

SURVEY DIRECTIONS
1990

INDEX OF PARTS

- PART 1 PROFESSIONAL
- PART 2 SURVEY MARKS, SURVEY COORDINATION, SPHEROIDS,
STANDARDISATION AND CALIBRATION
- PART 3 GENERAL PROCEDURES FOR SURVEYS AS SPECIFIED
- CUSTOMARY LAND
 ACQUISITION SURVEYS
 LAND TITLE COMMISSION SURVEYS
 SURVEYS OF MINING TENEMENTS
 SURVEYS AND PLANS FOR SUBLEASE PURPOSES
 CONTROL SURVEYS
 MISCELLANEOUS SURVEYS
 PRECISION OF SURVEYS
 CURVED BOUNDARIES
- PART 4 RURAL SURVEYS
- GENERAL
 RURAL CLASS ONE
 RURAL CLASS TWO
 RURAL CLASS THREE
 RURAL CLASS FOUR
- PART 5 RESERVES AND EASEMENTS
- THE LAW WITH RESPECT TO ROAD AND PATHWAY
RESERVES
 SURVEY OF ROADS AND PATHWAY RESERVES
 THE LAW WITH RESPECT TO ROADS & EASEMENTS
GENERALLY
 SURVEY OF RESERVES AND EASEMENTS
- PART 6 URBAN SURVEYS
- GENERAL
 URBAN CLASS ONE
 URBAN CLASS TWO
 URBAN CLASS THREE - SUBLEASE SURVEYS
- PART 7 AERIAL PHOTOGRAPHY, REMOTE SENSING & SATELLITE
POSITION
 FIXING.

Survey Directions 1990

PART 8 FIELD NOTES, COMPUTATIONS, RE-SURVEYS & RE-ESTABLISHMENTS

PART 9 PLANS & CADASTRAL DESCRIPTIONS.

INDEX OF SCHEDULES

SCHEDULE 1	FORWARDING LETTER (Clause 1.6)
SCHEDULE 2	DIAGRAM OF POSITION DATUM (Clause 8.13)
SCHEDULE 3	REFERENCE TREES (Clause 2.4)
SCHEDULE 4 (Clause 2.7)	PERMANENT SURVEY MARK SKETCH - URBAN
SCHEDULE 5 2.8)	PERMANENT SURVEY MARK SKETCH - RURAL (Clause
SCHEDULE 6 2.14)	SUMMARY, SUN OBSERVATION MANUAL (Clause
SCHEDULE 7	SUN OBSERVATION CALCULATION FORM, MANUAL (Clause 2.14)
SCHEDULE 8	SUN OBSERVATION CALCULATION FORM, COMPUTER (Clause 2.14)
SCHEDULE 9 PROCEDURE	RECOMMENDED BAND STANDARDISATION (Clause 2.19)
SCHEDULE 10	FORM FOR CHAIN STANDARDISATION (Clause 2.19)
SCHEDULE 11 STANDARD	STANDARDISATION CERTIFICATE FOR PERMANENT WORKING BASE (Clause 2.20)
SCHEDULE 12	LAW APPLICABLE TO SURVEYORS (Clause 3.1)
SCHEDULE 13	STANDARD SYMBOLS & ABBREVIATIONS
SCHEDULE 14	PRACTICAL DETERMINATION OF MEAN HIGH WATER MARK (Clause 4.6)
SCHEDULE 15	PLACE NAMES ACT & SPEELING OF LANDS NAMES
SCHEDULE 16	SPECIMEN PLANS

Survey Directions 1990

- 16.1 ACQUISITION PLAN
- 16.2 ACQUISITION ON CATALOGUE PLAN
- 16.3 ACQUISITION ON SEPIA OF CATALOGUE PLAN.
- 16.4 RURAL CLASS ONE
- 16.5 RURAL CLASS TWO – CATEGORY A
- 16.6 RURAL CLASS TWO – CATEGORY B
- 16.7 RURAL CLASS THREE – COMPASS
- 16.8 RURAL CLASS THREE – THEODOLITE

- 16.9 RURAL CLASS FOUR 1:50,000
- 16.10 RURAL CLASS FOUR 1:20,000 PHOTOBASE
- 16.11 RURAL CLASS FOUR 1:10,000
- 16.12 URBAN CLASS ONE
- 16.13 URBAN CLASS TWO
- 16.14 URBAN CLASS THREE – SUBLEASE SINGLE LEVEL
- 16.15 URBAN CLASS THREE – SUBLEASE MULTI-LEVELS
- 16.16 ROAD SURVEY – RURAL CLASS ONE (MARKED)
- 16.17 ROAD SURVEY – RURAL CLASS ONE (NOT MARKED)
- 16.18 SUBLEASE PLAN – RURAL CLASS ONE

- SCHEDULE 17 CLAUSES APPLICABLE TO CERTIFIED MEASURERS

- SCHEDULE 18 INFORMATION ON PREVIOUS MERIDIANS USED IN
CADASTRAL
& MINING SURVEYS

- SCHEDULE 19 INDEX TO MILINCH & FOURMIL SERIES & UTM ZONES

- SCHEDULE 20 GRID CONVERGENCE TABLES TO ONE MINUTE ACCURACY

- SCHEDULE 21 STANDARD CONVERSION TABLE

- SCHEDULE 22 BIBLIOGRAPHY OF SURVEY & LAND TENURE

- SCHEDULE 23 GUIDE TO GEOID REQUIREMENTS & METHODS OF
EVALUATION
(Clause 7.24)

- SCHEDULE 24 SPECIFICATIONS 1:10,000 CADASTRAL NOTING MAP
PRODUCTION

- SCHEDULE 25 ADJUSTMENTS OF COMPASS BEARINGS

PART ONE

PROFESSIONAL

1.1 Commencement

This part of the Survey Directions is effective from 1st January 1990.

1.2 Interpretation

In these Directions, or for the purpose of these Directions –

“Abuttal” (or “Bound”) means anything referred to in the original description that determines on the ground the limits of the property.

“Acquisition Survey” means a survey of land carried out for the purposes of either
Section 15, Section 15A or Section 17 of the Land Act (Chapter 185):

“Accretion” means an increase of land along the edges of a body of water, as by the
gradual and imperceptible increase of alluvial deposits.

“Authorised Survey” means a survey of land authorized or required: by, under or for the
purposes of any law; by the Government; or by the owner, lessee, mortgagee or other
person having an interest in the land and in the case of a Certified Measurer means a Rural Class
Three Survey.

“Avulsion” (or “Irruption” means the act performed by a river when it suddenly breaks
through it’s banks in an unexpected manner forming another channel or rapid erosion of
shoreline by waves from a storm.

‘Bound’ – See Abuttal

Survey Directions 1990

“Boundary” means ascertained limits of adjacent lands belonging to different owners.

“Compiled Plans” means a plan prepared from survey records.

“Computed Plan” means a plan prepared from survey records with computed boundaries to provide a subdivision for which dispensation for monumentation has been given by the Surveyor General.

“Delineation” means any mapping of group land holdings in such a way that the resulting documentation does not have legal status as a boundary.

“Dereliction” means an increase of land by the permanent recession (shrinking back) of the water line.

“Erosion” means the slow eroding or eating away of land gradually and imperceptibly.
“Elements of Boundaries” are :

“Delimitation” – relates to the rules and regulations, legally and politically decided, that govern on what basis the position of boundaries is decided.

“Demarcation” – relates particularly to the technology, observing technique and the data processing involved in the establishment of boundaries.

“Recovery” – relates to the techniques available to return to the boundary, the recorded and stored data and the stability of the ground marking system in terms of natural and man-made change.

“Redefinition” – is the act of recovery.

“General Boundaries” means those boundaries that indicate the approximate boundaries and their location relative to other lands and which are generally unable to be redefined by systematic measurement. (This means that the precise line can only be established by adjudication and demarcation on the ground).

“Hierarchy of Evidence” means the relative importance of evidence of boundary being natural features, monumentation, occupation and measurements.

“Land Titles Commission Surveys” means a survey of land carried for the purposes of Land Titles Commission Act 1962 and includes plans created for the purposes of the Land Tenure

Survey Directions 1990

Conversion Act 1964.

“Mete” means a vector quantity, an expression of direction and distance.

“Mining Tenement” shall be as defined from time to time by the Mining Act (Chapter 195).

“Monument” means any object, natural or artificial, referred to in a document as the means of ascertaining the location of land or any part of its boundaries.

“Noting Map” means a map compiled from the surveys and showing the legal status as regards boundary of land subject to intended issue of new title. In addition the map shall note such other surveys or plans for mining, control or miscellaneous purposes that are recorded in various plan registers of the Department of Lands and Physical Planning.

“Plan” includes all plans resulting from any survey made in accordance with these Directions.

“Regional Surveyor” means the surveyor, being an officer of the Department of Lands and Physical Planning, in charge of a Survey Region.

“Rural Lands” means any lands other than urban lands.

“Survey” means the measurement of land by ground or aerial methods or other methods approved by the Surveyor General, the marking, the drawing of plans and any report, calculations, schedules or correspondences relating to any Authorized Survey.

“Surveyor” means any person duly registered as a Registered Surveyor or Certified Measurer by the Papua New Guinea Surveyors Board, any person carrying out a land survey for the purpose of the Land Titles Commission Act 1962, any Mining Surveyor carrying a tenement survey for the purpose of the Mining Act (Chapter 195) or any acquisition surveyor carrying out a land survey of customary land under the provisions of Section 15 of the Land Act (Chapter 185).

“Surveyor General” means the surveyor holding that position under the Survey Act, as amended to date, or any surveyor acting in that position for the time being.

“Sublease Plan” means a plan prepared for the purposes of Section 5 of the Land Registration Regulation (Chapter 191).

“Systematic Boundaries” means those boundaries that are capable of being redefined by systematic measurement.

One “Systematic Measurement” means the forms of measurements applied in Urban Class and Rural Class One, Two and Three Surveys.

“Urban Lands” means lands within a gazetted city or town boundary or any other lands subdivided for town, patrol post or community centre purposes outside of the gazetted city or town boundary.

1.3 Application

All surveys shall be made in accordance with these Directions unless otherwise authorized, in writing, by the Surveyor General or the Regional Surveyor.

1.4 Surveys

- (a) All surveys shall be executed by a surveyor or under his direction and plans shall bear the signature of the surveyor, except that any surveyor who is not a registered surveyor, a certified measurer or a mining surveyor may not direct others in the execution of a survey that is their responsibility.
- (b) All surveys shall be the responsibility of the surveyor whose name appears on the plan.
- (c) To the extent that no express provision is made by these Directions, every surveyor shall comply with accepted and good survey practice.
- (d) Equipment and methods used on all surveys shall be such as to readily attain the standards of accuracy required by these Directions. Equipment shall be made available on request to the Surveyor General Regional Surveyor for testing and if found to be unsatisfactory, not be used on any survey until repaired and if necessary, recalibrated.

1.5 Duty of Surveyor

- (a) A surveyor shall keep in mind the interest of Papua New Guinea in all his operations, shall disclose all doubts, discrepancies and difficulties and shall apply to the Surveyor General all information obtainable by him in due performance of surveys entrusted to him that may aid in securing accuracy and completeness in the boundary

Survey Directions 1990

description of the land.

- (b) Before commencing any survey, a surveyor shall obtain full information on previous surveys, acquisitions and orders made under the Land Tenure Conversion Act as is applicable to the requirements of the particular survey. Title search for unsurveyed registered easements may be necessary.
- (c) At the commencement of survey of customary land, a surveyor shall make full enquiry from the customary owners as to whether any previous surveys, acquisitions or orders exist in the vicinity.
- (d) Surveyors shall ensure that they and their staff are familiar with the Survey Act as in force from time to time, the Regulations under that Act, the Survey Coordination Act as in force from time to time, the Regulations under that Act and these Directions and shall have in their possession and available for ready reference copies of those Acts, Regulations and Directions.
- (e) All official correspondence, unless otherwise directed by the Surveyor General, shall be directed to the Regional Surveyor.
- (f) Surveyors are to advise the Surveyor General and the Regional Surveyor of any change in their postal addresses.

1.6 Lodgment of Survey Documents

Plans of survey shall be lodged by the surveyor at the Office of the Regional Surveyor within three months of completion of the survey, together with the following as applicable:

- (a) Forwarding letter in the form of Schedule 1;
- (b) Lodgment fee;
- (c) Field book;
- (d) Calculations;
- (e) PSM Diagrams;
- (f) Report in triplicate;
- (g) Records of astronomical observations;
- (h) For any survey requiring Physical Planning Approval, copy of the approved plan and/or the letter of approval.
- (i) For town subdivision lease evidence that the Minister intends or has approved the
- (j) final proposal. (Refer Section 66(4) of the Land Act (Chapter 185)).

Survey Directions 1990

- (k) For a lessee's subdivision of his lease evidence that the Minister intends or has approved the application. (Refer Section 71(4) of the Land Act (Chapter 185)).
- (l) Where approvals are granted in (i) and (j) are conditional on engineering works being carried out, a Certificate from the relevant Engineering Authority that such engineering works have been carried out to their satisfaction.
- (m) For surveys of new streets under departmental instructions, and in urban lands, where those streets are not constructed, a Certificate from the Provincial Manager of the Department of Lands & Physical Planning that arrangements to construct these streets have been made.
- (n) For Urban Class Two Surveys, a certification, as a result of prior inspection of the site by an officer of the Department of Lands & Physical Planning, confirming that the approved buildings have been constructed to ground floor level.
- (o) For a sublease plan, evidence of Minister's approval of the granting of approval of the sublease under Section 69 (1) (c) of the Land Act (Chapter 185).
- (p) For a mining tenement survey a copy of either the lease/claim or grant/claim with that application having been signed by the Warden.

Explanatory Notes:

1. In the course of the Minister's decision for applications made under Sections 66(1), 66(2) and 71(1) of the Land Act (Chapter 185), the Surveyor General's approval as to survey design is required. Applications to the Minister are lodged with Assistant Secretaries of Regions and referral is made to the Surveyor General by these officers. These approvals are not delegated to the Regional Surveyors.
2. For surveys on vacant Government lands outside of gazetted towns, an approval of designs of proposed subdivisions is delegated to Regional Surveyors.

1.7 Survey Report

The report shall contain the purpose and the description of the survey and any difficulties and discrepancies encountered in its technical execution, and for,:

Survey Directions 1990

- (a) Leased alienated land, a summary of relevant approvals required prior to lodgment.
- (b) Vacant alienated land, the appropriateness of design and land use intentions, and variations to approved preliminary designs.
- (c) Freehold land, the owner's name and address.
- (d) Customary land, for private purposes, the names and addresses of clients and any evidence of title, application or intentions with respect to title applications.
- (e) Customary land for public purposes, a summary of the matter pertaining to acquisition.
- (f) Mining tenement surveys, the name of applicant or holder, and the date of application or grant of tenement. (To allow for checking of that tenement to confirm the Mining Regulations current at the time of application of grant.) Neat long hand written reports with either photocopies or typed copies are acceptable.

1.8 Delayed Lodgment

Should the surveyor be unable to lodge his full survey within three months of the of completion for whatever reason, he shall within that period , lodge with the Regional Surveyor a plan print showing work carried out, marks found and marks placed. In the context of this clause, date of completion is to be taken as substantial completion of the survey.

Such matters as permanent survey marks not placed, final connections not made etc. are not to be construed as making a survey incomplete. The plan print shall not be numbered. It shall be given a survey file number which shall be used for noting. The print shall not be examined. The Regional Surveyor shall monitor monthly for action under Clause 1.12.

1.9 Survey Rejected

Either at lodgment or in the course of examination thereafter surveys found to be incomplete may be rejected. The Regional Surveyor shall state the reasons for rejection in writing. Matters of requisition known to the Regional Surveyor at the time of rejection will be separately listed. The running of time for the purpose of Section 38(3) of the Survey Act shall not commence until relodgment of the survey is accepted.

1.10 Surveyor to Comply With Requisition

Surveyors are specifically directed to Section 38 of the Survey Act which deals with request or

Survey Directions 1990

instruction for correction of survey and the limits of time that apply.

- (a) Official memoranda or requisitions relating to errors and omissions must be given immediate attention by the surveyor. A reply shall be forwarded to the Regional Surveyor within three months of the date of requisition, unless an extension of the time has been granted in writing following a written request giving a good reason for such extension.
- (b) Wherever possible, requisitions should be attended to by the original surveyor. Where it is necessary for another surveyor to make substantial correction, amendments or additions to a survey, any changes in the field book are to be signed and the second surveyor's name is to appear also on the plan. In either case, a report on the execution of the requisition is to be made and signed by the surveyor attending to the requisition.
- (c) Where the surveyor refuses or neglects to comply with the provisions in (a), the Regional Surveyor may take action to advise the surveyor's employer or client of that refusal or omission and, failing satisfactory compliance with the requisition within three months of that advice, may cancel the survey under Clause 1.12.

1.11 Inquiries by Surveyor General

In the event of any dispute arising between the Regional Surveyor and a surveyor relating to

any survey, the matter may be referred to the Surveyor General who shall inquire into it, and

his finding shall be communicated to the Regional Surveyor and the surveyor. The Surveyor

General's decision is final.

1.12 Cancellation of Survey

- (a) A regional Surveyor may cancel a survey for reasons as allowed by any relevant clause of these Directions including directing which option shall be used in (b) below.
- (b) Where a surveyor responsible for any survey decides that there is cause to cancel the survey, he shall use the most relevant option from the list below:
 - (i) If the cancellation is absolute, the original survey plan and filed book shall be lodged with the Regional Surveyor together with any Permanent Survey Mark Diagrams. The plan shall be noted "Cancelled. For survey information only. Not to be used for dealings." The plan shall be noted, shall be given survey file and plan number and shall not be examined. No new allocation of legal description shall be made. The regional Surveyor shall not register the plan.

Survey Directions 1990

- (ii) If cancellation is not absolute, (e.g non payment of fees by client) a sepia print of the plan shall be lodged the Regional Surveyor together with any Permanent Survey Mark Diagrams. The sepia copy shall be noted “Cancelled. For survey information only. Not to be used for dealings.” The sepia print shall not be numbered. It shall be given a survey file number which shall be used for noting. This print shall not be examined. No new allocation of legal description shall be made. The Regional Surveyor shall not register the print.
If the lodgment of the plan and filed book proceeds, it shall be accepted under the issued file number whether for cancellation in (i) above or lodgment for registration.
- (iii) Alternatively the surveyor may remove all new survey marks placed by him in the course of the survey so that no evidence remains in the field that any work ever took place. The surveyor shall inform the Regional Surveyor in writing of this action.

1.13 Power of Entry of Land

The attention of surveyors is specifically directed to the requirement of Notice of Entry as laid out in Section 53 of the Survey Act. This is particularly important where reference or control marks are placed away from the actual boundaries or where a survey adjoins customary land. Disputes often occur because the people misunderstand the reason for the survey and mistakenly believe their land is being improperly alienated. Surveyors shall liaise closely with the relevant District Office officials and ensure that a full explanation of the work is given to the people.

1.14 Surveyor General’s Survey Instructions.

This clause applies to all surveys that are instructed by the Surveyor General or Regional Surveyor.

- (a) Instructions shall be issued only to a Firm (Registered Business Name) or Corporation (Company) which holds a Certificate issued by the Board under Section 40 of the Survey Act.
- (b) Surveys found to be erroneous or in contravention of instruction or not in accordance with these Directions may be rejected by the Surveyor General or the Regional Surveyor and the charges for the same disallowed. If such charges have been paid, the amount thereof may be deducted from any monies which may be due; or may be recovered as a debt; or another surveyor may be employed to complete the instruction and all charges for his services may be recovered from the surveyor in default as a debt.

Survey Directions 1990

- (c) Immediately after the end of each month, every surveyor holding instructions issued by the Surveyor General shall forward to the Regional Surveyor of the particular region a report listing instructions held, progress on these instructions and the estimated dates on which they will be commenced, completed and plans and survey data lodged.
- (d) In addition to the lodgment requirements under Clause 1.6, the surveyor shall forward an account, in triplicate, on forms supplied by the Surveyor General, together with supporting accounts, daily journals etc.

PART TWO

SURVEY MARKS, SURVEY COORDINATION, SPHEROIDS, STANDARDISATION AND CALIBRATION

SURVEY MARKS

2.1 Commencement

This part of the Survey Directions is effective from 1 January 1990.

2.2 Boundary Marks

The following marks shall be used for boundary marking on surveys carried out under these Directions, except as alternatively directed under Rural Class Four **Directions**.

Survey Directions 1990

- (a) Cement pegs shall be soundly constructed and be of dimensions 100mm square at the top, 200mm square at the bottom, and no less than 400mm or more than 500mm in length. The top shall have fine lines drawn from corner to corner. A small hole is to be made, or a copper tack inserted, at the intersection of these lines. A broad arrow is to be moulded or chiseled in on side of the peg so that it is visible above ground level. The peg shall be placed so that 75mm to 100mm projects above the natural surface of the ground under normal conditions.
- (b) Where the cement pegs are not used, a general notation shall be made on the face of the plan or shown adjacent to the station on the plan.
- (c) Galvanised water pipe which shall be either of minimum internal diameter 50mm and minimum length 500mm or of minimum internal diameter 25mm and minimum length 450mm. In both cases, the top 200mm shall be painted white with a broad arrow painted thereon in black.
- (d) Various patented marks may be approved for use from time to time by the Surveyor General upon request. Wooden marks may be approved in exceptional circumstances.
- (e) Where, because of the nature of the terrain the marks described in the preceding clauses would not be satisfactory, other types of marks may be used e.g. drill holes in rocks, provided they are of durable material for the environment in which they are to be placed and will indicate the corner satisfactorily. The mark and any supporting indicators of it e.g. scored picked marks, shall be described in the field notes and on the plan.
- (f) Inaccessible boundary positions shall be surveyed and marked on either side of, and up to the inaccessible place.

2.3 Identification of Boundary

To identify boundary marks on rural surveys, station numbers may be painted or stamped on the top sides of pegs or pipes to enable ready identification of the corner. On urban surveys, allotment numbers may be painted or stamped on the mark but not the station numbers.

In support of boundary identification, various traditional markers may be planted on boundaries. Amongst these are balbal, tanget, pao, mango, galip and breadfruit.

Recognition

of these traditional markers and encouragement in their use, particularly in Rural Class 3 and Rural Class 4 surveys is to be undertaken by surveyors. Attention is to be given to adequate use of reference trees as per Clause 2.4(b) below

Survey Directions 1990

For Rural Class 4 boundaries will be identified by natural features and special marking. Details of these are to be found in Part Four of these Directions.

2.4 Reference Marks

The following marks shall be used for referencing of boundary marks on surveys carried out under these Directions.

- (a) Iron pins shall be at least 15mm in diameter and 300mm in length and driven vertically into the ground so that the top of the iron pin is at least 150mm below the surface. At places where a pin might be disturbed, it should be driven to greater depth. Surveyors are expected to exercise professional judgment to locate iron pins in such positions as will ensure they are least likely to be disturbed.
- (b) A reference tree shall be prepared by removing the bark and sapwood in the form of shield about 1.5m from the ground and exactly facing the peg. On this shield, a broad arrow shall be cut 10mm deep into the heart-wood (A portion number may be cut into the heartwood). A horseshoe mark shall be cut into the heartwood on the opposite side of the tree, and in the case of a large tree, also on each side. (Refer to Schedule 3). The distance and bearing from the corner to the tip of the broad arrow shall be observed and recorded together with the name of the tree.
- (c) The bearing between a referenced corner and iron pin or a reference tree shall have its origin at the corner.

2.5 Permanent Survey Marks

Sections 7, 8, 13, 15, 16 and 17 of the Survey Coordination Regulations apply to Permanent

Survey Marks. The following marks shall be used as Permanent Survey Marks on surveys carried out under these Directions.

- (a) A brass plaque as depicted in Schedule 2 of the Survey Coordination Regulations. This may be set in a concrete kerb, headwall or other permanent structure, or a concrete block, which had been poured in the appropriate position. The minimum dimensions of this block shall be 200mm square at the top, 300mm square at the base and 450mm high.
- (b) In the absence of brass plaques for reasons of supply problems only, a Regional Surveyor may approve the following provided that in each case, the number of the mark is clearly written in the concrete block, of dimensions as above.
 - (i) A copper pipe 35mm in diameter and 300mm long set in concrete (A plaque may be cemented into this pipe as a later action).

- (ii) A star picket set in concrete.

2.6 Permanent Survey Marks (PSMs).

- (a) They shall be located where they are least likely to be disturbed and are able to be connected to from outside the survey. They shall not be used as a boundary marks nor be placed on a boundary. In urban areas they may be slightly below ground level and in rural areas slightly above.
- (b) Numbering will be by stamping, into the space provided, a serial number as allocated by an authorized officer.
- (c) They shall be connected to a minimum of two reference marks being iron pins or alternatively nails or other suitable mark set into a permanent structure. Substantial occupation within ten metres shall be shown, with accurate connections, on the Permanent Mark Sketch Plan. Where substantial occupation does not occur in a rural area, a star picket or length of water pipe, projecting at least 500mm above the ground shall be established not closer than one metre to the Permanent Survey Mark.
- (d) The minimum distance between a pair of Permanent Survey Marks shall be 200 metres unless good reasons, (noted in field book), exists for a shorter distance. They shall be situated so that they are intervisible and likely to remain so in the future.

2.7 Permanent Mark Sketch Plan

A diagram shall be prepared on the Permanent Mark Sketch Plan form for every Permanent Survey Mark installed and submitted to the Regional Surveyor with the records of the survey.
(Refer to Schedules 4 and 5).

2.8 Control Traverses

Control traverses are traverses joining Permanent Survey Marks or iron pipes set in concrete or iron pins set in concrete and shall be shown on survey plans. No other traverses shall be shown except as directed by Clause 4.5 and 4.6.

2.9 Marking of Mining Tenements

Mining tenements under the mining Act shall not be marked by any mark containing a broad arrow unless the boundaries of the tenement are coincident with the boundaries of land of which title is registered under another Act. Mining tenements will be marked as required by the Mining Act and marks, which are the same as boundary marks as defined in

Survey Directions 1990

Clause 2.2 above may be used without the broad arrow. The number of the mining tenement may be written on the mark or upon cement if the mark is set in cement.

SURVEY COORDINATION

2.10 Grid North

The meridians of all surveys carried out under these Directions shall be True North as the Central Meridian of the Universal Transverse Mercator Zone in which it lies. This shall be known as Grid North (GN).

Where Fourmil and Zone Boundaries coincide, any variation in the Fourmil boundary to include a portion, which crosses the meridian, shall also be deemed, for the purposes of these Directions, to vary the Zone Boundary accordingly.

2.11 Determination of Grid North Datum

It shall be the responsibility of the Surveyor to ensure that his azimuth datum will give the value of Grid North. Determination of datum would generally be by the following means.

- (a) Direct connection to existing trigonometrical stations, **PSMs, or standard traverses**, the bearings of which have (or from which can be calculated) a true value of Grid North: or
- (b) Astronomical means, refer to Clause 2.14 below.

The Regional Surveyor may accept other methods, which conform to good survey practice and will give the accuracy required for the particular class of survey.

It shall not normally be acceptable practice to determine a Grid North Datum from marks

found on an original survey unless it can be demonstrated to the satisfaction of the Regional

Surveyor that such a determination will give a true value of Grid North.

However, the Regional Surveyor may grant an exemption from this requirement on the grounds of isolation, unimportance or size of the survey relative to the cost of obtaining such a true value.

At points on any survey from which targeted trigonometrical stations are visible, bearings should be observed, shown in the field notes, and on the plan.

2.12 Check Observations of Datum

In an extensive survey, check connections or observations shall be made at intervals of about five (5) kilometers in a rugged country and ten (10) kilometers in a flat country.

2.13 Zone Edge Comparisons

Where a survey carried out in one Zone adjoins another survey carried out in an adjacent Zone, a bearing shall be read along a common line and compared with the bearing carried from the adjacent zone.

2.14 Astronomical Observations for Datum

Where Grid North is determined by astronomical means, the following procedure shall be adopted.

- (a) For Datum: Three complete solar or stellar observations both east and west shall be observed and calculated independently. The internal spread of results in each east and west set shall not exceed 30 seconds of arc. Both set of observations shall be taken from opposite ends of the one line.

Where continuous weather conditions do not permit both east and west observations, either may be accepted but every endeavor should be made to obtain both, due to the large deflections of the vertical in PNG, and the resultant differences between geodetic and astronomical latitudes.

- (b) For Check: Three complete solar or stellar observations, east or west shall be observed and calculated independently. The internal spread of results in the set shall not exceed 30 seconds off arc. A correction may be applied to the results of the check observation based on half the difference between the mean of the east and the mean of the west observations for datum, provided that the latitudes used in both cases are correct in relation to each other.

- (c) Convergence shall be calculated and applied to observations using the formulae:

Grid – True Convergence:

$(\text{Longitude CM} - \text{Longitude Stn}) \times \text{Sine Latitude Stn}$

True - FSM Convergence:

$$(\text{Longitude FM/SW} - \text{Longitude Stn}) \times \text{Sine sum Latitude} / 2$$

- (d) A summary of observations is to be provided in the form of Schedule 6 where calculations are done manually. Calculations shall be done on either of the forms in Schedule 7 (manual) or Schedule 8 (computer). Where Schedule 8 is used, the computer printout shall give all the input parameters. It is to be specifically noted that no other form of presentation or calculation shall be accepted.

2.15 Connections to Permanent Survey Marks (PSMs)

Surveys of the Type and Class listed hereunder shall be connected to a minimum of two existing or placed PSMs with at least one of those Marks being within the distance as specified from one corner of the land under survey.

Type	Class	Distance
Urban	One	300 metres
Rural	One	800 metres
Rural	Two	1200 metres

The Regional Surveyor may grant an exemption from the above on the grounds of isolation, unimportance, size of the survey or difficulty of access.

2.16 Coordination of Rural Surveys

On rural surveys, UTM Coordinates shall be determined either for one PSM for Rural Class

I and Rural Class 2 or for one corner of the land under survey for Rural Class 3 and Rural Class 4.

This shall be done as follows: -

- (a) In the case of Class 1 and Class 2 surveys, coordinates rounded to **one** metre, shall be determined by one of the following means -
- (i) A checked measured traverse to the precision of Rural Class 1 surveys to the point, which has, coordinates derived by at least the same order of accuracy as this connection. This connection need not exceed three kilometers. A calculated bearing and distance for this connection shall be shown on the plan.
 - (ii) Other methods which will give the accuracy required, except that

Survey Directions 1990

where topographic coordination is the only possibility, this may be used.

- (b) In the case of Class 3 and Class 4 surveys, where these are not controlled by surveys of a higher class. Coordinates to the accuracy as stated shall be determined.
- (i) A checked measured traverse to the precision of Class 3 surveys to a point which has coordinates of the same order as in (a)(i) above. This connection need not exceed one kilometre. A calculated bearing and distance for this connection shall be shown on the plan. Coordinates shall be rounded to 10 metres.
- (ii) Identification of a point on the boundary or in the vicinity of the survey may be made from a topographic map on which the planimetric and height accuracy of detail is notated and is acceptable for this purpose. For maps of no lesser scale than 1:100,000 coordinates shall be rounded to 100 metres and for maps of no lesser scale than 1:50,000 coordinates shall be rounded to 50 metres. Where the point is in the vicinity, a checked measured traverse to an accuracy of 1:200 shall be made from the survey to the point. A part copy of the map used showing the coordinated point shall be forwarded on the lodgment of the survey.
Surveyors are advised that where this form of coordination is carried out under delegation that staff should be required to make an independent check of their coordination.
- (iii) Other methods which will give the required accuracy.

SPHEROIDS

2.17 Spheroidal Datums

National Mapping Bureau are gradually converting existing coordinates from the Australian National Spheroids (AGD 66) to the World Geodetic Spheroid (WGS 72). Where control is available in WGS 72 and it is connected to, the resultant coordinates required in Clause 2.15 shall be in terms of WGS 72. To avoid confusion arising from the changeover, the noting of either AGD 66 or WGS 72 shall be shown after the coordinate values on plans. If World Geodetic Spheroid in an updated version is adopted, the noting of WGS shall reflect the year of adoption.

(The Spheroidal Datum adopted now is WGS84 which is almost the same as PNG 94).

STANDARDISATION AND CALIBRATION.

2.18 Approved Equipment.

All measurements of length are to be made with a steel band, or with electronic distance measuring equipment of a type and model approved by the Surveyor General.

Survey Directions 1990

Measurements of position may be made with equipment approved by the Surveyor General.

2.19 (a) Steel Bands

Where a steel band is used, the temperature and slope angle shall be observed at each measurement. The final result is the residual distance corrected for temperature, sag and slope as necessary.

Steel band shall be calibrated a Subsidiary Standard Band or a Permanent Standard Working

Base at intervals not exceeding six months. For the purpose of uniformity, the coefficient of

linear expansion of a steel band is to be taken as 11.61×10^{-6} per degree Celsius and Youngs

Modulus of Elasticity as 2.11×10^{10} kgm².

Band standardization may be carried out by the procedure recommended in Schedule 9 and

on the form shown in Schedule 10. This procedure assists in delegation of standardization as

a check is available on all measurements made.

2.19 (b) Subsidiary Standard Bands

Surveyors shall have ready access to a Subsidiary Standard Band or a Permanent Standard Working Base.

Subsidiary Standard Bands shall have a current Certificate of Standardisation issued by the Surveyor General under the authority of the National Standards Act (or the equivalent from an Australian State). The period of validity of the Certificate shall not be

greater than two years. A photocopy of this certificate shall be lodged with the Regional Surveyor in whose region surveys are carried out. If surveys are carried out in more than one region, a separate copy shall be lodged with each Regional Surveyor.

2.20 Permanent Standard Working Bases

Where 100 metre Permanent Standard Working Bases are laid out for regular tape comparisons, these shall be:

- (a) given a number by the Regional Surveyor;
- (b) laid out personally and certified to be correct by a registered surveyor. The certificate and full details of the measurements shall be submitted to and approved by the Regional Surveyor before use;

- (c) recertified by a registered surveyor at intervals not exceeding one year. The certificate and full details of the measurements shall be submitted to and approved by the Regional Surveyor before continuing use. Where the new distance differs from the previous by more than 5mm, a full explanation of the difference shall be provided; and
- (d) the measurement details and Standardisation Certificate shall be in the form of Schedule 11. Measuring equipment standardized against a Permanent Standard Working Base need only refer to the number of that Base in any certification.

2.21 Band Standardisation on Extensive Surveys

Where a number of surveyors are working on an extensive survey at the one time, all steel band in use shall be standardized against the one Subsidiary Standard Band or Permanent Standard Working Base, preferably established on the survey.

2.22 Electronic Distance Measuring Equipment Calibration

When electronic distance measuring equipment is used, the slope and such atmospheric parameters as are necessary to correct the reading shall be observed. The final result is the residual distance corrected for slope and atmospheric conditions.

Electronic distance measuring equipment shall be calibrated either on 6 bay bases established under the authority of the Surveyor General in locations as notified from time to time or alternatively on bases of either 4, 5, or 6 bays as established by other than **Departmental Surveyors**, with the approval of the Surveyor General. Where a 5 bay test is carried out on a 6 bay base, the first two bays should be combined to become the first bay. A 4 bay test is the minimum acceptable for cadastral surveys and it is preferred that this test is carried out against absolute distances therefore requiring use of an established base. (The 4 bay test allows determination of index, scale and cyclic error but does not determine random error).

Calibration shall be carried out at intervals not exceeding twelve months. Measurements shall be made available to the Regional Surveyor on request. A Regional Surveyor may order that a 5 or 6 bay test be carried out if he considers improved calibration information is required. Regional Surveyors shall collect sufficient calibrations so as to determine absolute distances for bases. Control Surveys shall require calibration on a 6 bay base.

2.22 Standardisation of Compass

For the purpose of Rural Class Two (Category B) and Rural Class Three Surveys, the compass used on the survey shall have the variation of the compass from Grid North determined near the locality of the survey so as to give a true value of Grid North as is

Survey Directions 1990

required by Clause 2.11. These observations shall be recorded on the cover sheet of the field book.

PART THREE

GENERAL PROCEDURES FOR SURVEYS AS SPECIFIED.

3.1 Commencement

Survey Directions 1990

This part of the Directions is effective from 1 January 1990.

NOTE: This part of the Directions contains clarification of procedures and covers various surveys carried out under Parts 4, 5 and 6.

For references to applicable law, refer to Schedule 12.

CUSTOMARY LAND

NOTE: In this part, certain directions are advice rather than directions and are preceded by the word; “Advice”. The intention of the advice is to encourage surveyors to enter into types of work they may not have been involved with and to point out the matters they should be aware of before doing so.

3.2 Customary Land Surveys

Surveys of customary land may be carried out under any part of these Directions. An additional certificate shall be placed on the face of the plan and signed by the surveyor.

“To the best of my knowledge and belief, there is no encroachment onto any alienated land or land subject to any other order issued under the Land (Tenure Conversion) Act, by the boundaries of the land which is wholly customary as shown on this plan(legal description)”

This certificate is only necessary on the face of initial survey of the land.

3.3 Advice: Land Ownership

Surveyors are instructed to be aware if their survey does not agree with customary title then no registered title can issue. Registration of title is not the means of settling disputes. With customary ownership, title is proven by investigation.

For Rural Class Four surveys in particular, proof of ownership is an integral part of the survey as the strength of the title will depend upon the unwritten description of the boundary, features or marking delineating (*formal – show by drawing or describing*) the boundary and the agreement of those persons owning lands on each side of the boundary.

Investigation of ownership depends upon discussion of genealogy, names, land use, migration, warfare, marriages, inheritance, grants, gifts and other customary transactions.

The least relevant matter will be measurement.

Surveyors must therefore understand customary land tenure for the locality they are working

in, must be capable of negotiating themselves where this becomes necessary and must cooperate with persons authorised to investigate land.

3.4 Abuttals (*Common boundary*) of Land Ownership

On Rural Class Four surveys, abuttals of the same degree of ownership, i.e, family, sub-clan, or clan, shall be shown on the plan. On all other surveys of customary land, it is preferred that surveyors wherever possible, indicate land ownership abuttals.

The accuracy of abuttals plotting shall be to the same accuracy as the survey itself.

3.5 Recording of Discussions of Ownership and Abuttal Ownership.

The names of owners and adjacent landowners accompanying surveyors in the course of boundary determination are to be recorded in the field book with relevant comments. The survey report shall refer to these records.

3.6 Advice: Law and Customary Owners.

- (a) Various Acts may be used in the creation of title to customary land for customary purposes. These are the Land Act and **Amendments**, the Land Tenure Conversion Act (No 15 of 1964 and **Amendments**) and the Land Groups Incorporation Act (Chapter 147). From time to time, legislation at a provincial level may be created. Surveyors are expected to be able to advise clients on their use of this legislation.
- (b) Under Schedule 2 of the constitution, custom prevails over common law. However, the Courts have pronounced that for a certain customary practice to be adopted and applied as part of the underlying laws of Papua New Guinea, it must be of nation-wide application, i.e., that is a common customary practice in the country.

3.7 Advice: The Interest of the State

In various ways, the State has an interest in the Customary Land. What these interests are may change from time to time. The following Acts are among that affect Customary Land and restrict the rights of customary owners. Surveyors are expected to be familiar with the manner in which these Acts limit or remove rights.

Water Resource Act (Chapter 205)
Forestry Act (Chapter 216)
Forestry (Private Dealings) Act (Chapter 217)
Mining Act (Chapter 195)
Petroleum Act (Chapter 185)
Fauna (Protection & Control) Act (Chapter 154)
Conservation Areas Act (No. 52 of 1978)
Environmental Contaminants Act 1978

Environmental Planning Act

3.8 Advice: Problems Encountered in Surveys of Customary Lands

- (a) Determining the location of a survey in an office with a client may result in a search of survey data for a wrong location and wasted field time. Visit the site first, send one of your staff or use someone visiting the locality who can be relied on to read a map correctly.
- (b) Mineralised areas have variable magnetic deviations and relocating of a boundary on a compass survey must be done with the knowledge of actual deviation. This is not necessarily the nominal variation shown on the plan form.
- (c) Land disputes delay approximately one third of sporadic customary land surveys. On one tenth of these disputed surveys, surveyors are threatened with physical violence. This occurs because sporadic surveys can be instructed without adequate discussion by affected owners or formal investigation by authorised persons.
- (d) Where the surveyor has suggested that customary owners cut their own lines as a means of reducing survey fees, the surveyor on commencing the survey may find that the lines were not cut, were inadequately cut, or have to be varied because of a boundary change with new cutting to be done. This often means that the surveyors fee is not necessarily reduced.
- (e) Because short boundary lines increase the time spent in survey and marking, surveys in densely populated areas and surveys of tree crops under rehabilitation, tend to be of higher than normal cost. Surveyors need to ensure they have adequate information before giving estimates of cost for survey work in localities containing high population or economic tree crops.
- (f) Where a surveyor uses a method of survey for water boundaries or coordination which could result in misunderstanding of where a boundary is, he should overcome this problem by adequate discussion.
- (g) The name of ground given to a surveyor for showing on a plan may not agree with the name of the same ground as written in an investigation report. Similar problems arise with clients' names.
- (h) Customary owners may give misleading advice on the location of prior surveys and any advice given must be checked.
- (i) Where a Class **Three** survey abuts a Class **One** survey, reinstatement costs of the Class **One** survey if an exceptional number of marks are missing may make the Class **Three** survey uneconomic. If the work is under instruction to a Certified Measurer who has not had sufficient Class **One** reinstatement experience, it may be impossible.
- (j) The above problem result in time loss that is either unable to be charged or difficult to negotiate charges for unless preliminary agreement with a client makes provision for these problems.
- (k) Lack of payment of survey fees is often a problem. Surveyors must comply with Clause 1.8 and Clause 1.12 irrespective of this problem.

ACQUISITION SURVEYS

Acquisition Surveys are surveys carried out under Section 15 of the Land Act (Chapter 185). Surveys carried out under Section 15A of the Land Act for lease lease-back purposes may not be drawn on catalogue plan forms.

3.9 Acquisition Surveyors who are neither Registered Surveyors nor Certified Measurers.

Where the surveyor is not a Registered Surveyor nor a Certified Measurer then, the lodgment of an acquisition survey shall be on an acquisition plan form only. Catalogue plan forms may not be used nor may such a surveyor carry out surveys under Section 15A of the Land Act. Surveys shall be in accordance with the relevant parts of these Directions for the particular class of survey except Urban Class Two, Urban Class Three and Rural Class Four surveys may not be carried out by such a surveyor.

3.10 Certification by all Surveyors on Acquisition Plan Forms

All surveyors who lodged surveys on Acquisition Plan Forms shall provide the following certification thereon.

I,(Surveyor's name), (Occupation) of(Business or Employer), at(Postal Address) hereby certify that the survey represented on this plan was made by me and was completed on the day of 20..... and survey has been executed in accordance with the provisions of the Survey Act 1969 as amended and any Directions made or given by the Surveyor General.

3.11 Options for Plans showing Land Ownership and Regional Surveyor's Responsibility

- (a) Acquisition survey require a description of land ownership. The time at which this land ownership is obtained with respect to the time of survey will affect the means of showing the land ownership in plan form.
 - (i) Should ownership be known or determined at the time of survey a surveyor may use an acquisition plan form. This may result in title subject to survey. (Refer to Schedule 16.1).
 - (ii) Should ownership be known or determined at the time of survey, the surveyor may use a catalogue number plan form. The title will not be subject to survey. (Refer to Schedule 16.2).
 - (iii) If ownership information is to be determined after registration of a catalogue plan survey, then a sepia copy of that catalogue plan may be renumbered with an acquisition plan number and additions made to the sepia copy to show the relevant additional information. The title will not be subject to survey. (Refer to Schedule 16.3)
- (b) A Regional Surveyor may refuse lodgment of a survey for acquisition of land if the information as to ownership of land has not been supplied and he considers that the creation of a plan showing this is the responsibility of the surveyor or his organization or client to obtain through normal investigation procedures by

Survey Directions 1990

government officers. If an arrangement is made that supply of the information will be made later, then a written agreement as to this will be supplied as a condition of acceptance of lodgment.

3.12 Portrayal of Divisions of Customary Land within an Acquisition

Where divisions of customary lands are shown on any acquisition plan, where the future land use ignores these divisions, it is preferred, but it shall not be necessary, to show the dimensions of these lands on the plan. Whether shown on the plan or not, these dimensions shall be recorded in field books and calculations.

In these cases, it is likely that tabulations of the details of the divisions of customary land would be required for clarity. Refer to the Specimen Plan in Schedule 16. Where tabulation is used, the plan face shall record only the legal description and area of each land.

The legal description in such cases shall be as a “subdivision” of a portion.

LAND TITLE COMMISSION SURVEYS

3.13 Land Titles Commission Surveyors who are neither Registered Surveyors nor Certified Measurers

(a) Where a survey is carried out under the authority of the Land Title Commission Act by a surveyor who is not a Registered Surveyor nor a Certified Measurer, then the lodgment of the survey shall be in accordance with the relevant parts of these Directions for the particular class of survey except that Urban Class Two, Urban Class Three and Rural Class Four surveys may not be carried out by such a surveyor.

(b) A surveyor, lodging a survey as in (a) above, shall lodge the survey on a Catalogue Plan Form which shall be amended by crossing out the Registered Surveyor’s Certificate. A new certificate shall be provided on the plan face in the lower right corner. This certificate shall be as follows:

I,(Surveyor’s name), (Occupation) of(Business or Employer), at(Postal Address) hereby certify that the survey represented on this plan was made by me and was completed on the day of 20..... and survey has been executed in accordance with the provisions of the Survey Act 1969 as amended and any Directions made or given by the Surveyor General.

3.14 Plan Title

Between the above Certificate and the title box of the catalogue plan form “LAND TITLES COMMISSION SURVEY” shall be 0.7mm high.

SURVEYS OF MINING TENEMENTS

3.15 Lodgment of Mining Tenement Surveys etc.

Clauses 2.9 and 3.15 to 3.19 shall apply to surveys of land for the purposes of the Mining Act. Surveys of mining tenements may be lodged in accordance with the requirements of any

Class of Survey under these Directions. Grants of mining tenements are usually made prior

to the survey. Tenements may be claims, leases, easements or rights, all of these being of various types. A surveyor must have authority, either under the Mining Act or the

Mining

(Safety) Act to carry out these surveys. A copy of any such authority is to be provided to the

Regional Surveyor upon his request.

3.16 Demarcation of Mining Tenements

The requirements of shape and size of mining tenements are defined by the Mining Act and

Regulations. Surveyors are governed by the requirements of the Mining Regulations in particular. (Generally, boundaries are measured as marked by the holder of the tenement and as recorded in the schedule of the application for claim or lease. However, in the case of

dredging or sluicing claims or leases, the surveyor commences from the datum post and marks the boundaries adhering to the schedule in the application for claim or lease instead

of the provisional marking of the claim or lease.)

Requirements as to shape and size of tenements and the depiction of other tenements and/or overlaps of these in the vicinity are subject to the approval of the Warden as in Clause 3.18 below.

3.16 Abuttal and Underlying Boundaries

Sufficient connections shall be made to identify and prove adjacent or underlying cadastral

boundaries and/or corners to enable accurate plotting of these or future calculations of intersections of various boundaries.

3.18 Plans of Mining Tenement Surveys

Plans shall be drawn as directed by the provisions of Part 9 except that:

Survey Directions 1990

- (a) The title of the plan shall be “Mining Lease Survey of”
- (b) The Class of survey shall be preceded by the word “Mining”.
- (c) The boundaries of existing surveyed portions shall be shown by 0.25mm solid lines.
- (d) The description of the land under survey shall be assigned by the Warden.
- (e) The plan and survey file, prior to registration by the Regional Surveyor, shall be referred by the Regional Surveyor to the Warden at the Warden’s office closest to the mining tenement which is the subject of the survey. The Warden’s approval shall be entered upon the plan by signature on a note written at the lower left hand side of the plan in the form:

“APPROVED ...(signature)..... (date) ...

Mining Registrar(office)

3.19 Noting of Mining Tenement Surveys

The traditional use of Milinch and Town Noting Maps is as a reference for title. Wider use of these maps is necessary and they are now to act as an index map reflecting all plans recorded in various plan registers of the Department of Lands & Physical Planning.

Mining Tenements shall be recorded on these noting maps as directed by Schedule 13.

SURVEYS AND PLANS FOR SUBLEASE PURPOSES

3.20 Creation of Sublease Surveys

Sublease surveys may be carried out under the provisions of Urban Class Three (See Part 6) or under the provisions of any Rural Class of Survey. Specimen plans in Schedule 16 depicts a rural sublease plan and two urban sublease plans.

Where a survey is carried out for lease or sublease purposes only, in accordance with the requirements of Section 5 of the Land Registration Regulations (Chapter 191), the following shall apply, except that where the lease or sublease is for a term shorter than ten years with no option of renewal or it is wholly contained within a building, then the requirements of this part may be disregarded unless otherwise directed by the Regional Surveyor.

- (a) Boundary marking as per Clause 2.2 is expressly disallowed, (i.e. marks with broad arrow may not be used), permanent survey mark connection as per Clause 2.15 is not required and coordination as per Clause 2.16 is not required.

For freehold and customary land, the plan title shall read “Survey of for Lease Purposes Only”.

For Government land, the plan title shall read “Survey of for Sublease Purposes Only”.

Survey Directions 1990

Each parcel shall be described numerically from 1 as a Subdivision of the existing description, i.e. Sub 1, 2 and 3 of Allotment 6, Section 10 or Sub 1, 2 and 3 of Portion 1234.

- (b) The plan shall be lodged with the Regional Surveyor, catalogued, noted, examined and registered. These surveys are not to be regarded as new surveys or in any way affecting the validity of the original survey. Should a formal subdivision be required in the future covering the subdivisions, normal procedures of approval, lodgment etc will be required. It will not be necessary to describe or complete a balance area, unless this also is the subject of a lease/sublease agreement.
- (c) Acceptance of a plan under this part of the Directions does not commit the Department of Lands & Physical Planning to acceptance of those subdivisions if it is proposed in the future to change their status to allotments/portions on a normal subdivision.

CONTROL SURVEYS

- 3.21 Control Surveys carried out for major cadastral surveys shall be to standards as specified in Directions prepared by the Director of Mapping or shall be as Regional Surveyor directs after seeking the advice of the Director of Mapping.
- 3.22 Control surveys carried out for cadastral purposes must be lodged for examination on Catalogue Number plan forms.

MISCELLANEOUS SURVEYS

- 3.23 Miscellaneous Plan Register contains a variety of surveys of investigation for design purposes, engineering control, street closing, definition of land for gazettal purposes or proposed subdivisions. Lodgment of such plan is through the Regional Surveyor only.
- 3.24 Regional Miscellaneous Plan Registers (H, I, N, S)

Each Regional Office has a Miscellaneous Plan Register for the holding of minor surveys that do not need to be referred to the Office of the Surveyor General.

3.25 National Land Plan Register

The National Plan Register is operated by the Titles Office for the purpose of the National Land Registration Act (Chapter 357). These plans are prepared by the Titles Office.

PRECISION OF SURVEYS

3.26 Limits of Angular Misclose

Survey Directions 1990

Where N is the number of times the instrument :

- (a) Urban Class One: The limit of angular miscloses shall not exceed 20 seconds times the square root of N, with a maximum limit of 1 minute 30 seconds.
- (b) Rural Class One: The limit of angular miscloses shall not exceed 20 seconds times the square root of N, with a maximum limit of 3 minutes.
- (c) Rural Class Two: The limit of angular miscloses shall not exceed 30 seconds times the square root of N, with a maximum limit of 5 minutes.

3.27 Rounding of Observed Data

- (a) Instrumental angles between lines or bearings shall be recorded and reduced to bearings reading from zero through East to 360°. The actual reduced bearings of boundary lines shall be adjusted by distribution of the misclose in accordance with good survey practice, provided such misclose does not exceed that allowed for the particular class of survey.

Deduced bearings shall be rounded as follows:

(Table next page)

Class	Length of Line	Rounding off to
Urban 1	Up to 100 metres	01 minute
Urban 1	Over 100 metres	20 seconds
Urban 2 & 3	See Part 6	
Rural 1	Up to 300 metres	01 minute
Rural 1	Over 300 metres	20 seconds
Rural 2(A)	Up to 300 metres	02 minutes
Rural 2(A)	Over 300 metres	01 minute
Rural 2 (B)	As Rural 2(A) or 3	
Rural 3	All lines	30 minutes
Rural 4	See Part 44	

- (b) Measurement shall be rounded off as follows :

Class	Rounding to
Urban 1	0.01 metre

Survey Directions 1990

Urban 2 & 3	See Part 6
Rural 1 & 2A	0.01 metre
Rural 2A & 3	0.1 metre
Rural 4	See Part 4

The rounded bearings and distances of the boundaries shall be accepted as the correct description of those boundaries, shown on the plan and used in the final calculations.

(NB: Second part of amendment to 101.8 (Appendix One) does not make sense. Omit.)

3.28 Angular and Linear Error

- (a) The bearings of any line shown on a plan shall not differ from the true bearing expressed in terms of the azimuth datum of the survey by more than the following limits of error :

Class	Length of Line	By not more than
Urban 1	Up to 200 metres	01 minute
Urban 1	Over 200 metres	20 seconds
Urban 2 & 3	See Part 6	
Rural 1	Up to 300 metres	02 minutes
Rural 1	Over 300 metres	40 seconds
Rural 2(A)	Up to 300 metres	04 minutes
Rural 2(A)	Over 300 metres	02 minutes
Rural 2(B)	As Rural 2(A) or 3	
Rural 3	All lines	01 degree 30 minutes
Rural 4	See Part 4	

- (b) The length of any line shown on the plan shall not differ from its true length in terms of the official standard of length by more than the following limits of error :

Class	Limits of Error
Urban 1	0.01m plus 0.001m for each 10 metres
Urban 2 & 3	See Part 6
Rural 1	0.01m plus 0.001m for each 10 metres
Rural 2	0.02m plus 0.002m for each 10 metres
Rural 3	0.1m plus 0.01 for each 10 metres
Rural 4	See Part 4

3.29 Closure of Surveys

Survey Directions 1990

- (a) The precision of closure of any survey shall not exceed the following limits, except that for Urban Class One and Rural Class One, on short or minor closes, miclosures of not more than 0.03 metres shall be permitted.

Class	Accuracy
Urban Class 1	1:5000
Urban Class 2 & 3	See Part 6
Rural Class 1	1:4000
Rural Class 2 Category A	1:2000
Rural Class 2 Category B	1:200
Rural Class 3	1:200
Rural Class 4	See Part 4

- (b) Where the survey partly consists of other surveyors' work, the Regional Surveyor may allow a lower accuracy after due consideration of the circumstances.

CURVE BOUNDARIES

3.30 Marking of Curve Boundaries

Boundaries defined by curves shall be marked on the ground by pegs or other accepted marks on the curves in such a manner that the offset from the middle of the chord between adjacent ground marks shall not exceed 0.4 metres, nor shall those marks be at greater intervals than 20 metres apart, but in every case, a curve shall be marked by at least one peg or mark in addition to the pegs or marks at the tangent points.

PART FOUR

RURAL LANDS

4.1 Commencement

This part of the Survey Directions is effective from 1 January 1990.

GENERAL

4.2 Choice of Class of Survey

Survey Directions 1990

The class of survey shall be as proposed by the client on the advice of the surveyor and shall

be in accordance with the general conception of the purpose of the class as recorded below.

However, where the land is likely to be within the twenty years, survey shall be carried out

under Part 6 Urban, and the surveyor shall advise his client accordingly.

4.3 Line Marking on Boundaries

- (a) Boundary lines shall be cleared and distinctly marked at intervals as listed hereunder. The interval for Rural Class One and Rural Class Two may be varied to suit the shape of the country, provided an average of the required interval is obtained.

CLASS	LENGTH
Rural Class 1	300 metres
Rural Class 2A	500 metres
Rural Class 2B	150 metres
Rural Class 3	Not Applicable
Rural Class 4	Not Applicable

- (b) Trees left standing and through which the line passes are to be double marked on opposite sides with a horseshoe mark in such positions that the marks face along the survey line.
- (c) For Rural Class One and Two in forested country, where it is not necessary to complete measurement of a boundary which can be calculated, only such cutting and marking of the line shall be required as will enable the ranging of the line in the future. This sub clause is subject to the consent of the client and adjoining owners and the surveyor is to advise of this in his report.
- (d) For Rural Class Four it is not necessary to clear boundaries other than for the purpose of walking on or near the boundaries to identify them insofar as is necessary for the purpose of creation of a plan of survey and to satisfy the identification of and agreement to the boundary by affected customary land owners. The agreement is to be witnessed.

4.4 Referencing of Rural Surveys

- (a) For Class One and Two Surveys, at intervals of about one kilometer, two pegs, (either line or corner pegs) making a suitable azimuth pair shall each be referenced with an iron pin, placed preferably on the line joining those pegs. A

Survey Directions 1990

minimum of one azimuth pair shall be referenced on any such survey. This sub clause does not apply to Class Three or Class Four surveys.

- (b) For Class Three Surveys, at intervals of about 700 metres, a peg shall be connected to a reference tree or other permanent feature. A minimum of two pegs shall be referenced on any such survey.

4.5 Measurement to Natural Boundaries

- (a) For Rural Class One, Two and Three Surveys, offset measurements fixing natural boundaries from traverse lines shall be taken at intervals sufficient to delineate those boundaries accurately but no such measurements shall exceed 50 metres length unless the natural boundary is tortuous or is located in rough inaccessible country, in which case the length of this measurement may be varied to suit the physical features.
- (b) Notwithstanding anything in Subclause (a) of this Direction, fixation may be determined by tacheometric, photogrammetric, plane table or compass surveys. Rural Class Four boundaries may be determined by these and other methods.

4.6 Water Boundaries

- (a) Watercourse Boundaries
- (i) At interval of about one kilometer, each end of a traverse line shall be marked by peg (without a broad arrow) and referenced either by an iron pin or a reference tree.
- (ii) Where the surveys are carried out along a watercourse, on the opposite bank of which there are previously surveyed portions, connections to such previous work shall be made and the meridians of the old and new work compared. The connections with the previous work shall be shown on the plan, together with sufficient information to show that the old work has been properly identified.
- (iii) Where the watercourse forms the boundary of any parcel of land, the bank shall be the boundary. The bank is the limit of the main watercourse as indicated by vegetation and landform, in containing water at its mean state throughout the year. The middle line of the watercourse is determined by reference to each such bank.
- (iv) The average width of the watercourse shall be noted in the field book and the opposite side plotted on the plan. The direction of flow of the watercourse shall be noted in the fieldbook and on the plan.

Survey Directions 1990

- (v) Subclauses (1) and (2) above do not apply to Class Four surveys and Subclauses (3) and (4) apply insofar as is practicable.
- (b) Tidal Boundaries
 - (i) Administrative systems define two lines, Mean High Water and Mean Low Water for the purpose of determination of boundaries for specific purposes. For Acts of Papua New Guinea where such boundaries are used, refer to Schedule 12.
 - (ii) The problem with each of these lines is the difficulty of fixing them because of the coastal zone in which they occur is at the meeting point of land, sea, air, wind and tides. Mean High Water Mark varies daily, weekly, monthly and yearly and does not represent the perceived edge of usable land. Mean High Water tends to be accepted as the seaward side of the frontal dune which is destroyed and rebuilt through storms. The concept of Mean High Water as a land boundary is inherited from British [Common Law](#) and [Case Law](#). If the law does not require it surveyors should question the wisdom of perpetuating the practise of use of these boundaries in the creation of boundaries in a coastal zone.
 - (iii) There may be a case for survey of a variety of features within the coastal zone and for these to be portrayed on a cadastral plan if the client should wish it. These include offshore bars, foredune scarps, crests, secondary dunes, vegetation lines, mangroves, swamps, estuaries, cliffs and manmade features.
(Refer also to Clause 4.9).
 - (iv) For practical determination of Mean High Water, refer to Schedule 14.

4.7 Common Law and Case Law Principles of Water Boundaries

A moveable boundary is one delineated by flowing water, a stream, river, tidal inlet or open sea.

Survey Directions 1990

- (a) Where a parcel of land is bounded by a non-navigable, non-tidal river or stream, it is presumed that the adjoining owners own the bed of the river to the middle line of the river.
- (b) In common law, the term “navigable” is restricted to tidal waters.
- (c) A town, city or similar boundary, where it is described by a natural boundary and accretion occurs, moves with that natural boundary (wherever it may be) from time to time.
- (d) Accretion is distributed by giving to each owner a share of the new shoreline in proportion to what was held in the old shoreline.
- (e) Where an island arises in a river by accretion, the property in the island is fixed by ascertaining where the middle line of the river would be irrespective of the island.
- (f) Where the boundary is shown by some clear physical feature and accretion becomes perceptible on the other side, it appears that the midpoint boundary remains unchanged. There is no clear decision in case law on this matter.
- (g) The doctrine of accretion does not apply to non-tidal ponds or lakes. The middle line rule applies to small lakes.
- (h) Where the land has been granted in the past, exclusion of the land to the middle line of a river must be evidenced by the terms of the grant, and if not so evidenced will be included in the grant if the grantor **has** power to include it.
- (i) Applications for accretion are treated as corrections of title and a plan of survey is to be supported by statutory declaration declaring that the land is of a stable nature and has ceased to be part of the bed.

4.8 Reserves on the Foreshore of Navigable River, Lake or Sea.

- (a) **Alienated Land:** In the past, it has been considered that reserves should be no more than 100 metres and no less than 30 metres in width. Future reserves, on vacant government lands or on leased land under application for subdivisional approval, shall be marked by right lines on the inland boundary. The shape and size of reserve should take into all relevant access and environmental factors.
- (b) **Freehold and Customary Lands:** Foreshore Reserves would have to be arranged with the consent of the owners or under any law which gave the right to take land for this purpose.

4.9 Improvements etc.

Survey Directions 1990

Permanent improvements within five metres of a boundary of a Class One, Two or Three

survey shall be recorded in the field book and plotted accurately on the plan. Other improvements, e.g. buildings, roads, fence lines, streams, form lines, etc within any portion

may be recorded upon the plan provided that this information shall be shown as per Schedule 13 and shall not distract from the main purpose of the plan as a document for the purpose of creation of title.

4.10 Land Names

In every first survey of customary land, the name of the land shall be shown on the plan face above the area. With respect to the correct spelling of names and the Place Names Act, surveyors are referred to Schedule 15.

RURAL CLASS ONE

4.11 Purpose of Class One Surveys

Class One surveys are for the purpose of economic development particularly, rural estate development and rural industry.

4.12 Control by Surveys of a Higher Accuracy

In any extensive Class One survey, Clause 3.21 may apply.

RURAL CLASS TWO

4.13 Purpose of Class Two Surveys

Class Two surveys are generally for the purpose of extensive small holder developments associated with rural estate development with planned crop processing in the same sub district.

4.14 Methods of Survey

- (a) Category A surveys shall be carried out by theodolite.
- (b) Category B surveys shall be controlled by all external and main internal boundaries (e.g. road lines, drain reserves) being surveyed by theodolite to Category A standards with remaining internal boundaries surveyed by chain, compass and clinometer. For the purposes of this subclause, any slope observed with compass and clinometer may not exceed 30 hectares. For adjustment of compass observations, refer to Clause 4.19.

4.15 Control by Surveys of a Higher Accuracy

In any extensive Class Two survey, the Regional Surveyor may direct that the survey be controlled by surveys of Rural Class One standard.

RURAL CLASS THREE

4.16 Purpose of Class Three Surveys

Class Three surveys are for the purpose of facilitating sporadic development where systematic registration has not proceeded or, when controlled by surveys of Class One accuracy, semi-extensive small holder development. In addition, they may be used to mark the entire lands held by a land owning group where those lands are less than 75 hectares and therefore, disallowed for survey under Class Four. (Refer also to Clause 4.23).

Those Clauses of these Directions applicable to Certified Measurers are listed in Schedule 17.

4.17 Limit of Area

No Class Three survey shall be in excess of 75 hectares. Lodgment by the one surveyor, in close time sequence, of adjoining surveys which infringe this direction shall be refused absolutely by the Regional Surveyor.

4.18 Methods of Survey

(a) **Compass and Clinometer**

Where the area of survey does not exceed 50 hectares and slopes do not generally exceed 25° compass and clinometer may be used. Where a survey carried out by [these](#) equipment [exceed](#) 2000 metres in perimeter, a check traverse to divide the survey into surrounds of less than 2000 metres shall be carried out.

(b) **Compass and Theodolite**

Where the area of survey exceeds 50 hectares or slopes generally exceed 25°, a theodolite must be used to measure angles and slopes. The survey may commence from a compass datum. (A theodolite may be used on areas of less than 50 hectares).

4.19 Adjustment of Compass Observations

Bearings shall be read in the forward and reverse directions at each corner. To remove local attractions, (forward and back bearings differing by greater than observational error, i.e. over 1°) the same correction is applied to each bearing observed from any one

station and after correction, the back and forward bearings of any line must differ by 180°.

4.20 Future Reinstatement of Theodolite Class Three Traverse.

Internal observed angles to the nearest minute, measured by theodolite, are to be tabulated on the plan in order to assist future reinstatement of boundaries.

4.21 Reinstatement of Class One Boundaries

Where a Class Three survey adjoins existing surveyed boundaries of a higher class, the following shall apply:

- (a) Where a peg is to be placed that redefines an old boundary mark or line, it shall be placed to the accuracy of the old survey except that;
- (b) Where the peg to be placed is within 150 metres of a reliable mark from the old survey, it may be placed to a precision of not less than 1:200. The plan will be noted: "Station has been reinstated to Rural Class Three precision". For the purpose of this subclause, reliability of old marks need only to be proven to the precision of 1 in 200.

RURAL CLASS FOUR

4.22 Purpose of Class Four Surveys

Class Four surveys are for the purpose of customary lands as a title base for surveys of subleases internal to those lands or such other surveys of extensive areas of land for various rural development purposes as may arise from time to time. The Class Four system is based on a planimetrically accurate plan not being essential where the boundary is described by natural or artificial features or by approximate coordinates in the absence of these features.

4.23 Limit of Area

No Class Four survey shall comprise an area less than 200 hectares, internal to a systematic registration area undergoing simultaneous survey may be accepted. In these cases, the land must be the entire land owned by a group which comprises an accepted unit group for registration purposes. (For such land less than 75 hectares, refer to Clause 4.16).

4.24 The Concept of General Boundaries for Customary Land

Boundaries will depend upon those factors listed in Clause 3.3. Therefore, that which **already** exists as a boundary in custom with natural, artificial or no features, has to be accepted. There is no choice as to where the boundaries will be located.

To create a Class Four survey, comprising of “general boundaries”, under these circumstances requires that the surveyor adequately advise customary owners on how evidence of boundaries may be strengthened. This is preferably done without systematic measurement which may destroy the generality of the boundary and create unwarranted dispute.

In **certain cases**, failure to resolve a general boundary should result in the resolution of what each party considers to be the firm boundary of the other party, to obtain their joint agreement as to those lines, and to leave a separate portion between the two lands, as being of unresolved ownership. This procedure occurs in custom by avoidance of use by both parties and there is no reason why the same cannot occur under this Class Four survey system.

Surveyors must obtain from customary owners their view of what a boundary in custom comprised of prior to any investigating officer requiring that a boundary be determined. At the centre of group owned land, rights are specific and further away grade into general rights, so that a boundary may be relatively undetermined. This is true particularly where it is unsupported by natural or physical features. The marking of such a boundary, where this is not evidenced by natural or artificial features, should therefore be indicative in that it will mark the general locality of the boundary and for this reason alternatives to normal boundary marks are to be preferred.

4.25 Boundaries of Natural or Physical Features

Boundaries may be natural or physical features, (and/or offsets from these), such as water

courses, riverbanks, shorelines, terraces, ridges, spurs, fences, barrets, hedges, traditional markers, formed roads, tracks or similar physical features that are capable of positive identification. The nature of all natural boundary features shall be specifically described on

the plan face. It is expected that most boundaries of this form will be relatively identifiable in the long term.

4.26 Boundaries Not Clearly Identified in Custom

Boundaries that cross the natural form of the land may be marked sporadically, at suitable

intervals, generally not less than 500 metres apart, and more probably 800 metres. A surveyor

in redefining such a boundary in the future would be guiding owners in their own decisions

as to where the general locality of the boundary was, through the location of sporadic marking. How the boundary should be further improved upon in definition at that future time would depend upon whether the boundary had become more significant

to the owners and accordingly better defined by them during the elapsed time since survey.

4.27 Boundaries Crossing Customary Lands

Where a survey crosses customary lands, previously surveyed, for reasons related to a particular economic use and the survey is carried out under this part, the boundaries thereon

may require a greater number of marks (which would therefore not constitute sporadic marking). This may either be by normal or special marking as determined by the particular circumstances.

4.28 Special Boundary Marking

For the purposes of Clauses 4.26 and 4.27, it is likely that surveyors will derive marking under Clause .23 that it is suitable for the indicative marking of Rural Class Four boundaries. Example of such marking are listed below. Surveyors are expected to develop new methods of marking these surveys:

- (a) In heavy bush, metal plate of less than 30 centimetres square, fluorescent painted, with a broad arrow either painted in black or cut out. The plate would be nailed to uneconomic trees at head height.
- (b) In cutover bush, metal plate as in (a) above except cut on the diagonal to half the size and bolted to one inch galvanized iron pipe not less than two metres in length. The pipe would be hammered into the ground until stable.
- (c) On grasslands, not normally cultivated, trench or baret, 1.5 metres long, 0.2 metre wide and 0.2 metre deep at corners or on boundary lines.

4.29 Abuttals on Class Four Surveys

On all surveys under Class Four, for whatever purpose, the external ownership must be shown as abuttals to the survey to the same accuracy that the boundary itself is indicated by

the plan. Wherever possible the description of the abuttal boundary at the point it departs

from the survey boundary should be given on the plan face. Adjoining owners are a party to

the decision on the location of the boundary and this direction is to ensure that their involvement has occurred. It may arise in customary registration law that statutory declarations in English and another suitable language be part of the documentation supporting boundary agreement between various parties and the surveyor may be required to

report on these.

4.30 Description on Boundary

A clear and continuous description of boundary must be able to be derived from the plan of survey so as to be able to describe the title to the land as and when required. Where the boundary comprises natural or artificial features, a scaled distance along such will be required. Where no feature exist the boundary will be described by coordinates, generally to 100 metres.

4.31 Survey of Boundary

Class Four Survey requires a non-traditional approach to the method of survey and of entry into field books of the records of survey. Various alternatives are listed hereunder as a guide only to the types of options that could be considered in the derivation of plans of surveys. Any of these options could be used in combination with each other or with methods not written hereunder:

- (a) Where line cutting is necessary to walk boundaries, ensure that the whole of this work is completed prior to commencement of survey. Ensure that only relevant cutting is done, e.g. in the heavy bush, the cutting of a walking route only.
- (c) Use topographic maps enlarged photographically to the scale of the intended plan. National Mapping Bureau's Chief Cartographer will quote the cost of this and arrange it with their Photolaboratory.
- (d) Utilise air photographs, rectified or unrectified photographs, orthophotos, controlled or uncontrolled mosaics, in field and office work
- (e) Record distances by; pacing and counting the paces with a tally counter, pedometer, linen 100 metre tape, measuring wheel, rangefinder, vehicle recording to 0.1 kilometre or by radiation of electronic distances.
- (f) Record direction by compass and record steep slopes by clinometer if pacing cannot be judged.
- (g) In field work, utilize clearly identifiable map features as control points and fix boundaries from those points by any relevant and simple traverse method e.g., the last identified point of a boundary may have been a high point of a ridge and pacing on a compass bearing half a kilometre may leave the location uncertain. If a known stream confluence is to the side of the boundary, mark where the boundary is departed from, locate the confluence, and traverse by pacing and compass back to the marked boundary position to confirm its position.
- (h) Utilise landowners for various purposes: e.g. to confirm the boundaries determined by prior resolution of affected owners, to stand where boundary position fixing ceases while an improved identification of that position is

Survey Directions 1990

obtained, to hold the end of 100 metre cloth tape if measurement becomes necessary to dig baret as boundary indicators in grassland etc.

- (i) Carry out normal traverse to Class One, Two or Three standards if it is relevant to include work of this accuracy within a Class Four Survey.
- (j) Utilise low accuracy global positioning systems or navigational systems where coordinates are needed to support boundary description.
- (k) On straight boundaries internal to a group ownership on **extensively** low population density lands, mark each end of the line by **PSMs** to high accuracy by global positioning systems and fly the landowners along the boundary by helicopter.
- (l) Support the survey record by printing a half-tone airphoto mosaic transparency to the plan of the survey.
- (m) Use side scanning aperture radar (ex Geological Survey) for scales of 1:15 000 or smaller as this sees through trees, remote sensing systems, or oblique 35mm photography to support boundary identification on more extensive lands.
- (n) With two theodolites from a measured and elevated base, simultaneously intersect, the location of a helicopter, hovering over boundary positions agreed upon by landowner representatives in the helicopter.
- (o) With two theodolites from a measured and elevated base, simultaneously intersect the location of a pillar of smoke from a fire, made by a ground party of landowners and surveyor to mark a boundary.
- (p) Utilise visible laser beams or strobe lights as identifiers of locations.

4.32 Precision of Survey

The surveyor will make a judgment as to the accuracy of the methods he has used in creating the plan of survey and will note upon the plan face “Areas on this plan are considered to be accurate to \pm ___ %”.

4.33 Scale of Class Four Survey Plans

Plans shall be drawn at scales not smaller than 1:50 000 for very extensive lands and not greater than 1:5 000 for small land areas with preferred intermediate scales being 1:20 000 and 1:10 000. (The last scale, 1:10 000 may become the scale of a new noting map series).

PART FIVE

RESERVES AND EASEMENTS

5.1 This part of the Survey Directions is effective from 1 January 1990.

5.2 Classes of Survey.

Surveys under this part may be carried out under any Class of Survey under this Directions, except that survey control shall be as per Clause 5.12 or Clause 5.18 hereunder, and provided that the reserve and easement boundaries are clearly and unambiguously defined as follows:

- (a) by marks on the ground,
- (b) by reference to a pegged centerline or,
- (c) by reference to an accurate traverse.

5.3 Exemption from Ground Marking

The subclauses 5.2(b) and 5.2(c) allow quick completion of survey plans without ground marking and should therefore be used only in localities of remoteness, low population or low land value. Exemption from ground marking is hereby given for the purpose of those subclauses. Surveyors using this exemption are advised to refer to “Customary Land” and “Acquisition Surveys” in Part 3.

THE LAW WITH RESPECT TO ROAD AND PATHWAY RESERVES.

5.4 Declaration or Dedication of Road and Pathway Reserves

Parts of this clause are a direction and other parts are advice. There is no statutory provision for the declaration or dedication of legal access. The following procedures have been used.

- (a) Where legal access over customary land is surveyed before purchase by the State or dedication by the owners, the noting (NP) shall follow the description of the access on the plan. For example, “PATHWAY (NP) 4 WIDE. “(NP) means “Not Purchased”. The area of the access (NP) shall be shown and the access shall receive a portion number.
- (b) Where legal access over freehold land is newly surveyed, the owner is required to dedicate the access as road or pathway on a Deposited Plan lodged with the Registrar of Titles. (A Deposited Plan is normally a copy of a Catalogue Number plan, renumbered as a D.P). The area of the access shall be shown and the access shall be described a subdivision of the subdivided portion.

The wording of the dedication is in the form: “.....(Owner)... assents to the

Survey Directions 1990

subdivision edged red hereon and dedicates the roads and reserves to public use".
If only some of the roads on a Deposited Plan are intended to be dedicated, it would be necessary to indicate such roads.

The dedicated roads remain the property of the owner and must be purchased by the State for ownership to transfer to the State. If the State purchased a Certificate of Title would issue to the State.

- (c) Where legal access over vacant rural and urban government lands is newly surveyed, the access is dedicated by the act of the registration of the survey plan by the Regional Surveyor. No area and no legal description is required for the access.
- (d) Where legal access over leased government land is newly surveyed, the access is dedicated upon the issue of a new lease for the balance area. The area of the access shall be shown.

NOTE: Clauses 5.5 to 5.8 are advisory

5.5 Advice: Evidence of Dedication of Legal Access: Land Title Commission Act 1962.

Section 22(1) states"in respect of land shown on the (demarcation) plan shall - ... (b) declare what are the public roads, public rights of way or water and areas reserved for public purposes in or over the (customary) land within the adjudication area".

Section 30 states " Evidence of five years undisputed and continuous use of land such as a road, track or right of way by the public may be accepted by the Commission as conclusive evidence that that land has been dedicated to the public as a road, track or right of way, as the case may be, and is the property of the Administration". Section 30 operates over land that is the subject of a Commission of Inquiry by adopting the common law doctrine of dedication and setting a time limit. The phrase " property of the Administration" appears to vest absolute title in the State but this is a significant variation from common law and would have to be tested in court or varied by Statute. "Road" as used in Section 30 has been adopted as meaning the land occupied by the actual road formation, i.e. from table-drain to table-drain.

Any objection by the State, to a Land Tenure Conversion application enclosing what is considered to be legal access, could be made either by request of the Department of

Provincial Affairs to the Public Solicitor to object to the loss of access on behalf of customary owners, or by the Department of Lands and Physical Planning to the State Solicitor to object to the loss of access on behalf of the State.

5.6 Advice: Common Law and Legal Access

Whether an access is public or not depends primarily on whether the access has been dedicated by the owner of the land or accepted by the public for its use. Dedication may be expressed but is usually implied from continuous use by the public over a period of time without interference by the owner. No fixed period is required.

Although an access may be dedicated to the public, the owners adjoining it are the owners of the subsoil up to the centre of the adjoining access. The State therefore, is not the owner of the subsoil and Section 81 (Temporary Occupation) and Section 82 (Taking of Materials, etc from adjacent land of the Land Act cannot be applied to such land.

5.7 Advice: Roads Maintenance Act (Chapter 246).

This Act provides for the classification and maintenance of roads etc. and applies to such roads as are gazetted under this Act.

Section 22(2) states “Subject to any other law, a person who, without consent of the Provincial Roads Board ... willfully obstructs, or hinders or prevents the free passage of, any person, vehicle, horse, cattle on a road is guilty of an offence.”

This section means that even if a road gazetted under the Act has not been dedicated, access is assured.

5.8 Closing of Roads

The only law applicable is the Street Closing Act (Chapter 201) and this applies in (gazetted) towns for:

- (a) a street or part of a street; or,
- (b) an area included in a street or part of a street.

Once the State acknowledges the right of the public to use land as a road, it cannot withdraw that right of the public to use land as a road, and it is so used, it cannot withdraw that right in rural areas, except for the purpose of maintenance or public safety under Section 23 of the Roads Maintenance Act.

SURVEY OF ROAD AND PATHWAY RESERVES

5.9 Legal Frontage

Legal frontage shall be created in accordance with the provisions of the Physical Planning

Act and Regulations for “physical planning areas” it is desired that the same standards be maintained, insofar as is possible.

5.10 Access through Land

- (a) In the course of new surveys of lands, surveyors must assess the applicability of legal access to the new survey or for excision from it for access to other lands. Where the survey such access is external to the survey, in the vicinity, and not part of the instructed work, surveyors are to comment in their report on any access that should be secured by State purchase.
- (b) In the course of new surveys of customary land that adjoins existing access and where that access is not surveyed as part of the instructed work, surveyors shall set back the boundary of the customary land half the normal width of such access from its centerline.

5.11 Road and Pathway Reserve Minimum Widths and Design Standards

- (a) Physical Planning Areas.

The Physical Planning Regulations contain standards for road hierarchy, containment of services, gradients, truncations at intersections and cul-de-sac designs. The minimum widths under these Regulations are:

Highways	20 Metres
Distributors	15 Metres
Collectors	12 Metres
Access Roads	8 Metres
Footpaths	2 Metres

Truncations are a minimum of 5 metres for highways and 2 metres for other roads.

- (b) Other than Physical Planning Areas

Rural road reserve widths have to take into account a number of factors. These are:

- (i) Provision for public utilities being electricity, telephone, water, sewerage and drainage and the maintenance and repair of these.
- (ii) Consideration of compensation costs on leasehold, freehold or customary land.

Survey Directions 1990

- (iii) Existing settlement patterns or the potential for road upgrading or construction to encourage new building construction in the vicinity of the road reserve and the impact of these upon safe traffic movement.
- (iv) Provision for safe horizontal and vertical alignments, location of intersections, earthworks benching for stability of ground and visibility, cut and fill batters, table drains, catch drains, guard fencing, culverts, bridges and road metal reserves.

Minimum widths shall be:

Rural highways	30 metres
Major roads	20 metres
Other roads	15 metres
Pathways	2 metres

Truncations are a minimum of 5 metres for highways and major roads and 2 metres for other roads.

The minimum width shall be increased in 5 metre increments unless irregular or tapering of width is necessary instead for reasons as in (1) to (4) above. Change of width between new and existing roads shall be done by tapering over a suitable distance.

5.12 Survey Control for Road Reserves

This shall be as required under the Clauses for Control Surveys in Part Three or, if not directed in any particular case, as follows. A control traverse of precision of not less than 1:10 000 shall be made following the approximate route, with each traverse point set in cement and a pair of PSMs placed every two kilometres.

The control shall be connected to the reserve boundaries at intervals of not less than one kilometre and at every pair of PSMs.

5.13 Balance Areas and Severed Lands

The intersection by surveyed road lines, reserves and easements with all marked boundaries shall be marked and sufficient connections to old marks made to enable the balance of such boundaries to be determined.

Survey Directions 1990

Where the roads and reserves intersect these lands, plans of balance areas shall be prepared.

Exemption on a case by case basis may be sought from the Regional Surveyor who will take into account in his decision who the client is for the current work, the ownership of the balance lands, any problems of preparing the title without such a plan, the cost of doing so and who pays that cost. For projects of national or regional importance, generally no exemption will be given as project funding must provide for such work.

THE LAW WITH RESPECT TO RESERVES AND EASEMENTS GENERALLY.

NOTE: This part of these Directions is advisory. Clauses 5.15 and 5.16 supplement the clauses on Acquisition Surveys in Part Three.

5.14 Advice: Definitions and Applicability of Reserve and Easement.

“Reserve” generally means any benefit in respect of the subject matter of a grant which is kept by the grantor for himself.

In respect of the Land Act, Section 25 deals with reservation and Section 28 deals with the effect of reservation with respect to government or leased land.

“Easement” generally means a right which may pass from an adjoining property through somebody else’s property for the purpose of serving a dominant tenement. Essential characteristics of easements are that there must be dominant and servient tenements, an easement must accommodate the dominant tenement, the dominant and servient owners must be different and, a right over land cannot amount to an easement unless it is capable of forming the subject matter of a grant.

In respect of the Land Act, it is preferable that easements be incorporated in leases at the grant of lease. Easements in gross must be incorporated at the granting stage and the State must be able to show evidence of title to the land which is the dominant tenement as no general provision exists to register easements in gross on registered leases, except for the provisions of Section 30 of the Electricity Commission Act (Chapter 78).

Where an easement in gross cannot be created, a reserve must be created instead and this, in the case of a lease, requires partial surrender and regrant of the lease. In the case of customary or freehold land, it requires purchase by the State.

5.15 Advice: Normal Acquisition versus Compulsory Acquisition

Normal acquisition requires procedures that take greater time than compulsory acquisition. Normal acquisition is preferred and compulsory acquisition is a last resort. If compulsory acquisition is used:

- (a) There is no purchase price, compensation is paid and may be negotiated after acquisition, and compensation derives from project funds instead of purchase funds.
- (b) Delays on land investigations and purchase agreements are avoided and the State acts from a dominant position; and
- (c) The risk that the value of the project development will become a component of the purchase does not exist.

5.16 Advice: Practical Field Procedures for Acquisition and Compensation.

Prior decision has to be made on rates of compensation for improvements, graves, sand, gravel, gardens, trees and houses. The developing authority should commit the local authority to agreement in principle on conditions as to a project prior to commencement so that objection does not deliberately arise thereafter in an effort to increase compensation payments. Gravel pits should be obtained well in advance of a project. Aerial mosaics are desirable for indicating proposed routes or as an acquisition plan base. Once a route is made of known development or the movement of graves can deliberately occur for the purpose of obtaining compensation.

Procedure for compensation payments by government officers(not the contractors) may include:

- (a) systematic movement through the project during compensation payment period;
- (b) overlap in the event of change of coordinating officers to avoid duplicate payments;
- (c) destruction of improvements upon payment so that what is paid for is clear and where the boundary *lies* is known;
- (d) use of photographic receipts with one photo given to the owner and the other filled; and
- (e) the keeping of a detailed compensation field book. This would record the above together with details of owners and of features inside and outside of the boundaries. Slope distances are an adequate record on route surveys which are cross sectioned and pegged on centre lines.

SURVEYS OF RESERVES AND EASEMENTS

5.17 Description, Minimum Width and Design Standards

Reserves and Easements shall be named as to their purpose and may not be designated as proposed as all are subject, after plan registration, to gazettal or title action and they do not exist until that action takes place.

Reserves shall be given an area and legal description.

(a) Physical Planning Areas

The Physical Planning Regulations require that where service and utility lines serve more than five properties, unless they are within road or footpath reserves, they shall be contained within service and utility reserves of minimum width of two metres.

(See Clause 5.14 re limitations on easement in gross, which may affect easements on five or less properties).

(b) Other than Physical Planning Areas

Rural reserve or easement widths have to take into account a number of factors. These are:

- (i) Provision for design standards for the service or utility.
- (ii) Provision for maintenance and repair of the service or utility.
- (iii) Consideration of compensation costs on leasehold, freehold or customary land.
- (iv) Existing settlement patterns or any potential for the service or utility to change this.

The minimum width of reserves and easements shall be four metres unless good cause for a lesser width can be provided to the Regional Surveyor in a request for exemption.

5.18 Survey Control

This shall be as required under the Clauses for Control Surveys in Part Three or, if not so directed in any particular case, as follows. A control traverse of precision of not less than 1:10 000, shall be made following the approximate route, with each traverse point set in

cement and a pair of Permanent Survey Marks placed every four kilometres.

The control shall be connected to the reserve boundaries at intervals of not less than two kilometres and at every pair of PSMs.

Where the service to be contained by the reserve or easement is of national or regional importance and exceeds twelve kilometres in length, variation to the spacing of control and connection may be sought from the Regional Surveyor. The Regional Surveyor shall take into account the terrain and population density in making his decision.

5.19 Balance Area and Severed Lands

Clause 5.13 applies.

5.20 Marking of Peripheral Boundaries of Reciprocal Easements.

The only boundaries of reciprocal easements that need be pegged shall be the peripheral boundaries.

5.21 As-built Services as Indicators of Boundary

As-built services may be used to indicate boundaries on plans of final survey instead of normal boundary marking. The surveyor will provide sufficient information on the plan so that boundary dimensions are either portrayed or may be readily calculated. For example:

- (a) Transmission line tower footings, shown in diagrams with the distances from each footing to the side boundary of the purchase.
- (b) Pipelines, by offset from the centre of the pipeline to the side boundaries.
- (c) Concrete lined channels or drains, by offset from one side of a defined part of the drain or its centerline.

PART SIX

URBAN LANDS

6.1 Commencement

This part of the Survey Directions is effective from 1 January 1990.

GENERAL

6.2 Choice of Class of Survey

The class of survey shall be as proposed by the client on the advice of the surveyor and shall be in accordance with the general conception of the purpose of the Class as recorded below.

6.3 Referencing of Urban Surveys

This clause applies to Urban Class Two and Three Surveys to the extent that Urban Class One standards might occur in those surveys.

- (a) An iron pin shall normally be placed at the intersection of the side boundaries at truncated corners, but where it is obvious that this will be lost to roads, this may be omitted.
- (b) All section corners, not marked with an iron pin as in subclause (a), and major bends in roads, not connected directly to a PSM within a radius of twenty (20) metres are to be connected to an iron pin or any other secure mark of a like nature.

6.4 Design of Urban Development

Design is carried out in accordance with the provisions of the Physical Planning Act and Regulations for “physical planning areas” as defined by that Act. In other than physical planning areas, it is desired that the same design standards be maintained insofar as is possible.

6.5 Natural and Water Boundaries

Survey shall be in accordance with the provisions of Clauses 4.5, 4.6 and 4.7.

6.6 Improvements

Improvements of a permanent nature within one metre of a boundary are to be recorded in

the field book and plotted accurately on the face of the plan. Other improvements may be shown if the client desires provided that this information shall be shown in fine lines and shall not distract from the main purpose of the plan as a document for the main purpose of creation of title.

URBAN CLASS ONE

6.7 Purpose of Urban Class One Surveys

Urban Class One surveys shall be carried out for the following zones; Commercial, Light Industrial and Warehousing, Isolation Industrial, Public Institutional as created through the provisions of the Physical Planning Act within the physical planning areas.

The zones of Open Space, Residential and Public Utilities may be surveyed as either Urban Class One or Urban Class Two surveys.

URBAN CLASS TWO SURVEYS

6.8 Purpose for Urban Class Two Surveys

Land zoned for Open Space, Residential and Public Utilities may be surveyed as Urban Class Two. Urban Class Two surveys are for the purpose of creating general boundaries, for Physical Planning approved subdivisions, where the boundaries are described by natural or artificial features.

- (a) For low cost residential development, buildings need not be existing on the land.
- (b) For medium to high density residential development, all of the buildings proposed for the land within the survey must either exist or have been constructed to ground floor level.

6.9 Perimeter of Survey

Urban Class Two surveys shall be contained within a section or portions which were originally surveyed as part of an Urban Class One survey with one source of datum. Identification to an Urban Class One standard will be shown on the plan for this perimeter only. If necessary, a new survey may create the perimeter boundary.

6.10 Inspection of Boundaries

Lodgment of a survey requires a certification by an officer of the Department of Lands and Physical Planning as to inspection and confirmation of natural or artificial boundaries for surveys under 6.8(a) and 6.8(b) confirmation of the existence of buildings as shown on the plan as prepared for lodgment.

6.11 Boundary of Allotment

Unless otherwise stated on the plan, the common boundary of any allotment with any other allotment shall, where that boundary or part thereof lies within a wall, fence, floor or ceiling, be the middle line of that wall, fence, floor or ceiling as the case may be.

6.12 Accuracy of Survey

The position of any internal boundary is to be determined to a precision of ± 0.5 metres by the methods used. Plans of Urban Class Two surveys will be drawn at scales of not smaller than 1:1000

6.13 Method of Survey

- (a) Plans may be derived from a combination of aerial photography, site plans as approved by planning and building boards and ground measurements.
- (b) Boundary marking is not required but selective marking may be placed in support of the features that are the boundaries.

URBAN CLASS THREE - SUBLEASE SURVEYS

6.14 Purpose of Urban Class Three Surveys

Those subleased surveys in urban areas that are lodged with the Regional Surveyor shall be lodged as Urban Class Three Surveys.

6.15 Perimeter of Survey

Identification to an Urban Class One or Urban Class Two standard will be shown on the

plan for the perimeter only. If necessary, a separate identification survey may be lodged to maintain clarity of information.

6.16 Inspection of Boundaries

Lodgment of the survey requires a certification by an officer of the Department of Lands and Physical Planning as to inspection and confirmation of sublease boundaries as shown on the plan as prepared for lodgment.

6.17 Boundaries of Sublease

Unless otherwise stated on the plan, the common boundary of any sublease shall, where that boundary or part thereof lies within a wall, fence, floor or ceiling, be the middle-line of that wall, fence, floor or ceiling, as the case may be.

6.18 Accuracy and Method of Survey.

Clauses 6.12 and 6.13 shall apply.

6.19 Schedule of Sublease Particulars

A schedule shall appear on the plan and this shall list the description of the sublease, its function, and, if a building or part of a building, the approximate floor area and upper and lower height limits. Refer to the two specimen plans in Schedule 16.

6.20 Plans of Urban Subleases

The following provisions shall apply to urban sublease plans.

- (a) A site diagram shall be drawn on the plan showing title boundaries of the site together with bearings and distances, abuttals, easements and building lines;
- (b) The main and any ancillary buildings shall be accurately plotted on the site diagram;
- (c) Where any of the buildings are on or within **one** metre of the boundaries, or the relationship of any building to the boundary is obscure, the correct relationship shall be shown on the plan by offsets derived from field measurements;
- (d) The dimensions and positions relative to the boundary of the overlapping portion of buildings shall be shown on the plan and are to be excluded from any sublease to be registered;

Survey Directions 1990

- (e) A floor diagram shall be drawn on the plan showing accurately the extent and shape of each sublease;
- (f) Only the external perimeter walls shall be shown. Internal room walls and details of furniture and fittings shall not be shown. Dimensions of the perimeter walls are not required; but dimensions of areas which are not physically partition may be shown;
- (g) Identical floors of multi-storey buildings may be shown as one diagram entitled, "Identical, floor, plan, floors ... to";
- (h) The floor diagram shall have the same orientation as the site diagram;
- (i) An elevation of all multi-storey buildings showing all floors, basements, and roof areas shall be plotted together with their levels, which shall be referred to a permanent survey mark established on or close to the site. The datum of levels used and the number of the **PSM** shall be shown on the plan.

PART SEVEN

AERIAL PHOTOGRAPHY, REMOTE SENSING AND SATELLITE POSITION FIXING

7.1 Commencement

This part of the Survey Directions is effective from 1 January 1990.

NOTE: Past Survey Directions have not given guidance on the allowed use of aerial photography or photogrammetry and the lack of use of these indicated that advice was necessary to provide a base for discussion of proposals using aerial

photography and other technology. This Part is intended to provide that starting point. Surveyors are also referred to the bibliography in Schedule 22.

7.2 National Mapping Bureau

- (a) A mapping Advisory Committee (MAC) is a subcommittee of a National Land Management Committee (NLMC). The role of the MAC is to develop specifications and decide on technology for standard mapping, to liaise and coordinate with academic institutions on teaching surveying and mapping and to coordinate mapping activities of other Government agencies that create their own specialized maps.
- (b) Improvements pending action are geodetic densification and determination and finalization of an appropriate geoid, rapid update of the 1:100 000 topographic maps using remote sensing, prioritization of cadastral mapping update, automation of large and medium scale mapping and improved computer facilities for geodetic calculations and storage of files.

AERIAL PHOTOGRAPHY

7.3 Aerial Photographs

Aerial photographs when compared with line maps are more readily understood by land owners. Photographs, as contact prints or enlargements, can be used as working documents

by a field surveyor, by identifying and plotting visible boundaries and surveying boundaries

not directly visible by using identifiable details as control.

These are acceptable for use in Rural Class Four surveys, as prints or uncontrolled mosaics

etc. For other classes of survey, the surveyor is to obtain the agreement of the Regional Surveyor.

7.4 Rectified Photographs

Photographic rectification partially corrects scale by removing only the distortion caused by aircraft tilt. The setting of the tilts in an automatic rectifier is achieved by making the projected images of four points of details coincide with the plan positions of those points as plotted on the image plane of the enlarger. The control plan on the image plane is removed and exposure of sensitized paper in its place is done.

This would be preferred, but are not necessary, as prints or semi-controlled mosaics for Rural Class Four surveys where the land is nearly flat and the population is of medium to high density.

7.5 Photo Mosaics

Survey Directions 1990

- (a) An uncontrolled mosaic is prepared by simply matching the image details of adjacent photos. There is no ground control. Vertical photographs which have not been rectified or corrected for scale are used.
- (b) A semi-controlled mosaic may use ground control with unrectified and unscaled photographs or vice versa.
- (c) A controlled mosaic is prepared from rectified photographs corrected for scale by assembly on a base of control points recognizable on the photographs and coordinated by field survey, radial-line triangulation or aerial triangulation. Relief displacement affects image matching and scale.
- (d) A strip mosaic is of a single flight strip and is used in planning and designing engineering of roads, pipelines, transmission lines etc.

For acquisition surveys for reserves and easements of national or regional importance, it is preferred that a strip mosaic be incorporated in the plan.

7.6 Orthophotographs

These are the results of scanning narrow strips of stereo models. From an analysis of heights, the correct planimetric position for any point on the photograph is calculated and a new photograph is compiled.

These would be preferred but are not necessary as orthophotomaps for Rural Class Four surveys where the land is hilly and the population is of high density. They would be expected to be used in any extensive Urban Class Three development which use photography as the base for the survey. No method of production is available in PNG as at October 1989.

7.7 Halftone Transparencies

Reproductions from an original photo or mosaic are made by halftone process. These tend to give poor results if not copied at contact scale.

7.8 Production of Mosaics on Drafting Film

A negative of the mosaic area is produced on photographic film. This negative is then combined with a 50% screen to create a halftone negative. The halftone negative is then combined with blockout mask, so giving the precise area and the format sheet negative of the selected drawing sheet. Both of these negatives must be in registration to achieve the best result. This negative combination is exposed onto pre-sensitised drafting film in the lateral reverse position. That is, linework and mosaic are on the backside of the drafting film allowing for drafting to be completed without damage to the mosaics if corrections are necessary.

7.9 Pre-existing Control Information

Photography may be oriented by use of existing PSMs, longitudinal sections of roads, positions of transmission towers, cadastral boundaries or interpolation of heights from small scale mapping.

7.10 Field Control

A general guide only to standards is 1:10,000 for horizontal control and for vertical control \pm 10% of the contour interval for intervals of 5 metres or less. Ground marking of field control requires a target of good contrast in relation to background and one larger than the photogrammerist's "floating mark" i.e. 0.04 – 0.06mm at the photograph scale. The number of field control points required will depend on mapping accuracy and how models are controlled with field points or aerial triangulation.

7.11 Photogrammetric Control Extension (Aerial Triangulation)

Analytical procedures for this orient each stereomodel relatively, connect adjacent models to form a block and adjust the block to field-surveyed control. Stereomodels in an analytical stereoplotter are formed by mathematical means and the interaction between a computer and an observation/measuring unit. Analytical stereoplotters output graphical and digital mapping.

7.12 Digital Mapping

This is the process of acquisition (capture), transformation, and presentation of spatial data held in digital form. Digitising is the process of converting graphic maps into digital form. Digitising software requires a symbol table which stores feature codes, description, symbol colours, symbol line types and point symbol types.

Analogue stereoplotters are expensive and worldwide experimentation is occurring; e.g. the development of a stereo digitizer using digitising tablets, a mirror stereoscope, a modified parallax bar and an IBM-PC micro-computer. It is expected that developments like this will change the cost of equipment needed to operate in this field and accordingly will see consulting services for it expand in the private sector.

logical Quality of digital information requires information on lineage, attribute accuracy, consistency, completeness and positional accuracy. Updating maintenance on stored data requires a smoothing algorithm to improve positional accuracy.

REMOTE SENSING

7.13 Terminology

- (a) Multispectral Analysis – Imagery recorded by photography or scanning in narrow wavelength bands allows selective analysis by spectral reflectance and image tone.
- (b) Pixel – Imagery resulting from scanning results in picture elements (pixels) of small areas for which an average reflectance is recorded.

7.14 Remote Sensing Centre Training

The Department of Surveying and Land Studies in the University of Technology at Lae provides an analysis facility, a user library and training courses.

A Microbrian Image Analysis System (Australian) was purchased in 1998 on joint venture by Agriculture & Livestock, Forestry, Lands & Physical Planning and the University of Technology. Microbrian is a powerful and inexpensive microcomputer-based (IBM/PC-AT) system that supports image processing, shallow water mapping, land cover mapping, image rectification and data integration.

7.15 SPOT (Probative System for Observation of the Earth)

The SPOT satellite offers repetitive coverage at 26 days in vertical mode (or programmable)

over PNG. The total swathe width in vertical mode is 117 km with selection mirrors which

may allow acquisition of imagery upto 420 km either side of the ground track. Scenes are available at four processing levels.

- (a) Characteristics of SPOT Scenes (60km x 60x85 km)
 - Multispectral Mode
 - Panchromatic Mode
 - (256 reflectance levels)

Pixel Size	20m x 20m	10m x 110m
Spectral Bands	0.50 – 0.59 micrometers (Green)	0.51 – 0.73 micrometers
	0.61 – 0.68 micrometers (Red)	

Survey Directions 1990

0.79 – 0.89 micrometers
(near Infra – Red)

Volume 27 to 76.5 Mb 36 to 100 Mb

(b) Costs of SPOT scenes (Us \$ 1989)

	Multispectral (XS)	Panchromatic (P)
Computer compatible tape (CCT)	2000	2500
Film (full scene)	1500	2000
Prints (full or ¼ scene)		
964 x 964 mm	240	120
482 x 482 mm	110	70

Stereopairs can be acquired by combining an image gathered on day one with an image gathered on day 5, 10, 11, 15, 16 or 21. Image data can be generated on request at scales ranging from 1:25 000 to 1:400 000. Programming request forms may be obtained from the University of Technology.

7.16 Other Remote Sensing Techniques

- (a) Landsat Thematic Mapper (TM), 30m resolution, or Landsat Multispectral Scanner (MSS), 80m resolution – American system, satellite carried, does not cover the Islands Region.
- (b) Laser Airborne Depth Sounder (LADS) – an Australian system, is carried and provides survey data of coastal waters.
- (c) Geoscan multispectral airborne scanner - an Australian system and is geologically oriented for acquiring data for mineralogical identification.
- (d) Conventional aerial cameras for large scale, low altitude colour infra-red aerial photography.
- (e) Small single lens reflex cameras (35mm or Hasselblad) for large scale, low altitude photography.

SATELLITE POSITIONING SURVEYS

7.17 Use of Satellite Positioning in Cadastral Surveys

- (a) Any surveying/geodetic receiver used in accordance with manufacturer's specification is suitable for cadastral surveys.

- (b) Navigational receivers may be used for Rural Class Four surveys provided the precision of fix is appropriate to the scale of the plan to be drawn.
- (c) Plans of survey on which control or boundary positions have been fixed by satellite positioning shall be noted as to the make and model of equipment used and the accuracy of position fix. The survey report shall note date and times of observation, the number of satellites used for fix of each position and the program used.

7.18 Satellite Positioning Survey Terminology

- (a) Systems in use are the Global Positioning System (GPS –US Department of Defence) and the Transit System (US Navy). Results of different epochs are compared by use of the same coordinate system, the conventional terrestrial system.
- (b) “Point positioning” provides an absolute position in the system. The “satellite ephemerides” defines the position of the satellite at any given epoch.
- (c) “Differential positioning (Translocation)” provides a position relative to a known point. This may be dynamic (corrections from a monitor station) or static determination of baseline vectors (chord) between pairs of points.
- (d) Points determined as above can be transformed from this reference system into latitude, longitude and ellipsoidal height. Ellipsoidal heights then have to be corrected to orthometric heights.
- (e) Ellipsoidal height, h , equals orthometric height, H , plus the geoid separation from the spheroid, N . Determination of one of these at points relative to a point, may be by geometric solution of the relationship: $\Delta H = \Delta h - \Delta N$, for the differences in each. In practice, systematic errors in h and N will have minimal effect on the determination of the orthometric height difference, provided these errors have similar magnitude at each point. N is solved by gravimetric or geometric technique.

In PNG lack of orthometric heights H and gravity data for solution of N will provide problems. If sufficient orthometric heights were available, use of the geometric solution by interpolation would be limited by any lack of knowledge as to whether N was varying linearly or not. For a general guide to evaluation of N , see Schedule 23.

17.19 Errors in Satellite Positioning Surveys

- (a) Antenna multipath, equipment measurement resolution, receiver delays and antenna phase uncertainty – these are a function of hardware design.
- (b) Satellite and receiver clock errors – eliminated on baseline measurement by observing procedure of one satellite and two stations for satellite clock and one

Survey Directions 1990

receiver and two satellites for receiver clock or two satellites and two receivers for both.

- (c) Ionospheric delays – determined on baseline measurement by receivers measuring on dual frequencies.
- (d) Uncompensated tropospheric refraction – main cause is water vapour, elimination applicable to **first** order surveys.
- (e) Incorrect satellite ephemerides – because of the military purposes of the GPS system for the restricted P Code (Precise Positioning Service –PPS) independent tracking networks and ephemeris services are in development. Approximate ephemerides(Stand Positioning Service – SPS) are available if a C/A Code receiver is used. For baseline accuracies, the uncertainty is approximately:

$$\frac{\text{Baselinelength}}{\text{Satellite altitude}} \times \text{Ephemeris uncertainty}$$

PART EIGHT

FIELD NOTES, COMPUTATIONS, RESURVEYS AND RE-ESTABLISHMENT

8.1 Commencement

This part of the Survey Directions is effective from 1st January 1990.

FIELD NOTES

8.2 Field Books

Field Books are in loose format with standard front and rear cover sheets, pages and binders available from retail sources.

8.3 Original Field Notes

The original field notes, kept in the field, shall be lodged with the plans to which they refer. If the field notes are indistinct in any particular, the information may be duplicated in the field book and noted as a copy. Erasures in field notes are not permissible, but erroneous entries should be crossed out and re-written.

Use of electronic field books will be supplemented by original field notes. Any variation to the normal standard of field notes shall be explained by the surveyor in the report..

8.4 Complete Field Notes

Survey Directions 1990

- (a) A surveyor shall make neat, precise, complete and readily intelligible notes of every survey with indices and cross references in such a manner as would facilitate the preparation of a complete and accurate plan thereof without recourse to any other records and without verbal explanation.
- (b) Each surveyed line shall be entered in the field book either separately in the sequence in which it is measured, with the number of the station at its commencement and completion or instead as part of a clearly drawn diagram. Numbered references to all the pages of the book in which any station reappears shall be shown. Where diagrams are used, measurements of lines and angles shall be clearly notated, preferably on the adjacent page.
- (c) The actual measured lengths of lines, the angles of inclination, the temperature, the horizontal lengths of lines, the measurement of offsets to natural features, the bearings and distances to reference marks and measurements made to improvements, shall all be clearly shown.

8.5 Astronomical Stations

The stations from which astronomical observations are taken and to which they are referred, shall be noted in the field book.

8.6 Rural Notes

In rural surveys, surveyors shall make general notes of the type of country and its timber, geological formation, natural water supplies, liability to flooding, etc. Where a surveyed line crosses, or is closely adjacent to hills, undulations, creeks, gullies, fences and the edges of scrub, timber, swamps etc., these shall be located with sufficient accuracy so that they may be plotted on the plan.

8.7 Front Cover Sheet

The front cover sheet of the field book shall show the following information:

- (a) The title of the survey, the surveyors name and the dates of field commencement and field completion.
- (b) A brief description of the datum for azimuth and position including original marks found.
- (c) The convergence between Grid North, Fourmil Standard Meridian and True North, and the magnetic variation.
- (d) The name of the parcel if a new rural portion, the milinch, Fourmil and province.

Survey Directions 1990

- (e) The consultant's job number and the Department's Survey File number and Catalogue Plan Number.
- (f) The calibration details and make, model and serial numbers of measuring equipment used on the survey.

Certification as to calibration shall be in the following form:

"I hereby certify that the measuring equipment used on this survey and listed hereunder was calibrated by comparison with standards at the named locations on the dates shown. The results are as listed."

8.8 Rear Cover Sheet

The inside of the rear cover of the field book shall show the following information:

- (a) Certification as to responsibility for the survey shall be in the following form; "This is to certify that the field notes herein contained are the actual results of observations and measurements made in the field by me or under my immediate supervision and that this survey has been executed in accordance with the provisions of the Survey Act as amended to date and any directions made or given by the Surveyor General. The Class of Survey herein is Urban/Rural Class"
- (b) Beneath this certification this note shall appear; "The date of field completion is"

COMPUTATIONS

8.9 Closure of Survey

The angular and linear measurements made on each survey shall be checked by the calculation of the difference in latitude and departure of each line following adjustment of bearing miscloses, reduction of distance and rounding off as directed for the particular class of survey.

The error of closure shall be calculated relative to the length of the surround where the survey closes on itself, or to the length of a traverse between coordinated points and shall not be less **than** specified for that class of survey.

Where necessary, areas may be planimetered.

8.10 Computation of Areas

Areas to be computed after the miscloses has been adjusted out. Areas shall be shown in hectares to a tolerance of ± 1 part in 1000 (3 significant figures)with the areas rounded up or

down within this tolerance, except that for Urban Class Two, Rural Class 2B, Urban Class Three, Rural Class Four or any area partially bounded by a natural boundary, the tolerance shall be ± 1 part in 100 (2 significant figures).

8.11 Position Datum and Re-establishment

The establishment of position datum shall be indicated by a clear diagram of the relevant marks showing new measurements compared with original measurements. Refer to Schedule 2. Where re-establishment of disturbed marks is made, the bearing and distance between the disturbed and the correct positions shall be shown in the calculation.

8.12 Lodgment of Calculations

All calculations necessary for the survey shall be forwarded with the plan and other records. Calculations submitted on computer sheets shall show the input bearing and distance, miscloses bearing and distance, accuracy and area. Where the output of a computer is on paper of lesser width than 125mm, it shall be affixed to A4 sized paper and each calculation clearly identified.

RESURVEYS AND RE-ESTABLISHMENT

8.13 Redefinition of lands “Subject to Survey”.

In the survey of lands held under grant, and not previously surveyed under these or previous directions, the surveyor must adhere to the principle that the boundaries originally marked on the ground, by the purchasing officer, are the true boundaries, although the bearings and lengths of such boundaries may not, on survey, be found to agree with the bearings and lengths recorded on the original document. Where there are no original purchase marks found, the surveyor must make every effort to locate the original vendors and have them specify the purchase boundaries. Where it is evident that the metes and bounds indicated by the vendors do not reasonably represent the metes and bounds as described in the purchase document, a full report of the circumstances shall be made to the Regional Surveyor to obtain approval of any proposed solution.

8.14 Reference Marks and Trees

- (a) Where the peg and reference tree or mark are found, the position of the peg shall be checked by comparing its actual bearing and distance from the tree or mark with that originally determined and recorded on the plan.
- (b) Where the reference tree or mark only is found, the peg shall be reinstated on the original bearing and distance *thereof*.

- (c) Where neither the peg nor the reference tree or mark are found, but indications of the original survey are given by line-pegs or blazed trees, the boundaries and corners shall be reinstated in correct relation to such marks. However, before adoption, these shall be checked by measured reference to existing adjacent corners or boundaries.

8.15 Absence of Original Marks

Where no marks of the original survey can be found, it must be shown that the boundaries and corners have been reinstated in their correct measured relationship to adjacent boundaries, to those situated on opposite sides of roads, to fences or to such other evidence of original location as may be found.

8.16 Recording of Old or Original Marks

Old or original marks used for the definition of the survey shall be shown in the field book and on the plan.

If marks are not found, they should be noted as 'G'.

A mark not looked for shall be noted as 'NF'.

Old or original pegs broken shall be noted as 'B'

Pegs found disturbed shall be noted as 'D'. This description shall be used only where the peg has actually been disturbed, i.e., by road works etc.

Pegs found out of position and for which there is no conclusive evidence why this is so, shall be noted 'Unrel.' to indicate that they are unreliable. (Under these Directions no peg shall be adjusted).

The noting 'R' shall be used in conjunction with 'B' or 'D' to indicate that a peg has been replaced. Such replacement shall be done only on the boundaries of the land under survey.

8.17 Acceptance of Original Distances

Where original marks found are undisturbed, or are reinstated from nearby undisturbed marks, and the measurements between such marks compared with the original are within the limits as specified for the class of survey being carried out, the original distances shall be adopted and noted "p.o. adopted" in the field book. No notation is necessary on the plan.

8.18 Investigation of Excess

Where the resurvey shows lengths of boundaries in excess of original lengths, the field notes and plan shall show satisfactory evidence that the excess is not due to encroachment on adjoining lands or roads. In the absence of sufficient original marks, this shall be ascertained by the actual measurement of so much of the boundaries of adjoining lands as is necessary to determine whether such boundaries contained their granted lengths in full.

8.19 Disputed Common Boundary

Should the location of a common boundary be in dispute between the owners of adjoining lands, all particulars of occupation and evidences of original location must be shown on the plan.

8.20 Resurvey of Reserves and Easements to a Higher Class

Resurvey of reserves and easements from e.g. Rural Class Three to Rural Class One will result in the nominal width of such becoming a variable width upon redefinition through acceptance of the position of the original marks.

8.21 Removal of Marks on Underlying Plans

Upon resubdivision of land, any marks that no longer define boundaries are to be removed. If a record of this is to be lodged, it may be done using a copy of the relevant plan.

8.22 Balance of Land

If only part of a parcel of land is affected by subdivision, a plan of the balance area shall be prepared by the surveyor, except where a large balance area is still vacant government land and is likely to be the subject of further subdivision in the future.

It is preferable for the balance area to appear on the same plan as the area being surveyed. The plan of the balance area is at the cost of the lessee or organization **requesting** the survey.

8.23 Identification Surveys

- (a) An identification survey is a redefinition of an existing survey which is recorded on a catalogue plan.
- (b) From time to time during the course of identification surveys or work not constituting a new survey, it becomes necessary for a surveyor to replace an old mark, place new ones, or to comment on an inaccuracy found. In such cases, the surveyor is required to lodge a plan within three months showing any changes he has made to the original situation. Where no new survey marks are placed or differences recorded, it is not necessary to lodge a plan.
- (c) The plan shall be prepared on the standard plan form, entitled, "Identification Survey of", and will show only sufficient detail to illustrate the differences found, or new marks placed. The plan and field notes shall be lodged with the Regional Surveyor where the plan will be catalogued, examined and available for any future search.

PART NINE

PLANS AND CADASTRAL DESCRIPTIONS

9.1 Commencement

This part of the Survey Directions is effective from 1st January 1990.

PLANS

9.2 Plan Standards

- (a) Plans shall be drawn on forms approved by the Surveyor General and to the standards as set by the specimen plans shown in Schedule 16. Standard symbols and abbreviations are shown in Schedule 13.
- (b) Plans must be drawn such that they are suitable for photographic reduction in size of 50%. Lines shall be firmly ruled, with hair lines avoided. Figures and lettering shall be in bold, open lettering and fully black. No other colour may be used. Linework shall be drawn on the reverse side of the plan form.
- (c) Plans shall be accurately plotted except that in the case of miscloses of lower classes of survey, this miscloses is to be distributed by an approved graphical adjustment method.
- (d) Neat hand lettering, cut out stencil (**Rotring, Staedtler**) or **Stylus** template (professional lettering set) are acceptable as illustrated in the specimen plans, refer to Schedule 16. A line guide is to be used on freehand lettering.
- (e) Bearings and distances shall be shown on the plan in a sequential direction, either clockwise or anticlockwise.
- (f) The recording of reference marks, stream traverses, secants etc shall be either by tabulation or upon the plan face in accordance with good drafting practise.
- (g) The locally known names of rivers, creeks etc should be written on the plan. With respect to correct spelling of names and the Place Names Act, surveyors are referred to Schedule 15.
- (h) No adhesive lettering is permitted on transparent medium.
- (i) Plan forms that are folded, creased, dirty or untidy shall not be accepted for lodgment.
- (j) The surveyor shall sign his plan using a black ink drafting pen.
- (k) Physical Planning Plans (TRPs) are to be drawn under the provisions of this part and Schedules 13 and 16.

9.3 Distances and Areas

Distances shown on the plan shall be ground distances, in metres, except where the change of sea level and scale correction factors require, then grid distance as well as ground distance, shall be shown on lines of control or coordination.

Areas shall be shown in hectares as per Clause 8.12

9.4 Adopted Lines

Where original bearings and distances are used without survey, these will be shown with the letters 'p.o.' (plan original) added, except on compiled or computed plans, where no noting is necessary.

9.5 North Point

All plans shall show a north point indicating Grid North. The convergence between Grid North, Fourmil Standard Meridian (FSM) and True North, and the magnetic variation shall be shown by notation beneath the north point, as is relevant to the survey. Where the survey is extensive, the convergences shall be noted as to which mark they are determined for.

Unless otherwise directed by the Regional Surveyor, plans shall be drawn on Grid North. In exceptional cases, where it is necessary to make the best use of the plan form on account of the shape or layout of the survey, the plan may be plotted with the north pointing not below a line parallel with the bottom edge of the form.

9.6 Naming of Marks

Where a corner is not marked with a cement peg, a description of the mark shall be noted on the plan. Old marks found shall be described. A station number shall be shown adjacent to every corner and traverse station. Original station numbers and plan numbers may be shown bracketed, adjacent to new stations for clarification.

9.7 Supplementary Information

Rural notes and improvements shall be shown on the plan so as to not interfere with the lettering.

9.8 Datum

The datum used for azimuth and position on all surveys shall be briefly described on the plan form in the space provided and separately labeled as such. Where the azimuth datum is astronomical, the description shall include a notation of whether the observation was taken East or West (or both) and the latitude and longitude used in the calculation.

9.9 Underlying Plans

It is mandatory that preceding and superseded or partly superseded plans and legal descriptions be shown on the face of the plan as a note.

9.10 Shared Responsibility

Where different surveyors are involved in the survey and accept responsibility for separate parts, whether prior to lodgment or as result of requisition, each surveyor shall sign a certificate of responsibility, varying this certificate to define the part of the survey affected.

9.11 Balance Area on the Survey Plan

Where it is necessary to prepare a plan of the balance area on the same plan as the survey, this shall be drawn in the following manner:

- (a) Original bearings and distances shall be used, adjusted for azimuth or datum shifts or to metric units of measurements. These shall be noted 'p.o.' It is not necessary to show traverses, intermediate line pegs or reference marks.
- (b) A calculated area of the balance land shall be shown.
- (c) The numbers of all plans used in the compilation shall be recorded on the face of the plan.

9.12 Compiled or Computed Plans

Where a plan is **compiled or is computed** for a balance area, or another reason then it shall be drawn as directed in Clause 9.11 above, except that the noting 'p.o.' shall not be used. Where a line is calculated for a purpose of a computed plan, 'calc.' Shall be shown with the distance.

- (a) For a compiled plan, the certificate of responsibility shall reads "I hereby certify that this plan is correct and has been compiled from Plan Cat. No." The description on the plan shall be preceded by "Compiled Plan of"
- (b) For a computed plan, the certificate of responsibility shall read, "I hereby certify that this plan is correct and has been **compiled and** computed from Plan Cat. No." The description on the plan shall be preceded by "Computed Plan of"

9.13 Plan Prepared from Field Notes

Where the Surveyor bearing the responsibility for the survey is permanently unavailable to sign the plan, the Regional Surveyor or another Registered Surveyor/Certified Measurer may certify that the plan has been prepared from the field notes of the surveyor in the following form: "I hereby certify that this plan has been compiled from the field notes of the Registered Surveyor/Certified Measurer responsible for the survey and whose name appears below on this plan."

9.14 Registration (*Amended 23/05/94*)

Survey Directions 1990

When a plan is submitted to the Regional Surveyor, accepted for lodgment, it is referred to as an Unexamined Plan. When the examination of the plan has been completed with any requisition satisfied and the plan signed by the Regional Surveyor, the plan is defined as registered. Until the plan is **registered**, it is not acceptable for any land dealing, unless specifically approved by the Surveyor General in the particular case.

9.15 Amendments to Registered Plans (Amended 23/05/94)

Amendments and additions of substance to registered plans shall be noted in red and may only be carried out by officers of the Department so authorized by the Regional Surveyor.

Original plans are withdrawn from the Central Plan Registry for this purpose.

CADASTRAL DESCRIPTIONS

NOTE : A UPRN number is referred to in other parts of these Directions as a legal description.

9.16 Papua New Guinea Land Information System

The computer system containing land records is referred to as the Papua New Guinea Land Information System (PNGLIS). Under the PNGLIS, a parcel is:

- (a) 'Proposed' because it does not agree with title to freehold lands, customary land, vacant government land or DLPP grants;
- (b) 'Current' because it does agree with title to freehold lands, customary land, vacant government land or DLPP grants and;
- (c) 'Cancelled' because it does not have a current title or lease issued over it and has been superseded by a proposed or current description.

Each parcel in the Directory is assigned a UPRN or "Unique Parcel Reference Number". The UPRN is made up as follows:

Province	- 2 digit number
Fourmil/Town	- 2 digit number (Fourmil) or 2 letters (Town)
Section/Milinch	- 5 digit number
Allotment/Portion	- 4 digit number
Name Indicator	- 1 digit number (0 -9)
Part Parcel	- 3 digit number

Each part of the code is separated by a slash (/) giving the UPRN a total length of 22 characters.

.e.g. Portion 100, Milinch of Blanche 18/19/00047/0100/2/000

Allotment 1, Section 100, Town of Rabaul 18/RG/10100/0001/2/000

If the allotment/section/portion is amended by subdivision, road excision etc, the original allotment/section/portion number shall be cancelled or remain current. A superseded, cancelled or current allotment/section/portion is to be allocated a proposed or current allotment/section/portion number from the next available number of the Directory of the PNGLIS.

9.17 Portions

In rural areas all parcels of land shall be described by portion numbers.

In urban areas a portion number is not normally allocated, however, where there is a large area of land which could conceivably be subdivided into a number of sections, a portion number will be allocated.

9.18 Provincial Boundaries and Portions.

Where a milinch is intersected by a Provincial **Boundary**, it is possible to have more than one portion in a milinch with the same number but different Provincial Codes. This requires that where a milinch exists in more than one province that portions of that milinch in a plan title be noted as to the province, i.e. Milinch of Suain “Portion 1001 (WSP) or Portion 1001 (ESP).

9.19 Customary Land

- (a) In rural areas, customary land shall be described by portion numbers with a ‘C’ added to the portion number as a suffix, i.e. 79C. Should any portion subsequently be alienated, the ‘C’ shall be crossed out as an amendment under Clause 9.15.
- (b) In urban areas, undivided parcels of customary land shall be dealt with as in subclause (a) above. On subdivision the customary land shall be described by section and allotments, as per Clause 9.21, with a ‘C’ added to each allotment number as a suffix. Should any allotment subsequently be alienated, the ‘C’ shall be crossed out as an amendment under Clause 9.15.

9.20 Freehold Land

In the past, freehold land has been described as “Portions” and, when subdivided, “Lots of Portions”, both in urban and rural areas. Under the introduction of the PNGLIS, it has been necessary to cease the use of ‘Lots’ upon subdivision and to use “Portion” for urban and rural areas.

Existing “Lots” are indicated on PNGLIS as part parcels of the portion, e.g. Portion 10 Lot 1.

9.21 Leasehold Land in Urban Areas

Survey Directions 1990

All parcels of leasehold land shall be described by allotment and section numbers, in accordance with the following:

- (a) All parcels of land completely surrounded by roads or in some other way conveniently isolated shall be given a section number.
- (b) An unsubdivided section shall be described as Allotment 1 of the section. If this section is subsequently amended by the excision of roads, reserve etc., but remains unsubdivided, the amended section will retain the same section number but will be allocated the next allotment number, i.e. after the first amendment, it will be described as allotment 2.
- (c) In a newly created and subdivided section, allotment numbers shall commence from 1.
- (d) The numbering of allotments shall be in logical order taking into account the need of persons endeavouring to locate the lot from the road or pathway giving legal frontage to it.

9.22 Allocation of Legal Description

Allocation of new legal descriptions is by delegation from the Surveyor General, initially to Senior Title Officers and then to other delegated officers of the Department.

9.23 Sublease Descriptions by Part Parcel

Sublease descriptions shall be by part parcels. These should be recorded in the PNG LIS. The description of part parcel shall be 'Subdivision' abbreviated to 'Sub' for plan purposes.

i.e. Subdivision 1-4 Portion 24
Subdivision 1-5 Allotment 7 Section 26.

APPENDIX ONE

101.1	Commencement	
		This appendix of the Survey Directions is effective from 1 st October, 1990.
101.2	Clause 1.5.(b)	
		Add to the clause “Title search for unsurveyed registered easements may be necessary.”
101.3	Clause 2.16(a)(ii)	
	that	Amend to read “Other methods which will give the accuracy required, except where topographic coordination is the only possibility, this may be used.”
101.4	Clause 2.16(b)(ii)	
		Amend “1:250” to read “1:200.”
101.5	Clause 2.19	
	Subsidiary	This clause can be considered to be in two parts, (a) Steel bands and, (b) Standard Bands.
101.6	Clause 2.5(a)	
		Amend “on site” to read “in the appropriate position.”
101.7	Clause 3.20(a)	
		Amend “alphabetically” to read “numerically.”
101.8	Clause 3.27(b)	
	2A	Amend “Rural 1 & 2, 0.01m” to read “Rural 1&2A, 0.01m, Rural 2B, as Rural & 3.”
101.9	Clause 4.3	

Survey Directions 1990

- Rural Amend “Rural Class Two, 500 metres” to read “Rural Class 2A, 500 metre;
Class 2B, 150 metres.”
- 101.10 Clause 4.31
Amend spelling to “baret.”.
- 101.11 Clause 5.4
Amend “20” to read “4” . (Pathways (NP) will occur in Rural Class Four work,
which is why this illustration was intended).
- 101.12 ~~Clause 5.12 and Clause 5.18~~
~~Amend “less” to read “more”~~
- 101.13 Clause 6.3
that Add “This clause applies to Urban Class Two and Three Surveys to the extent
Urban Class One standards might occur in those surveys.”
- 101.14 Clause 6.8
Amend “density” to read “cost”
- 101.15 Clause 8.10
Include Rural 2B with those classes of survey where the area shall be shown to 2
significant figures.
- 101.16 Schedule 13
The normal spelling of “abuttal” is with **one** “b”, however, some dictionaries
consider **two** “bs” is also correct.

Note that in this schedule that no mining tenement survey boundary symbol for
noting was created as referred to in Clause 3.19. Boundaries on noting maps will
therefore be as for portions and allotments, except that MT shall be place
alongside the boundary, at intervals, in 0.25mm point size, or in an appropriate
size.
- 101.17 Schedule 16.4

Survey Directions 1990

The rounding of areas is not correct in all portions except 1807 and 1828 which are correct. The other areas are rounded to two significant figures if bounded by water or three significant otherwise.

101.18 Schedule 16.6

The rounding of areas on all portions should be to two significant figures.

101.19 Schedule 16.7

The customary land certificate should have A.G. Jones signing as a “Certified Measurer.” In the tabulations, spell “reference” correctly, and add “Grantee, PNG Elec. Comm.” Between Servient Tenement and Area.

101.20 Schedule 16.9

The rounding of areas on all portions should be to two significant figures.

101.21 Schedule 16.11

The area is wrong, amend to 280 ha on the plan face and the Schedule.

Notes require to be added to this plan as follows:

1. Contour lines are approximate only, adopted from Angoram No. 7789.
2. The area of this plan is considered to be accurate to $\pm 10\%$.

101.22 Schedule 16.12

In the easement schedule, “proposed” is to be deleted.

APPENDIX TWO

102.1 Commencement

This Appendix of the Survey Directions is effective from March, 1991.

102.2 Authority for the Survey Directions 1990. The following error is corrected retrospectively back to the date of commencement of the Survey Directions 1990, being the 1st of January 1990. In the certification of the cover sheet to the Direction amend “Survey Act 1969” to read “Survey Act (Chapter 95).”

Further to this, all plan certifications referring to the Survey Act must read “C.95” instead of “1969”.

Surveyors are to note that the same correction is to be considered to have applied to the 1980 Survey Directions from the 1st January, 1982, the date of commencement of the Revised Laws of Papua New Guinea.

102.3 Clause 5.14

In the last paragraph, amend ”partial surrender” to read “partial surrender or surrend and regrant.”

102.4 Clause 5.12 and 5.18

Delete Clause 101.12 in Appendix One. The Directions as originally written were correct.

APPENDIX THREE

103.1 Commencement

This Appendix of the Survey Directions is effective from 1st July, 1991.

103.2 Clause 3.18(a)

Amend to read "Mining Tenements Survey of".

