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Land Survey Act, 1993

Regulations relating to the Manner in which Land Surveys shall be Conducted, 2002

Government Notice 58 of 2002

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Regulations relating to the Manner in which Land Surveys shall be Conducted, 2002

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[The Government Notice which publishes these regulations notes that they were made by the Survey Regulations Board with the approval of the Minister of Lands, Resettlement and Rehabilitation.]

Part I – PRELIMINARY

1. Definitions

In these regulations a word or expression to which a meaning has been given in the Act bears that meaning and, unless the context otherwise indicates-

“accurately determined” means determined with a standard of accuracy conforming with that specified in regulation 9;

“arc” means the mean of two rounds of observations to surrounding stations and beacons, one being taken in a clockwise direction and the other with the telescope transitted, taken in an anti-clockwise direction;

“approved” and its derivatives, means approved by the Surveyor-General;

“metre” means the unit of length as defined in table 1 of the first schedule to Government Notice R.1146 published under the Measuring Units and National Measuring Standards Act, 1973 (Act No. 73 of 1973);

“original diagram” means the diagram of the property being surveyed, re-surveyed or subdivided;

“registration division” means a registration division referred to in regulation 3 of the Deeds Registries Regulations, promulgated in Government Notice No. 180 of 1996;

“**rural land**” means land which is not situated in a township or settlement;

“**side**” when used in relation to a figure on a diagram or general plan, means a straight boundary represented thereon, or the imaginary line joining any two beacons between which the boundary is curvilinear, and includes the line joining an unbeaconed corner point with the indicatory beacon defining such point;

“**SBP**” means Satellite Based Position;

“**the Act**” means the Land Survey Act, 1993 (Act No. 33 of 1993);

2. Operation of regulations

These regulations shall not apply to a survey, the field work of which commenced before the coming into force of these regulations or to a diagram which was framed in accordance with the regulations in force at the date of that survey.

Part II – TESTING OF SURVEYS BY SURVEYOR-GENERAL

3. Surveyor-General may test surveys

- (1) The Surveyor-General may, at any time in the field, check the accuracy of any survey conducted by a land surveyor under the Act.
- (2) If, after having carried out a check as provided for in subregulation (1), the Surveyor-General has reason to doubt the accuracy, correctness, or authenticity of a survey or any information supplied in connection with that survey, he or she may, after having given notice of his or her intention to the land surveyor concerned, appoint a land surveyor who may be a staff member in the employ of the State, to test the accuracy, correctness or authenticity of the survey and thereafter the Surveyor-General may take any action which he or she reasonably considers necessary in the circumstances.

Part II – FIELD WORK

[This PART should be labelled “PART III” instead of “PART II”.]

4. Survey information

- (1) Before carrying out a survey, a land surveyor shall obtain all available information in respect of any previous surveys of the piece of land to be surveyed and of the adjoining pieces of land, and the Surveyor-General shall, if he or she is in a position to do so, supply that information to land surveyors.
- (2) A land surveyor who wishes to prepare a diagram under section 36 or 38 of the Act shall obtain all the available information in respect of that diagram.
- (3) When applying for the information referred to in subregulation (1) or (2), a land surveyor shall furnish a sketch plan or verbal description of the land indicating the approximate location of the portion to be surveyed, or the diagrams required in relation to surrounding pieces of land.

5. Survey instruments

- (1) Every land surveyor shall ensure that instruments and equipment which he or she uses for any survey or which are used in a survey for which he or she is responsible are in proper working order.
- (2) The Surveyor-General may, at any time request a land surveyor to make available for testing by the Surveyor-General, the instruments or equipment which the land surveyor uses for surveying.

- (3) A land surveyor who receives a request made under subregulation (2) shall comply with that request and he or she shall furnish the Surveyor-General with any calibration certificate and any other documentary evidence which proves that subregulation (1) has been complied with.
- (4) After making a request under subregulation (2) and receiving the documents referred to in subregulation (3), the Surveyor-General may test the instruments or equipment and if he or she is satisfied that-
 - (a) the instruments are or the equipment is suitable for survey work, he or she may assign an official number to each instrument or to the equipment;
 - (b) the instruments are or the equipment is unsuitable for survey work he or she may, in writing, declare that they are or it is so unsuitable and advise the land surveyor concerned.
- (5) No land surveyor shall use instruments which have or equipment which has been declared unsuitable under subregulation (4)(b) unless the instruments comply or equipment complies with the requirements of subregulation (1) and the Surveyor-General has confirmed that fact in writing.

6. Field measurements and observations

- (1) A land surveyor shall determine the positions of all stations, beacons, landmarks and boundaries within the limits of accuracy specified in regulation 9 and he or she shall check the accuracy of every part of each survey carried out by him or her or under his or her control.
- (2) In the case where topographical or other features have a bearing on the determination of the position of a beacon or boundary, those features shall be fixed with a degree of accuracy commensurate with the purpose for which they are required.
- (3) Unless a point is otherwise adequately checked-
 - (a) when its position is determined by intersection or trilateration, the angle at the vertex of any triangle used in such determination shall not be less than 30 degrees nor greater than 150 degrees;
 - (b) its position shall not be determined by resection from less than four points favourably situated, and the observations used in such determination shall consist of not less than two arcs, unless three of the points are within 3 000 metres of the point being determined, in which case only one arc need be observed;
 - (c) its position shall not be determined by a single triangle only, unless observations are made at all three points and on at least two different parts of the circle;
 - (d) its position shall, in a SBP survey, be determined from at least two known points.
- (4) Angular observations at any station or beacon shall consist of at least one arc when observed over distances exceeding 1 000 metres, or over any distance of more than 100 metres when the slope exceeds 10 degrees.
- (5) When witness marks are placed as stipulated in regulation 15 the measured distance from the beacon to such witness marks shall be recorded in the field book.
- (6) (a) Points which are co-ordinated by photogrammetric methods shall-
 - (i) fall wholly within the perimeter of the ground control points;
 - (ii) be measured in at least two stereoscopic models where the base over height ratio shall not be greater than 0.80, or be measured in at least four photographs for bundle intersections, where the intersection for any pair of rays shall not be less than 30 degrees and not greater than 150 degrees;
 - (iii) be positively identified on the photographs by the land surveyor.

- (b) Every beacon, the co-ordinates of which have been determined photogrammetrically, shall be adequately checked by the land surveyor, but however, all block corners shall, unless otherwise checked, be checked by the measurement in the field of at least two distances terminating at that block corner, where the difference in the directions of the two check distances shall not be less than 30 degrees and not greater than 150 degrees.
- (7) Unless otherwise adequately checked by the land surveyor, in a township, the relative positions of adjacent beacons in close proximity to one another which have been determined independently of one another or from distances greater than 300 metres shall be verified by the measurement of at least two distances terminating at such beacons, as long as the difference in the directions of the two check distances is not less than 30 degrees and not more than 150 degrees.
- (8) When traversing between two fixed points, observations must be taken at both fixed points in order that the traverse may be properly adjusted, unless the orientation is otherwise adequately checked.

7. Measurement of distances

- (1) The unit of measurements for all distances shall be the metre.
- (2) Measured distances shall be corrected for slope and for all factors to enable the correct plane distance to be obtained and measurements made in the course of a survey based on trigonometrical stations shall, in addition, be reduced to sea level and corrected for scale enlargement factor.

8. Connection to the National Control Survey System

- (1) Any survey of land shall be based on the national control survey system but, the Surveyor-General may, in exceptional circumstances and subject to necessary conditions which he or she may impose, exempt any survey from the operation of this subregulation.
- (2) When beacons are co-ordinated by means of SBP techniques, sufficient SBP vectors shall be measured to determine the local relationship between the SBP reference datum and the national control survey reference datum by connection to at least three trigonometrical stations or reference marks which are nearest to the land under survey and to any trigonometrical station or reference mark within the boundaries of the land under survey and the survey shall fall wholly within the perimeter of these trigonometrical stations or reference marks.
- (3) A land surveyor may use the co-ordinate value of any survey station or beacon whose position on the trigonometrical survey system has been determined in the manner and with a degree of accuracy acceptable to the Surveyor-General and whose physical position has been verified by the land surveyor concerned.
- (4) When a visible feature of a permanent nature which is not situated on ground level is surveyed for the purpose of registering a servitude or lease, the difference in height between the feature and two permanent survey stations in the vicinity of the land being surveyed, shall be determined.

9. Limits of allowable error in field work

- (1) For the purpose of this regulation-
 - (a) class A refers to:
 - (i) the determination of reference marks established under section 20 of the Act;
 - (ii) the fixing of reference marks in previously surveyed townships; and
 - (iii) any other determination which the Surveyor-General may make,
 - (b) class B refers to:
 - (i) the survey of new townships;

- (ii) the survey or subdivision of an erf in an existing township;
 - (iii) the survey for the replacement of a beacon in a township; and
 - (iv) the survey for the preparation of a diagram required under the law relating to the registration of mining titles in respect of precious stones and metals,
 - (c) class C refers to all surveys not included in class A or B, and includes surveys for mining titles in respect of base materials.
- (2) The accuracy with which a survey, other than the survey referred to in subregulation (3) shall be done, shall be in accordance with Item 7 of the Annexure and is expressed by the following formulae-
- (a) when the position of a point is determined by polars, traverse, triangulation, trilateration, SBP or a combination of these methods, the displacement between any observed ray, measured distance or SBP vector and the equivalent quantity derived from the final co-ordinates of the point fixed shall not exceed-
 - (i) for class A - A metres;
 - (ii) for class B - 1.5A metres; and
 - (iii) for class C - 3A metres,
 where A is equal to-

$$0.012 + \frac{0.082S}{3S + 1000} + \frac{0.15S}{100\,000}$$

and S is the distance in metres between the known and the unknown point but, in the case of a SBP vector, the comparison is made between the vector derived from the final co-ordinates and the measured vector after the datum transformation has been applied and in the case of a traverse, the comparison is made to the misclosures of the traverse, where S is the total length of the traverse in metres; and

- (b) when the position of a beacon in a township is checked by the measurement of distances from adjacent beacons, the difference between a single measured distance and the adopted final distance shall not exceed 0.06 metres.
- (3) The error in a survey made for the purposes of determining the position of a curvilinear boundary shall not exceed the limits set for class C.
- (4) The position of a curvilinear boundary shall be determined with an accuracy commensurate with tacheometric measurement.
- (5) The Surveyor-General may determine a standard of accuracy for any survey operation not specified in this regulation.

10. Limit of allowable difference from original survey

- (1) For the purpose of section 14 of the Act, the limit of disagreement from the existing diagram is-
- 0.2 *d*

where *d* represents the distance in metres derived from data on the existing diagram between any two beacons affected by the subdivision and any portion of a boundary line shall be deemed to be within the limit when the whole of such boundary line is within such limit.

- (2) The limits of allowable difference referred to in sub-regulation (1) shall not exceed the limits set out in Item 6 of the Annexure.

11. Adoption of data for alignment purposes

- (1) When the position of a terminal beacon has previously been properly identified and determined on the trigonometrical system, the co-ordinates of that beacon may be adopted for the purpose of alignment, as long as any beacon is not placed so close to that terminal beacon that its alignment could be appreciably affected by such survey errors as could normally be expected in the determination of the position of the terminal beacon.
- (2) The data defining an unbeaconed point in relation to an indicatory beacon and obtained in the process of correcting the alignment of a beacon as specified in regulation 15, may be adopted without verification for the purpose of any new diagram.

12. Curvilinear boundaries

- (1) When the centre line of a railway forms or defines an existing boundary, the intersections of that centre line with the rectilinear boundaries, and when necessary, the ends of the straights, shall be accurately determined.
- (2) The position of a railway curve defining an existing boundary may be determined by any survey method as long as-
 - (a) that determination conforms with the standard of accuracy specified in regulation 9; and
 - (b) points surveyed on that railway curve shall not be more than 30 metres apart, unless the elements of the curve are accurately determined, or the curve is determined by photogrammetric methods.

[The word “photogrammetric” is misspelt in the *Government Gazette*, as reproduced above.]

- (3) Notwithstanding subregulation (2), it shall not be necessary to re-determine the radius and the centre of a circular railway curve which forms or defines an existing boundary, when that curve has previously been accurately determined.
- (4) Wire fences, railway fences, roads (except those roads which are proclaimed roads as defined in section 1 of the Roads Ordinance, 1972 (Ordinance No. 17 of 1972) and have been surveyed), streams which are liable to change course or any regular curves or natural or artificial features which are not permanently or clearly defined, shall not be adopted as new boundaries.
- (5) When a land surveyor is prevented from obtaining access to the middle of a river forming a boundary, he or she may determine its position by surveying the position of one of the banks and the widths at critical points.
- (6) When a river boundary is described on an original diagram in ambiguous terms, but the land is depicted as extending to a bank, and when the ambiguity is not removed under section 28 of the Act, the position of that bank shall be determined for the purpose of representing it on a new subdivision diagram.
- (7) The Surveyor-General shall not permit a curvilinear boundary to be substituted by a boundary of another character, unless he or she is satisfied that the two boundaries are so nearly coincident that no material alteration in area of land has taken place by reason of the substitution.
- (8) The survey records relating to a survey conducted under subregulation (7) shall include a plan showing complete details of the new boundary together with the relevant numerical data for inclusion in a new diagram that may be required to be framed on any property so affected.
- (9) Photogrammetric methods that have been accepted by the Surveyor-General may be used for determining the position of any curvilinear boundary as long as the annotation of that boundary on an aerial photograph is done in the field and is the personal responsibility of the land surveyor concerned.

[The word “Photogrammetric” is misspelt in the *Government Gazette*, as reproduced above.]

13. Physical features affecting rights of ownership

During the survey of any land, sufficient observations, measurements and sketches shall be made to enable physical features affecting rights of ownership such as roads and railway lines to be determined but, the positions of those physical features may be obtained from large scale modern maps or from aerial photographs as long as the positions of those physical features which are liable to change are verified.

14. Alignment of existing boundaries

- (1) When surveying a piece of land, any existing beacon which is supposed to be on a straight line boundary common to that piece of land and other land, a surveyor shall, subject to subregulation (6), proceed as follows-
 - (a) when the terminals of the common boundary line are lawfully established beacons or are well ascertained beacons recognised by all parties, the beacon if not on a straight line joining the terminals shall, subject to subregulation (5), be replaced on line unless it is a lawfully established beacon of the land under survey;
 - (b) when the terminals of the common boundary line are not lawfully established beacons, and the positions of one or both is doubtful, the beacon, if not on line, may be adopted as long as it is a well ascertained beacon recognised by all parties and in respect of which an agreement similar to the one contained in the First Schedule to the Act has been signed by all parties and lodged with the Surveyor-General.
- (2) Where a beacon which is supposed to be on the common boundary referred to in subregulation (1), of a piece of land adjoining that under survey is found not to be on line, it need not be dealt with as long as-
 - (a) if it is a lawfully established beacon, it shall be adopted as a beacon of the land under survey; and
 - (b) if it is a well ascertained beacon recognised by all parties and in respect of which an agreement similar to the one contained in the First Schedule to the Act has been signed by all parties concerned and lodged with the Surveyor-General, may be adopted as a beacon of the land under survey.
- (3) In cases not provided for in this regulation, a land surveyor shall-
 - (a) investigate the matter thoroughly and collect all available information and evidence to enable him or her to place beacons in the most likely positions;
 - (b) submit to the Surveyor-General, any agreement referred to in this regulation;
 - (c) take cognisance of beacons and boundaries of a township along the straight line boundary; and
 - (d) submit to the Surveyor-General, a full report detailing all the evidence on which the land surveyor based his or her action as well as the relevant survey records.
- (4) When correcting the alignment of a beacon as provided for in this regulation, a land surveyor shall, as a rule, place the relevant beacon at the intersection of the boundary line of which it forms a terminal, with the straight line on which it is supposed to be.
- (5) For the purpose of this regulation, a beacon shall be deemed not to be on the true and correct boundary when its displacement exceeds $0.06 + d/4000$ metres with a maximum of 900 millimetres but a beacon need not be moved in order to correct its alignment when its displacement falls within the limits of $0.06 + d/2000$ metres with a maximum of 900 millimetres, where in both cases, "d" is the distance in metres from that beacon to the nearest terminal, or point justifiably adopted as

the terminal under this regulation, and in cases where it is necessary to correct alignment, if the relevant beacon is not placed on line-

- (a) it shall be used as an indicatory beacon for the unbeaconed point as a corner of the land under survey; and
 - (b) any data which may be necessary to define the position of that unbeaconed point in relation to that indicatory beacon shall be recorded on any new diagram affected by the alignment.
- (6) Where a land surveyor is able to identify a beacon previously placed online and in respect to which survey records have been approved, and the Surveyor-General is satisfied that the alignment was correctly done, that beacon need not be re-tested for alignment.

Part IV – BEACONS, TRIGONOMETRICAL STATIONS AND REFERENCE MARKS

15. Specifications for beacons and witness marks

- (1) Unless as otherwise provided for in regulation 17, the corner points of every surveyed piece of land shall be marked by beacons which shall comply with the following minimum requirements-
- (a) for land situate in a township the beacon shall be an iron peg 12 millimetres in diameter or a galvanised iron pipe 15 millimetres in diameter, either of which must be at least 400 millimetres in length and driven vertically and flush with the surface of the ground;
 - (b) for rural land and land situate in a settlement-
 - (i) the beacon shall be an iron standard weighing approximately three kilograms per metre and one metre long or an iron peg or a galvanised iron pipe 20 millimetres in diameter and at least 600 millimetres in length;
 - (ii) the beacon referred to in subparagraph (i) shall be driven vertically into the ground and shall not project more than 150 millimetres above the surface of the ground;
 - (iii) the beacon referred to in subparagraph (i) shall be marked by a cairn of stones 600 millimetres high with a base of 600 millimetres in diameter or a solid stone or concrete block 900 millimetres in length and 225 square centimetres in cross-section and firmly planted into the ground to a depth of at least 600 millimetres, or marked in some other identifiable manner.
- (2) Notwithstanding subregulation (1)-
- (a) if the corner point falls in soft or sandy ground, the length of the standard, peg or pipe shall be increased sufficiently to ensure the stability and permanence of the beacon;
 - (b) if it is not possible to drive the standard, iron peg or pipe into the ground, the corner point shall be defined by a hole of sufficient depth drilled into the obstructing rock, pavement or structure;
 - (c) if the corner point falls on hard or rocky ground and the standard, peg or pipe cannot be driven in to the depth specified in subregulation (1), the standard, peg or pipe's length may be reduced, if the stability and permanence of the beacon will not be impaired, otherwise the corner point shall be defined by a standard, peg or pipe which is at least 300 millimetres in length and embedded in a symmetrical block of concrete 15 000 cubic centimetres in volume,
 - (d) when necessary, any standard, peg or pipe may be embedded in a symmetrical block of concrete; and
 - (e) where the piece of land constituting the perimeter of a proposed township is surveyed or re-surveyed at the same time as the township,

the requirements of subregulation (1)(a) shall, subject to necessary changes, apply to that survey or re-survey.

- (3) In the case of a post the following conditions apply-
 - (a) when the post forms part of a properly erected fence and occupies a corner point of land being surveyed, it may be adopted as a beacon;
 - (b) in the case of rural land being surveyed, the corner post shall be distinguished from other fence posts in the vicinity in some physical manner; and
 - (c) a peg shall not be placed at the foot of the corner post for the purposes of identification.
- (4) In surveying rural land, a land surveyor may place two or more witness marks in respect of each beacon which he or she determines during the course of the survey, and the witness marks should consist of iron pegs which-
 - (a) are not less than ten millimetres in diameter and at least 450 millimetres long; and
 - (b) shall be driven in below the surface of the ground at a distance of approximately five metres from the beacon and along the boundaries meeting at that beacon, but where necessary, witness marks may be placed at any distance other than the distance referred to in this regulation.
- (5) Any person who wishes to depart from the requirements for beacons specified in this regulation may only do so with the approval of the Surveyor-General.
- (6) Where during the survey of a piece of land, a beacon which should define one of its corner points is missing, is in a dilapidated condition or is composed of inferior type of material, it shall be replaced or repaired so that it complies with the requirements of this regulation.
- (7) No person shall use a trigonometrical station erected by the Surveyor-General as a new beacon.
- (8) This regulation shall not apply to the survey of a mining right.

16. When beacons are not required

- (1) It shall not be necessary to define any corner point by a beacon-
 - (a) where the corner point coincides with the corner of a permanent building, which shall, in that case be adopted as a beacon;
 - (b) where the corner point is in such close proximity to the corner of a building that a beacon cannot be conveniently placed in position, in which case the position of the corner of the building shall be accurately determined for use as an indicative beacon;
 - (c) where the area affected by a servitude is of defined width and in that case it shall be necessary to place beacons along one side of the area or on a convenient line indicative to that side;
 - (d) at the ends of the straight of a railway line forming a boundary;
 - (e) when the purpose of the beacon will fall away by consolidation of title; or
 - (f) in the case of a servitude based on visible physical features of a permanent nature.
- (2) The Surveyor-General may waive the requirement to erect or restore a beacon when he or she considers that the erection or restoration of the beacon will serve no useful purpose.

17. Indicatory beacons

- (1) Where a corner point of a piece of land or the beacon of a real right falls in an inaccessible or insecure position or in a position where it is unsuitable to place a beacon, that position shall be preserved by means of indicatory beacons.

- (2) Except as otherwise provided in regulation 15(6), an indicative beacon shall be placed on each of two of the rectilinear boundaries meeting at such corner point and as close thereto as will be consistent with its safety, but, it shall not be placed in a position where it could be mistaken for the corner beacon and it shall not be necessary to place an indicative beacon when-
 - (a) permission not to do so has been obtained from the Surveyor-General; or
 - (b) it cannot be placed on line due to the existence of an obstructing building or other permanent structure.
- (3) An indicative beacon for defining the intersection of a rectilinear boundary with a curvilinear boundary shall be placed-
 - (a) on the rectilinear boundary as near to the intersection as circumstances permit without endangering the permanency of the beacon; and
 - (b) where it is practicable, on the same side of the curvilinear boundary as the land under survey.
- (4) Where the removal of a beacon has been authorised under section 33 of the Act and it is not possible to replace the beacon in its original position the land surveyor conducting the survey shall-
 - (a) place indicative beacons where possible one on each of the straight boundary lines meeting there or in such other positions which have been authorised by the Surveyor-General; and
 - (b) without delay, furnish the Surveyor-General with all information which would enable the Surveyor-General to record the positions of the indicative beacons on the relevant diagrams.

18. Marking of survey stations

Favourably situated main survey stations which are not likely to be disturbed, shall be marked in a permanent manner, preferably by iron pipes or wire nails which are not less than 150 millimetres long.

19. Damage to and removal of trigonometrical stations, reference marks and bench marks

- (1) No person shall remove or demolish a reference mark erected under section 20 of the Act, a trigonometrical station or a benchmark unless he or she has, in writing, been authorised to do so by the Surveyor-General.
- (2) When a land surveyor has knowledge that a reference mark, trigonometrical station or benchmark has been or is likely to be damaged or destroyed, he or she shall immediately supply that information to the Surveyor-General.

20. Reference marks

- (1) In the survey of new townships, extensions to existing townships or the subdivision of an erf, reference marks shall be placed at convenient intervals and in suitable positions, but-
 - (a) not less than two reference marks shall be placed;
 - (b) in general the reference marks shall be placed in the order of 300 metres from each other; and
 - (c) in the case of the subdivision of an erf, the reference marks may only be placed if a general plan is required under regulation 50.
- (2) Notwithstanding subregulation (1), the Surveyor-General may, after an application has been made to him or her, relax the requirements of subregulation (1).
- (3) A person who is carrying out a survey pursuant to subregulation (1) shall, for the purpose of determining the most suitable position of the reference marks so as to obviate the possibility of

destruction of those reference marks by the subsequent installation of service facilities, consult with the local authority of the area where the survey is being carried out.

- (4) A reference mark erected under section 20 of the Act shall comply with the specifications indicated in Item 11 of the Annexure.
- (5) A reference mark referred to in subregulation (4) shall consist of an iron peg or iron pipe-
 - (a) which is at least 12 millimetres in diameter and at least 700 metres long; and
 - (b) which is set in concrete at least 200 millimetres below the surface of the ground, but the Surveyor-General may, subject to conditions which he or she may impose, sanction a departure from this subregulation.

Part V – DIAGRAMS

21. Nature, form and size

- (1) Except as provided in subregulation (4), a diagram shall be framed on one or more rectangular sheets of good durable paper of a quality approved by the Surveyor-General and in accordance with the lay-out, style, specifications and symbols indicated in Item 9 of the Annexure, but-
 - (a) where the diagram comprises more than one sheet of paper, a note to that effect and the relevant sheet number shall be placed in a prominent position on each sheet of the diagram; and
 - (b) only one side of each sheet of paper shall be used.
- (2) A departure from the requirements of subregulation (1) shall be made with the prior approval of the Surveyor-General.
- (3) A diagram shall be prepared in good quality black ink or black print which is acceptable to the Surveyor-General and the signature of the land surveyor shall be in black or blue-black ink of good quality.
- (4) Unless otherwise authorised by the Surveyor-General, at least one copy of each diagram shall be framed on paper referred to in subregulation (1) and the remaining copies may be prepared on any other material or prepared by a process approved by the Surveyor-General.
- (5) The dimensions of a diagram form shall be 297 by 210 millimetres (size A4) but, in exceptional circumstances, the Surveyor-General may permit the use of forms of different dimensions.
- (6) The margins of a diagram shall-
 - (a) in the case of size A4 forms, be 40 millimetres wide along the left-hand edge of the longer side and ten millimetres along the other sides; or
 - (b) in the case of other forms approved by the Surveyor-General, be those permitted by the Surveyor-General.
- (7) No writing or drawing shall encroach onto the margins of a diagram but the right - hand margin may be used for initiating alterations.
- (8) The Surveyor-General may refuse to approve a diagram which he or she considers to be dilapidated, framed in a careless manner or spoilt in appearance by amendments or additions.

22. Number of copies required

Unless the land being surveyed is to be registered by reference to a general plan, a diagram shall be submitted to the Surveyor-General in single and the Surveyor-General shall prepare and supply the additional copies required for registration but, where a diagram of a size larger than size specified in regulation 21(5) is submitted, the Surveyor-General may call for additional copies required for registration.

23. Figure

- (1) Land shall be represented on a diagram by a single figure but two or more parts of a piece of land may be represented on more than one figure, where-
 - (a) the diagram is framed for the purpose of amendment or rectification of title as contemplated in section 44 of the Deeds Registries Act, 1937 (Act No. 47 of 1937);
 - (b) the diagram is framed for the purpose of consolidation of title and a component portion has been split into parts by the deduction of one or more intervening portions or comprises existing detached portions represented on a single property;
 - (c) those parts meet at one or more common points;
 - (d) those parts are disconnected by the prior deduction of a strip of road or a railway reserve; or
 - (e) a diagram of rural land is framed for the purpose of a single lease in respect of those parts of one parent property.
- (2) Where a diagram is framed on any size other than the size specified in regulation 21(5), the figure shall be drawn wholly to the left or right of the central margin.

24. Scale and plot

- (1) The figure of a diagram shall be accurately plotted to one of the following scales, 1/1000, 1/1250, 1/1500, 1/2000, 1/2500, 1/3000, 1/4000, 1/5000, 1/6000, 1/7000 or to any of these scales in which the denominator is multiplied or divided by ten to any integral power but, the size of the figure shall not be less than six square centimetres except in the case of a servitude diagram or in circumstances permitted by the Surveyor-General.
- (2) Where beacons are in such close proximity to each other that their respective positions cannot be clearly shown without unduly increasing the size of the diagram form, they may be represented in an inset at a larger scale oriented to the main figure.
- (3) The scale to which the figure is plotted shall be recorded on the diagram below the figure and the scale of an inset shall be given in the inset.
- (4) The plot of the figure shall agree with the data on the diagram within a limit of one millimetre.

25. Physical features

The physical features referred to in regulation 13 shall be depicted on the diagram in the conventional manner indicated in Item 8 of the Annexure.

26. Land held under different tenures or conditions of title

Where, for the purpose of registration, it is necessary to present on a diagram the boundaries of areas held under different tenures or conditions of title, those boundaries shall be represented by black broken lines which shall be lettered and those lines shall be repeated in a similar manner on all subsequent diagrams unless they are no longer required for registration purposes.

27. How to indicate contiguous properties

The directions of the boundary lines of contiguous properties shall be indicated by broken lines drawn from the points representing common beacons, and the names and other designations of such contiguous properties shall be written in their respective positions.

28. Connecting figure

Where it is necessary to depict the connecting figure referred to in regulation 33(1), it shall be indicated on a diagram by broken lines or by means of an inset, and it shall not be necessary to plot such figure to scale if this is found to be inconvenient.

29. Description and official designation of beacons

- (1) A diagram shall contain a clear and concise description of each beacon, and of the location of each beacon in relation to any permanent feature in its vicinity and if any beacon is a fence post, this must be stated as a description of that beacon.
- (2) A reference to witness marks placed in respect of a beacon and the distance at which those witness marks are placed from the beacon, shall be recorded on a diagram.

30. Unit of measure

On any diagram the sides, and when required the co-ordinates, shall be expressed in metres.

31. Numerical data

- (1) Subject to regulation 46(2), a diagram shall contain the following numerical data:-
 - (a) subject to regulation 32, the co-ordinates in metres, to two decimal places, of-
 - (i) every corner point defining the rectilinear figure and of every indicatory beacon defining that corner point;
 - (ii) all other corner points in respect of which connecting data is furnished under regulation 33;
 - (iii) all trigonometrical stations within the figure or within 30 metres of any corner point referred to subparagraphs (i) and (ii);
 - (iv) at least two favourably situated trigonometrical stations or two reference marks erected under section 20 of the Act, to which the survey has been connected but the Surveyor-General may waive this requirement;
 - (v) the centre and tangent points of every circular curve forming a boundary, if determined during the course of the survey;
 - (vi) the ends of the straights when the elements of the curve have not been accurately determined and where these straights form part of the boundary of the land being surveyed,
 - (b) the length, in metres to two decimal places, of-
 - (i) the sides of the rectilinear figure;
 - (ii) the radius of every circular curve forming a boundary, if determined or adopted during the course of the survey,but it shall not be necessary to record the distance from an indicatory beacon to an irregular curvilinear boundary,
 - (c) directions to the nearest one second of all sides but-
 - (i) when the length of side is less than 1 000 metres, the direction may be expressed to the nearest ten seconds;

- (ii) when the side is part of a boundary determined during the course of the survey, and whose length exceeds 1 000 metres, the direction of such sides shall be expressed to single seconds;
 - (iii) on a diagram of land in a township, the directions of all lines less than 1 000 metres in length shall be expressed to the nearest ten seconds; and
 - (iv) angles may be recorded on the diagram of an erf, if the erf is represented on an approved general plan on which angles are recorded,
 - (d) the area shall be expressed in square metres to the nearest square metre when the area is less than one hectare, otherwise it shall be expressed in hectares to four decimal places, but-
 - (i) when disconnected parts of land are represented on the diagram, only the combined area of those parts shall be recorded;
 - (ii) as a general rule, the area of a servitude need not be recorded,
 - (e) subject to regulation 43(2), any data which may be necessary to determine the limits of the figure representing a servitude; and
 - (f) any data which is specified in regulation 33.
- (2) All data shall be tabulated, but any indicatory data may be shown in an insert drawn to an enlarged scale.
- (3) When tabulating the data on a diagram, the corner points of the figure shall be referred to consecutively in clockwise order by letters placed outside the figure.

32. Co-ordinates system: When not required

- (1) When a survey has been based on trigonometrical stations or reference marks, a reference to the co-ordinate system shall be recorded on the diagram.
- (2) Co-ordinates need not be stated on a diagram-
 - (a) framed from an approved general plan, unless the co-ordinates of each corner point of the land concerned are stated on that general plan;
 - (b) of land situate in a township or settlement, unless the survey or re-survey of that land is based on or connected to trigonometrical stations or to reference marks in the manner specified in regulation 8;
 - (c) compiled for consolidated title in the special circumstances referred to in regulation 46(1)(b) and (c).

33. Connecting data

- (1) Where the rectilinear boundary of a subdivision does not coincide, in whole or in part, with a boundary of the land being subdivided, the position of two suitably situated beacons of that land, of a former subdivision of that land, shall be accurately determined and, connecting data, comprising the sides, directions and co-ordinates of the quadrilateral figure connecting those beacons to two beacons of the subdivision shall be furnished on the subdivision diagram, but-
 - (a) the co-ordinates shall be omitted when no other co-ordinates are furnished;
 - (b) if a diagram of a road or railway traversing the land or of a servitude area within the land is filed in the office of the Surveyor-General, the subdivision may be connected to two suitable beacons represented on that diagram;
 - (c) connecting data shall not be furnished on a subdivision diagram when the subdivision survey is based on trigonometrical stations or on reference marks, and any approved survey which

included at least two beacons not less than 150 metres apart of the land being subdivided has been similarly based.

- (2) Where a rectilinear boundary of a subdivision coincides in whole or in part with a boundary of the land being subdivided, the following data shall be recorded on the diagram:-
 - (a) the sides of the remaining extent along the boundary on either sides of the subdivision as well as the co-ordinates of the corresponding terminals, adjusted, if necessary, to coincide with the true and correct boundary determined under regulation 14; and
 - (b) the distances from-
 - (i) the terminals referred to in paragraph (a);
 - (ii) the beacons of the subdivision on that rectilinear boundary,
 to the beacons referred to in regulation 14(1) and (2), if the positions of those beacons have been accurately determined for the purpose of effecting the correct alignment;
 - (c) the co-ordinates of the terminals referred to in regulation 14(1) and (2).
- (3) In spite of subregulation (2)(b) and (c) -
 - (a) the co-ordinates of the terminals shall be omitted when no other co-ordinates are furnished;
 - (b) if a land surveyor is in a position to effect the correct alignment of the subdivisional beacons without determining the positions of both terminals referred to in subregulation (2)(a), data in respect of only one of those terminals need to be recorded, but if section 8 of the Act applies to the boundary, the position of both terminals shall be accurately determined and the data recorded accordingly;
 - (c) the connecting data shall not be recorded if the subdivisional survey is based on trigonometrical stations or reference marks and the co-ordinates of the terminals are similarly based and recorded on an approved diagram, unless it is necessary to redetermine the position of the terminals.
- (4) Connecting data shall not be furnished on a subdivisional diagram if that data can be deduced from diagrams of adjoining subdivisions submitted for examination at the same time.
- (5) For the purposes of this regulation "terminal" means a beacon which terminates the boundary of the land being subdivided.

34. Consistency of data

- (1) Sides, angles or directions and areas given on any diagram shall, as far as is permitted under regulation 31, be numerically consistent with the co-ordinates on the diagram, but the area of a regular figure shall be determined directly from the sides.
- (2) The numerical data recorded on a diagram, other than a diagram compiled for the purpose of registering a certificate of consolidated title, on which co-ordinates are not recorded shall be unacceptable for registration when-
 - (a) the closure of a data traverse computed round the rectilinear figure exceeds;

$$0.02 + \frac{P\sqrt{n}}{10\,000} \text{ metres}$$

or

- (b) the inconsistency in the area of the rectilinear figure as computed from the sides and angles

$$\frac{2}{80\,000} + \frac{P\sqrt{n}}{80\,000} \text{ square metres}$$

or directions exceeds

where P represents the perimeter in metres and n the number of sides of the rectilinear figure.

- (3) When the land represented on any diagram is bounded by a curvilinear line, other than a railway line or curve defined entirely by mathematical data, the allowable maximum discrepancy in the recorded area shall be the area contained between the curvilinear line and a line parallel to it displaced at a distance corresponding to one millimetre on the scale adopted for the working plan referred to in regulation 60 and the curvilinear area shall be derived from a correct representation of the curvilinear line on that working plan.
- (4) Where, in the survey of several lots, it is necessary to frame a diagram of the whole blocks of those lots, the data recorded on the diagram of the individual lots shall be consistent with the data recorded on the diagram of the whole block of lots.

35. Certificate

Every diagram, except a diagram referred to in regulation 46(3), shall be signed by the land surveyor or land surveyors who prepared it and certified as follows:-

“Surveyed in (month, year) _____ by me/us

Name(s) _____

Professional Land Surveyor(s)

Registration No(s) _____

but-

- (a) in appropriate circumstances, the certificate referred to in this subregulation may, with the consent of the Surveyor-General, be modified; and
- (b) a diagram framed under section 36 of the Act shall be signed by the land surveyor or land surveyors who prepared it and certified as follows:-

“Framed under section 36 of Act 33 of 1993 in (month, year) by me/us

Name(s) _____

Professional Land Surveyor(s)

Registration No(s) _____

36. Thoroughfares

When a road, street, right of way or lane of uniform width abuts on any boundary of township land under survey, its registered width shall be recorded on the subdivision diagram, but if the width has been redetermined the new width shall be stated.

37. True north

The direction of the true north shall be indicated on a diagram, as a general rule, by an arrow pointing towards the top of the paper.

38. Ambiguous curvilinear boundary

When a curvilinear boundary is not described in clear terms on the original diagram, or its description is ambiguous, the obscurity or ambiguity shall, whenever possible, be removed under section 27 of the Act, but if the obscurity or ambiguity is not removed, it shall be retained in the same form on all new diagrams affected.

39. Verbal definition

- (1) Subject to regulation 38, every diagram shall contain a clear verbal definition of the limit of the figure representing the land.
- (2) The definition shall recite, clockwise and in the order in which they occur, the letters by which the corner points are indicated, and if applicable, a description of the curvilinear boundary.
- (3) When a river, stream, water-course, wall or other well-defined permanent, natural or artificial feature forms a new boundary, the specific part of the feature which forms part of the boundary shall be distinctly recorded in the verbal definition.
- (4) In the case of figures referred to in regulation 23, the verbal definition shall be recorded in such a manner as not to reflect separate figures.

40. Designation

- (1) The land represented on a diagram shall be distinguished by name, letter or number according to the customary procedures prevailing in Namibia.
- (2) The spelling of a name or the designation of a piece of land as recorded on the original diagram, shall be retained in all subdivisional diagrams.

41. Locality

Where applicable, a diagram shall contain an appropriate reference to-

- (a) the township or settlement;
- (b) the area of the urban local authority; and
- (c) the registration division,

where the land to which it relates is situated.

42. References

Every new diagram shall contain-

- (a) the Surveyor-General's number which appears on the original diagram;
- (b) reference to the title deed to which the original diagram relates; and
- (c) any other Deeds Registry references to the original diagram as may be required.

43. Servitudes

- (1) Special care shall be taken to present accurately features which, on a diagram, form the subject of a servitude.
- (2) Features or boundaries defining an existing servitude which have been determined by survey and are represented on a registered diagram, need not be re-surveyed for the purpose of preparing a new diagram of the whole or a portion of the land affected by that servitude as long as the limits of the servitude falling within the land surveyed are graphically represented and described on the

new diagram and a reference is made to the original diagram and to the deed, where available, from which the limits and description were obtained.

- (3) Where a new subdivision boundary falls in close proximity to an existing servitude which is not indicated on the diagram of the relevant subdivision, the land surveyor conducting the survey of the subdivision shall furnish the Surveyor-General with a certificate to the effect that the subdivision is not affected by that servitude.
- (4) When it is intended to create a servitude over a portion of land on transfer of that portion, the features or boundaries defining that servitude shall be represented on the relevant subdivisional diagram together with a note describing the servitude and that note shall be in the form of a written statement and it shall contain no condition which is proposed to be attached to the servitude.
- (5) Where on transfer of a portion of land, a servitude is to be registered against the remainder of the land or against contiguous or neighbouring land, the features or boundaries defining that servitude may, with the consent of the Surveyor-General, be represented and described on the subdivision diagram but, if the figure or servitude cannot conveniently be represented to the scale of the diagram, it may be shown in an inset plotted to a different scale.
- (6) Where an existing servitude is not registered in the Deeds Registry, and the only indication of its existence is a note on a registered diagram, the identical words used on that diagram shall be produced in a similar position on any subdivisional diagram representing land affected by that servitude but that note shall not be altered or omitted except as a result of-
 - (a) an order of a competent authority;-
 - (b) the written consent of the owner of the servitude and the owner of the land encumbered by the servitude;
 - (c) the registration of a notarial deed to remove any uncertainty; or
 - (d) lapsing by merger.
- (7) Where a servitude encumbers land extending beyond the limits of the feature determining the position of the servitude, the servitude note shall, whenever practicable, refer to the area concerned as a servitude area.
- (8) Regulation 33 applies to a diagram prepared for the purposes of registering a servitude.

44. Composite diagrams

No subdivision diagram shall represent portions of land which are represented on more than one original diagram.

45. Diagrams of land situate in more than one registration division

No diagram shall be accepted for registration if it represents land situated in two or more registration divisions.

46. Diagrams for consolidated title

- (1) A diagram compiled without a re-survey, for the purpose of consolidation of title, shall contain only such numerical data as are directly derived from component diagrams, or are obtained by simple addition or subtraction of data appearing on diagrams of components and their original diagrams, but where-
 - (a) a component diagram contains both beacons and transfer data, both sets of data shall be reproduced on the compiled diagram but, if reproduction of that transfer data may lead to confusion, the Surveyor-General may authorise that the data be omitted;
 - (b) component diagrams record different co-ordinate systems, only co-ordinates based on the trigonometrical survey system shall be furnished;

- (c) component diagrams contain discordant co-ordinates on the trigonometrical survey system, of common corner points, all the co-ordinate values shall be reproduced on the compiled diagram;
 - (d) a remaining extent is included as a component, the data may, with the consent of the Surveyor-General, be derived from the diagrams of the deducted portions of the same property of which that component is the remaining extent;
 - (e) the data on component diagrams apparently create bends in what was a straight line boundary before deduction of the components, the relevant angles on those component diagrams may be ignored.
- (2) On a diagram compiled, without re-survey, for the purpose of consolidation of title-
- (a) the numerical data shall be consistent within the limits specified by regulation 34, but, with the approval of the Surveyor-General, those limits may be exceeded;
 - (b) the aggregate area of the consolidated portions shall be equal to the total sum of the component portions.
- (3) A land surveyor shall sign and certify a diagram compiled for consolidation of title as follows-
- “Compiled in (month, year)_____ by me/us
- Name(s)_____
- Professional Land Surveyor(s)
- Registration No(s)_____
- (4) On any diagram prepared for the registration of consolidated title, whether framed by compilation of component diagrams or from survey-
- (a) the details specified in regulation 40, and the diagram and the deed reference shall be quoted for each component portion;
 - (b) the internal boundaries of portions and of land held under different tenures or conditions of title shall be indicated by black broken lines and lettered;
 - (c) the areas of component portions shall be omitted; and
 - (d) the data in respect of internal boundaries of the component portions shall be omitted.

47. Certificate of township or registered title

- (1) When an area of land which is to be laid out as a township or settlement does not comprise the whole of the land represented by an approved diagram, a subdivision diagram of the portion to be so laid out shall be framed for the purpose of being annexed to the certificate of township, settlement or registered title.
- (2) If the Surveyor-General finds it necessary, where an area to be subdivided into lots in any manner not provided for in subregulation (1) does not comprise the whole of the land represented on an approved diagram, a diagram of the portion of land being subdivided shall be framed for the purpose of being annexed to the certificate of registered title.

48. Deductions, alterations and endorsements

- (1) No person, other than the Surveyor-General, shall make a deduction, note, alteration or endorsement on a registered diagram unless that person has, in writing, been authorised to do so by the Surveyor-General.
- (2) Where a diagram has been approved, but has not been registered, the Surveyor-General may, with the consent of the land surveyor who prepared that diagram amend that diagram.

- (3) An alteration to a diagram which is being examined by the Surveyor-General shall be initialled by the land surveyor who prepared it or in certain circumstances, by the Surveyor-General, and in the latter case the Surveyor-General shall notify the land surveyor concerned, but, no erasures shall be made on the diagram.

49. Certified copies

Prior to registration of an approved diagram or general plan, the Surveyor-General shall not issue a certified copy of that diagram or general plan to any person unless the written consent of the land surveyor concerned or of a person acting on behalf of that land surveyor has been produced to the Surveyor-General, but that consent is not required-

- (a) if the Surveyor-General has been supplied with evidence that the land surveyor concerned has unreasonably withheld his or her consent or has failed, within a reasonable time, to respond to a notice requesting authorisation for the issue of the certified copy;
- (b) if one or more of the original copies of the diagram are produced to the Surveyor-General by the applicant;
- (c) if the Surveyor-General is in a position to supply additional copies of a diagram or general plan as contemplated in regulations 22 and 51 respectively;
- (d) in respect of copies supplied to government ministries, offices and agencies or to local authorities;
- (e) after a period of five years from the date of approval of the diagram or general plan.

Part VI – GENERAL PLANS

50. When required

A general plan shall be prepared when it is required to be produced under any law or when it is required by the Surveyor-General.

51. Number of copies required

The number of copies of a general plan to be framed for registration depends on the number required for that purpose, but a single copy may be framed if the Surveyor-General is in a position to supply the additional copies required for registration.

52. Nature, form and size

- (1) A general plan shall be framed on polyester film.
- (2) A general plan shall be framed on a size of paper stipulated by the Surveyor-General and in accordance with the lay-out, style specification and symbols specified in Item 10 of the Annexure but, if the lay-out of the erven is depicted on more than one sheet of paper, the main sheet shall indicate which erven appears on the respective sheets and shall contain a key plan in the form of an inset indicating the sheet number and divisions and if the plan comprises more than one sheet, all the sheets shall be numbered and be of the same size.
- (3) Unencumbered margins of not less than 75 millimetres in width shall be left along all sides of every sheet of a general plan, but-
 - (a) a margin of not less than 250 millimetres in width shall be left along the right-hand side of the title sheet; and
 - (b) the requirements of this subregulation may, with the consent of the Surveyor-General, be relaxed.

- (4) In order to ensure neatness in the final general plan, a preliminary plan, complete in all respects except for the margins referred to in subregulation (3), may be submitted to the Surveyor-General for examination.
- (5) Where consent for a survey is required in terms of any law, a copy of that consent together with the survey records, shall be submitted to the Surveyor-General.
- (6) A complete digital copy of the preliminary general plan in a DXF format or any other format approved by the Surveyor-General, shall be submitted to the Surveyor-General for examination.

53. Data and details to be recorded

- (1) Regulations 21(3) and (7), 24, 25, 26, 27, 29, 30, 32(1), 34, 36, 37, 38, 39(3), 40, 41, 42, 43 and 48 in so far as they apply to diagrams shall, subject to necessary changes, apply to the whole figure and to the subdivisions represented on a general plan.
- (2) Subject to necessary changes, regulation 60(2)(f) applies to a general plan framed under this regulation.
- (3) Subject to necessary changes, regulation 31(1)(a), (b) (c) and (e) and (2) applies to the whole figure represented on a general plan, but-
 - (a) in the case of rural land, no data other than the co-ordinates referred to in regulation 31(1)(a)(iii) and (iv) need be recorded;
 - (b) in the case of townships, the co-ordinates of the reference marks shall be tabulated;
 - (c) the sides and directions may be recorded on the figure.
- (4) The following information shall be furnished in respect of subdivisions:-
 - (a) the co-ordinates, which shall be tabulated, of-
 - (i) in the case of rural land, all corner points and any indicatory beacons defining that corner point;
 - (ii) the corner blocks of erven or, instead of that, the apices of truncated corners, unless adjacent blocks are of regular shape and several block corners or apices are collinear, in which case the co-ordinate of only the terminal of the line is required, but, the co-ordinates of the corner points of blocks or erven in a township shall be expressed in metres to two decimal places,
 - (b) the length and direction of each side, which shall be recorded within the figure itself where it is possible to do so, but-
 - (i) it shall not be necessary to record that data on both sides of common boundary;
 - (ii) where two or more erven or lots in a single block abut on the same straight line, it shall be sufficient to record the direction of that line only once;
 - (iii) where the sides of two or more adjoining erven in a block are parallel, it shall only be necessary to record the directions of the first and last of those parallel sides;
 - (iv) the sides of erven in a township shall be expressed in metres to two decimal places;
 - (v) the value of the direction of a side shall be recorded within the figure so as to represent the clockwise direction of that side irrespective of the manner in which it is written;
 - (vi) where a change of direction is not visually obvious on the general plan, the point at which the change occurs shall be distinguished by a single black circle,
 - (c) the areas, which shall be tabulated consecutively and separately for each erf or lot, shall be expressed in accordance with regulation 31(1)(d),

- (d) the widths of the roads which, when uniform, shall be recorded in the figure of the road,
 - (e) sufficient numerical data to connect blocks from each other and with boundaries of the outside figure and that data shall be given in the figure of the plan or in an inset.
- (5) The Surveyor-General may, in exceptional circumstances and subject to necessary conditions which he or she may impose, relax any of the requirements of subregulation (4).
 - (6) The designation of each erf or lot shall be written within the figure.
 - (7) The Surveyor-General may, subject to necessary conditions which he or she may impose, accept the use of alpha-numeric symbols to denote beacon descriptions in groups.

[The term “alpha-numeric” is misspelt in the *Government Gazette*, as reproduced above,]

54. Numbering of erven and lots

- (1) The numbering of erven or lots on a general plan shall proceed consecutively in each block and progressively along the streets or roads adjoining a block but, public places shall be numbered in accordance with customary procedure.
- (2) The requirements of subregulation (1) may, with the consent of the Surveyor-General, be relaxed where it is necessary.

55. Certificate

- (1) A general plan shall bear the date of survey and shall be signed and certified by the land surveyor in the manner provided for in regulation 35.
- (2) If two or more land surveyors were engaged in a survey and responsibility was shared, each land surveyor shall sign and certify the general plan for which he or she was responsible during the survey and the extent to which each land surveyor was responsible shall be indicated on the general plan.
- (3) Each sheet of a general plan shall be signed by the land surveyor and approved by the Surveyor-General.

56. Exemptions

- (1) For the purpose of provisional approval of a general plan under section 35 of the Act, the Surveyor-General may authorise a departure from the manner in which a general plan is to be prepared under these regulations, if compliance with these regulations is impossible or impracticable.
- (2) Where it is necessary for the Surveyor-General to correct a general plan which was provisionally approved under section 35 of the Act, and it is considered that the correction will affect the extent or designation of an erf represented on the general plan, the Surveyor-General shall inform the Registrar of Deeds accordingly.
- (3) Where the Surveyor-General has, at the request of the land surveyor who signed a general plan, provisionally approved a general plan pursuant to section 35 of the Act, the responsible land surveyor shall, within five months after the date of the approval, submit the final general plan to the Surveyor-General for approval but, the Surveyor-General may extend the five months period by a further period of four months if the land surveyor concerned has, before the end of the initial five months, furnished the Surveyor-General with reasons why the final general plan could not be submitted within the five months.

Part VII – SURVEY RECORDS

57. Survey records: Composition and lodgement

- (1) The survey records referred to in section 7(1)(c) of the Act shall consist-
- (a) the original field book;
 - (b) the computations, which shall be contained in a typewritten co-ordinate list which conforms with the example given in Item 4 of the Annexure or a list written in black ink which conforms with the example given in Item 4 of the Annexure, of all final co-ordinates in which complete references to the source from which the co-ordinates were obtained shall be given;
 - (c) the working plan;
 - (d) the triangulation plan, unless all trigonometrical stations are plotted to scale on the working plan;
 - (e) a comparison sketch, which shall be in the form of the example given in Item 2 of the Annexure, on which the following are recorded:-
 - (i) the data derived from the survey;
 - (ii) the data obtained or deduced from the original and adjoining diagrams, in brackets; and
 - (iii) the data finally adopted for the survey, underlined,but if the original and new survey are based on the same system of coordinates, a comparison of the original, surveyed and adopted co-ordinates shall also be furnished and when the comparison is not done in accordance with the example in Item 2 of the Annexure, prior approval of the Surveyor-General should be obtained;
 - (f) a report on the survey and on incidental matters, and that report shall be similar to the one contained in Item 1 of the Annexure;
 - (g) the records which the Surveyor-General may require when a curvilinear boundary has been determined by photogrammetric methods;
 - (h) an index to the calculations and field notes, which may be included in the co-ordinates list;
 - (i) the descriptions of all the beacons found, together with the description recorded by other land surveyors in previous surveys;
 - (j) the following additional records when the numerical data of a portion of land are determined by photogrammetric methods-
 - (i) a full set of contact prints and diapositives;
 - (ii) a flight plan showing photo centres, photo numbers and boundary of the area under survey;
 - (iii) a list of residual errors of transformation of photogrammetric co-ordinates of all ground control points, trigonometrical stations and reference marks; and
 - (iv) the comparison between the calculated and measured distances,
 - (k) in respect of diagrams and general plans which have been submitted to the Surveyor-General for examination and approval, a certificate from the responsible land surveyor stating that-
 - (i) the consistency of data has been checked directly from those diagrams and general plans;

- (ii) the co-ordinates of beacons appearing on those diagrams and general plans have been checked against the co-ordinate list and the calculations of the fixes of such beacons;
 - (iii) the beacon descriptions on those diagrams and general plans have been checked against those recorded in the field book and those shown on the working plan; and
 - (iv) he or she has satisfied himself or herself of the correctness of the checks mentioned in subparagraphs (i), (ii) and (iii),
- (l) copies of the diagrams and general plans referred to in paragraph (k) which demonstrate the results of the checks for consistency of the data;
- (m) if SBP techniques have been used to co-ordinate beacons, the following additional records-
 - (i) a report on the type of processing used for each SBP vector;
 - (ii) a description of the method of datum transformation and the accuracy of the transformations; and
 - (iii) the difference in metres on the national control survey system, between measured and final vectors, after datum transformation has been applied,but any unprocessed data shall be retained by the land surveyor for examination by the Surveyor-General if so required.
- (2) Survey records shall be lodged with the Surveyor-General for examination and filing simultaneously with every relevant diagram and general plan, unless those records are already filed in his or her office.
- (3) When a survey for the replacement of beacons involves only their replacement into co-ordinate positions previously established on the trigonometrical system, the land surveyor need only submit a copy of the relevant diagram or general plan on which the beacons replaced are indicated, together with a report in which any variations in the descriptions of the beacons are mentioned.

58. Field notes

- (1) The field book referred to in regulation 57(1)(a) shall contain a record of the following:-
 - (a) all angular and linear measurements and all observations made for the purpose of reducing those measurements, but-
 - (i) if the measurements are recorded manually, entries of all those measurements and observations shall be made, preferably in pencil or in ink, on one side of the paper only; and
 - (ii) if the measurements are recorded electronically, the data shall be printed out unaltered and unedited and that printout shall be certified by the land surveyor to be the original field record,
 - (b) calculated data used for the placing and checking of beacons, which-
 - (i) in the case of a manual field book, shall be entered in ink of a colour different from that used for the field entries; and
 - (ii) in the case of an electronic recording method, shall reflect both the calculated data and recorded measurements, but, field plans in the form of permanent prints of the general plans may be used to record measured distances when placing beacons of a block of erven in a township or settlement, subject to prior approval of the Surveyor-General,
 - (c) the date on which each set of measurements or observations were made and reference to any conditions which could affect the quality of the measurements,

- (d) a description of-
 - (i) the land under survey;
 - (ii) the measuring instruments used, including official numbers of those instruments;
 - (iii) all beacons, landmarks and permanently marked stations, as found or erected, including particulars of witness marks found or placed and those descriptions are to be recorded at the time of finding or erecting the relevant beacons, marks or stations,
 - (e) any sketches which may be necessary,
 - (f) if the land surveyor employs an assistant as an observer, the name of that observer, which shall be recorded on the fly leaf, or on each page and the signature or initials of the land surveyor shall appear on every page of the field book.
- (2) All measurements and observations made in the field shall be recorded at the time when they are made.
 - (3) No erasures shall be made in the field book but, entries may be altered only as a result of re-measurement or re-observation and in such a manner that the original entries are not obliterated.
 - (4) The form of the field book and the manner of recording entries shall comply as far as possible with the example in Item 3 of the Annexure, but, any departure from that example shall be made with the prior approval of the Surveyor-General.

59. Computations

- (1) Computations shall be done in ink or printed out on only one side of the paper whose dimensions shall be 197 by 210 millimetres (size A4), but, minor computations made in the field for the placing of a beacon may be made in the field book.
- (2) Computations shall be made throughout in the unit of measure specified in regulation 30.
- (3) The form of computation shall comply with the example given in Item 5 of the Annexure, but, if a land surveyor wishes to depart materially from the example, he or she shall submit, to the Surveyor-General for approval, the proposed form of computation together with a report giving explanations in regard to built-in checks.
- (4) A measure of the accuracy, reliability and manner of fixes and checks shall be given and shall be indicated by means of cross references or concise statements to the sources from which data for the computations have been obtained so as to enable the manner in which the data have been processed to be followed.
- (5) When a curvilinear area is surveyed, calculations which were made to determine the area shall be furnished.
- (6) Computations, if not done in accordance with the examples in Item 5 of the Annexure, shall include-
 - (a) data abstracted from field records or from deduction sheets;
 - (b) the displacement in seconds and their equivalent in metres between the finally selected point and the directions used in its determination by triangulation;
 - (c) the displacements in metres between the finally selected point and the distances used in its determination by trilateration;
 - (d) the closure of a traverse determination and final distances and directions between successive traverse stations;
 - (e) limiting values and class of accuracy obtained pursuant to regulation 9;

- (f) calculated distances and directions between the finally selected point and the fixed point used for its determination;
- (g) a data or consistency calculation in respect of the numerical data on each diagram or general plan but, the data or consistency calculation shall be retained by the land surveyor for examination by the Surveyor-General if he or she so requires.

60. Working plan

- (1) The working plan shall-
 - (a) not be smaller than 210 by 297 millimetres;
 - (b) be neatly framed in ink on durable material approved by the Surveyor-General;
 - (c) be in accordance with the layout, style, specifications and symbols specified in Item 8 of the Annexure; and
 - (d) be to one of the scales contemplated in regulation 24(1).
- (2) The following information shall be recorded on a working plan:-
 - (a) the designation of-
 - (i) the land under survey;
 - (ii) each portion or erf into which the land has been subdivided;
 - (iii) adjoining land and the locality specified in regulation 41,
 - (b) the positions and designations of-
 - (i) all beacons, stations, or points used, adopted, fixed or calculated during the course of the survey but, beacons, stations or points used for orientation purposes only may be omitted;
 - (ii) principal and ground control points where photogrammetric methods are used,
 - (c) the positions of all curvilinear boundaries and all servitude features, which shall be plotted to the scale of the diagram to be framed, or to a scale of 1/7 500 whichever is larger but, a different scale may be used if the prior approval of the Surveyor-General has been obtained,
 - (d) all measured lines, directions or SBP vectors used in the determination of a curvilinear boundary or of a servitude feature;
 - (e) all measured lines or SBP vectors used for the determination of any beacon, station or other point, but, if the density of the lines is such that interpretation becomes difficult, those lines shall be shown for the control survey only, in which case a schedule clearly indicating the points from which all beacons were placed and checked shall be included in the survey records,
 - (f) the co-ordinate axes appearing on the co-ordinate list,
 - (g) the physical features referred to in regulation 13, including fences and walls along boundaries,
 - (h) the direction of the true north referred to in regulation 37,
 - (i) a concise description of all marked stations, beacons, witness marks and land marks or other indications of corner points which were adopted, found, determined or placed in the course of the survey,
 - (j) the scale of the figure and of the plot of curvilinear boundaries and servitude features, if any,

- (k) the area of each portion contained between the curvilinear boundary and the straight line joining the stations used in fixing the position of that boundary or between the curvilinear boundary and the straight line joining the beacons nearest to that boundary, if the area can be determined with sufficient accuracy.
- (3) A land surveyor may depart from the requirements of subregulation (2) if he or she has obtained the prior approval of the Surveyor-General to do so.
- (4) Where points are so close to each other or to fences or boundaries such that details cannot be clearly shown on the scale of the working plan, an enlarged inset which is not necessarily drawn to scale, may be given.
- (5) The working plan shall be signed, dated and certified as follows:-
 - “Surveyed by me in accordance with the Land Survey Act, 1993”
 - “Surveyed in (month, year) _____ by me/us
 - Name(s) _____
 - Professional Land Surveyor(s)
 - Registration No(s) _____and a land surveyor who has participated in the survey shall sign the working plan in accordance with regulation 55.

Part VIII – MISCELLANEOUS

61. Letters and numbers: Limitation on use

Letters or numbers which cannot be reproduced by an ordinary typewriter shall not be used in any field book, working plan, diagram, sketch or calculation.

62. Surveys on behalf of the State

No person shall survey State-owned land or conduct a survey on behalf of the State unless that person has been given written instructions or authorisation to do so by the Surveyor-General.

63. Documents to be part of the survey

Any diagram, plan, report, document or other information required by the Surveyor-General under these regulations shall be deemed to be an essential part of the survey and the costs of producing it shall form part of the costs of that survey.

64. Replacement of beacons

- (1) When a land surveyor has replaced a beacon or determined the position of one or more boundaries, he or she shall-
 - (a) report on the circumstances relating to the replacement or determination to the Surveyor-General; and
 - (b) within three months of the replacement or determination, submit to the Surveyor-General for examination, acceptance and filing, the survey records relating to the replacement or determination.
- (2) In exceptional circumstances, the Surveyor-General may extend the period stipulated in subregulation (1)(b).

65. Beacon having bearing on land

For the purpose of section 17 of the Act, a beacon shall be deemed to have a bearing on a piece of land represented on a diagram based on a division survey, if it defines a terminal point of a straight boundary line which is common to that piece of land and to the land being subdivided.

66. Fees

The Surveyor-General shall not accept a diagram or general plan for examination unless the fees determined under section 6 of the Act for that examination have been paid.

67. Arbitration proceedings

- (1) A person who has requested an owner of contiguous land to sign the agreement required under section 8(2) of the Act, shall keep a record of the time and date on which, and the place at which he or she made the request, or if he or she made the request in writing, he or she shall keep a copy of the written request and the reply, if any.
- (2) Where, under the Act, a dispute has to be referred to arbitration the Surveyor-General shall serve a written notice on each owner of land affected by the dispute or his or her authorised agent, requesting that owner to-
 - (a) if the owner is in Namibia at the time of the service of the notice, within one month after service of the notice;
 - (b) if the owner is not in Namibia at the time of service of the notice, within three months after service of the notice,

complete the deed of submission contained in subregulation (4).

- (3) The deed of submission shall-
 - (a) be signed by the owner in the presence of two witnesses who shall also sign it; and
 - (b) be returned to the Surveyor-General within the periods referred to in subregulation (2).
- (4) The deed of submission referred to in subregulation (2) shall be in the following form-

DEED OF SUBMISSION

I, _____ the registered owner of the piece of land called _____ situated at _____ in the district of _____ hereby undertake to submit the question of the disputed beacon and boundary common to the land called _____ and to the land called _____ to the decision of an arbitrator or arbitrators to be appointed by the _____ Surveyor-General under the Land Survey Act, 1993, and to accept _____ award to that beacon or boundary, and to the cost of or incidental to that arbitration to be final and conclusive. I further agree that, for the purpose of giving effect to any award or order made pursuant to the award this deed shall be deemed to be submission under the laws relating to arbitration in Namibia and that at the instance of either party it may be made an order of the court.

Owner _____

Witness (1) _____

Witness (2) _____

- (5) On receipt of the completed deed of submission, the Surveyor-General shall appoint an arbitrator, or may appoint more than one arbitrator, if he or she considers that more than one arbitrator is necessary to determine the matter in dispute.
- (6) If half, or more than half of the persons who are party to the dispute request that more than one arbitrator should be appointed, the Surveyor-General shall appoint at least three arbitrators, but,

he or she shall not appoint more than one arbitrator for the settlement of a dispute falling under section 15 of the Act.

- (7) Before an arbitrator takes up any matter referred to him or her under the Act, he or she shall make and subscribe to the following declaration before a Commissioner of Oaths or Justice of the Peace:
“I, _____ do solemnly and sincerely declare that I will faithfully and honestly, without fear or favour, and to the best of my skill and ability, hear and determine the matter referred to me under the Land Survey Act, 1993.”
- (8) The appointment of an arbitrator may be revoked with the consent of all the parties to the dispute and the death of any party to the dispute shall not be regarded as a revocation of an appointment.
- (9) An arbitrator or arbitrators shall submit his or her or their award, as the case maybe, to the Surveyor-General within 60 days of appointment, but, the Surveyor-General may, on good cause shown, extend the period within which an award may be submitted to him or her.
- (10) If an arbitrator dies or becomes incapable of acting before making an award, or fails to make an award within the period referred to in subregulation (9) or the extended period given under that subregulation, the Surveyor-General shall appoint another arbitrator in his or her place and the arbitrator so appointed shall perform the functions and exercise the same powers as those performed or exercised by his or her predecessor.
- (11) An arbitrator appointed under these regulations shall have the power to summon and hear witnesses, to administer oaths or take affirmations, to call for the production of any document and to enter and inspect any land for the purpose of determining the matter in dispute.
- (12) The issue of a subpoena or summons to compel a witness to attend before the arbitrator or the production of documents before the arbitrator shall, subject to necessary changes, be done in the manner provided for in the Arbitration Act, 1965 (Act No. 42 of 1965).
- (13) The parties to the dispute may present oral or documentary evidence at the hearing of the matter and may be examined under oath or affirmation by the arbitrator in relation to any of the matters in dispute and if they so wish, they may be represented by a legal practitioner.
- (14) The arbitrator or arbitrators shall, as far as possible, take written notes of the oral evidence given by parties to the dispute or witnesses and those notes shall be submitted together with the award to the Surveyor-General for filing.
- (15) If any of the parties to the dispute fails, without reasonable excuse, to attend the hearing after he or she has been given reasonable notice to attend, the arbitrator may proceed to hear and determine the matter and to give an award in that person's absence.
- (16) When making an award, an arbitrator shall determine which party should pay the costs of the arbitration proceedings and the amount of the costs and if the parties had not agreed on the rate at which the costs are to be taxed, the costs shall be taxed in accordance with the tariff which is applicable in the magistrates courts.

[There should be an apostrophe after “magistrates” in the phrase “magistrates’ courts”.]

- (17) The Surveyor-General shall, prior to the appointment of an arbitrator, determine the fees which are to be paid to that arbitrator.
- (18) The Surveyor-General may, at the time that he or she appoints an arbitrator, require the parties to the arbitration to pay to him or her as a deposit, a sum of money which is equal to the estimated fees of the arbitrator and the estimated travelling, food and accommodation expenses of the arbitrator or to give any form of security which is acceptable to the Surveyor-General.
- (19) If the actual fees or expenses due to an arbitrator exceeds the deposit paid under subregulation (18), the Surveyor-General may withhold the arbitrator's award until the balance has been paid.

[The verb “exceeds” should be “exceed” to be grammatically correct.]

- (20) Any matter regarding the conduct of arbitration proceedings not provided for in these regulations shall be dealt with in accordance with the Arbitration Act, 1965 (Act No. 42 of 1965).

68. Recovery of costs on re-survey of blocks of land

- (1) A schedule which has been prepared by the Surveyor-General under section 15 of the Act, and which schedule apportions the costs of or incidental to a survey made under that section, shall be available for inspection for a period of 30 days at the office of the Surveyor-General and at the office of the magistrate of the district in which the surveyed land is situated.
- (2) The costs referred to in subregulation (1) shall be paid to the Surveyor-General by the person whose name appears in the schedule within the period referred to in subregulation (1), or within a longer period which the Surveyor-General has allowed.
- (3) The person referred to in subregulation (2), may, as from the end of the period referred to in subregulation (1), be allowed to pay the costs together with any interest which has accrued on the outstanding amount by way of ten equal instalments but that person may, pay off the outstanding amount in larger instalments.
- (4) If the person whose land has been the subject-matter of a re-survey as provided for under this regulation wishes to transfer any portion of that land, he or she immediately becomes liable to pay the outstanding costs together with any interest which has accrued at the date of transfer.
- (5) The Surveyor-General shall issue out, to the person whose name appears in the schedule referred to in subregulation (1), a certificate which states the total costs which are due by that person, but the Surveyor-General may rectify an error which appears on the certificate.
- (6) The person whose name appears on the certificate referred to in subregulation (5) shall be deemed to be indebted to the Minister in the amount stated in that certificate together with any interest which accrues on the debt and the Minister may recover that money through a competent court.
- (7) The Surveyor-General shall furnish the Registrar of Deeds with a certified copy of the schedule referred to in subregulation (1), and the Registrar of Deeds shall not register any piece of land described in that schedule unless he or she has received a certificate signed by the Surveyor-General which states that the costs together with any interest due in respect of the re-survey of that piece of land has been paid to the Surveyor-General.

ANNEXURE

SURVEY REPORT

The following headings may prove useful as a basis for the report which should be signed and dated:

1. Assistants

Indicate to what extent employed.

2. Purpose of survey

Subdivision, consolidation, servitude, diagram of substitution or replacing of beacons, etc.

3. Special requirements

- (i) Defined area.
- (ii) Servitude.
- (iii) Sequence of registration.
- (iv) State whether Act 30/1960 is applicable.
- (v) Flow mineral rights are held.

- (vi) Other requirements.

4. **Reference to statutory consents**

Which consent; NAMPAB, Township Boarder Agricultural Consent (Act 70/1970). The consent number and date.

5. **Beacons**

- (i) By whom pointed out.
- (ii) Doubtful beacons
 - necessity for beacon agreement.
 - alteration in description.
- (iii) Alignment of existing beacons.
- (iv) Terminals accepted from previous surveys.
- (v) Reconstruction.
- (vi) Lost beacons - manner of search, etc.
- (vii) Positions relative to fences, walls, roads, etc.
- (viii) New beacons - to whom pointed out.
- (ix) Reasons for rejecting beacons.
- (x) General

6. **Comparison of data**

- (i) Whether differences are outside prescribed limits,
- (ii) Possible causes of discrepancies.
- (iii) Erroneous data

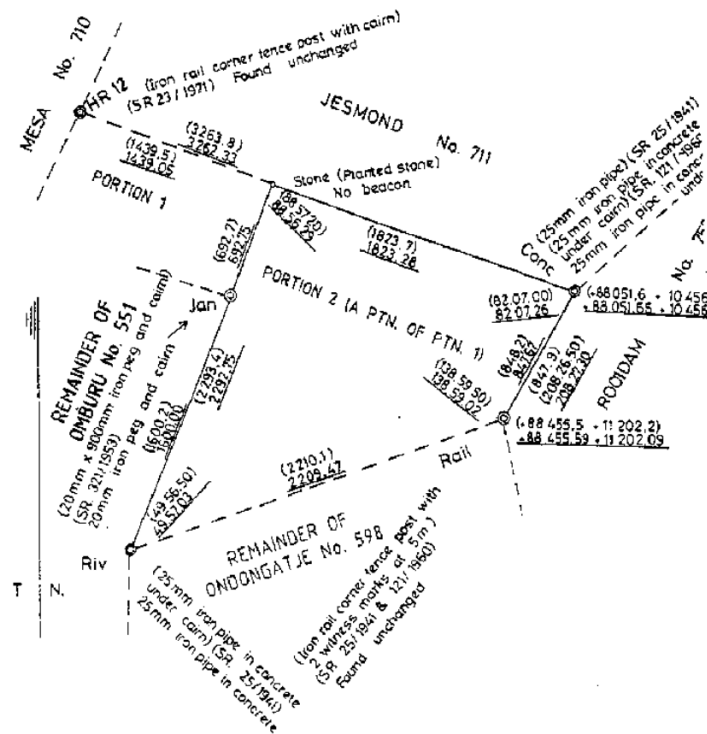
7. **General**

- (i) Whether differences are outside prescribed limits.
- (ii) Terrain.
- (iii) Access.
- (iv) Miscellaneous.

Name

Professional Land Surveyor

Dated

Comparison Sketch

NB

(1) Survey data adopted is underlined

(2) Survey Record references for data and beacon descriptions may be colour-coded


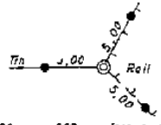

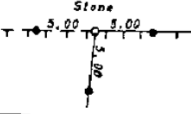
FIELD BOOK

Cover/Fly leaf

Survey of _____	

Instrument _____	Official N° _____
Measuring band _____	Official N° _____
E. D. M. Equipment _____	Official N° _____
Land Surveyor _____	
Observer _____	
Date of Survey _____	

Beacon Descriptions

Beacon	As found	As left
Rail	Iron rail corner fence post with 2 witness marks 	ditto with cairn and third witness mark on line to Tin 
Stone		20mm x 300mm iron peg and cairn with 3 witness marks 12mm x 450mm 

FIELD BOOK

At Kop		Observer I. A.	
Time 5:30 pm		Date 14.9.1977	
Remarks Dusty			

Zwartkop Δ	355	55	19	175	55	21	355	55	20	
Past	4	32	59	182	33	03	4	32	61	
Pole 1	53	26	01	233	26	05	53	26	03	
Fort	91	25	39	271	25	45	91	25	42	
Geluk Δ	256	22	36	76	22	40	256	22	38	
Uitzicht Δ	140	15	07	320	15	09	140	15	08	
Zwartkop Δ	355	55	21	175	55	19	355	55	20	
Target				820	65	(a)	92	21		E
Target	-	Pole 1		+0	55		level			

At Fort		Observer A.N.O.	
Time 10:00 a.m.		Date 27.9.1977	
Remarks to place Stone			

Geluk	261	51	36	261	51	40				p108
Zwartkop	334	47	07	334	47	08				108
Aux	81	51	36	81	51	40				120
		30	48			level	30	48		
Stone	23	49	00	23	49	00				120
		178	86		261	51	40	108	98	
R.O.				261	51	41				
at Aux -	to check		Stone							
Geluk, Fort	261	51	36	261	51	39				120
Pad	357	27	42	357	27	43				120
Stone	7	39	20	7	40	00				120
		95	97		96	33	01	30	00	
at Stone	(alternate		check)							
Kop	268	45	01	268	45	08	58	45	02	119
Past	306	48	59	306	45	04	125	49	00	119
Tin	342	05	52	342	05	53	162	05	50	121
Moosplaats	51	52	07	61	52	13	241	52	03	119
Fort	203	48	50	203	48	00				120
R.O.				268	45	06	88	45	04	

S. R. No. Page 15

Survey of Erf 7847 (formerly, Public Open Space) a Portion of Erf 1947 Windhoek
and a Sewer Servitude over the Remainder of Erf 1947, Public Open Space Windhoek
Situate in the Municipal area of Windhoek
Registration Division 'K' Republic of Namibia

Field Page	Calc Page	Point Name	System To 22/17		Beacon Description
			Y-Co-ord	X-Co-ord	
<u>TRIGONOMETRICAL BEACONS:</u>					
		Höhe Windhoek	-11 071,260	64 410,770	Standard Concrete Pillar.
		Kaiser W. Berg	- 2 802,630	68 240,850	Standard Concrete Pillar.
<u>WORKING STATIONS:</u>					
1	105	MWx	- 7 790,242	62 583,987	Not Mark.
3	102	MH1	- 7 533,534	62 663,101	Center of Manhole.
3	101	MH6	- 7 649,378	62 540,198	Center of Manhole.
1	103	MH10	- 7 793,105	62 573,492	Center of Manhole.
1	100	T	- 7 582,566	62 589,490	12mm Round Iron Peg next to Kerb.
1	100	T2	- 7 646,067	62 561,539	12mm Round Iron Peg.
1	100	Ta	- 7 568,474	62 596,624	12mm Round Iron Peg next to Kerb.
<u>BEACONS ADOPTED, BUT NOT SURVEYED:</u>					
	E102/52	MB3597	- 7 837,090	62 496,136	16mm Round Iron Peg.
	E102/52	MB3646	- 7 595,650	62 596,520	16mm Round Iron Peg.
<u>BEACONS FOUND AND ADOPTED:</u>					
1	E102/52	MB3641	- 7 702,460	62 533,820	12mm Round Iron Peg in Concrete.
1	E102/52	MB3642	- 7 575,050	62 596,740	16mm Round Iron Peg.
<u>BEACONS FOUND AND REJECTED:</u>					
2	105	MB3596	- 7 774,458	62 600,559	16mm Round Iron Peg.

Continue/2

Survey of Erf 7847 (formerly, Public Open Space)(a Portion of Erf 1947) Windhoek
and a Sewer Servitude over the Remainder of Erf 1947, Public Open Space Windhoek

Situate in the Municipal area of Windhoek

Registration Division 'K' Republic of Namibia

Field Calc Page Page	Point Name	System	Lo 22/17 Y-Co-ord X-Co-ord	Beacon Description
-------------------------	---------------	--------	-------------------------------	-----------------------

BEACONS PLACED/REPLACED:

5	103	7847b	- 7 584,281	62 594,037	16mm Round Iron Peg.
3	102	7847a	- 7 588,565	62 603,722	16mm Round Iron Peg.
3	102	7847d	- 7 579,749	62 608,298	16mm Round Iron Peg.
2	101	HB3595New	- 7 774,430	62 600,520	16mm Round Iron Peg.
3	101	HB3544	- 7 569,160	62 612,810	16mm Round Iron Peg.
3	102	MH2	- 7 582,568	62 651,092	Center of Manhole.
3	102	MH3	- 7 605,761	62 642,286	Center of Manhole.
3	101	MH4	- 7 640,226	62 624,687	Center of Manhole.
3	101	MH5	- 7 642,637	62 597,651	Center of Manhole.
3	101	MH7	- 7 675,034	62 609,767	Center of Manhole.
3	101	MH8	- 7 694,877	62 585,243	Center of Manhole.
3	101	MH9	- 7 734,890	62 571,777	Center of Manhole.

CALCULATED POINTS:

104	Int1	- 7 581,367	62 651,396	Not Beaconsed.
104	Int2	- 7 646,798	62 562,182	Not Beaconsed.
104	Int3	- 7 790,894	62 573,430	Not Beaconsed.

REFERENCE MARKS

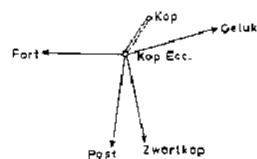
1	E102/52	RM63	- 7 689,440	62 511,990	20mm Round Iron Peg, in Concrete below G.L.
1	E102/52	RM64	- 7 532,410	62 625,240	20mm Round Iron Peg, in Concrete below G.L.

ECCENTRIC REDUCTIONKOP ECC.

$$T - T_e = e \times \frac{206265}{S} \sin (T_e - E)$$

$$e = 0.76$$

Sta.	T_e	$T_e - E$	S, Metres	$T - T_e$
	O I "	O I		"
Zwartkop	355 . 54 . 34	150 . 38	5 225	. 15
Post	4 . 31 . 54	159 . 15	1 570	. 35
Fort	91 . 26 . 19	246 . 09	2 110	. 68
Kop	$E = 205^\circ . 19'$			
Geluk	256 . 21 . 33	51 . 05	3 670	. 33



T_e — Direction observed at Kop Ecc

E — Observed direction to Kop

S — Distance to distant station

e — Eccentric distance.

T — Adjusted direction.

DIRECTION SHEET									
1	2	3	4	5	6	7	8	9	
p.2	ZWARTKOP Δ								
Moeiplaats Δ	120	32	40	40	40	11		120	61
Pad	136	51	22	22	11	23		+21	44
Fort	154	46	49	44	46	11		66	+20
Post	172	15	12	12	11	13		32	+19
Kop	175	55	08	08	11	09		28	+20
Gek Δ	207	44	16	18	17	18		+18	36
								+38	
								+19	
p.3	GELUK Δ								
Zwartkop Δ	27	44	30	30	30	-1		17	36
Post	50	39	39	39	39	-1		14	42
Kop	76	22	42	42	42			48	16
Fort	81	51	30	33	32			36	+4
Urzent Δ	118	32	56	54	56	11		15	62
								+12	
								+6	
4	FORT								
Zwartkop Δ	334	46	50	50	50	-1		49	66
Pad	368	07	07	07	07	+1		06	17
Moeiplaats Δ	40	50	61	59	60			60	17
Urzent Δ	156	59	40	42	41	11		42	17
Gek Δ	261	51	16	17	16			38	122
Kop	27	25	32	32	32			16	22
Post	309	11	06	06	06			06	24
								+38	
								+20	
									+72
									+18
5	Pad								
Zwartkop Δ	366	51	30	30	30	-1		29	42
Moeiplaats Δ	104	8	03	03	03			03	42
Fort	178	07	06	05	05	11		06	24
Post	239	55	12	12	12			12	24
								+3	
								+15	
									+98
									+16

1 Station or Beacon
 2 Approx. spherical direction
 3 1-T
 4 Approx. plane direction
 5 Oriented forward direction
 6 Provisional correction
 7 Oriented back direction
 8 Final correction

TRAVERSE

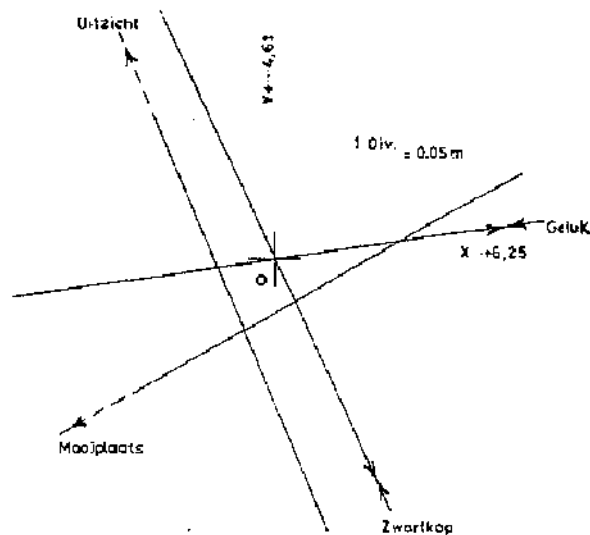
F.B. Pg.	Measured	Final Join		
			Ant	+213589 +715925
7	37:58:10 213,79	37:58:03 ✓ 213,81 ✓		
			T1	+226842 +723721
8	51:17:05 317,88	51:17:02 ✓ 317,91 ✓		
			T2	+251648 +753555
9	17:18:06 216,51	17:18:10 ✓ 216,53 ✓		
			T3	+258088 +774338
10	21:25:20 197,95	21:25:29 ✓ 197,96 ✓		
			T4	+265319 +792756
11	37:28:45 516,43	37:28:13 ✓ 516,46 ✓		
			Bear	+296738 +833756
				-0,06 -0,09
(S)=146257		A A=0,07		=0,21

POLARS

T1→BnB pg. 8	318:17:10 27,21	BnB	2250,32 +7258,12
T2→BnB pg. 9	23609:00 320:50	Check BnB	+2250,31 +7358,12 ✓
T2→F Post pg. 9	127:2530 ✓ 51,83 ✓	F Post	+255764 +750515
		Calculation checked by join	

<u>Fort</u>			
38 36 Geluk	81. 51. 37	S = 5733	
06 09 Zwartkop	154. 47. 06	S = 5819	
(Fort)	+89 714,61	+9 716,25	
20 Mooiplaats	240. 51. 20		
S = 3792	+9 715,35		
02 Uitzicht	337. 00. 02		
+89 714,72	S = 5508		

Fort +89 714,64 +9 716,29



(Post) +87 731.35 +11 333.33

Zwartkop 172 15 32
+ 87 731.35 S = 3655

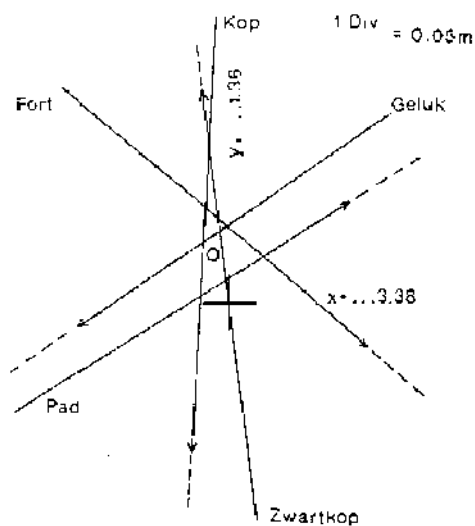
Geluk 56 39 44
S = 4419 +11 333.24

Fort 309 11 24
S = 2559 +11 333.24

Pad 239 55 28
S = 2183 +11 333.33

Kop 4 33 11
+ 87 731.41 S = 1569

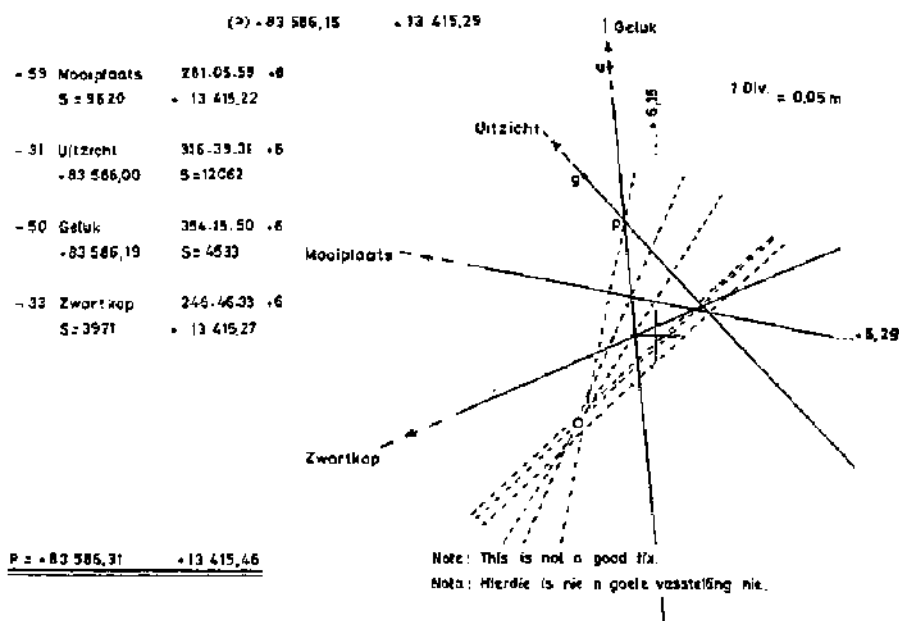
Post +87 731.39 +11 333.29



RESECTION**Orientation Correction**

Mooplaats	101-05.24	$\pm 0^{\circ} 0' 35''$	101-05.58
Uitzicht	136-37.56		136-39.31
Geluk	174-15.15		174-15.50
Zwartkop	66-45.58		66-46.33

Preliminary Co-ordinates of P and Orientation correction obtained by any recognized method

**Tangent graph**

1. Draw the tangent through p (intersection of rays from Geluk and Uitzicht) parallel to ug , where pu and pg are scaled proportionally to distances (P-Uitzicht) and (P-Geluk) resp.
2. Treat the above tangent as an oriented ray of length $\frac{PU \times PG}{UG}$ where PU = distance (P-Uitzicht), PG = distance (P-Geluk) and UG = distance (Uitzicht - Geluk)

JOINS TO PLACE BEACONS

T1-BnA	235-16-20 ✓	12,57
T1-ZY	159-21-10 ✓	13,51 ✓
T1-ZX	171-24-20 ✓	21,58 ✓
ZY-BnA	289-58-50 ✓	15,07 ✓
T4-R5	12-14-30 ✓	27,14 ✓

Joins checked by polar calculation

OR

Joins checked by repetition after calculating them all

CONSISTENCY AND AREA

Calc.pg			Surv	+2168,30	+3167,56
59	103,66	25-01-20			
			Gen	+2212,75	+3261,48
				00 ✓	00 ✓
63	42,75	117-41-30			
			Off	+2250,60	+3241,53
				00 ✓	- 01 ✓
42	67,10	114-21-10			
			Ice	+2311,73	+3213,95
				00 ✓	+ 01 ✓
42	98,75	207-21-10			
			Mar	+2266,36	+3126,23
				00 ✓	+ 03 ✓
60	105,85	292-58-50			
			Surv	+2168,30	+3167,56
				+01 ✓	00 ✓
1,0820ha					

TRIGONOMETRICAL LEVELLING

CALCULATION OF HEIGHT DIFFERENCES

$$\text{Formula } h = S \tan \alpha \left(1 + \frac{H_1 + H_2}{2r} \right) + \frac{1-k}{2r} S^2 - \frac{1-k}{2r} S^2 \tan^2 \alpha$$

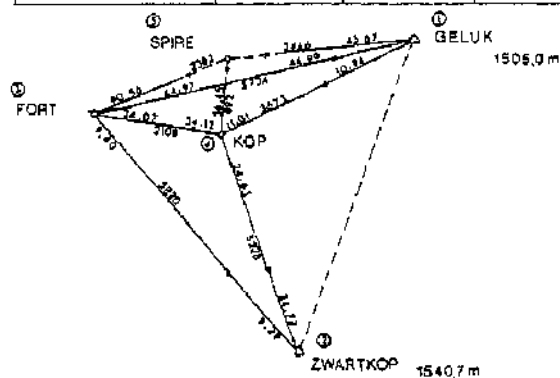
$$H_m = 1500m$$

$$1 + \frac{H_m}{r} = 1000.2357$$

$$S = \text{Plane Distance}$$

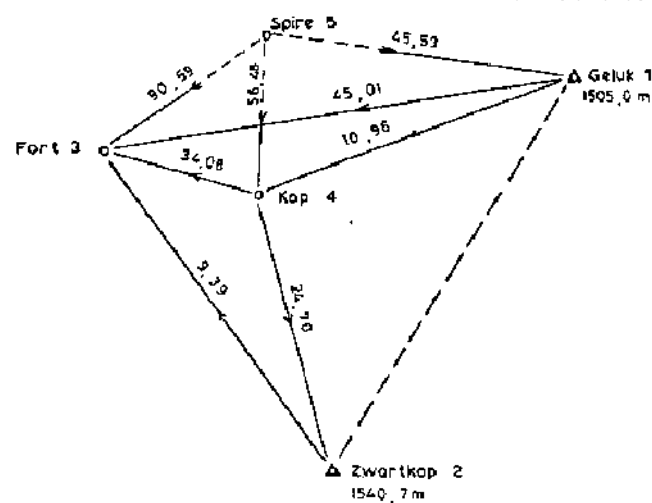
$$S' = \text{Spheroidal Distance}$$

Station : FORT	Height of instr. above top of pipe : 1,53m			
Fieldbook p. 20	Height of top of flag above top of pipe : 1,78m			
Station Object	SPIRE Roof apex	GELUK Top of beacon	XOP Top of flag	ZWARTKOP Top of signal
Set I	+ 2.73.22	+ 0.29.17	+ 0.53.40	+ 0.07.18
Set II	- 2.13.25	- 0.29.08	- 0.53.37	- 0.07.18
Mean α	+ 2.13.24	+ 0.29.13	+ 0.53.39	+ 0.07.17
Tan α	0.038824	0.008499	0.015002	0.002119
Dist. in m = S	2281	5733	2108	5819
Dist. in m (correct) = S'	2282	5734	2108	5820
S tan α	+ 22,48	+ 48,74	+ 32,90	+ 12,34
Corr'n (Table I)	+ 3,39	+ 2,24	+ 0,36	+ 2,31
Ht. of instr.	+ 1,53	+ 1,53	+ 1,51	+ 1,53
Ht. of object	- 2,04	- 0,32	- 3,00	- 0,90
Sum = h	+ 90,36	+ 49,97	+ 34,07	+ 5,40
Station : GELUK	Height of instr. above top of beacon : 0,27m			
Fieldbook p. 19	Height of signal above top of beacon : 1,20m			
	Height of beacon above ground level : 1,22m			
Station Object	XOP Top of flag	FORT Top of flag	SPIRE Roof apex	
Set I	+ 0.11.54	+ 0.26.33	+ 0.48.42	
Set II	+ 0.11.58	+ 0.26.30	+ 0.48.35	
Mean α	+ 0.11.56	+ 0.26.32	+ 0.48.38	
Tan α	0.003471	0.007718	0.015866	
Dist. in m = S	3672	5733	3445	
Dist. in m (correct) = S'	3673	5734	3446	
S tan α	+ 12,75	+ 44,26	+ 48,75	
Corr'n (Table II)	+ 0,32	+ 2,24	+ 0,81	
Ht. of instr.	+ 0,27	+ 0,27	+ 0,27	
Ht. of object	- 3,00	- 1,78	- 0,00	
Sum = h	+ 10,94	+ 44,99	+ 49,83	



Mean height differences

Stations	N ^o	Height Difference	Weight P	Stations	N ^o	Height	Weight P
Geluk	1	Metres		Fort	3	90,56	2
	3	49,85	2		4	90,57	1
	4	44,97	1		1	90,66	1
	Mean	45,13	5		Mean	90,59	4
Fort	3	34,07	2	Geluk	1	45,67	2
	4	34,12	2		4	45,44	1
	1	34,06	1		3	45,59	1
	2	34,08	1		Mean	45,59	4
Mean		34,08	6				

Final Heights

Metres above Sea Level.

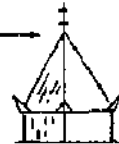
			Geluk. Zwartkop	1505,0 1540,7	} Top of beacon.
1. Geluk 1505,00 + 10,96 1515,96	2. Zwartkop 1540,70 - 24,70 1516,00		Kop 1516,0		
1. Geluk 1505,00 + 45,01 1550,01	2. Zwartkop 1540,70 + 9,39 1550,09	4. Kop 1515,96 + 34,08 1550,06	Fort 1550,0		Top of Iron pipe.
1. Geluk 1505,00 - 45,59 1459,41	3. Fort 1550,05 - 90,59 1459,46	4. Kop 1515,96 - 56,48 1459,50	Spire 1459,5		Roof Apex. 

TABLE FOR TRIGONOMETRICAL LEVELLING

$$\text{Formula 1:- } h = S \tan \alpha \left(1 + \frac{S^2 + H^2}{2r} \right) + \frac{1-k}{2r} S^2 + \frac{1-k}{2r} S^2 \tan^2 \alpha$$

1. Table for $\frac{1-k}{2r} S^2$ (metres) $k = 0,13$ $r = 6\,354\,836 \text{ m } (\phi = 26^\circ)$

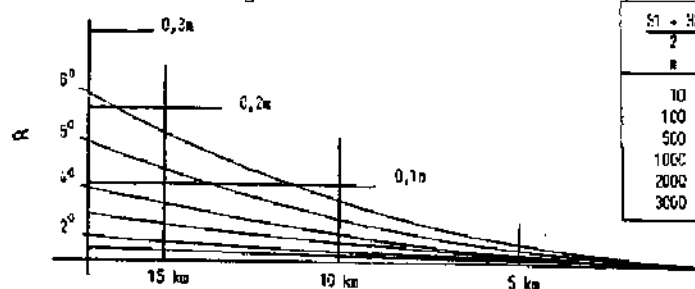
S metres	$\frac{1-k}{2r} S^2$	S metres	$\frac{1-k}{2r} S^2$	S metres	$\frac{1-k}{2r} S^2$	S metres	$\frac{1-k}{2r} S^2$	S metres	$\frac{1-k}{2r} S^2$
0	0,00	2600	0,46	5200	1,84	7800	4,74	10400	7,37
100	0,00	2700	0,50	5300	1,92	7900	4,25	10500	7,51
200	0,00	2800	0,53	5400	1,99	8000	4,36	10600	7,65
300	0,01	2900	0,57	5500	2,08	8100	4,47	10700	7,80
400	0,01	3000	0,61	5600	2,14	8200	4,58	10800	7,94
500	0,02	3100	0,65	5700	2,21	8300	4,69	10900	8,09
600	0,02	3200	0,70	5800	2,29	8400	4,80	11000	8,24
700	0,03	3300	0,74	5900	2,37	8500	4,92	11100	8,39
800	0,04	3400	0,79	6000	2,45	8600	5,04	11200	8,54
900	0,06	3500	0,83	6100	2,53	8700	5,15	11300	8,70
1000	0,07	3600	0,88	6200	2,62	8800	5,27	11400	8,85
1100	0,08	3700	0,93	6300	2,70	8900	5,39	11500	9,01
1200	0,10	3800	0,98	6400	2,79	9000	5,52	11600	9,16
1300	0,12	3900	1,04	6500	2,88	9100	5,64	11700	9,32
1400	0,13	4000	1,09	6600	2,97	9200	5,78	11800	9,48
1500	0,15	4100	1,14	6700	3,06	9300	5,89	11900	9,64
1600	0,17	4200	1,20	6800	3,15	9400	6,02	12000	9,81
1700	0,20	4300	1,26	6900	3,24	9500	6,15	12100	9,97
1800	0,22	4400	1,32	7000	3,34	9600	6,28	12200	10,14
1900	0,25	4500	1,36	7100	3,43	9700	6,41	12300	10,30
2000	0,27	4600	1,44	7200	3,53	9800	6,54	12400	10,47
2100	0,30	4700	1,50	7300	3,62	9900	6,67	12500	10,64
2200	0,33	4800	1,57	7400	3,73	10000	6,81	12600	10,81
2300	0,36	4900	1,64	7500	3,83	10100	6,95	12700	10,98
2400	0,39	5000	1,70	7600	3,93	10200	7,08	12800	11,16
2500	0,43	5100	1,77	7700	4,04	10300	7,22	12900	11,33

11. Table for $1 + \frac{H_1 + H_2}{2r}$

Average height of terrain
above M.S.L.

$\frac{H_1 + H_2}{2}$ m	$1 + \frac{H_1 + H_2}{2r}$
10	1,000 002
100	1,000 016
500	1,000 079
1000	1,000 157
2000	1,000 314
3000	1,000 471

111. Graph for $\frac{1-k}{2r} S^2 \tan^2 \alpha$

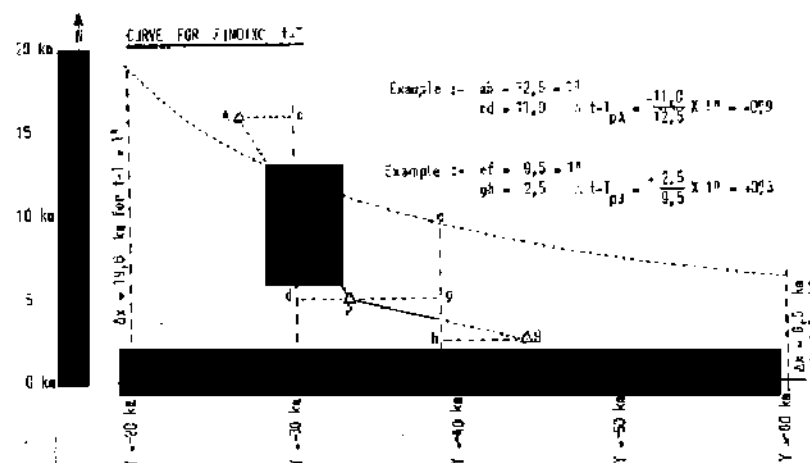
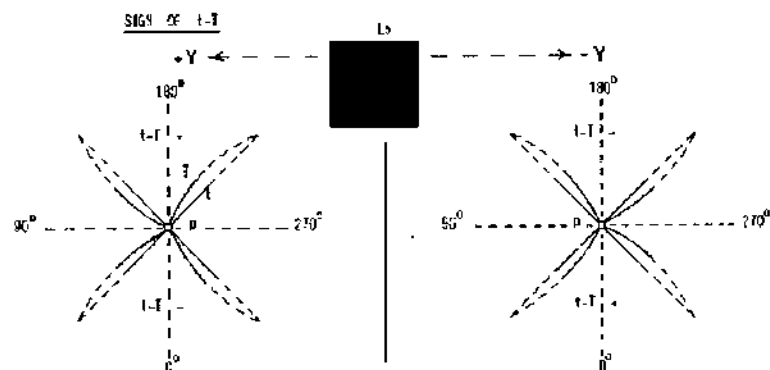


THE (t-T) CORRECTION

$$Y = 6364836 \sin \theta \div 4 = 26^\circ$$

Table of X Intervals in kilometres for t-T = $^\circ$ for distance in kilometres of Y from the L₀ Meridian.

Y km	ΔX km t-T=1"	Y km	ΔX km t-T=1"	Y km	ΔX km t-T=1"	Y km	ΔX km t-T=1"	Y km	ΔX km t-T=1"	Y km	ΔX km t-T=1"
10	33,28	20	16,64	30	11,09	40	8,82	50	7,06	100	3,53
11	35,71	21	18,71	31	12,67	41	9,58	55	7,14	105	3,74
12	32,73	22	17,85	32	12,28	42	9,35	60	6,55	110	3,57
13	30,22	23	17,06	33	11,90	43	9,14	65	6,04	115	3,42
14	29,06	24	16,37	34	11,55	44	8,93	70	5,61	120	3,27
15	26,19	25	15,71	35	11,22	45	8,73	75	5,24	125	3,14
16	24,55	26	15,11	36	10,91	46	8,54	80	4,91	130	3,02
17	23,11	27	14,55	37	10,62	47	8,36	85	4,62	135	2,91
18	21,82	28	14,03	38	10,34	48	8,18	90	4,36	140	2,81
19	20,57	29	13,55	39	10,07	49	8,02	95	4,11	145	2,71



THE (t-T) CORRECTION

This correction is appreciable only when the rays are long, and can be neglected in areas where tertiary triangulation has been completed and the distance between stations is less than 8 km.
The formula for the correction in seconds of arc is :-

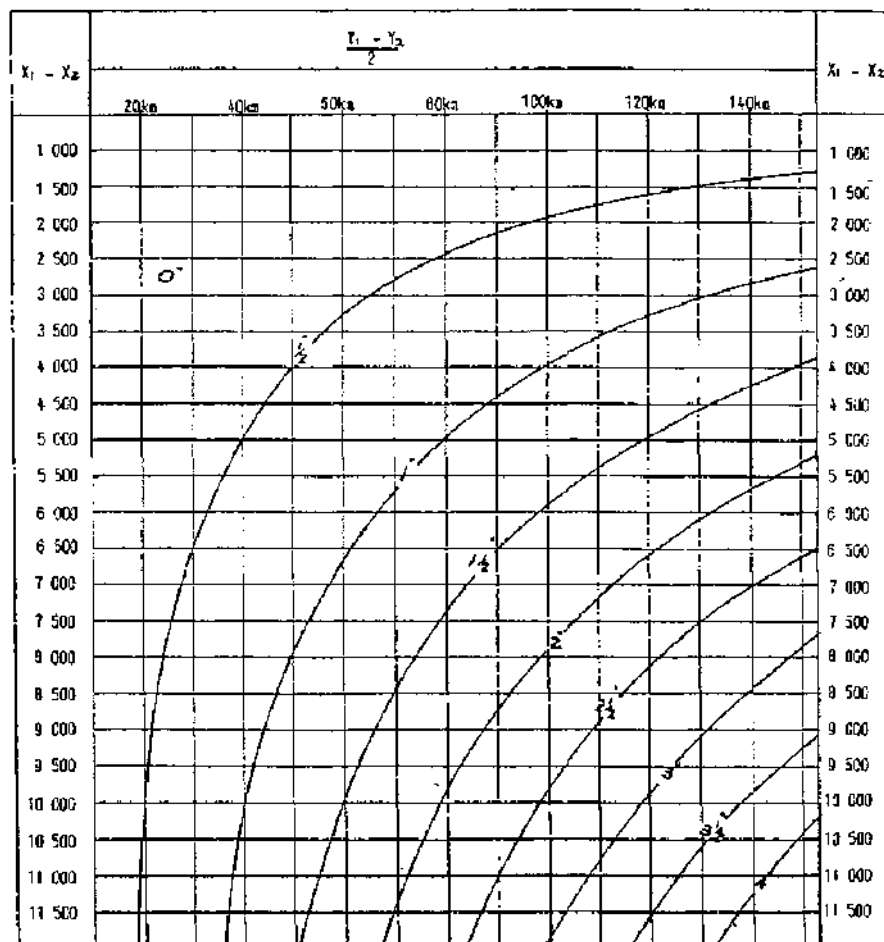
$$(t-T)^s = \frac{206265}{R^2} (X_1 - X_2) (xY_1 + Y_2) = \frac{206265}{2R^2} (X_1 - X_2) \frac{(Y_1 + Y_2)}{2} \text{ Approximately}$$

$$\text{where } R = 6364838 \text{ m } (\phi = 29^\circ)$$

Sign : The sign of the t-T is the same as $(2Y_1 + Y_2)$ when the direction of the ray lies between 90° and 270° (i.e. in the Northern sector).

The addition of the correction to the observed (Spheroidal) direction reduces the observation to the plane.

TABLE OF t-T FOR TERTIARY TRIANGULATION






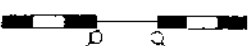
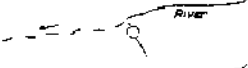



d	0,2fd	d	0,2fd	d	0,2fd	d	0,2fd
10	0,63	260	3,22	550	4,69	1800	8,49
20	0,89	270	3,29	600	4,90	1850	8,60
30	1,10	280	3,35	650	5,10	1900	8,72
40	1,26	290	3,41	700	5,29	1950	8,83
50	1,41	300	3,46	750	5,48	2000	8,94
60	1,55	310	3,52	800	5,66	2500	10,00
70	1,67	320	3,58	850	5,83	3000	10,95
80	1,79	330	3,63	900	6,00	3500	11,83
90	1,90	340	3,69	950	6,16	4000	12,65
100	2,00	350	3,74	1000	6,32	4500	13,42
110	2,10	360	3,79	1050	6,48	5000	14,14
120	2,19	370	3,85	1100	6,63	5500	14,83
130	2,29	380	3,90	1150	6,78	6000	15,49
140	2,37	390	3,95	1200	6,93	6500	16,12
150	2,45	400	4,00	1250	7,07	7000	16,73
160	2,53	410	4,05	1300	7,21	7500	17,32
170	2,61	420	4,10	1350	7,35	8000	17,89
180	2,68	430	4,15	1400	7,48	8500	18,44
190	2,76	440	4,20	1450	7,62	9000	18,97
200	2,83	450	4,24	1500	7,75	9500	19,49
210	2,90	460	4,29	1550	7,87	10000	20,00
220	2,97	470	4,34	1600	8,00	10500	20,49
230	3,03	480	4,38	1650	8,12	11000	20,98
240	3,10	490	4,43	1700	8,25	11500	21,45
250	3,16	500	4,47	1750	8,37	12000	21,91










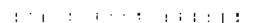









ACCURACY OF FIELD WORK FOR CLASS A SURVEYS

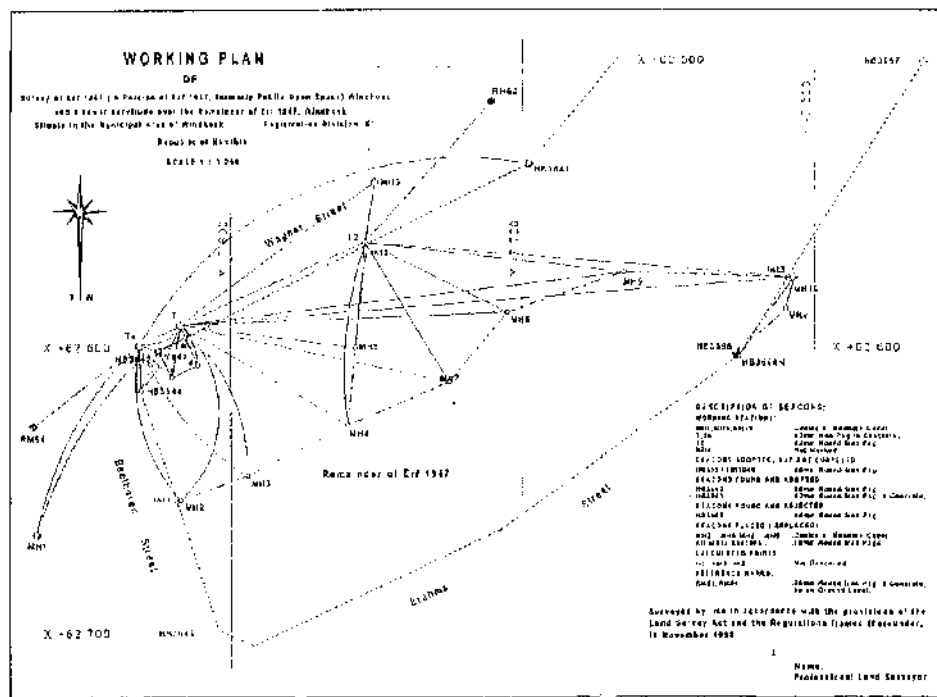
TRAVERSE				TRIANGULATION			
Class A = $(0,005 + \frac{f}{24\,000}) n$ Class B = 1,5 X A Class C = 3 X A				Class A = $(0,3 + \frac{17\,000}{3S + 1000})^n$ Class B = 1,5 X A Class C = 3 X A			
f.m	A	f.m	A	S.m	A	S.m	A
100	0,01	1600	0,07	50	15,7	1500	3,4
200	0,01	1700	0,08	100	13,4	2000	2,7
300	0,02	1800	0,08	150	12,0	2500	2,3
400	0,02	1900	0,08	200	10,9	3000	2,0
500	0,03	2000	0,08	250	10,0	3500	1,8
600	0,03	2100	0,09	300	9,2	4000	1,6
700	0,03	2200	0,10	350	8,6	4500	1,5
800	0,04	2300	0,10	400	8,0	5000	1,4
900	0,04	2400	0,11	450	7,6	5500	1,3
1000	0,05	2500	0,11	500	7,1	6000	1,2
1100	0,05	2600	0,11	600	6,4	6500	1,1
1200	0,06	2700	0,12	700	5,8	7000	1,1
1300	0,06	2800	0,12	800	5,3	8000	1,0
1400	0,06	2900	0,13	900	4,9	9000	0,9
1500	0,07	3000	0,13	1000	4,6	10000	0,8

CONVENTIONAL SYMBOLS.
CADASTRAL SYMBOLS
DIAGRAM AND GENERAL PLAN (ALL BLACK)

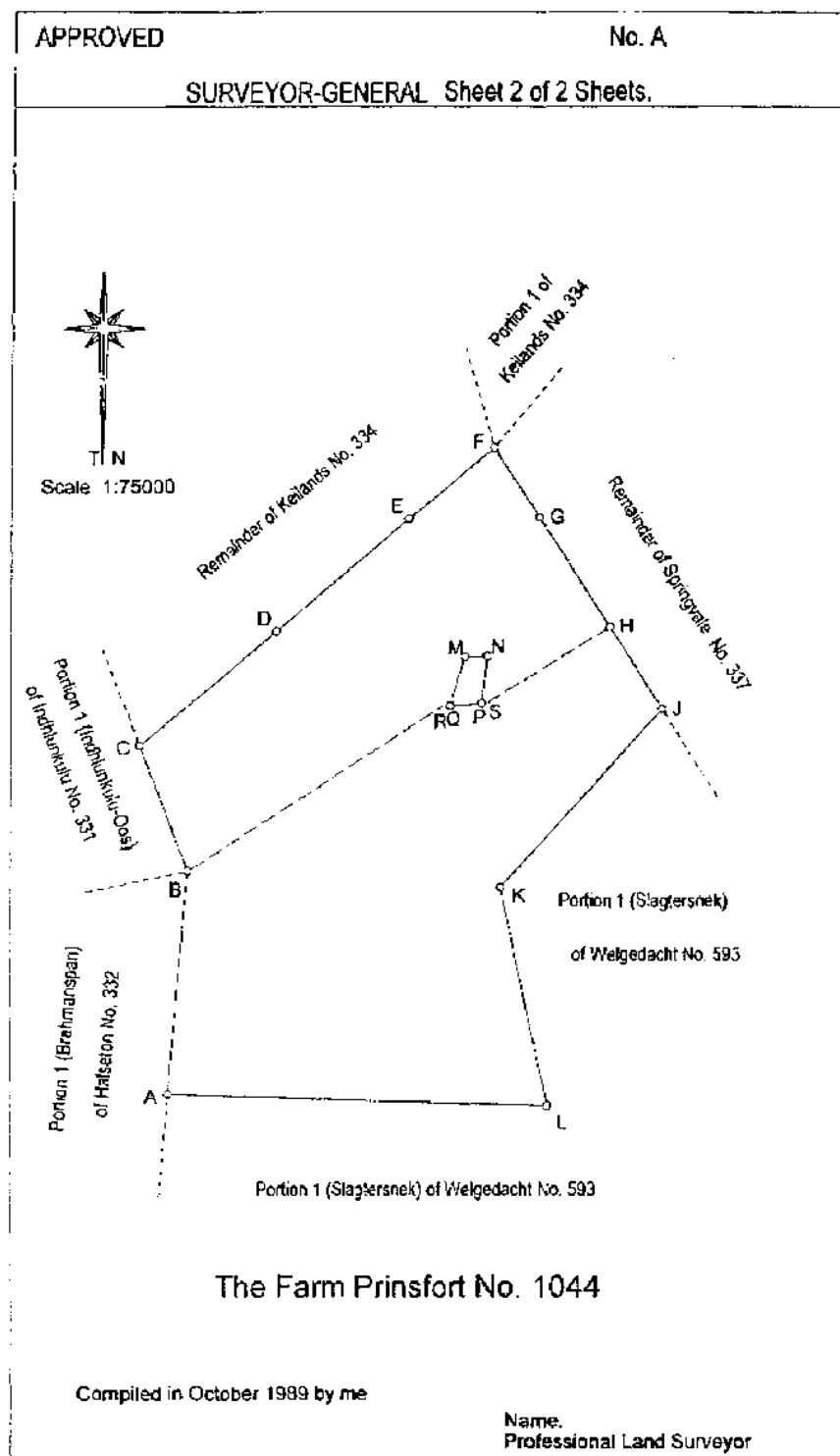
BEACON	
BOUNDARY	
BOUNDARY, ADJOINING	
BOUNDARY, CONSOLIDATION COMPONENTS	
BOUNDARY, SERVITUDES	
BOUNDARY, RAILWAY	
BOUNDARY, RIVER	
BOUNDARY, TIDAL RIVER	

WORKING PLAN

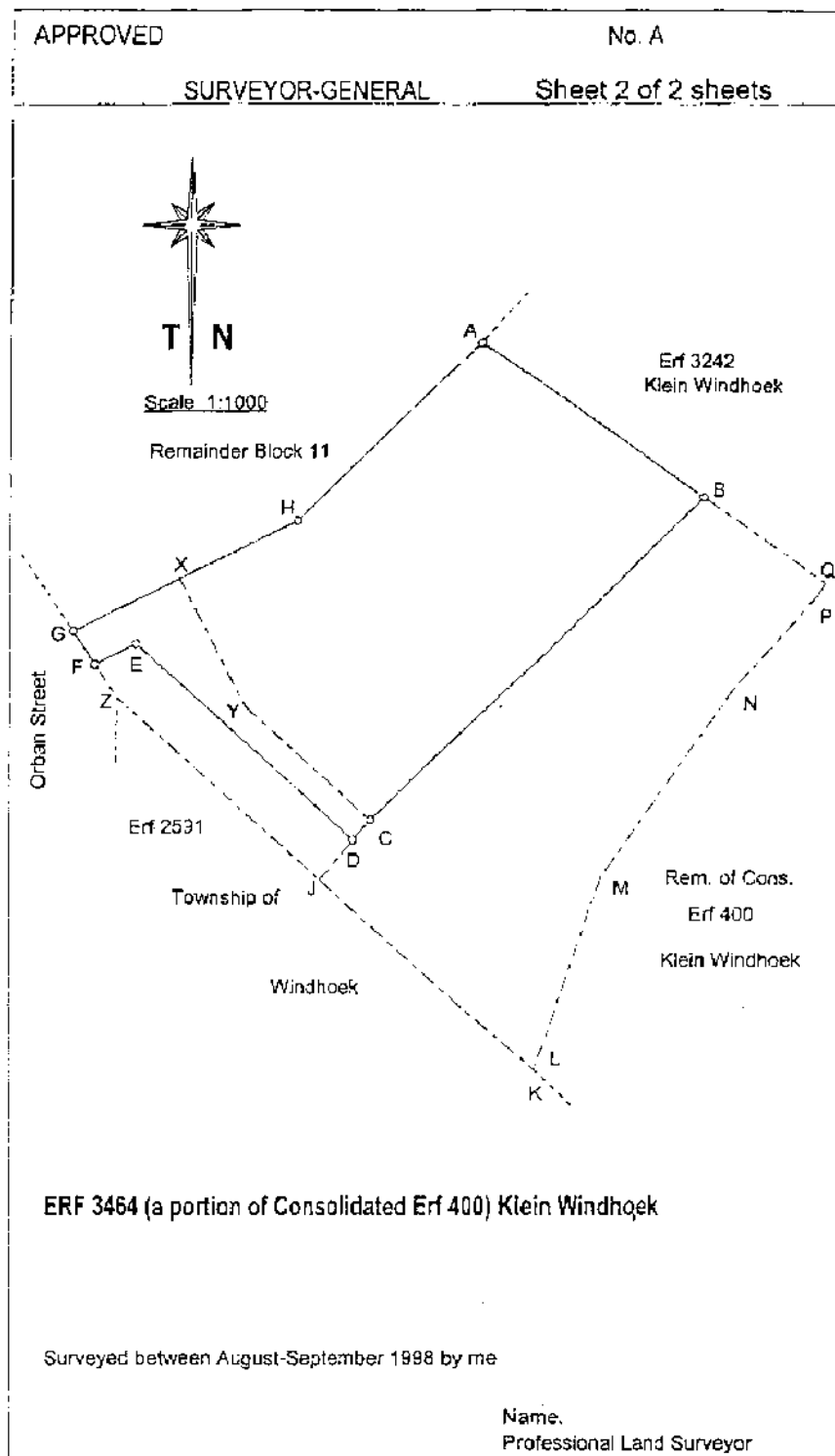
BEACON FOUND AND ADOPTED		COLOUR BLACK
BEACON FOUND, BUT NOT ADOPTED		BLACK
BEACON PLACED / REPLACED		BLACK
BEACON ADOPTED, BUT NOT SURVEYED		GREEN
BEACON, CALCULATED BUT NOT PLACED		GREEN
BOUNDARY		BLACK
BOUNDARY, ADJOINING		BLACK
BOUNDARY, CONSOLIDATION COMPONENTS		BLACK
BOUNDARY, SERVITUDES		BLACK
BOUNDARY, FENCED		BLACK
MEASURED BASE		RED
MEASURED LINE		RED
PHOTO CENTRE		BLUE
STATION, MARKED		RED
STATION, UNMARKED		RED
REFERENCE / TOWN SURVEY MARK		BLACK
TRIGONOMETRICAL STATION		BLACK
WITNESS MARK		BLACK
BUILDING		GREEN HATCHING



APPROVED			No. A			
SURVEYOR-GENERAL Sheet 1 of 2 Sheets.						
SIDES Metres	ANGLES	CO-ORDINATES		Designation		
		Y	X			
AB	3 148,01	66° 44' 20"	A	-53 804,50	-42 757,08	1663
BC	1 899,94	206° 11' 23"	B	-64 082,87	-45 892,76	1664
CD	2 521,44	108° 18' 06"	C	-53 390,38	-47 665,12	1665
DE	2 489,93	180° 01' 10"	D	-55 347,20	-49 265,05	1666
EF	1 589,21	179° 59' 59"	E	-57 271,13	-50 845,64	1667
FG	1 180,63	83° 29' 33"	F	-58 499,09	-51 854,45	1668
GH	1 828,94	179° 59' 32"	G	-59 140,32	-50 863,13	1669
HJ	1 374,02	180° 00' 00"	H	-60 133,46	-49 327,32	FB9932
			J	-60 879,57	-48 173,52	1670
			System: Lo 22/19°			
JK	3 391,14	104° 56' 06"	J	42 683,65	-48 232,07	1670
KL	3 142,24	234° 09' 13"	K	44 944,00	-45 704,10	FB9931
LA	5 453,91	76° 12' 46"	L	44 271,80	-42 634,60	FB9931
			A	49 724,00	-42 771,10	1663
			Excluded figure - Ptn 1 of Manina No. 335 System: Lo 22/19°			
MN	319,0	108° 57' 40"	M	45 481,1	-48 946,1	HB4
NP	662,8	81° 10' 10"	N	45 162,3	-48 956,9	HB3
PQ	450,7	101° 45' 00"	P	45 241,8	-48 298,9	HB1
QM	716,8	68° 07' 10"	Q	45 690,9	-48 260,7	HB2
		KULU	△	51 914,10	-52 349,34	No 53
		OROANA	△	40 469,80	-57 792,87	No. 72
Description of Beacons:						
A, J, K, L 20mm Iron Peg.						
B, M, N, P, Q Iron Standard.						
Components:						
1) The figure BCDEFGHSPNMQR represents the Remainder of the Farm Manina No. 335. Vide Diagram A786/62, annexed to Certificate of Registered Title No. 308/1964.						
2) The figure ABRSHJKL represents the Remainder of the Farm Welgedaght No. 593 Vide Diagram A744, annexed to Government Title No. 125/1944.						
Excluded Figure:						
The figure MNQR represents the Portion 1 of the Farm Manina No. 335. Vide Diagram A176/65, annexed to Certificate of Registered Title No. 849/1965.						
The figure ABCDEFGHJKL, excluding the figure MNPQ represents 4 231,2746 hectares of land being The Farm Prinsfort No. 1044, comprising 1) and 2) above. Situate in the Registration Division " L " Republic of Namibia						
Compiled in October 1989 by me						
Name Professional Land Surveyor						
This diagram is annexed to		The original diagrams are		Compiled.		
No.		as quoted above.		Noting Plan. NH - S		
dated				File No. L 1044		
Registrar of Deeds				Lat. 21°38'00" S		
				Long. 18°25'00" E		



APPROVED			No. A			
SURVEYOR-GENERAL			Sheet 1 of 2 sheets			
SIDES Metres	DIRECTION	CO-ORDINATES Y System: Lo 22/17° X		Designation		
AB	51.40	304 11 00	A	-9 923.51	+62 832.47	401f
BC	87.48	46 24 30	B	-9 966.03	+62 861.35	A1
CD	5.00	41 06 30	C	-9 902.67	+62 921.67	rs3
DE	55.88	131 06 10	D	-9 899.38	+62 926.44	rs4
EF	8.82	64 35 30	E	-9 867.27	+62 888.70	rs5
FG	7.50	145 52 30	F	-9 849.30	+62 892.49	rs6
GH	47.87	244 35 30	G	-9 845.10	+62 886.28	1451a
HA	48.41	226 35 20	H	-9 888.34	+62 865.74	1451b
SERVITUDE DATA						
GX	23.50	244 35 30	X	-9 866.33	+62 876.20	rs1
XY	27.04	333 40 00	Y	-9 878.32	+62 900.43	rs2
YC	32.31	311 06 10				
DJ	10.00	41 06 30	J	-9 892.81	+62 932.97	A2
JZ	52.15	131 06 10	Z	-9 853.51	+62 898.69	400 a'
ZF	7.50	145 52 30	F			
JK	53.69	311 06 10	K	-9 933.26	+62 968.27	sew2
KL	0.77	210 28 00	L	-9 933.65	+62 967.61	MH5
LM	37.54	199 34 50	M	-9 946.23	+62 932.24	MH6
MN	43.97	216 04 00	N	-9 972.12	+62 896.69	MH7
NP	23.69	222 55 30	P	-9 988.25	+62 879.35	MH2
PQ	2.41	210 23 40	Q	-9 989.47	+62 877.27	se3
QB	28.34	124 11 00	B			
		Hohe Windhoek	△	-11 071.26	+64 410.77	No. 83
		Win 8	△	-11 841.55	+62 072.99	No. 223
Description of Beacons:						
A.....: 16mm Iron Peg						
B,F,J,X,Y.....: 16mm Iron Peg in Concrete						
G,Z.....: 12mm Iron Peg in Concrete						
H.....: Iron dropper in Concrete						
K,Q.....: Not beacons						
L,M,N,P.....: Center for manhole						
SERVITUDE NOTES:						
1) The figure GXYCDEF represents a Right of Way Servitude over Erf 3464						
2) The figure FEDJZ represents a Right of Way Servitude over the Remainder of Consolidated Erf 400 Klein Windhoek.						
3) The line KLMPQ represents the centre line of a 3 Metre wide Sewer Servitude over the Remainder of Consolidated Erf 400 Klein Windhoek						
The Figure A B C D E F G H						
represents 4802 square metres of land, being						
ERF 3464 (a portion of Consolidated Erf 400) Klein Windhoek						
Situate in the Municipal Area of Windhoek						
Registration Division 'K'						
Republic of Namibia						
Surveyed in August-September 1998 by me				Name.		
				Professional Land Surveyor		
This diagram is annexed to		The original diagram is		S.R. No.		
No.		No. AS.G. No. A 539/50		Gen. Plan No.		
d.d.		Annexed to		Noting Plan No. MG-5AC/V4		
Registrar of Deeds		C C T No. 1062/60		File No. KWH 15		



APPROVED		No. A			
SURVEYOR-GENERAL					
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22 / 17° X		Designation
		Constants:	0.00	+100 000,00	
AB	3 186,92	277° 06' 53"	A + 8 724,44	+ 34 717,19	E
BC	1 932,00	38° 06' 30"	B + 5 581,90	+ 35 109,42	D
CD	2 024,35	104° 34' 08"	C + 6 774,26	+ 36 629,58	A
DA	1 403,20	180° 22' 14"	D + 8 733,52	+ 36 120,36	N
		Charlottenberg	Δ +17 874,68	+ 33 179,39	No. 33 -
		Sandputz	Δ + 8 749,38	+ 40 413,56	No. 185

Description of Beacons:
 A, D : 15mm Round Iron Peg under Cairn.
 B, C : 20mm Round Iron Peg under Cairn.

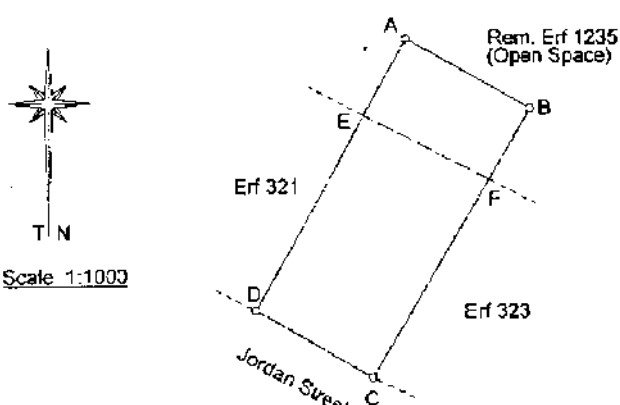
The figure A B C D
 represents 399,9321 hectares of land being

Portion 1 of the farm ARBEIDSGENOT No. 894

Situate in the Registration Division ' M ' Republic Of Namibia

Framed in terms of Section 36 of Act 33 of 1993
 by me, in June 1997 Name Professional Land Surveyor

This diagram is annexed to	The original diagram is	Framed, (E 27 / 77)
No.	No. A6 / 81	Noting Plan: LF-N, LF-2
dated	Transfer/Grant	File No. M 894
Registrar of Deeds	dated	Lat. 23°13'00" S
		Long. 16°55'00" E

APPROVED			No.			
SURVEYOR-GENERAL						
SIDES Metres		ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22/17° X		Designation	
AB	28.27	299 04 10	A	-6 948.90	+64 575.48	1715a
BC	56.88	30 48 30	B	-6 971.87	+64 598.23	1715b
CD	25.01	119 22 30	C			
DA	56.72	209 32 30	D			
Kaiser Wilhelm Berg			△	-2 802.63	+68 240.85	No. 80
Nubuanisberg			△	-5 533.63	+53 318.30	No. 150
Description of Beacons						
A,B,C,D.....: 16mm Round Iron Peg						
1) The figure A B F E represents Erf 1715 (formerly Open Space) PIONIERSPARK vide diagram A 123/98, annexed to T						
2) The figure DEFC represents Erf 322 Pionierspark, vide General Plan K 165 (A 35/67), annexed to T						
Note: The line EF represents the southern boundary of a 3.00 metre wide servitude, vide diagram A 123/98.						
						
The figure A B C D						
represents 1456 square metres of land being						
Erf 1716 PIONIERSPARK, comprising 1) and 2) above.						
Situate in the Municipal Area of Windhoek						
Registration Division ' K' Republic of Namibia						
Compiled in July 1996 by me Name: Professional Land Surveyor						
This diagram is annexed to		The original diagrams		Compiled.		
No.		are as quoted above.		Gen. Plan No.		
d.d.				Noting Plan: MG-5AC/W3		
Registrar of Deeds				File No. PIO A		

APPROVED		No. A	
SURVEYOR-GENERAL			
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: 22/15° X
AB	10.00	221 15 00	A
BC	48.45	286 52 10	B
CD	25.00	311 15 00	C
DE	48.21	335 45 30	D
EF	10.00	41 15 00	E
FA	113.00	131 15 00	F

Description of Beacons:
 A,B 16mm Iron Peg
 C,D,E,F 16mm Iron Peg

The figure A B C D E F
 represents 2510 square metres of land being
ERF 853 Henties Bay Extension No. 3
 Situate in the Municipal area of Henties Bay
 Registration Division 'G' Republic of Namibia
 Framed in April 1998 by me

Name.
Professional Land Surveyor

This diagram is annexed to	The original diagram is	Framed
No.		Gen. Plan No.
d.d.	Transfer/Grant	Noting Plan: MD - IBC/Y1
Registrar of Deeds		File No. Hen. A/3

APPROVED			No. A			
SURVEYOR-GENERAL						
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System. Lo 22/17° X		Designation	
AB	62,00	236° 46' 00"	A	-10 910,06	+68 076,83	410a
BC	27,00	326° 46' 00"	B	-10 961,92	+68 042,95	414a
CD	62,00	56° 46' 00"	C	-10 976,72	+68 065,53	414d
DA	27,00	146° 46' 00"	D	-10 924,86	+68 099,51	410d
Kleine Kuppe			△	-10 567,94	+70 190,86	No. 104
Hohe Windhoek			△	-11 071,26	+64 410,77	No. 83

Description of Beacons
A,B,C,D : 16mm Iron Peg and Cairn

Components:

- 1) The figure AEFD represents Erf 410, vide G.P. No.K252 (A628/96), annexed to T
- 2) The figure EHGF represents Erf 411, vide G.P. No K252 (A628/96), annexed to T
- 3) The figure HJKG represents Erf 412, vide G.P. No.K252 (A628/96), annexed to T
- 4) The figure JBCK represents Erf 413, vide G.P. No.K252 (A628/96), annexed to T

Scale 1:1000

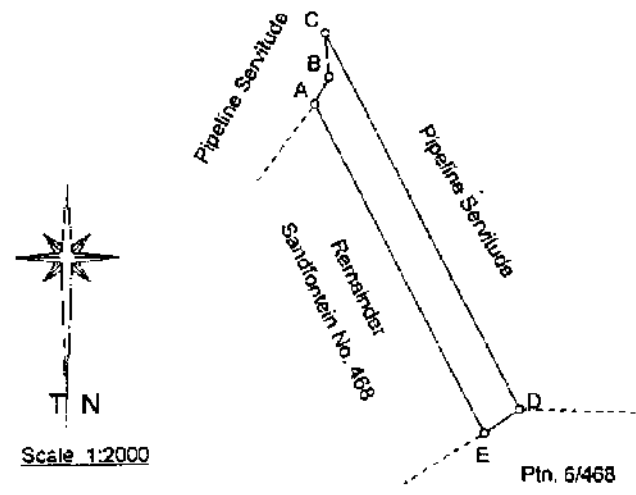
The figure A B C D represents 1674 square metres of land being
ERF 988 KLEINE KUPPE EXTENTION 1, comprising 1) to 4) above
 Situate in the Municipal Area of Windhoek
 Registration Division 'K' Republic of Namibia

Surveyed in April 1998 by me _____ Name _____
 Professional Land Surveyor

This diagram is annexed to	The original diagrams are	S.R. No. E 123/98
No.	as quoted above.	Gen. Plan No. K 252
dated		Noting Plan:MG-5AC/Y5-Z5
Registrar of Deeds		File No. KL KU. A/1

APPROVED			No. A			
SURVEYOR-GENERAL						
	SIDES Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22/19° X		Designation	
AB	10.83	209 13 23	A	-12 411.17	+30 846.62	FB3384
BC	15.97	175 12 40	B	-12 416.36	+30 837.34	FB3377
CD	150.85	332 38 45	C	-12 415.03	+30 821.43	FB3379
DE	15.09	56 17 47	D	-12 484.35	+30 955.41	FB3316
EA	131.92	152 38 45	E	-12 471.79	+30 963.79	FB3363
		Siwad	Δ	-9 694.99	+41 646.89	No. 11
		Vicki	Δ	-12 257.71	+26 367.42	No. 12

Description of Beacons
 B,C,D : 16mm Iron peg under cairn
 A,E : Not marked



Scale 1:2000

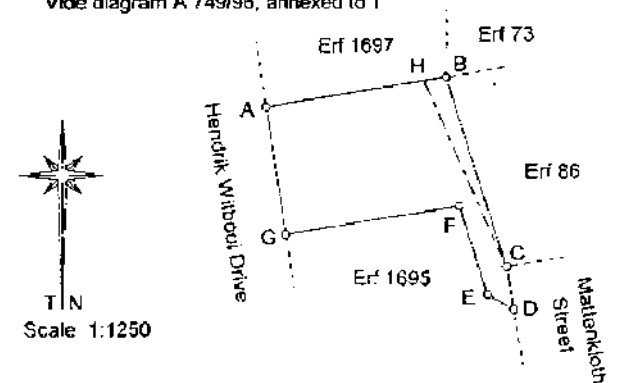
The figure A B C D E represents a
Road Servitude over The Remainder of The Farm Sandfontein No.468
 Situate in the Registration division 'L' Republic of Namibia

Surveyed between May 1976 & November 1987 by me

Name Professional Land Surveyor		
This diagram is annexed to	The original diagram is	S.R. No. E.
No. No.	No. A 281/44	Gen. Plan No.
d.d.	Annexed to	Noting Plan: ML-N
Registrar of Deeds	G. G. 59/45	File No. L 468

APPROVED			No. A		
SURVEYOR-GENERAL					
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22/17" X		Designation
		<u>Constants:</u>		0,00	
AB	42,64	260° 41' 20"	A	-6 264,85	+65 253,50
BC	45,53	342° 07' 50"	B	-6 306,73	+65 246,60
CD	9,86	350° 41' 20"	C	-6 320,70	+65 289,93
DE	6,76	120° 01' 10"	D	-6 322,29	+65 299,66
EF	21,38	162° 08' 00"	E	-6 316,44	+65 296,28
FG	41,00	80° 41' 40"	F	-6 309,88	+65 275,93
GA	29,45	170° 41' 20"	G	-6 269,42	+65 282,56
BH	5,12	80° 41' 20"	H	-8 301,68	+65 247,43
	<u>Servitude</u>	<u>Data</u>			
HD	56,15	338° 28' 00"	H	-6 301,68	+65 247,43
		Kaiser Wilhelm Berg	△	-2 802,63	+68 240,85
		Nubuanisberg	△	-5 533,63	+53 318,30
					No. 90
					No. 150

Description of Beacons
A, B, C, D, E, F, G, H, J: 16mm Round Iron Peg.
Note: The Line HD represents the centre line of a 3,00 metre wide servitude.
Vide diagram A 748/96, annexed to T



The figure A B C D E F G
represents 1458 square metres of land being
ERF 1696 (Formerly Open Space)(a Portion of Erf 1225) PIONIERSPARK
Situate in the Municipal Area of Windhoek
Registration Division 'K'
Republic of Namibia

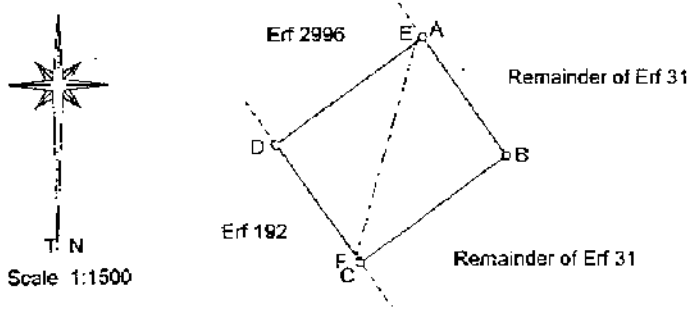
Surveyed in September 1998 by me _____ Name _____
Professional Land Surveyor

This diagram is annexed to	The original diagram is	S.R. No. E
No. _____	No. A 748/96	Gen. Plan No. _____
dated _____	Transfer/Grant	Noting Plan. MG-5AC/X3
Registrar of Deeds	dated _____	File No. PIO. A

APPROVED			No. A			
SURVEYOR-GENERAL						
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES	Y System: Lc 22/17° X		Designation
AB	39,99	324° 12' 30"	A	+49 023,23	+104 176,88	2997b
BC	50,00	54° 11' 50"	B	+48 999,84	+104 209,32	2997c
CD	40,00	144° 11' 50"	C	+49 040,39	+104 238,57	2997d
DA	50,01	234° 12' 10"	D	+49 063,79	+104 206,13	2997a
Connecting		Data				
AE	2,40	54° 19' 30"	E	+49 025,18	+104 178,28	SER3
CF	2,08	144° 10' 30"	F	+49 041,61	+104 236,88	SER1
Servitude		Data				
GH	60,86	15° 39' 40"	E	+49 025,18	+104 178,28	SER3
			F	+49 041,61	+104 236,88	SER1
			Δ	+50 432,50	+105 465,04	POT
			Δ	+49 073,33	+104 081,61	CROSSB

Description of Beacons:
A,B,C,D,E,F,G : 12mm Round Iron Peg

Servitude Note:
The line EF represents the centre line of a 3,00 metre wide pipeline servitude.



The figure A B C D
represents 2000 square metres of land being
ERF 2997 (a Portion of Erf 31) Kuisebmond
Situating in the Municipality of Walvis Bay
Registration Division 'F' Republic of Namibia
Surveyed in October 1996 by me Name.
Professional Land Surveyor

This diagram is annexed to	The original diagram is	S.R. No. E
No.	No. A422/77	Gen. Plan No.
dated	Annexed to	Noting Plan. MD-8CC/V1
Registrar of Deeds	C.C.T. No. 17022/84	File No. Kuisebmond 355

APPROVED			No. A			
SURVEYOR-GENERAL						
	SIDES Metres	ANGLES OF DIRECTION		CO-ORDINATES Y System: Lo 22/15° X	Designation	
AB	85,77	239° 34' 10"	A	+38 983,70	+71 588,73	Ptn 1c
BC	80,17	238° 52' 00"	B	+38 909,75	+71 543,29	Ptn 1d
CD	5,47	193° 25' 40"	C	+38 841,13	+71 501,84	Ptn 1e
DE	299,10	286° 11' 10"	D	+38 839,88	+71 496,52	MAL 2
EF	112,32	18° 51' 20"	E	+38 552,82	+71 579,90	BB 83
FG	151,81	88° 04' 20"	F	+38 588,92	+71 686,19	Non 5
GH	185,80	105° 55' 10"	G	+38 740,64	+71 691,30	Non 4
HA	102,29	125° 14' 50"	H	+38 900,08	+71 646,82	Non 2
JC	SERVITUDE 154,72	DATA 193° 59' 10"	J	+38 878,52	+71 651,97	Non 2L
		Kuppe KM19	Δ	-33 670,80	+63 535,08	No. 38
		Swakopmund	Δ	+48 805,71	+75 238,83	No. 62

Description of Beacons:
 E Iron Peg
 A,B,C,D,G,H,J 16mm Iron Peg in Concrete
 F 50mm Iron Pipe in Concrete

Servitude Note:
 The line CJ represents the eastern boundary of a Right of Way Servitude,
 15 metre wide, vide Dgm A 32/92 annexed to T 7188/94

Scale 1:5000

The figure represents 5,2734 hectares of land being

PORTION 5 OF THE FARM ALT NONIDAS NO. 167

Situate in the Registration Division "G" Republic of Namibia

Surveyed between May 1982 and August 1999 by us


Names.
Professional Land Surveyors

This diagram is annexed to	The original diagram is	S.R. No. E
No.	No. A554/88	Noting Plan. MD-3 & MD-8C
dated	Annexed to	File No. G187
Registrar of Deeds	T 3941/91	Lat. 22°38'00" S
		Long. 14°37'00" E

APPROVED			No. A		
SURVEYOR-GENERAL					
SIDES	Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22/15° X		Designation
AB	17,00	240° 00' 00"	A		
BC	15,99	330° 00' 00"	B	+48 058,54	+103 363,78
CD	17,00	60° 00' 00"	C	+48 050,54	+103 377,61
DA	16,00	150° 00' 00"	D		
			Δ	+50 432,50	+104 465,04
			Δ	+49 073,33	+104 081,61
					POT CROSSB

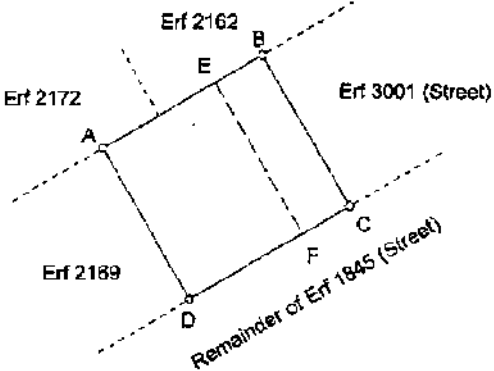
Description of Beacons:
 A,B,C,D 18mm Iron Peg in Concrete.
 POT Post Office Tower.
 CROSSB Cross on Church.

Comments:
 1) The figure AEFD represents Erf 2168 Kuisebmond,
 Vide General Plan F 61 (A 7321/93), annexed to T
 2) The figure EBCD represents the Remainder of Erf 2167 Kuisebmond,
 Vide Diagram A 760/95, annexed to T



T N

Scale 1:500



The figure ABCD
 represents 1272 square metres of land being
Erf 3002 Kuisebmond, comprising 1) and 2) above.
 Situate in the Municipal Area of Walvis Bay
 Registration Division 'F'
 Republic of Namibia
 Surveyed in August 1996 by me

Name:
Professional Land Surveyor

This diagram is annexed to	The original diagrams are as	S.R. No. E
No.	quoted above.	Gen. Plan No. F 61/3
dated		Noting Plan, MD-8CA/Z2
Registrar of Deeds		File No. Kuisebmond 355

APPROVED			No. A			
SURVEYOR-GENERAL						
SIDES Metres	ANGLES OF DIRECTION	CO-ORDINATES Y System: Lo 22/17° X		Designation		
AB	500,0	233° 34' 15"	A	-38 522,40	+56 076,50	DB1
BC	728,4	01° 18' 11"	B	-38 964,90	+55 749,90	Hb
CD	428,6	74° 13' 00"	C	-38 948,30	+56 478,70	Pb
DA	518,4	178° 30' 30"	D	-38 535,90	+56 594,70	Pad 2
AE	1660,1	53° 34' 15"	E	-37 188,70	+57 062,30	Bt 543
		Bismark	△	-42 152,70	+62 882,72	NO 31
		Neudammek	△	-31 578,47	+46 592,90	NO 147

Description of Beacons:
 A : Iron Peg under Cairn
 E, F : Iron Pipe and Cairn
 B, C, D : 20mm Iron Peg and Cairn

The figure A B C D
 Represents 26,8043 hectares of land being
 Portion 2 (A portion of portion A) of the Farm Neudam No. 63
 Situate in the Village Area of Kappsfarm
 Registration Division ' K ' Republic of Namibia
 Surveyed in August 1998 by me
 Name, Professional Land Surveyor

This diagram is annexed to	The original diagram is	S. R. No. E
No.	No. AA 338/27	Noting Plan: MG-S
d.d.	Transfer/Grant	File No. K63
Registrar of Deeds	No. 19/29	Lat 22° 31' 00" S
		Long 17° 22' 00" E