The Circle Director will note the changes on his own office copies, and decide whether they may be accepted as they stand, or whether they should be verified in the field. When returning office copies to No. 1 Drawing Office he should advise the Director, Map Publication as to the extent to which the changes may be accepted for topographical or geographical maps, and state when he expects to carry out verification in the field if this is necessary. Office copies thus sent out to circles should be returned to No. 1 Drawing Office as soon as possible, and where verification is necessary, a note should be entered against the item on the office copy. The Officer in Charge of the Circle Drawing Office or independent unit will maintain an index map on a reasonably large scale showing all material requiring verification. This index should be passed annually in April each year by the Circle Director to Officers in Charge of Parties to enable them to prepare their programmes of correction surveys.

476. Circle office copies.—On the office copy kept up in the circle office will also be noted all information regarding additions and corrections that comes to the knowledge of the director. His information will be derived for the most part from local sources, and will generally refer to such matters as changes in the relative importance of villages, the construction of new roads, alterations in the courses of rivers, the opening of new post offices, and the like. The Circle Director should also enquire from the local authorities whether any new police station, dāk or inspection bungalows have been opened. Symbols for roads may

be altered in accordance with the latest "Conventional Signs" table when the Circle Director is in a position to obtain the necessary information.

477. Edges of sheets to be examined on publication.—On first receipt of published sheets directors or officers in charge of offices in which the fair sheets were drawn, will invariably examine the edge of these sheets with any adjoining published sheets on the same or different scales, and will note any discrepancies on their office copies.

478. Non-adjustment of edges.—The reason for any non-adjustment of edges mentioned in paras. 173 and 174 should be entered on all office copies, the History Sheets being examined for this purpose.

479. Disposal of office copies of superseded editions.—When a new or revised edition of a map is published, the office copies of the superseded edition (together with appliqué slips, &c., if any) maintained in No. 1 Drawing Office and the circle office should be lodged in the Map Record and Issue Office and the circle office respectively.

480. Procedure when stock of a sheet gets low.—When the stock of a sheet gets low the Officer in Charge, Map Record and Issue Office, submits an indent for its reissue to the Director, Map Publication, who will then send No. 1 Drawing Office's office copy to the Director or Officer in Charge of the independent unit concerned even if no corrections are shown on it. The latter will decide, after adding any corrections from his own office copy, whether any corrections are of sufficient importance to necessitate their verification in the field before the sheet is reissued. He will also inform the Director, Map Publication, if there are any new surveys in the area which should be incorporated in the reissue. The Director, Map Publication will decide whether a new or revised edition is to be issued and in the latter case the Circle Director or Officer in Charge of the independent unit will ordinarily be responsible for the preparation of the revised edition.

481. Verification of changes.—As a rule only new railways, canals, important main roads, and boundaries will be verified in the field, while minor topographical changes will be ignored; minor changes not affecting the topographical detail such as changes in names, the addition of new post and telegraph offices, &c., may be accepted without verification in the field. The Circle Director, having approved of the corrections, whether based on verification or not, will return the office copy to the Director, Map Publication, who will decide whether the corrections are sufficiently numerous to necessitate the fair sheet being sent

to the Circle Director. After the corrections have been made the sheet will be published as a new or revised edition. Changes in, or additions to, topographical detail, which have not been departmentally verified in the field should not be entered on plane-table sections, but, except on transfrontier sheets, should be entered on the original fair sheet in red, under the orders of the Circle Director; and the fact that they have been obtained from extra departmental sources, and have not been verified in the field should be explained in a special foot-note on the following lines:—

“The.....railway branch has been entered from information supplied by the Railway Board.”

Verified changes and changes in transfrontier areas will be entered in black on the fair sheet.

482. Rivers changing course.—In Assam, Bengal, Bihar and the Punjab, rivers continually change their courses. Valuable information about these can often be obtained from local officials, settlement surveys, and air surveys. This information, though useful, is seldom sufficiently complete to warrant the redrawing of a topographical map. In such cases the new position of the main banks of a shifting river should be shown by heavy broken lines, with the note “Approximate course of the.....River in 19 ” typed alongside the new banks. Another note, *viz.* “Area liable to continual change owing to shifting of river-bed” should be typed across the area concerned in the body of the map. Both the above notes and the broken bars, showing the new alignments of the river banks, are to appear in blue on the printed map. The source of information about the new course of the river should be given in a special foot-note, thus:—

The approximate course of the.....River is taken from.....Surveys of 19.....

483. New editions, &c., of compiled sheets.—The correction of compiled fair sheets will be done from the office copies described in para. 472 or from reductions of the latest editions of the component sheets.

484. Procedure when component sheets are out of date.—It may happen that when a new edition of a compiled sheet is called for, some of the component sheets have not been corrected for a long time; the Circle Director will then decide on one of the following courses:—

- (a) To advise that the fair sheet be reprinted as it stands. This course will be adopted when the office copy corrections to the component sheets are of no importance.
- (b) To check in the field all important additions and corrections that are shown on the office copies of the component sheets and to incorporate these on the compiled sheet before issuing the next edition. In

this case the sheet will be classified as a "new edition", or a "revised edition" if the additions and corrections are numerous, each case being decided by the Director, Map Publication, and will bear the imprint note used with new or revised editions of the component sheets.

- (c) To rule that some, or all of the component sheets must be resurveyed before a new edition of the compiled sheet can be prepared. In this case he would probably advise that a small reprint of the existing edition (see sub-para. (a), above) should be made so as to provide a stock for issue to the public in the meantime.

Under analogous circumstances these orders will apply to all departmental maps.

485. Reissues of old style sheets.—In preparing the reissue of an old style sheet, it is essential that the modern or old style sheets, as the case may be, which adjoin it on all four sides, be consulted, in order to ensure correct junction of the graticule lines, as well as to obviate a gap or repetition of 2' 27" in longitude between old and modern work. To secure uniformity of treatment the following rules are given for guidance.

486. Complete old style sheet.—

- (a) No "revised editions" will be made, but reprints or new editions in old style, in black, or black and brown, will be issued as required. Office copy corrections, reprint note, old and modern sheet numbers, and indexes will be added.
- (b) When a modern sheet adjoins the western edge, a strip of 2' 27" in longitude will be cut off.
- (c) When a modern sheet adjoins the eastern edge, a strip of 2' 27" taken from the old style superseded sheet to the east of it, must be added. In the meantime, if the public calls for copies of maps under this category, the superseded sheet to the east which contains the gap of 2' 27" will be supplied free by the Map Record and Issue Office, and an early opportunity should be taken of preparing a corrected edition of such a sheet.

487. Old style sheets partly superseded by modern sheets:—

- (a) Where a modern sheet supersedes the eastern half, and the adjoining sheet to the west is an old style sheet, the remainder of the sheet should be published in old style in black, or black and brown, with modern numbering and index to modern sheets, thus:—72 D/12 and part of D/8. This means that the remaining western half is increased on its eastern edge by 2' 27".

- (b) Where a modern sheet supersedes the western half, and the adjoining sheet to the east is an old style sheet, the remainder of the sheet should be published in old style in black, or black and brown, with modern numbering and index to modern sheets. This means that the remaining eastern half is diminished on its western edge by 2' 27".
- (c) In both (a) and (b) the old meridian lines will be retained; the old provincial numbering will be typed in brackets after the modern number; and, in addition to the index to modern sheets, the provincial numbers of sheets which adjoin and still exist, will be shown on a separate index to facilitate reference to the existing old style sheets which have not been superseded. Where adjoining old style sheets have been superseded by sheets in modern style, an asterisk will be substituted for the number with the explanation below the index to old style sheets: "*Published in modern style". Sheets will be published in old style without change of symbols in black, or black and brown. In cases where village names have been typed on the margins, such of these as still exist on the amended sheets will be retained and fresh numbers given. Sheets under (a) and (b) will be marked "Provisional".
- (d) Colour patterns for machine-printing of boundary ribands will be prepared for all sheets mentioned in paras. 486 and 487, except when such sheets require hand-colouring.
- (e) Where modern publications exist on both sides of a partly superseded old style sheet, the remaining portion will be printed in old style in black, or black and brown. The portion of the old style sheet will be cut out and prepared as an original upon the modern graticule by cutting 2' 27" from its western edge and adding 2' 27" from the adjoining superseded old style sheet to its eastern edge. The sheet should be given a modern number and index and the old style reference foot-notes will be used. The old imprint, with reprint note added, will remain.

488. Old style sheets dealt with in No. 1 Drawing Office.—All old style sheets will be dealt with in No. 1 Drawing Office, and paras. 473 and 474 will not apply in these cases; No. 1 Drawing Office office copies should, however, be sent to the circle director concerned to scrutinize, confirm, or supplement the corrections noted on them.

489. Completing old style sheets to edge.—If any old style sheet is not completed to edge, and ready means exist of

supplying the missing part, it will be completed in No. 1 Drawing Office, but available material is to be accepted as it stands, and nothing in the nature of an adjustment attempted; a foot-note should be added to show what material has been used to complete the sheet up to edge. Reprints and new issues should bear a foot-note stating, if it is the case, that information obtained from extra-departmental sources has been added, *e.g.*—

“Reprinted in 19.....with additions and corrections from extra-departmental information.”

490. Classification and numbering of editions.—For orders regarding classification and numbering of editions, see paras. 43 to 47 of Chapter I, Fifth Edition, (1932).

SECTION XV.

STANDARDIZED AND SPECIAL FOOT-NOTES

491. Indentation of first line.—In all foot-notes, references, &c., on a map, the first line of each note or paragraph will be indented one *em*, thus:—

Tahsil boundaries are approximate.

Boundaries are undemarcated and approximate and are not to be taken as any authority in settling tribal disputes.

492. Standardized foot-notes.—The following standardized foot-notes for one-inch, half-inch, and quarter-inch sheets are printed on their respective sheets unless changes or omissions are specially asked for in the Publication Instructions of the sheets. See para. 453.

(a). ONE-INCH SHEETS.

Contour intervals 50 feet.

Water features are shown in blue where they generally contain water.

Cultivated areas are coloured yellow.

The exterior boundaries of areas of State, Reserved, or Protected Forests are shown by green ribands.

Contours are approximate.

A relative height, *.25r*, represents the approximate height, in feet, between the top and bottom of a steep slope.

Trees and other vegetation are in green, but prominent surveyed trees are in black.

(b). HALF-INCH SHEETS.

Contour intervals 100 feet.

Water features are shown in blue where they generally contain water.

Large cultivated areas are coloured yellow.

The exterior boundaries of areas of State, Reserved, or Protected Forests are shown by green ribands.

Contours are approximate.

A relative height, *.25r*, represents the approximate height, in feet, between the top and bottom of a steep slope.

Trees and other vegetation are in green, but prominent surveyed trees are in black.

(c). QUARTER-INCH SHEETS.

Contour intervals 250 feet.

Water features are shown in blue where they generally contain water.

The exterior boundaries of areas of State, Reserved, or Protected Forests are shown by green ribands.

Contours are approximate.

A relative height, *.25r*, represents the approximate height, in feet, between the top and bottom of a steep slope.

Trees and other vegetation are in green, but prominent surveyed trees are in black.

There are also standardized foot-notes for transfrontier half-inch and quarter-inch sheets.

493. Special foot-notes.—Special foot-notes are frequently necessary and these should be drafted to suit each particular case and entered in the Publication Instructions in the actual words in which they are to be printed. Below are given a few examples of such foot-notes. The list is by no means exhaustive, and directors of circles are invited to send to the Director, Map Publication, any additional forms of foot-notes that they may consider should be included in the list. References in these foot-notes to the body of the map should not be made to map squares, as these will not appear in gridded editions. Special foot-notes should not be entered unless they give information of real value. They should be grouped according to subjects and should be carefully punctuated.

(a) *Areas added from other maps.*

- (i) The area in which hill features are shown by form-lines has been compiled from sheet No.....*
- (ii) Allahābād town has been compiled from two-inch topographical surveys, 1901-03, and Mirzāpur from 16-inch cadastral surveys, 1877-81 and 1885-86.
- (iii) With additions from 16-inch surveys executed by the Land Records Department in 1904-05.

(b) *Bathymetric contours.*

The five- and ten-fathom lines have been taken from Admiralty Chart, No.....(or name), dated 1879, with corrections to 1904.

(c) *Bench-marks.*

Bench-mark values have been taken from the old reveenu survey maps.

(d) *Magnetic declination.*

This area is magnetically disturbed and the declination given may differ $\frac{\text{largely from the actual value}}{\text{from the actual value by as much as}}$.

(e) *Boundaries.*

- (i) Boundaries are approximate.
- (ii) Tahsil boundaries are approximate.
- (iii) Boundaries are undemarcated and approximate and are not to be taken as any authority in settling tribal disputes.
- (iv) Amsam and Desam boundaries in.....are approximate.
- (v) The district boundary along the Indus River is approximate.
- (vi) The boundary in the Jhelum River is approximate.

*Note:—See also para. 23; reference should be made to actual surveys when possible; but in cases where it is only possible to refer to a map, the full title of the map should be given, with scale and date.

(vii) The northern boundary of the Usterāna tribal area is approximate.

(viii) The district boundary between Zhob and Loralai is approximate.

(ix) The Bannu district boundary from..... to..... is approximate.

(x) The boundary between Manglon and the Wa States has not been defined.

(f) *Boundary pillars.*

Site of boundary pillar not found at time of survey :—
.....

(g) *Railways.*

The.....railway branch has been entered from information supplied by the Railway Board, and has not been surveyed by the Survey of India.

(h) *Wells.*

(i) Lined (or unlined, as the case may be) wells are numerous in the southern half of the sheet.

(ii) Numerous lined wells exist throughout the cultivated portions of this sheet.

(i) *Perennial water.*

The accuracy of the information regarding perennial water on this map is not guaranteed and must not be accepted without further investigation.

(j) *Canals.*

(i) Canal distance-stones are 1,000 feet apart, and every fifth stone is shown.

(ii) A relative height, e.g. 20r, marked along a canal, indicates the height of the top of the canal embankment above the adjacent country.

(iii) Roads fit for wheeled traffic, and avenues of trees, exist along all main and branch canals and distributaries in this sheet except (here detail any exception)..... Permission to use these roads is required from the Irrigation authorities.

(k) *Cultivation.*

Periodical cultivation dependent on rainfall occurs in the southern half of the sheet, with numerous field bunds of less than 5 feet in height.

(l) Glaciated regions.

In $\frac{\text{this sheet}}{\text{the area shown by form lines}}$ the height of the snow line is about 16,000 feet.

(m) Rivers.

The course of the.....river has altered so greatly since the previous survey that adjustment of edges is not possible.

SECTION XVI.

BOUNDARY RIBANDS

494. Colouring of boundaries.—Copies of all departmental maps, except those layered, will have their boundaries coloured in accordance with the following rules.

495. External boundary of India.—There is no special coloured riband to denote the external boundary of India. The appropriate province or state riband will be used.

496. Undemarcated boundaries.—

- (a) Where a boundary is undemarcated, and the undemarcated boundary symbol is shown on the map, a broken colour riband of the appropriate colour will be used. For the external boundary of India, and for the boundaries of provinces and states, an undemarcated boundary symbol is provided; but for minor boundaries there is no special undemarcated symbol. Such minor boundaries, if not strictly accurate, will have the word "Approximate" typed along them, but on maps of all scales they should have a continuous, and not a broken, riband of colour, unless they are purely conjectural or very roughly defined.
- (b) The broken riband along an undemarcated boundary will have each space the length of one bar and a cross of the symbol, and each bar of colour will be twice that length.

497. Colour of ribands.—

- (a) All boundaries that appear on a map that is to be coloured are to be shown by ribands of colour in accordance with the table in para. 502 below. On layered editions, however, these ribands will be omitted.
- (b) When the exterior boundary of an area of reserved, &c., forest coincides with any other boundary, the riband or ribands of the latter must be placed so as to avoid being superimposed on the green forest riband. The green forest riband should be omitted where it coincides with an administrative riband of the same colour.

498. Position of ribands.—In order to comply with para. 497 the following rules will be adhered to:—

- (a) The crimson (alizarin) cantonment, &c., riband (para. 503 below), and the green forest riband (para. 504 below) will always be placed on the inside of their boundary symbols.
- (b) Other single ribands will be placed on the boundary symbol, but if they coincide with any of the ribands mentioned in sub-para. (a) above, they will be placed on the opposite side of the symbol.
- (c) If the boundary ribands mentioned in (a) above coincide with a double riband, that riband which would fall on the same side of the boundary as the ribands mentioned in (a) should be placed on the inner side of the ribands mentioned in (a).

499. Width of ribands.—The following will be the widths of boundary ribands when these boundaries are coloured:—

- (a) External of India or international, two ribands, each $\frac{5}{8}$ inch.
- (b) Province, or state of provincial status, two ribands, each $\frac{3}{8}$ "
- (c) Districts, and states of similar status, or tribal areas which are not part of any district, two ribands, each $\frac{2}{8}$ "
- (d) Subdivision or other administrative partition of a district or subdivision of an Indian State of district status for which the district boundary symbol is used; small state forming one of a group, total width $\frac{2}{8}$ "
- (e) *Thānas*, estates or similar boundaries or subdivisions of Indian states for which the *tahsil* boundary symbol is used, total width $\frac{1}{8}$ "
- (f) Exterior boundary of areas of reserved, &c., forests $\frac{1}{8}$ "

500. Light colours to be used.—Light colours should be used, especially in the wide ribands, to avoid obscuring detail and to improve the appearance of the map.

501. Ribands along rivers.—When single or double ribands are necessary along a boundary in the bed of a river, or along a perennial stream shown by a single line, it is permissible to enter a riband on each bank in the case of a double riband and on either bank in the case of a single riband if the character of the river would be obscured by placing the riband or ribands along the boundary symbol.

502. Province, &c., colours.—The following colours will be used, *vide* Chapter I (1932) para. 54.

<i>Country or Province.</i>	<i>Colour riband.</i>
Afghanistān	Light Blue.
Ajmer-Merwāra	Green (Viridian).
Assam	Indigo.
Baluchistān	Green (Viridian).
Bengal	Do. do.
Bihār and Orissa	Bluish Purple.
Bombay	Do. do.
Burma	Burnt Sienna.
Central Provinces	Indigo.
Ceylon	Reddish Purple.
China	Bluish Purple.
Coorg	Green (Viridian).
Delhi	Do. do.
Foreign Possessions in India	Viridian green lightened by Aureolin yellow.
French Indo-China	Do.
Indian States, and tribal areas	Yellow.
‘Irāq	Green (Viridian).
Madras	Burnt Sienna.
Nepāl	Indigo.
North-West Frontier Province	Bluish Purple.
Persia	Burnt Sienna.
Punjab	Indigo.
Siam	Do.
U. S. S. R.	Reddish Purple.
Tibet	Green (Viridian).
Turkey in Asia	Indigo.
United Provinces	Burnt Sienna.

503. British enclaves in Indian States.—A crimson (alizarin) riband, $\frac{2}{8}$ -inch wide, should be shown inside, and a yellow riband, $\frac{2}{8}$ -inch wide, outside the boundaries of all areas leased or assigned to the Government of India, which fall within Indian states, and which are not administered by any province or presidency, for which a distinctive colour has been laid down (such areas are usually cantonments). Where a portion of the boundary of such an area is conterminous with the boundary of a state or a district of the

state in which the area lies, that portion of the boundary will have ribands of appropriate colour and width, with $\frac{2}{80}$ -inch crimson (alizarin) riband placed inside, as explained in paras. 498 (b) or (c).

504. Reserved, &c, forests.—The exterior boundaries of the areas of reserved, protected, and state forests will be coloured by a green riband. The common boundaries between forests under entirely different ownership (*e.g.* between British Reserved Forests and State Forests) should be considered as exterior ones.

505. Areas comprising a unit of district status.—The outer boundary of a district must always be coloured with a riband of the appropriate provincial colour.

(a) A district may include any, or all, of the following areas:—

- (i) Purely British territory.
- (ii) Areas under permanent British Administration.
- (iii) Tribal areas administered by the district officers.
- (iv) Indian states administered by the district officers.
- (v) Outlying portions of another district, in the same province.
- (vi) Outlying portions of a state or a district of some other province; outlying portions of some other Indian state of provincial status.
- (vii) Outlying portions of Indian states or unadministered tribal areas in the same province.

(b) The colouring of the most recent edition of the 32-mile map of India and Adjacent Countries must be accepted as the authority for the definition of the areas Nos. (i) and (ii) above; on this map, No. (i) is coloured with a red and No. (ii) with a pink tint; this map also differentiates between areas Nos. (iii) and (iv), for although they are both coloured with a yellow tint, the latter are enclosed by a riband while there is no riband dividing the former from the district of which they form part. In case of doubt as to areas No. (iii), reference should be made to the Imperial Gazetteer.

(c) The colour ribands to be placed along the boundaries separating the areas mentioned in para. 505 (a) are as follows:—

- (i) One riband, provincial colour, total width $\frac{2}{80}$ -inch between (i) and (ii).
- (ii) Two ribands, provincial colour and yellow, each $\frac{1}{80}$ -inch, between (i) and (iii), (ii) and (iii), (i) and (iv), (ii) and (iv).

- (iii) One riband, yellow, total width $\frac{2}{80}$ -inch, between (iii) and (iv).
 - (iv) One riband, provincial colour, total width $\frac{4}{80}$ -inch, between (v) and (i), (v) and (ii), (v) and (iii), (v) and (iv).
 - (v) Two ribands, provincial colours, or yellow and provincial colour, each $\frac{5}{80}$ -inch, between (vi) and (i), (vi) and (ii), (vi) and (iii), (vi) and (iv), (vi) and (v), (vi) and (vii).
 - (vi) Two ribands, yellow and provincial colour, each $\frac{2}{80}$ -inch between (vii) and (i), (vii) and (ii), (vii) and (iii), (vii) and (iv), (vii) and (v).
-

SECTION XVII.

ADMINISTRATIVE PARTITIONS ON
TOPOGRAPHICAL MAPS

506. Administrative partitions.—Owing to the wide differences that exist between Indian states in the nomenclature, character, and size of the classes of administrative areas into which they are divided, it has not been found practicable to lay down definitely for all cases how, and to what extent, such administrative partitions should be shown on our maps.

507. Three methods of showing.—We have three normal methods of showing the different classes of administrative partitions:—

- (a) The central heading.
- (b) The district heading.
- (c) Spaced names across the map.

508. Central heading.—The names to appear in the central heading are enumerated in the Border Specimen and in Section XVIII.

509. District heading.—The heading in the left-hand top margin is known as the District Heading: the following names usually appear in it:—

- (a) Districts of British India.
- (b) Partitions of the great Indian states whose names appear in the central heading, when the partitions correspond to British districts.
- (c) Indian states whose names do not appear in the Central Heading and which are not themselves petty states even though they may be included in an agency containing petty states. In the latter case a special footnote should be entered explaining the administrative connection.
- (d) When portions of a number of petty Indian states that are not grouped into agencies fall within a sheet, if there is not room in the district heading for their names, the names may be omitted from the heading, and a general term, *e.g.* "Simla Hill States", substituted for them.
- (e) Agency names (such as 'Eastern Kāthiāwār', 'Southern Shan States', &c.) in the case of petty Indian states which are grouped into agencies.

- (f) Foreign possessions in India, and the special province of Delhi, which have no partitions.
- (g) Administrative areas (such as 'Khyber Agency', 'Sadiya Frontier Tract', &c.,) in the case of tribal areas which are grouped, for administrative purposes, into separate agencies. Tribal areas which are not grouped into agencies, or which are not partitions of a regular British district, should be designated by a general term such as 'Tribal Territory', which may be qualified by the name of the locality or the tribe entered in brackets, provided such names are officially recognized and give true and useful information; such locality or tribal name should not appear in the administrative index. In Burma and in the adjacent areas of Assam, the term "Tribal Area" should be used in preference to "Tribal Territory".
- (h) Provinces (or major partitions) of foreign countries, provided the portions of these comprised in the sheet are wholly or partly mapped, even from material of an inferior survey value. (See para. 515).

510. Spaced names across the map.—The following names usually appear as spaced names:—

- (a) Partitions of districts of British India, in accordance with para. 250.
- (b) Sub-partitions of the partitions of the great Indian states, mentioned under para. 509 (b) above.
- (c) Important partitions of the Indian states whose names appear in the district heading, (*vide* para. 509(c) above).
- (d) Petty Indian states, or sub-states, whose names do not appear in the district heading under para. 509 (d) or (e) above.
- (e) Indian states (*vide* para. 509 (c) above), containing no internal subdivisions.
- (f) Names of foreign countries and their administrative partitions under the special rules detailed in para. 515.

511. Procedure when more classes of partitions have to be shown.—If, as is generally the case, there are, in Indian states (other than those whose names appear in the central heading), more classes of administrative partitions than can be shown by the methods described in paras. 508 to 510 above, then those which are not of general importance may be neglected in the same way as divisions (commissionerships) of British India are now neglected on our maps: but if the Director of the Circle considers that it is advisable to show more classes of partitions than can be shown by the methods described in paras. 507 to 510 above, one

more class of partition can be shown in the following manner (always assuming that the boundaries have been surveyed):—

- (a) Instead of entering the same state names in the Administrative Index at the foot of the map as appear in the district heading, the names of their major partitions should be entered in the administrative index and, in addition (unless the whole sheet falls in one state), the name of each state appearing in the district heading, or its initial or abbreviation (if no room for full names), will be entered, within brackets, underneath the names of these major partitions in the administrative index (see Border Specimen). The names of the minor partitions which are required to be shown will, in such cases, be typed across their areas on the map, but in such a manner as not to give them undue importance.
- (b) This method should not ordinarily be used in the case of petty states which are grouped into agencies. The names of such states should be shown spaced across their areas on the map, and their partitions should be neglected.
- (c) When the names of Indian states, or those of their major or minor partitions, appear in the body or borders of the map, and there is doubt as to the administrative status of any area to which the names refer, the term denoting its administrative status may be inserted after the name.

512. Complicated systems of sub-states.—The principles explained above in paras. 507 to 511, the instructions conveyed in the Border Specimen as amended from time to time, and in paras. 250 to 258 of this Handbook will be found sufficient in a large number of cases; where, however, owing to the existence of a complicated system of sub-states or of some other exceptional administrative system in Indian states, directors are doubtful as to the procedure that will best suit the case, the matter should be referred to the Director, Map Publication, for his advice in order that as much uniformity as possible in the circumstances may be obtained.

SECTION XVIII.

NAMES TO APPEAR IN THE CENTRAL HEADING
OF TOPOGRAPHICAL MAPS, AND SPECIAL
RULES APPLICABLE TO SUCH MAPS AS
WHOLLY OR PARTLY FALL IN ANY
OF THE FOREIGN COUNTRIES
ADJACENT TO INDIA

513. General rules for central heading.—

- (a) All names in the central heading will be entered in alphabetical order, in one or more lines as may be necessary.
- (b) The length of the longest line should never exceed eight inches.
- (c) The names should be hand-printed in light blue on the outline original drawing in their correct order and position on the map.

514. List of names for central heading.—The following names will appear in the central heading:—(a) *In India.*

	Abbreviation	A.-M.
AJMER-MERWĀRA.....	..	A.
ANDAMAN AND NICOBAR ISLANDS.....	..	A.
ASSAM.....	..	B.
BALUCHISTĀN.....	..	Ba.
BARODA.....	..	B.
BENGAL.....	..	Be.
BERĀR.....	..	Bn.
BHUTĀN.....	..	B. & O.
BIHĀR AND ORISSA.....	..	Bo.
BOMBAY.....	..	Bu.
BURMA.....	..	C. I.
CENTRAL INDIA.....	..	C. P.
CENTRAL PROVINCES.....
*CHANDERNAGORE		
COORG.....	..	C.
*DAMĀN		
DECCAN STATES.....	..	D. S.
*DELHI		
*DIU		
EASTERN STATES.....	..	E. S.
GILGIT AGENCY.....	..	G. A.
*GOA		
GUJARĀT STATES.....	..	G. S.
QWALIOR.....	..	G.
HYDERĀBĀD.....	..	H.
*KĀRIKĀL		
KASHMĪR AND JAMMU.....	..	K. & J.

* No abbreviations are needed in the Administrative Index for the names of these territories as they have no partitions; the names will appear in the district heading and in the Administrative Index, as well as in the central heading.

SECTION XVIII.—NAMES IN THE CENTRAL
HEADING

MADRAS.....	Abbreviation M.
MADRAS STATES.....	" M. S.
*MAHÉ.....	"
MYSORE.....	" My.
N. W. FRONTIER PROVINCE.....	" N. W. F. P.
*PONDICHERRY.....	"
PUNJAB.....	" P.
PUNJAB STATES.....	" P. S.
RĀJPUTĀNA.....	" R.
SIKKIM.....	" S.
SIND.....	" S.
STATES OF WESTERN INDIA.....	" S. W. I.
UNITED PROVINCES.....	" U. P.
*YANAM.....	"

(b) *Foreign countries outside India.*

AFGHĀNISTĀN.....	Abbreviation A.
CEYLON.....	" C.
CHINA.....	" C.
INDO-CHINA.....	" I.-C.
'IRĀQ.....	" I.
NEPĀL.....	" N.
PERSIA.....	" P.
SIAM.....	" S.
U. S. S. R.....	" U. S. S. R.
TIBET.....	" T.
TURKEY IN ASIA.....	" T. A.

515. Sheets falling in foreign countries.—The following rules apply to topographical maps of which either the whole or a portion of the sheet falls in any of the foreign countries detailed above:—

- (a) If the map comprises portions of one or more foreign countries only (and of no portion of India) and these portions are wholly or partly mapped, the name or names of these countries will be entered in the central heading; the names of the provinces (or major partitions) of these countries will be entered in the district heading and in the administrative Index, but not in the body or borders of the map; and the names (if known) of the districts (or corresponding sub-partitions) of the provinces (or major partitions) will be entered in the body or in the borders of the map.
- (b) If the map comprises portions of one or more foreign countries and portions of India also, and if the area of the foreign country has been wholly or partly mapped (even if from material of an inferior survey value to that from which the rest of the sheet has been drawn), the names of the foreign countries and of the provinces in India concerned will be entered in the central heading and will be treated as collateral; the successive sub-partitions of each being treated collaterally in the

* No abbreviations are needed in the Administrative Index for the names of these territories as they have no partitions; the names will appear in the district heading and in the Administrative Index, as well in the central heading.

district heading and the administrative index, and in the body or in the borders of the map, (*e.g.* "Afghānistān" and "N. W. Frontier Province" in the central heading; "Kābul Province" of the former and "Peshāwar District" of the latter in the district heading and in the administrative index: and the names of the districts of "Kābul Province" and of the tahsils of "Peshāwar District" spaced in the body or borders of the map).

- (*c*) If, however, in either of the cases detailed in (*a*) and (*b*) above, the area of any of the foreign countries is not mapped and is published entirely blank on the map, the name or names of such foreign countries should not be entered in the central and district headings, nor in the administrative index, nor in the borders of the map, but should be spaced in the body of the map. The name or names of the provinces (or major partitions) if known, (with the name of the foreign country in brackets, below or alongside) may replace the name of the foreign country. These spaced names need not necessarily be typed horizontally, but should be complete on each sheet.
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APPENDIX A.

*NOTES ON TYPING

1. Typing machines.—The typing machine, now in general use throughout the department, is a modification of the pattern used by the Ordnance Survey, known in India as the Southampton pattern. It consists of a small tripod stand with a socket, in which a tube, with the type holder connected, works. Impressions are produced by a direct stroke and not by pressure as was the case formerly.

2. Method of using—A typer's first care on receiving a machine should be to see that it is properly adjusted to suit his style of holding and stroke. He should then clear the holder of every speck of dust and nearly fill it with letters from the same fount, hold the machine firmly at the back with the left hand and strike the centre of the disc above the spring sharply with his right hand; the blow should be delivered with the outside of the little finger of the right hand and not with the palm, the movement being from the wrist. The improved pattern machines have small back guides which, when the holder shows any sign of lateral play, have only to be unscrewed and pushed forward. To have a machine adjusted for his own use, get familiar with and keep it, is, to a typer, a valuable aid to producing good work.

3. Typing ink.—Trade "Type ink" is never quite satisfactory for hand-typing on drawing paper, because of its lack of density, but good results can be obtained from a mixture of Shackell Edwards' Fine Black Proofing Ink and Winstone's Chalk Black Lithographic Ink. The proportion in which these should be mixed varies with climatic conditions and can only be determined by experiment. In Calcutta the best results are obtained by using equal quantities of the two kinds. In a dryer climate more of the proofing ink would be necessary, while in a moist climate the proportion of lithographic ink should be increased.

4. Reducing and testing ink.—Turpentine is not recommended as a reducer. One drop (not more) of oil of lavender may be used on a slab, but if the proportions are correct this will not be necessary. To test the quality of the mixture, a small quantity should be well rolled or spread on a glass slab with a roller or dabber. If the slab be held up against the light the ink, if the mixture is correct, will present an even opaque layer, free from lumps or brown patches. Another test is to type a few impressions on drawing paper, and lightly pass the tip of the finger over them.

If the ink is right it will not spread easily, and any smudging there may be will not be brown.

5. Slabs.—Glass slabs for ink are best, and these, like all other inking materials, should be kept as free from dust as possible; gritty ink never produces the best results; once, at least, during the day a typer should scrape the ink that he has been using from the slab and replace it by fresh ink. Keeping a slab on a small stool right away from the fair map table side not only safeguards the work, but there is much less chance of the ink being smothered with minute particles of paper which, especially when an erasure is being made, are very plentiful. After the ink is mixed, if the slab is held up to transmitted light, the ink should appear an even shade throughout and not patchy. Patchiness indicates that the ink has not been properly spread on the glass, and may result in the defects mentioned in para. 22 (c) and (d).

6. Dabbers.—Each unit should be responsible for its own dabbers; the handles can be “turned” locally, the composition being obtained on indent from the Director, Map Publication, and small moulds, either of china or brass, bought in the nearest *bāzār*. The composition should be cut up into small pieces and boiled in a vessel placed in a saucepan full of water so as to prevent burning. The boiling should continue just long enough to bring the material to a liquid state. The mould should be oiled very slightly and the handle hung in position over it; the boiling composition should then be skimmed with a spoon so as to remove any small air bubbles, and then poured into the mould: if the skimming is not attended to, the surface of the dabber when dry will be found to be full of small holes. The dabbers should be left in the moulds for at least twelve hours to ensure their setting properly.

7. Use of dabbers.—For good clean sharp typing soft dabbers are best; those which have been allowed to harden never distribute ink well, but put it on in blotches, thus making small “condensed” lettering unreadable when reduced. The dabber should be used with great care; when preparing ink, the handle should be moved about in small circles, the weight of the dabber and nature of the composition being quite sufficient to cause the ink to adhere properly. Dabbers, slabs and knives should be cleaned every evening, the two latter with a little turpentine, dabbers by rubbing lightly on a clean slab or paper to remove the ink and then washing with cold water only; the dabbers should not be dried but should be placed upside-down in a box with a lid and by next morning they will be found to be quite ready for use again.

8. Rollers.—As composition dabbers are difficult to make, and do not last long in good condition, many units prefer to use rollers made of soft red rubber, which the Mathematical Instrument Office will supply.

9. Tables.—A typer has a better chance of producing good work when working on a smooth hard material such as glass, zinc or slate, but a single thickness of blotting paper should always be kept between the paper and the glass or zinc plate. Thick zinc plates or plate glass, which can be obtained on indent from the Director, Map Publication, should be used. The zinc should always be kept covered with a smooth piece of thin paper, otherwise the back of a fair map will soon become soiled.

10. Composing.—With a pin or other sharp pointed instrument make sure that the type holder is clear of every speck of dust, hold the machine with the stand uppermost and the type holder showing in the left hand, start composing on the side away from the screw, all letters being placed with the nicks inside. Set the name in the centre of the holder by placing spaces to the right and left; in choosing spaces for this purpose reject any that have been used often as the "screw space," as they never rest flat in the machine and also cause a bad "set" to a name with the probability of a blurred impression. A good plan for "screw spaces" is to have a few of different sizes made from harder material such as brass; these can always be used to receive the screw and help to prevent bad composing. Observe the base of the letters and do not allow the slightest space between them and the holder to show; if one letter be higher than the rest, gently press it with a pencil as ink does not take readily after the hand has been on type, so pressing down with the fingers should be avoided. There is always a good supply of type in each fount and if a compositor keeps using the top letters in each division the result of his work will not be satisfactory; the letters in the tray should occasionally be stirred up so as to ensure the whole fount being in use.

11. Preparation of ink.—Always prepare ink for typing by gradually adding very small quantities to obtain the amount required; the practice of smearing too much on the slab and then trying to reduce it, is far from good and always leads to bad results. Experience soon teaches a typer how to prepare his ink. When starting a day's work it is always a good plan for the typer to have a small piece of paper similar to the fair sheet he is using; he should let it take the place of the fair sheet for a few moments, compose a name, and test under the same conditions as when working; he can then start on his fair sheet with confidence. "Grey" typing is bad, though it has a remedy in good "touching-up"; type which has been too heavily loaded with ink gives the worst results as the ink is sure to smear; an excess of ink should, therefore, be rigorously avoided.

12. Method of work.—All the names for which small type is prescribed in the section of work allotted to a typer for the day should be typed first and afterwards the larger lettering; large type

requires more ink than small, and to follow this plan gives an opportunity for ink to dry overnight with possibilities of smearing reduced to a minimum. To ink the name properly a typer should hold the machine in his left hand with the stand nearest to his body, the disc at the head of the spring resting on his third finger, then press upon the stand with his thumb, pushing the legs quite clear of the dabber and avoiding any possibility of their being covered with ink. The type should be pressed very lightly with the dabber as it is only the face of the type which requires inking; to force the dabber into the type or to use a scraping motion gives a patchy impression instead of sharp lettering.

13. Books for typers.—A small book should be kept near at hand to receive the first trial impression and thereby enable the typer to check each name for correct spelling and good condition of type; this also provides a good record of the daily outturn.

14. Guide lines.—With a few exceptions, names have to be typed parallel to the graticule lines which run east and west. The best way to ensure this is to draw fine guide lines right across the sheet in cobalt blue, about two inches apart. It is then possible to get true alignment of the machine by sighting one or other of its straight edges along the nearest guide line.

15. Care of type machines.—Special care should be taken that the machine is properly levelled, and for this purpose trial impressions should be taken; otherwise one end of a name will get a heavier impression than the other. A piece of thin roughish paper may be used under the feet of the machine to give a good grip and prevent any soiling of the fair map.

16. Making the impression.—When satisfied that the position is correct the typer should keep the machine fast with all possible pressure from the left hand, and should then strike sharply with a hard part of the right hand; the contact having once been made, continued pressure should not be resorted to in the hope of getting a better impression; usually this means a blurred result; on the other hand the holder should be prevented from snapping up by gently relieving the pressure and allowing it to rise slowly from the paper, thus giving the ink every possible chance of leaving the type.

17. Stroke.—A beginner generally finds difficulty at first in regulating his stroke; small names require only the slightest touch, while in large lettering it is almost impossible to hit too hard; with a little practice and sufficient confidence the difficulty will soon be overcome, and the typing will require little or no hand work on it afterwards.

18. Placing of names.—It should very seldom be found necessary to erase detail; if the placing of a name presents difficul-

ties, an impression should be made on tracing paper which should be moved about until the best parallel position is found, when the points at which the tops of the capitals and long letters fall should be pricked through with a very fine point; with careful watching and manipulation the name should not be out of position by a hair's breadth.

19. Curved names.—To type names on the curve the same course is followed as with straight ones; the curve desired should be marked very lightly in blue, then each letter should be fixed in turn in the holder, and, after its centre has been marked on the curved line, the impression should be made; practice alone will enable a typer to make letters fall in correct relationship to each other. If the position of a curved or spaced name has to be worked out, do it roughly on tracing paper first as the marking up of fair maps with many lines is very objectionable.

20. Importance of clean type.—The cleaning of type that has been used is a very important matter and on it a great deal of the success of typing depends. The impressions will never be clear and black unless the old and dry ink is removed from the face of the type, nor will they be fine if the face and hair lines of the type are destroyed by rough usage during the process of cleaning.

21. Cleaning type.—After an impression has been taken and before the type is removed from the holder, it can be cleaned by lightly passing over it a soft camel's hair brush dipped in turpentine and then dabbing it gently with a piece of soft leather; the type should not be returned to the case without being dried as far as possible; dust always lingers there and turpentine has enough sticking properties to cause the small particles to adhere. The typer should blow into the case occasionally with a pair of bellows to prevent the accumulation of dust. It should be remembered that if it is necessary to wipe the fresh ink off the type when in the holder, leather should be used and not cloth; the hairs from a rag get into the ink and spoil the impression by rendering it woolly. The typer should have by his side away from the map a little pot of turpentine, but turpentine should not be used if the type is to be used immediately afterwards as it takes time to dry, and the slightest trace of turpentine prevents the ink adhering to the type. If by neglect the old ink has become hardened on the letters they should be boiled in a pot in either a solution of soda or of caustic potash; the type should afterwards be set up on a typeboard and polished with a very soft brush dipped in the same solution; it should then be thoroughly rinsed with water to ensure all traces of the alkali being removed. A hard brush, or old tooth brush should never be used, nor should the face of the type ever be rubbed. The somewhat irksome duties of cleaning and sorting should never be neglected but should form part of the daily routine.

22. Faults to be avoided.—The principal faults to be avoided in typing are:—

- (a) Typing not parallel to graticule due to
 - (i) careless alignment against guide lines.
 - (ii) holder loose or out of parallel with machine base.
 - (iii) machine slipping.
 - (b) Bad alignment of letters due to
 - (i) careless composition.
 - (ii) old type.
 - (iii) dirty holder.
 - (c) Unevenness of impression due to
 - (i) machine not level.
 - (ii) dirty type or holder.
 - (iii) old type.
 - (iv) bad striking.
 - (v) bad mixing of ink.
 - (vi) uneven application of ink.
 - (d) Weak impressions due to
 - (i) bad set-up of type.
 - (ii) bad inking.
 - (iii) bad striking.
 - (e) Sunk impressions due to soft backing: no backing of paper at all is required for short words in small type, and never more than two sheets of blotting paper for the largest type.
 - (f) Constant erasures or corrections due to careless or inadequate typer's guides.
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APPENDIX B.

TRANSLITERATION OF VERNACULAR NAMES

1. Orthography of vernacular names.—The proper transliteration of vernacular names into English must be carefully attended to. For most parts of India, lists of names showing the proper spelling have been circulated by order of the Government, but these lists cannot embrace every name that the surveyor will meet with, and consequently he should be conversant with the system in use.

2. The Hunterian system.—The system of transliteration adopted by the Government of India, a modification of that proposed by Dr. Hunter, is given herewith. It must be in all cases strictly adhered to for the spelling of all names throughout India, with the exception of Burmese, Arabic, Tibetan, and Chinese names, and names in all trans-frontier countries for which special rules are issued. (See Section IV—Typing, and Appendix B paras. 5 to 8).

Note:—Accents will not, however, be used by the Survey of India for a final “a”, “i”, or “u”. The “a” in “gaon” and the “u” in “pur” are not accented.

3. Rules for transliteration.—Every letter in the vernacular must be uniformly represented by a certain letter in the Roman character as follows:—

(i). *Vowels.*

PERSIAN		DEVANĀGRI		Roman	Pronunciation
Initial	Non-initial	Initial	Non-initial		
ا	- or ؤ - (when at the end of a word)	अ	not expressed	a	As in woman.
آ	اَ	आ	।	ā	„ father.
اِ	-	इ	।	i	„ bit.
اِي	يَ or يِ	ई	।	i	„ machine.
اُ	ُ	उ	.	u	„ pull.
اُو	ُو	ऊ	.	ū	As in rude.

Note.—It should be noted that when the letter ‘i’ is accented, the dot should not be entered, and that the letters ‘e’ and ‘o’ are not accented.

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NAMES

(i). Vowels—(Conclud.).

PERSIAN		DEVANĀGRI		Roman	Pronunciation
Initial	Non-initial	Initial	Non-initial		
ا	* اے ی ی also اے ی	ए	ँ	e	„ grey or French 'allé'.
آ	آ or آ	ऐ	ँ	ai	As in aisle or rhyming with the English 'high'.
او	و	ओ	ँ	o	As in hole.
آو	ز	औ	ँ	au	As ou in house (nearly), being a combination of the a and u above.
ع	ع ع ع			† (inverted comma)	Guttural, slightly aspirated.

* اے or اے should always be transliterated 'e' except when it forms, with Hamza ء, a "Ya-i-izafati" (or "joining" Ye), e.g. :— چشمهٔ مالک = Chashma-i-Mālik (not Chashma-e-Mālik). The letter 'i' should be used unaccented in such cases, as it is in accordance with usage.

Nouns in Pashto and other oriental languages frequently end in اے ی or آ. The first two forms of the vowel rhyme with the e in 'allé' (French). The last rhymes with the i in 'high'. If the letter e is kept for the final اے ی (or é) and ai for the final آ, no difficulty will be found in pronouncing these vernacular sounds e.g. :—(1) Kile, Khidze, Tale, etc. (2) Tanai, Patai, Orakzai, etc.

† The letter ع (ain) is generally accompanied by vowel a, i, or u, and sometimes o. To avoid confusion with detail due to the use of diacritical marks, the '(inverted comma)' for 'ain' is not to be entered in the body of maps. Only the correct vowel a, i, u, or o should be used and the '(inverted comma)' omitted. In all other cases the '(inverted comma)' should be used.

(ii). Consonants.

Persian	Devanāgri	Roman
ب	ब	b
پ	भ	bh
چ (ج)	च	ch
ق	क	chh
د or ذ	द or ड	d

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(ii). *Consonants.*—(Concl'd.).

Persian	Devanāgri	Roman
د or د	ध or ढ	dh
ف	wanting	f
گ	घ	g
غ (غ) or گ	घ	gh
ح (ح) or ه	ह	h
ج (ج)	ज	j
ج	झ	jh
ک	क	k
خ (خ) or ک	ख	kh
wanting	ख	ksh
ل	ल	l
م	म	m
ن (ن)	न, ञ, ङ, ञ, or <i>anuswara</i>	n
پ	प	p
پ	फ	ph
ق	wanting	q
ر or ر	र or ङ	r
ز or ز	ड	rh
س or س	स	s
ش	श or ष	sh
ط or ت	त or ट	t
ث or ث	थ or ड	th
و	व	w or v
ی	य	y
ظ or ض ز	wanting	z
ژ	”	zh
wanting	ञ	gy

4. The principal diacritical marks used in Persian character.—

- (i) The mark *Hamza* ʾ is used to separate a syllable ending with a vowel from another commencing with a vowel, e.g. فَايِدَة = fā-ida (*not* fāida). It is thus used much as we use a hyphen in English in words like re-open. It may be transliterated by a hyphen. It is also used with or without َ to form the Persian genitive case in some instances, e.g. چشمانِ مالک = Chashma-i-Malik or چشمِ مالک = Chashma-i-Mālik.
 - (ii) The mark *Madda* ̄ is placed over the letter ا (*alif*) to lengthen it, thus: ā = آ.
 - (iii) The mark *Tashdid* ˆ doubles the letter over which it is placed, thus: بَّ = Ballā.
 - (iv) The mark *Jazm* ˆ is used to mark the end of a syllable, thus: جَزْم = Jazm (*not* Jazam).
 - (v) The mark *Tanwin* ˆ signifies the letter n when used over a vowel at the end of a word, e.g. اِنْتِفَاقًا = ittifaqān.
 - (vi) The mark *Wasla* ˆ is placed over ا in Arabic words to mark union with the preceding vowel.
- صَلَّاحُ الدِّينِ = Salāhuddīn (*not* Salādīn *nor* Salāhuddīn); *vide* note below.

Note.—In the case of Urdu names derived from Arabic, when the Arabic definite article ال occurs preceding the letters { ن ل ط ظ ض ص } قس ز ر ذ د ث ت the ال is not pronounced but the following letter is doubled.

Therefore قَمَرُ الدِّينِ, for instance, should be transliterated Qamruddīn, (*not* Qamrudīn *nor* Qamrdīn).

5. Rules for spelling geographical names in maps of trans-frontier countries.—The spelling of names will be that adopted by the “Permanent Committee on Geographical Names” of the Royal Geographical Society as given in their published lists. If names given in these lists are found to be incorrect, the evidence to this effect should be put forward to the Director, Map Publication, who will correspond with the Permanent Committee on Geographical Names on behalf of the Surveyor General.

6. Chinese names.—

- (a) Chinese names not included in para. 5 will be taken from the “List of Post Offices” in the *Postal Guide of China*.

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- (b) Chinese names not included in the above will be taken from the following in the order named:—
- (i) "Postal Atlas of China" (Peking: Directorate General of Posts, 1919).
 - (ii) "Complete Atlas of China", by Edward Stanford, for the China Inland Mission.
- (c) Other Chinese names will be romanized on the system adopted by the Chinese Imperial Post Office as mentioned in the preface to (b) (ii) above.

Note:—The term "Chinese names" does not include Turki names which will be spelt in accordance with paras. 5 or 8.

7. Tibetan names.—Tibetan names not included in para. 5 will be rendered phonetically in Roman characters using the table of pronunciation laid down in the Royal Geographical Society System II. The following books should be consulted:—

- (a) Tibet, Past and Present, by Sir Charles Bell, published by the Oxford University Press.
- (b) Tibet—Historical Section of the Foreign Office—No. 70, published by H. M. Stationery Office, London.
- (c) In the absence of vernacular spelling, however, preference will always be given to spelling as given by well known explorers or authorities on Tibet.

8. Names not included in the above.—When a name is not included in any of the above it will be transliterated in accordance with the Royal Geographical Society System II, as given in the "Alphabets of Foreign Languages" published by the Royal Geographical Society.

APPENDIX C.

INSTRUCTIONS FOR THE PACKING AND
DESPATCH OF MAPS AND RECORDS

1. Packing of originals, &c.—When plane-table sections, original fair drawings, blue prints, proofs, colour patterns, and enlargements for fair drawings are despatched from one station to another, they will be packed in boxes, each containing a single *chonga* of 6-inch or 9-inch diameter. Double *chongas* are not necessary, but after packing, a strip of brown paper must be pasted along the edge of the cover to make the *chonga* water-tight.

2. Proofs and colour patterns.—Proofs and colour patterns, unless they are enclosed with other documents of greater value, should be merely wrapped round a roller and packed in wax cloth, the parcel being registered.

3. Originals, &c., sent from office to office in the same station.—When original fair drawings, plane-table sections, or blue prints, to be used for plane-tabling or fair drawing, are sent from one office to another in the same station, they should be sent flat in portfolios which should always be covered over with tarpaulins or some other waterproof material. The portfolios, except when they only contain plane-table sections, should be carried in crates to prevent their bending.

4. Packing in chongas.—When original fair drawings, &c., are sent in *chongas*, they should be packed in brown paper and tied with tape to enable them to be easily removed from the *chongas*, and padding of crumpled paper should be placed at both ends of the *chongas* to prevent movement during transit. When *chongas* are sent in boxes, similar padding should also be placed all round the *chongas*.

5. Capacity of chongas.—The number of sheets to be ordinarily packed in each size of *chonga* is given below as a general guide.

(a) *Plane-table sections.*—In all cases these are to be insured, and packed as follows:—

From 1 to 8 sections in 6-inch *chongas* within boxes,
by post.

From 9 to 24 sections in 9-inch *chongas* within boxes,
by rail.

Plane-table sections and their enlargements are to be
sent in separate parcels.

(b) *Original fair drawings, enlargements for fair drawings and blue prints*:—The fair drawings are to be insured, and the prints only registered; each case should be packed and sent as under:—

From 1 to 8 sheets in 6-inch *chongas* within boxes, by post.

From 9 to 25 sheets in 9-inch *chongas* within boxes, by rail.

Any larger number to be forwarded in flat tin-lined cases.

(c) *Proofs colour patterns, and enlargements of plane-table sections other than those on drawing paper*.—In all cases these are to be sent registered, and packed as follows:—

From 1 to 20 sheets in 6-inch *chongas* within boxes, by post.

From 21 to 60 sheets in 9-inch *chongas* within boxes, by rail.

Any larger number must be forwarded in flat tin-lined cases.

6. Lids to be screwed on.—The lids of all boxes must be screwed on, and each box and lid issued must be given a consecutive number prior to issue, unless they are already numbered.

APPENDIX D.

**PROCEDURE TO BE OBSERVED BETWEEN THE
GENERAL STAFF AND THE SURVEY OF INDIA
WITH REGARD TO THE COMPILATION,
SCRUTINY AND AMENDMENT OF
TOPOGRAPHICAL MAPS**

1. Responsibility.—The General Staff is responsible for furnishing to the Survey of India all material which they consider should be embodied in Mobilization and F. O. U. O. maps, and will forward all such information as soon as it is received. The Survey of India is responsible for the best utilization of the information supplied.

2. Maps resulting from rigorous surveys, including those compiled from air photographs.—As these maps will ordinarily include all information supplied by the local Intelligence authorities, no further reference to the General Staff is necessary before drawing, but, as explained in para. 1, the Survey of India will endeavour to incorporate additional information, if any, which the General Staff may have collected, at proof stage.

A proof will be submitted to the General Staff for this purpose, which should be returned early, so as not to hold up publication.

3. Reissues.—

(a) *Mobilization maps.*

- (i) When a new or revised edition of a sheet situated in the mobilization area is contemplated, the Director, Map Publication (D. M. P.) will inform the Officer in Charge No. 6 Drawing Office, Simla, (O. C. 6 D. O.) at the same time forwarding his Office Copy.
- (ii) On receipt of this information, O. C. 6 D. O. will, on a sheet of the current edition, calling it Print "A", show all approved corrections and additions, utilizing all information on the Circle and D. M. P's. Office Copies, and will send this print to the Officer Commanding the Survey Company concerned in the Northern or Western Command. This officer will check the Print "A" in consultation with the Brigade or District Headquarters concerned and with the Deputy Director of Intelligence, Government of India, Peshawar, or the Officer in Charge,

Intelligence Bureau, Quetta, and return it duly corrected, as may be considered necessary, to O. C. 6 D. O.

(iii) Print "A" will next be sent to the General Staff (M. O. 3. Maps). This officer will arrange for a final scrutiny of the map and return it to O. C. 6 D. O., after adding any further additions or corrections he may have for the sheet. Should he consider the changes important enough to warrant the maps in the mobilization stores being replaced, he will give the number of copies required and will also state if he has funds for this purpose, or if not, when they are likely to be available.

(b) *F. O. U. O. Maps.*

When a new or revised edition of a sheet of this nature is to be made, D. M. P. will forward his Office Copy to the Drawing Office concerned who will make a Print "A" as in para. 3(ii). Print "A" will be forwarded to the General Staff who will, after consulting the local Intelligence Authorities, return the print to the Drawing Office, after adding any further additions and corrections they may have.

4. Maps compiled from various sources.—

(a) When a sheet is to be compiled for the first time or recompiled for a revised edition, the Officer in Charge of the Drawing Office concerned will ask the General Staff if they have any information which they consider should be incorporated, and will at the same time forward a Compilation Diagram, showing the sources from which it is proposed that the sheet is to be compiled, by areas. If they know that more recent or reliable information is available the General Staff will give details marking on the diagram the area concerned.

(b) When the guides for fair drawing are ready the Drawing Office will prepare an additional combined guide on a blue print on the scale of drawing, calling it print "B", and send it to the General Staff for scrutiny while the drawing is proceeding.

The following items will be inked up on Print "B":—

- (i) Boundaries.
- (ii) Roads (in red) and railways.

- (iii) Perennial water in blue.
- (iv) Names of main divisions.
- (v) Tribal and Locality names.

Attention will also be drawn to any doubtful points.

The General Staff will check the items concerned, if necessary sending to the local Intelligence Authority for verification, and then return Print "B" to the Drawing Office.

- (c) *General Staff scrutiny.*—The Scrutiny Officer is responsible for pointing out any information which is important from a military point of view, and also that the latest information is incorporated. He should devote special attention to the following points:—

- (i) That no new routes are omitted.
- (ii) Spelling of names where they differ from the General Staff spelling. If any spellings suggested by M. O. 3 still appear doubtful and at variance with the rules for spelling contained in Appendix B, Chapter VI, Topo. Handbook, the O. C. Drawing Office concerned will refer them to the Adviser in Oriental Languages and Secretary to the Board of Examiners for a final ruling, and inform M. O. 3 accordingly.
- (iii) Tribal and Locality names.
- (iv) Classification of roads under the following heads:—
 - A. Motorable, metalled and unmetalled.
 - B. Fit for other wheeled traffic (cart tracks).
 - C. Fit for pack animals.
 - D. Footpaths.

If the alignment or classification of a road is from a verbal description, or for any other reason is doubtful, this should be clearly stated.

- (v) Doubtful names and sites, which will be shown thus:—

Doubtful name	o Khan Hussain ? or ? Khan	Hussain o
Doubtful site	? o Khan Hussain or Khan	Hussain o ?
Doubtful name		
and site	? o Khan Hussain ? or ? Khan	Hussain o ?

- (vi) Entering in blue of perennial water not shown, and noting if water is drinkable.
 - (vii) Names that should be emphasized.
 - (viii) If the area is outside India that the provinces and districts are correctly shown.
- (d) On receipt of proofs from D. M. P. the Drawing Office concerned will submit one to the General Staff for final scrutiny. This proof should be returned as early as possible so as not to hold up publication. In the case of mobilization maps the General Staff (M. O. 3 Maps) will give the number of copies required and will state if he has funds for the purpose, or if not, when they are likely to be available.

5. Orders for mobilization maps.—Before placing an order for mobilization maps the General Staff will prepare a list of the maps which it is proposed to order and will submit this to O. C. 6 D. O. for scrutiny, with the object of confirming that the maps in question are not due for major alterations in the near future. O. C. 6 D. O. will advise the General Staff as to whether such sheets are in hand or likely to be taken up, with approximate dates, consulting the Director, Map Publication, if necessary.

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Correction to the Handbook of Topography, Chapter VI, (1935).

Page 112, para. 454 (e) (vii) first sub-para. as amended by the correction slip No. 150, dated 18-2-39—

At the end *add*:—

When the sheet is finally published a copy with the following endorsement will be sent to the $\frac{\text{E. A. Department}}{\text{Home Department}}$ and each of the Local and State Governments concerned and Burma Government for sheets containing the Indo-Burma boundary—“The alignment/alignments of the.....boundary/boundaries on this sheet has/have been approved by the $\frac{\text{E. A. Department}}{\text{Home Department}}$ in its (U. O.) No..... dated.....”.

After “of India” in the fourth line *insert* “(Home Department in the case of the Indo-Burma boundary)”.

After “External Affairs” in the sixth line *add* “or Home”.

After “Department” in the fourth line from the bottom *insert* “(Home Department in the case of the Indo-Burma boundary)”.

No. 192, dated 26-9-41.

Corrections to the Handbook of Topography, **JAN**
Chapter VI, 1935 edition.

Appendix "B", p. 154—

Add the following as new paras :

9. Thai names.—Subject to the rules in para. 5 Thai names in Thai characters will be transliterated according to the "Bangkok Times" phonetic system. Unless they can be converted to the "Bangkok Times" system Thai names in Latin characters will be accepted. The conventional British spelling will be adhered to in both cases.

10. Names not included in R. G. S. system II and on foreign maps.—

(a) Names in the language of a country not falling within the purview of other rules in this Appendix will be transliterated on such system as may be devised by an authority possessing an appropriate knowledge of the language concerned, the Director, Eastern Circle, being consulted before a system is decided upon.

(b) Spelling of names appearing in Latin characters on maps of foreign countries will be accepted by the Survey of India in republishing such maps or incorporating them in Survey of India maps, subject to rule 5 of this appendix. In cases where there is a considerable difference between the spelling of names under this rule and rule 5, alternative spellings may be given, the foreign spelling being given in brackets.

No. 193, dated 13-2-42.

Correction to the Handbook of Topography,
Chapter VI, 1935.

JAI

Page 112, para. 455.

~~604~~

At the end of sub-para (a) change the fullstop after "correction" to a comma and *add* "care being taken that previous signatures are not defaced or obliterated".

No. 194, dated 31-3-42.