CODE OF PRACTICE

LAND SURVEY ORDINANCE

(Chapter 473)

Fourth Edition (Revised) – December 2006

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CONTENTS

I GENERAL

1. These regulations state the requirements for carrying out all land boundary surveys in Hong Kong under the Land Survey Ordinance (LSO). Words or expressions importing the masculine gender include the feminine gender.

2. For the purpose of control of land boundary surveys, every Authorized Land Surveyor (ALS) shall carry out land boundary surveys in compliance with the Land Survey Ordinance and these regulations.

II INTERPRETATION

3. The following are the definitions of the terms used in these regulations:-

"adopted data" means the traverse or land boundary information accepted from previous survey.

"boundary mark" means a survey mark which demarcates a parcel of land.

"boundary stone" means a boundary mark made from white granite, or concrete slab established by the Survey and Mapping Office of Lands Department to demarcate a parcel of land.

"calibration" means the process of checking of a distance measuring equipment against a standard baseline established by the Survey and Mapping Office of Lands Department for corrections to be made to measured lines.

"common land boundary" means the common boundary of two adjoining land parcels.

"field note" means the original record of field observations and measurements recorded in the field in the course of a land boundary survey, including a print-out from an electronic data recorder.

"geodetic survey station" means a trigonometric station, a traverse station or a GPS control station emplaced and mathematically fixed under the Hong Kong Geodetic Survey System with coordinates published by the Geodetic Section, Survey and Mapping Office, Lands Department.

"grid lines" means lines drawn on a map or plan in the form of rectangular grid under the Hong Kong Geodetic Survey System.

"Hong Kong Geodetic Survey System" means the current network of survey stations, emplaced and mathematically fixed, based on the "Hong Kong 1980 Geodetic Datum (HK80)" by the Survey and Mapping Office of Lands Department.

"Hong Kong GPS Control Station" means a geodetic survey station emplaced and

mathematically fixed under the Hong Kong Geodetic Survey System with geodetic coordinates (latitude and longitude) published by the Geodetic Survey Section, Survey and Mapping Office, Lands Department.

"Hong Kong 1980 Geodetic Datum (HK80)" means the survey datum used by the Survey and Mapping Office, Lands Department since 1980.

"ITRF96" means International Terrestrial Reference Framework 1996 to which the geodetic coordinates of the Hong Kong GPS Control Stations are referred.

"land" includes-

(a) land covered by water; and

(b) a building or other thing attached to land or a thing permanently fastened to a building or other thing attached to land,

but does not include-

(i) any right, interest or easement in or over land; or

(ii) the whole or part of an undivided share in land or a building.

"land boundary" means a line defining the territorial limits of a parcel of land.

"land boundary plan" means a plan showing and delineating the land boundary of a parcel of land.

"land boundary record", in relation to a parcel of land, means the record, kept by the Land Survey Authority, of all measurements, computations and survey data used in connection with defining the land boundary of the parcel of land and includes the survey record plan, the land boundary plan and other documents used in connection with defining such land boundary.

"land boundary survey" means any survey which is required in connection with defining land boundaries and includes the preparation of field notes, survey record plans and land boundary plans.

"missing lot" arises when its landowner requests the Government to locate the boundaries of a lot but a search of Government records fails to establish their position.

"party wall" means a wall wherein the common boundary of two land parcels is located.

"permanent survey mark" means a survey mark established by a land boundary survey for future use and reference. It serves to provide primary evidence for boundary definition when other more vulnerable survey stations have been disturbed or destroyed by development / redevelopment.

"picket box" means a geodetic survey station enclosed by a cast iron box.

"Satellite Positioning Reference Station" means a Hong Kong GPS Control Station with GPS equipment set up by the Geodetic Survey Section, Survey and Mapping Office, Lands Department for continuous tracking of GPS data in support of positioning activities throughout the territory of Hong Kong.

"survey mark" means a mark defining a surveyed position.

"survey record plan" means a plan recording survey data (including land boundaries, survey evidence, survey marks, traverses, alignments and significant ties to occupation and related features) used in a land boundary survey.

"survey station" means a survey mark over which survey observations are made in connection with land boundary surveys submitted to the Land Survey Authority under the Land Survey Ordinance or land boundary surveys carried out by the Survey and Mapping Office of Lands Department. It can be a trigonometric station, a traverse station, or a control station established by using GPS.

"*traverse*" means a series of lines between survey stations established by angular and linear measurements starting from and closing onto geodetic survey station or old traverse survey stations, or controls stations established by using GPS.

"urban survey mark" means a geodetic survey station made of metal in a mushroom like shape.

III GENERAL PRINCIPLES FOR RE-ESTABLISHMENT OF LOT BOUNDARIES

4. In order to maintain a standard practice for re-establishment of lot boundaries, all Authorized Land Surveyors are required to follow the general principles set out below in performing their lot boundary re-establishment work:-

(a) **Follow the intention of grant** – the re-established boundaries (in terms of position and dimension) and the resultant shape of the lot should not deviate materially from that as shown on the land grant document, save that part of the lot which might have been surrendered to or resumed by the Government;

(b) **Adopt original occupation** – the re-established boundaries should follow those surviving boundary features that are found or believed to have been in existence when the lot was first granted or when it (in case of a section) was carved out from its parent lot;

(c) **Respect existing boundary features** – subject to sub-paragraph (b) above, the re-established boundaries should normally follow the existing boundary features (e.g. field bunds, fences, walls, hedges, ditches, channels etc.) if the distance between these features and the relevant boundary line as shown on the grant / assignment / division plan is within the graphical accuracy of that boundary line. This notwithstanding, in case the exact dimensions of the subject lot are shown on the relevant grant / assignment / division plans, such dimensions should be respected unless they are proved to be wrong;

(d) **Adopt common boundaries previously defined** – common land boundaries previously defined by the Government or by an Authorized Land Surveyor should be adopted unless the previous boundary definition is proved to be wrong;

(e) **Provide reasons for discrepancies** – it is essential that the dimensions and areas of the adjacent lots be checked against their respective values as shown on the relevant land grant documents and plans or other related documents and plans, and the causes for any significant discrepancies in such dimensions and areas be identified, as this would help avoid creating any unwarranted excess or shortfall in area or undue boundary problems to the adjacent lots. In case the re-established lot boundaries should fall on some existing structures or space being occupied by persons other than the subject lot owner, extra care should be taken to ensure that no undue boundary conflicts would be inflicted as a result.

5. It is understandable that there are circumstances under which an Authorized Land Surveyor will not be able to follow all the above general principles in a boundary re-establishment exercise. Therefore, it will not be regarded as a non-compliance with the requirements of this Code of Practice if an Authorized Land Surveyor can demonstrate that in the performance of his boundary re-establishment work, he has considered following the above principles but there are circumstances preventing him from doing so.

IV CONDUCT OF LAND BOUNDARY SURVEYS

In order to maintain a uniform standard practice for all land boundary surveys, Authorized Land Surveyors are required to adhere to the following regulations:-

(A) Field notes

6. The first page of the field notes of every survey shall bear the certificate signed by the Authorized Land Surveyors in the following form:

I , …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that these field notes, consisting of …… pages, are a correct and complete record of the observations and measurements made in the field, either by me, or under my immediate direction and supervision.

I also certify that the land boundary survey, of which the field notes form a part, was carried out in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that the survey was completed on the …… day of …… 20 …… .

Dated this …… day of …… 20 …… .

……
Authorized Land Surveyor

7. An ALS or his assistants who carry out the land boundary surveys shall initial and date each page of the field notes. Where an assistant is carrying out the survey under the direction of an authorized land surveyor, the latter or his delegate will additionally initial and date those pages of the field notes where the survey has been tested or otherwise checked by him and/or, other field instruction has been given.

8. Field notes shall be prepared for all land boundary surveys performed under the Ordinance and should be a complete original record of all field observations and field measurements recorded in the field. Printout from electronic data recorder shall bear the signature of the surveyor and shall contain equivalent information as contained in traditional field notes. Hand-written field notes shall be neatly and clearly recorded or annotated in permanent blue or black ink and shall not be obliterated, inked over or erased. Corrections may only be made by crossing out the erroneous entry in such a way that it remains legible, and writing the correct value above or alongside it.

9. Field notes shall record the type and identification number of the instruments including theodolite, electronic distance meter (EDM) and steel tape etc. used for the survey. The first page shall show the designation of the land parcel, locality or such other reference or legal descriptions. The date of starting and completing the survey shall also be recorded.

10. All field notes and computations shall be properly kept for submission upon request by the Land Survey Authority.

(B) Origin of co-ordinates & bearings

11. Only survey stations shall be used for origin of co-ordinates and bearings. Old permanent survey mark not being a survey station in the previous land boundary survey shall not be used for an origin of coordinates and bearings.

12. The reliability of any survey station(s) used for origin of coordinates and bearings shall be proved in any of the following ways by <u>direct observations and measurements</u> :-

(a) Where the survey station to be used for origin of coordinates is a trigonometric station, by observing the angle between the rays to two or more trigonometric stations and measuring the distances between the survey station and at least two witness marks as shown in Figure 1.

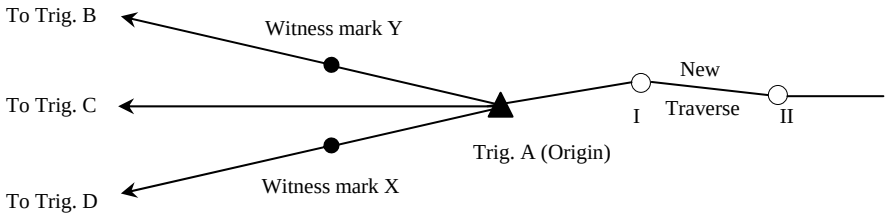


Figure 1

(b) Where the survey station to be used for origin of coordinates is a traverse station, by observing the angle between two adjacent traverse lines of the same existing traverse and measuring the length of one of these traverse lines as shown in Figure 2 and Figure 3.

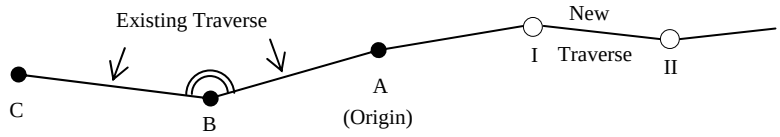


Figure 2

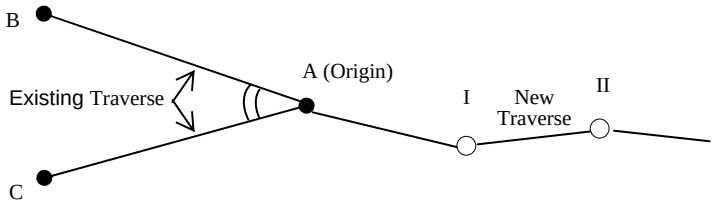


Figure 3

(c) Where the survey station to be used for origin of coordinates is collinear with two adjacent stations of the same existing traverse, by checking whether the three stations are still in a straight line and measuring the distance between any two of them as shown in Figure 4.

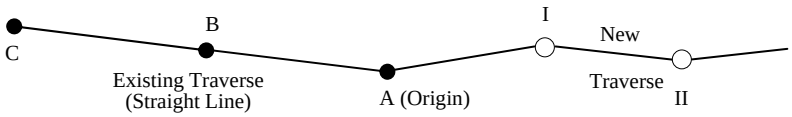


Figure 4

(d) Where the survey station to be used for origin of coordinates is a traverse station and it is impossible or impractical to prove its reliability in the ways as described in Sub-paragraphs (b) or (c) above (for example where only two stations from an old traverse can be found), by measuring the distance of a previously observed and adjusted ray and observing the angles between this ray and at least two other calculated rays to distant geodetic survey stations as shown in Figure 5.

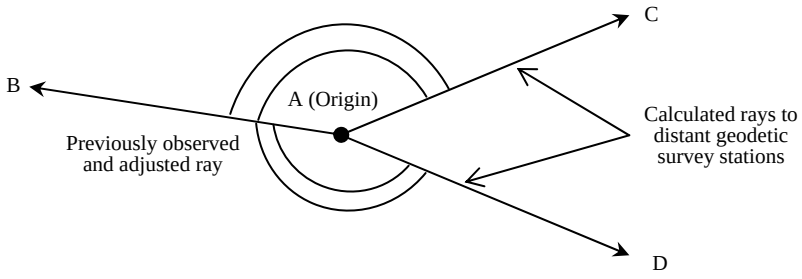


Figure 5

(e) Where the survey station to be used for origin of coordinates is a geodetic survey station, by observing a minimum of 1 angle between the calculated rays to two or more other geodetic survey stations, and measuring the distance of any one of the calculated rays.

(f) Where the survey station to be used for origin of coordinates is a control station established by using GPS, by measuring the distance of a calculated ray and observing the angle between this ray and another calculated ray to survey stations as shown in Figure 6.

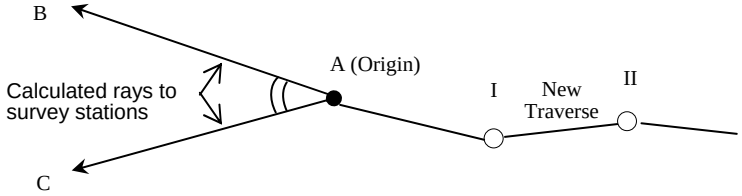


Figure 6

13. Any one of the survey stations proven reliable as in paragraph 12 above shall be acceptable as an origin of co-ordinates.

14. The survey tolerances stated in Part V shall be used when proving origins and testing agreements with old survey work in the field.

(C) Bearings, distances and co-ordinates

15. Bearings shall be observed with a theodolite reading to 20 seconds or better precision. Traverse bearings shall be made with a minimum of one arc on both face left and face right of the theodolite.

16. Bearings shall be recorded in the field in accordance with the precision of the theodolite being used and shown on survey record plan and land boundary plan to the nearest 10 seconds. To facilitate the use of computer in computation and plan production, bearings may be shown on land boundary plan and survey record plan to the nearest 1 second without rounding off the figures.

17. Distances shall be measured in metres and decimals of a metre and recorded in the field to 0.001 of a metre. Distance measurements shall be made with a steel tape or an electronic distance meter (EDM). All necessary corrections shall be applied.

18. Distances and co-ordinates shall be shown on survey record plans to 0.001 of a metre but shall be shown on the land boundary plan to the nearest 0.01 of a metre. To facilitate the use of computer in computation and plan production, distances and coordinates may also be shown on land boundary plan to the nearest 0.001 of a metre without rounding off the figures.

(D) Survey instruments

19. Distance measuring instruments include steel tape and electronic distance meter (EDM). Steel tape shall be checked against an adopted baseline, which is established by the Land Survey Authority, at intervals not exceeding 6 months, or immediately following repair. EDM shall also be checked against an adopted baseline established by the Land Survey Authority annually or immediately following servicing.

20. A full report of each calibration shall be kept by the Authorized Land Surveyor for record purposes, and shall be presented for inspection when required by the Land Survey Authority.

21. The Land Survey Authority may also inspect instruments used for a land boundary survey to ascertain they are in an operating condition to the satisfaction of the Land Survey Authority.

(E) Traverses

22. Traverses shall start from survey stations as described in Paragraph 11. Before any traverse begins, the reliability of the survey stations used for an origin should be

proved by the Authorized Land Surveyor as described in Paragraph 12. Closing rays should be considered as second origins. The reliability of the survey stations used for closing rays and coordinates should be proved by using the same methods as for origins. It is just as important to select suitable closing stations as it is to select a good origin, and particular care should be taken to ensure that the bearings used for the closing rays are in the same terms as the bearings used for the origin.

23. No unclosed traverses are allowed.

24. Geodetic survey stations emplaced and mathematically fixed by the Survey and Mapping Office of Lands Department are normally in the form of concrete pillars, picket boxes and urban survey marks, and they are collectively described as geodetic survey stations.

25. Traverse survey stations shall be marked by one of the following survey marks, details for which are specified at Appendix A:-

(a) Iron tubes;
(b) Lead plugs;
(c) Iron spikes;
(d) Survey nails;
(e) Wooden pegs; or
(f) Cut marks. (cut marks shall only be used where other marks cannot be emplaced)

26. Angular misclosure for a traverse shall not exceed ($30\sqrt{\mathbf{n}}$) seconds where **n** is the number of survey stations in the traverse.

27. Linear misclosure for a traverse shall not exceed (10+2**S**/15) millimetres where **S** is the total length of the traverse in metres.

28. When a traverse longer than 1.5 km is run, control bearings shall be observed reciprocally between traverse survey stations and some other geodetic survey stations, at such station intervals as will adequately control the orientation of the traverse lines. The number of traverse survey stations between control bearings shall not be more than fifteen. In special situations and where there is no practical alternative, the Land Survey Authority may approve the use of a single ray, observed to a distant geodetic survey station, to control the orientation of the traverse lines.

29. Traverse misclosures shall be mathematically adjusted.

(F) Establishment of Control Stations using GPS

30. Control stations established by using GPS shall comply with the accuracy standard and quality requirements as stipulated in Part I of Appendix F. Authorized Land Surveyors are required to follow the recommended practice for establishing such control stations and maintaining survey records for quality checking as set out in Part II of Appendix F.

(G) Boundary marking

31. In defining the boundary of a parcel of land, an ALS shall adopt the common land boundary previously surveyed and defined by the Government or by another ALS unless he has proved that the previous boundary definition is wrong.

32. Boundaries shall be marked at every corner, and where necessary at points on the boundary line if the corners are not intervisible.

33. Where a boundary mark cannot be placed because of an obstruction the boundary mark position shall be offset for establishing its position in future.

34. Boundary marks shall be one of the following survey marks, details for which are specified at Appendix A:-

    (a) Iron tubes;
    (b) Lead plugs;
    (c) Iron spikes;
    (d) Survey nails;
    (e) Wooden pegs; or
    (f) Cut marks. (cut marks shall only be used where other marks cannot be emplaced)

35. Every boundary mark shall be placed by bearing and distance from a survey station and checked independently by radiation from another survey station. Where double radiation is impracticable, other checking method will be used to verify the accuracy intended. The same requirements apply when fixing the position of old marks, occupation and other elements essential to land boundary definitions.

36. The setting out distance from a survey station to a boundary mark using steel tape and EDM shall not exceed 20 metres and 150 metres respectively. They must be checked independently and recorded accordingly.

37. Curved boundaries shall be marked at both end points and at least one other point on the curve. In addition, curves shall be marked at intervals not exceeding 15 metres, measured along the chord.

(H) Permanent Survey Marks

38. At least two permanent survey marks (PSMs) shall be established for every land boundary survey in accordance with specifications at Appendix A. Where there are existing PSMs from previous land boundary surveys in the vicinity, they may be accepted as PSMs after verification. No PSM shall be at a greater distance than 100 metres from a boundary mark.

39. All PSMs shall be fixed by double radiation. They shall be described with sketches in the field notes and shown on the survey record plan as to the type of survey mark and its position and height above ground level.

(I) Physical features

40. The positions of all buildings or prominent physical features, on or within 0.5 metre of a boundary line, shall be surveyed, calculated and shown as offsets on the survey record plan. Physical features beyond this and up to 3 metres need only be shown graphically.

41. If the boundary is located in a party wall, its offset distances in relation to the party wall shall be shown on the survey record plan.

42. Where a boundary is located in a party wall, or between abutting walls, checks must be carried out to confirm that the line of the party wall or the line between abutting walls is a straight line.

(J) Survey Report

43. The ALS shall submit a survey report, giving the rationale of how the boundaries are established for every land boundary survey. The report should contain information regarding the evidence found and include a copy of any land boundary plan, survey record plan, lot index plan, traverses and any other plan, sketch, photograph or document containing information or data, which have been used or based on for traverse origin and/or boundary definition or redefinition. The recommended format for survey reports is at Appendix C.

44. Evidence as referred to in Paragraph 40 above may include relevant information obtainable from records (such as Demarcation District (DD) sheets, DD control sheets, DD enlargement, house lot plans, house lot plans retrace, "A" sheet, Cadastral Survey Plan, lot index plan (previously known as DD lot identification plan), survey record plans (SRP), SRP equivalent data, land boundary plans, aerial photographs, survey sheets from microfilm), as well as ground occupation and investigation, interviews and any other form of data that will support the position and dimensions of the lot under survey.

45. It is essential that a field survey be conducted to verify the actual field conditions when a division of land is carried out by pure calculations based on an existing land boundary plan prepared by an ALS in accordance with the code of practice or by the Government of the land being divided. If an ALS considers that no field survey is required for that purpose, he shall provide justifications for and make a declaration of his decision in the survey report.

V MEASUREMENTS AND SURVEY TOLERANCES

46. If a bearing, an angle, a distance or an area is re-measured or re-calculated for verification, re-establishment or whatever reasons, the original values will be adopted if the discrepancies are within the tolerances listed below. If the discrepancies fall outside these tolerances the new values must be conclusively checked for correctness. If confirmed, the original values must be considered as superseded by the new values with reasons clearly recorded. The tolerances are:

(1) Survey tolerances – **Bearing / angular** measurements:

Distance	Tolerance
under 15 m	**±2' 00"**
15 m - 150 m	**±1' 00"**
over 150 m	**±0' 30"**

(2) Survey tolerances - **Distance** measurements:

Tolerance:

±(0.015 + 0.0001 x distance in metres) metre

(3) Survey tolerances - **Area** calculations:

Tolerance: **± 0.1 %**

47. Areas shall be **rounded off** to the nearest unit as follows:

Area of Lot	Expressed in	Rounded off to nearest	
under 2000 m^2	**sq. metre (m^2)**	**0.1 m^2**	
2000 m^2 and above	**sq. metre (m^2)**	**1 m^2**	**(for normal cases)**
		0.1 m^2	**(for cases where the area computation involves the deduction of an area already rounded off to 0.1 m^2)**

However, areas already committed may be exempted from this rule, in which case the tolerance in Paragraph 46(3) will apply.

All areas shown on plans shall be qualified with the word "about".

VI LAND BOUNDARY PLANS

48. A land boundary plan is a plan showing and delineating the land boundary of a parcel of land. It shall be prepared for every land boundary survey in connection with defining land boundaries. Under Section 30(4) of this Ordinance, a duplicate of the land boundary plan prepared for a division of land for attachment to the instrument for registration with Land Registry under the Land Registration Ordinance (Cap. 128) shall be deposited to the Land Survey Authority. Nevertheless, the Land Survey Authority will not accept the deposition of a duplicate of the land boundary plan or a survey record plan prepared for the division of a missing lot.

49. A specimen land boundary plan is at Appendix D. A land boundary plan shall include the following information:

(1) Land parcel information:

(a) A plot of boundaries drawn to scale;
(b) Designation of the subject lot or parcel;
(c) The area of each lot or parcel;
(d) Notation and if applicable, the description of each boundary corner;
(e) Boundary dimensions of subject lot or parcel;
(f) Co-ordinates of each boundary corner may be shown at the discretion of the Authorized Land Surveyor; and
(g) Abutting land information.

(2) Supporting information:

(a) Grid lines with co-ordinates;
(b) Location diagram of the site, where necessary;
(c) The plot, with details of colouring and abbreviations;
(d) Scale; and
(e) Standard north point symbol.

(3) Plan size:

Any such plan and copy thereof shall be of A3 size or of such size as specified under the Section 8 of Land Registration Regulations (Cap. 128).

(4) Plan numbering:

The number of the land boundary plan for each land boundary survey shall be unique. It shall not be re-used for numbering of another plan for the purpose of superseding the old plan or others. The plan numbering system shall be as follows:-

LBP/[DSO]/[ALS#]/[Plan#]/[Type][Version] where

[DSO] = 2-figure code of District Survey Office. The codes for various DSOs are:- 'HK' for Hong Kong, 'KL' for Kowloon, 'TK' for Tsuen Wan & Kwai Tsing, 'IS' for Islands, 'DN' for North, 'SK' for Sai Kung, 'ST' for Shatin, 'TP' for Tai Po, 'TM' for Tuen Mun and 'YL' for Yuen Long. It is not necessary to specify the division of a DSO such as east, west or central, etc.

[ALS#] = 3-figure registration number of the ALS who signs and certifies the plan.

[Plan#] = 4-figure plan number as prepared by the ALS.

[Type] = Nature of the survey. 'D' for lot dimension plan. 'S' for lot setting-out plan.

[Version] = The version number of a plan. The next Arabic numeral shall be used if there is change made to the earlier version. A revision note giving information about the new version shall be given in the notes column of the revised plan.

Example:- LBP/HK/001/0001/D1

(5) Except for cases under Sub-paragraph (6) below, every land boundary plan shall bear a certificate signed and certified by the Authorized Land Surveyor in the following form:-

I , …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this land boundary plan has been prepared from land boundary surveys that were carried out by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that this plan correctly represents that survey completed on the …… day of …… 20 …… .

Dated this …… day of …… 20 …… .

……
Authorized Land Surveyor

(6) Where the land boundary survey is carried out partly by or under the supervision or direction of another authorized land surveyor, the land boundary plan shall bear a certificate in the following form:-

I , …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this land boundary plan has been prepared from land boundary surveys that were carried out partly by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and partly by or under the supervision or direction of another authorized land surveyor, and that this plan correctly represents that survey completed on the …… day of …… 20 …… .

Dated this …… day of …… 20 …… .

……
Authorized Land Surveyor

Remarks:- The above certificate shall not be applied to the adoption of survey stations, lot boundary coordinates, and other types of survey data extracted or derived from the work of another surveyor. It shall only be applied to a land boundary survey conducted by more than one authorized land surveyor and the authorized land surveyor who signed and certified the plan shall be responsible for the accuracy and completeness of the plan.

VII SURVEY RECORD PLANS

50. A survey record plan (SRP) is a plan which records survey data (including land boundaries, survey evidence, survey marks, traverses, alignments and significant ties to occupation and related features) used in a land boundary survey. It shall be prepared for every land boundary survey in connection with defining land boundaries. The objectives of preparing a SRP are:

(1) to maintain repeatability such that:

(a) the SRP alone is to ensure users to be able to maintain consistency of boundary definition,

(b) the SRP alone can allow a reader to be confident in that consistency has been achieved, and

(c) positive identification of marks and boundary features are made possible; and

(2) to comprehensively convey what constitutes and marks the boundary. It is accepted that SRP alone cannot reveal why a boundary is so defined or how decision has been made.

51. The draughting specifications for SRP are at Appendix B. A specimen SRP is at Appendix D. A survey record plan shall include the following information:

(1) Land parcel information:

(a) A plot of boundaries drawn to scale;
(b) Designation of the subject lot or parcel;
(c) The area of each lot or parcel;
(d) Notation and if applicable, description of each boundary corner;
(e) Boundary dimensions of subject lot or parcel;
(f) Co-ordinates of each boundary corner; and
(g) Abutting land information.

(2) Survey station information:

(a) A plot of survey stations;
(b) Description of the survey stations; and
(c) Bearings and distances of traverses.

(3) Supporting information:

(a) Grid lines with co-ordinates;
(b) Location diagram, inset diagram where necessary;
(c) Co-ordinates of points;
(d) Scale;
(e) Reference to relevant document and computations where necessary;
(f) Standard north point symbol;
(g) Setting out and PSM radiations if applicable (checking radiations are not required to be shown); and
(h) Positions and descriptions of PSMs.

(4) Plan numbering:

The number of the survey record plan for each land boundary survey shall be unique. It shall not be re-used for numbering of another plan for the purpose of superseding the old plan or others. The plan numbering system shall be as follows:-

SRP/[DSO]/[ALS#]/[Plan#]/[Type][Version] where

[DSO] = 2-figure code of District Survey Office. The codes for various DSOs are:- 'HK' for Hong Kong, 'KL' for Kowloon, 'TK' for Tsuen Wan & Kwai Tsing, 'IS' for Islands, 'DN' for North, 'SK' for Sai Kung, 'ST' for Shatin, 'TP' for Tai Po, 'TM' for Tuen Mun and 'YL' for Yuen Long. It is not necessary to specify the division of a DSO such as east, west or central, etc.

[ALS#] = 3-figure registration number of the ALS who signs and certifies the plan.

[Plan#] = 4-figure plan number as prepared by the ALS.

[Type] = Nature of the survey. 'D' for lot dimension plan. 'S' for lot setting-out plan.

[Version] = The version number of a plan. The next Arabic numeral shall be used if there is change made to the earlier version. A revision note giving information about the new version shall be given in the notes column of the revised plan.

Example:- SRP/HK/001/0001/D1

(5) Except for cases under Sub-paragraph (6) below, every survey record plan shall bear a certificate signed and certified by the Authorized Land Surveyor in the following form:-

I , …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey record plan has been prepared from land boundary surveys that were carried out by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that this plan correctly represents that survey completed on the …… day of …… 20 …… .

Dated this …… day of …… 20 …… .

……
Authorized Land Surveyor

(6) Where the land boundary survey is carried out partly by or under the supervision or direction of another authorized land surveyor, the land boundary plan shall bear a certificate in the following form:-

I , …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey record plan has been prepared from land boundary surveys that were carried out partly by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and partly by or under the supervision or direction of another authorized land surveyor, and that this plan correctly represents that survey completed on the …… day of …… 20 …… .

Dated this …… day of …… 20 …… .

……
Authorized Land Surveyor

Remarks:- The above certificate shall not be applied to the adoption of survey stations, lot boundary coordinates, and other types of survey data extracted or derived from the work of another surveyor. It shall only be applied to a land boundary survey conducted by more than one authorized land surveyor and the authorized land surveyor who signed and certified the plan shall be responsible for the accuracy and completeness of the plan.

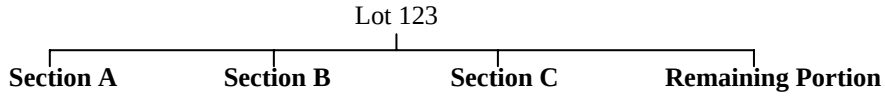
VIII LOT SUBDIVISION SURVEY

(A) Designations of Subdivided Lots

52. The resultant parcels of land when a lot is subdivided shall be designated in accordance with the following practice. It is essential that a standardized system of designations and abbreviations is adopted so that the subdivided lots can be unambiguously and easily identified.

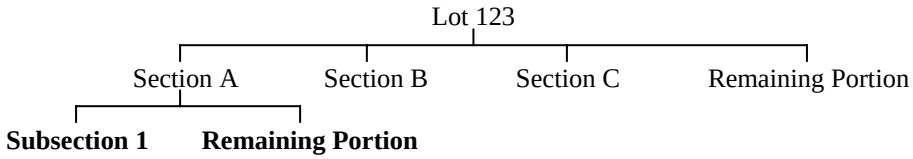
53. When a lot is subdivided for the first time, the subdivided portions are called "Sections" which shall be designated with letters in alphabetical order successively as Section A, Section B, Section C etc. except for the last section which shall be designated as the Remaining Portion of the original lot (see Example 1). There shall be no skipping in the sequence of the letters (the letters I and O shall also be used). If Z is reached then the sequence shall be continued by prefixing A to the letter, then B, and so on, e.g. Section Z, Section AA, Section AB etc.

Example 1: First subdivision of Lot 123



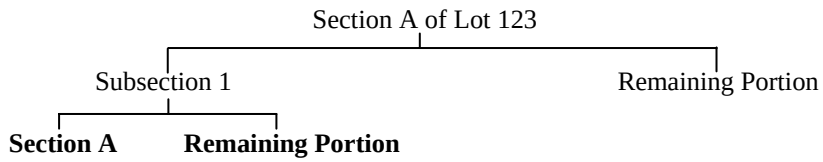
54. In a subsequent subdivision of a section, the subdivided portions are called "Subsections" which shall be designated with numbers successively as Subsection 1, Subsection 2, Subsection 3 etc. except for the last subsection which shall be designated as the Remaining Portion of the original section (see Example 2).

Example 2: Subdivision of Section A of Lot 123



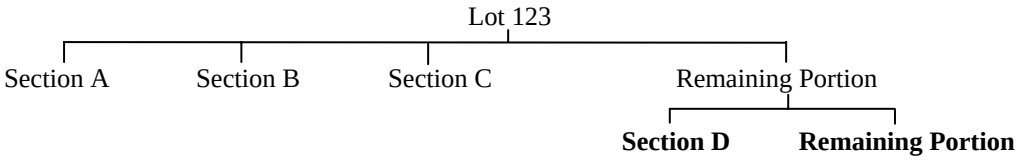
55. On further subdivisions of a section or a subsection into the next tiers, the key to the designations is that a section is followed by a subsection which in turn followed by a section, ad infinitum. The last portions shall always be designated as the Remaining Portion of the original section/subsection. Sections are labelled by using letters and subsections are labelled by using numbers (see Example 3).

Example 3: Subdivision of Subsection 1 of Section A of Lot 123

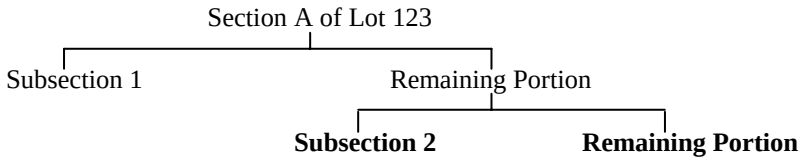


56. If the Remaining Portion of a lot, a section or a subsection is further subdivided, the subdivided portions become additional sections or subsections of the original lot/section/subsection. For new sections, they shall be labelled alphabetically with the letter sequence following on from the letters used in the previous subdivision (see Example 4). For new subsections, they shall be labelled by numbers following on from the sequence in the previous subdivision (see Example 5). There shall be no skipping in the sequence of the letters or numbers. The last section or subsection shall be designated as the Remaining Portion of the original lot/section/subsection.

Example 4: Subdivision of the Remaining Portion of Lot 123

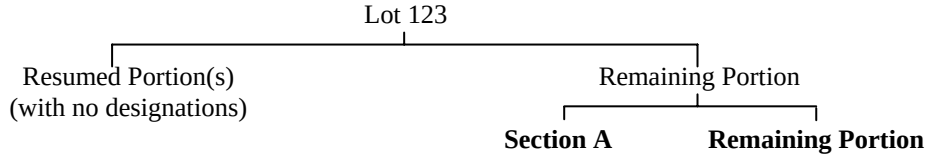


Example 5: Subdivision of the Remaining Portion of Section A of Lot 123

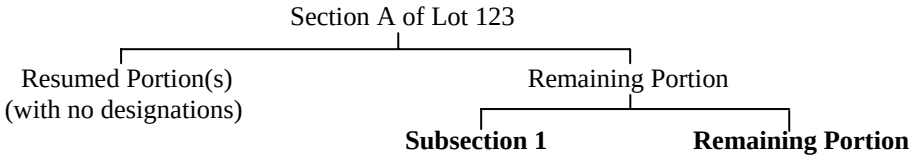


57. When a portion of a lot/section/subsection is resumed by the Government, it will not be given any designation. The land parcel with non-designated portion(s) being resumed will become known as the Remaining Portion of the original lot/section/subsection. On subdivision of a remaining portion involving resumed portion(s) with no designation(s), labels for the designations of the subdivided portions shall start with the letter "A" for sections or the number "1" for subsections if the parent lot/section/subsection has not been subdivided previously (see Examples 6 and 7). If parent lot/section/subsection has been subdivided before, the new sections/subsections shall be labelled by letters or numbers following on from the letter or number sequence of the designated sections/subsections in the previous subdivision (see Examples 8 and 9).

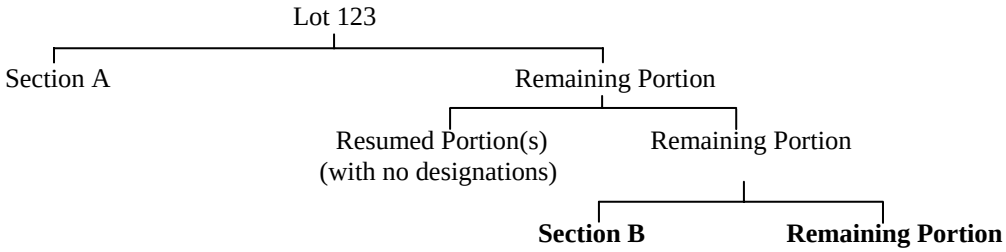
Example 6: Subdivision of the Remaining Portion of Lot 123 involving resumed portion(s) with no designation(s) (Lot 123 has not been subdivided previously)



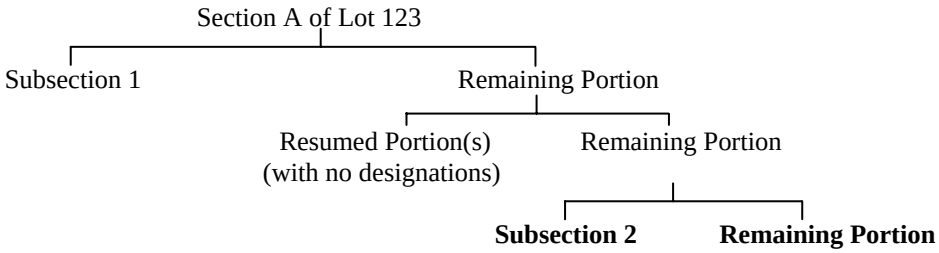
Example 7: Subdivision of the Remaining Portion of Section A of Lot 123 involving resumed portion(s) with no designation(s) (Section A of Lot 123 has not been subdivided previously)



Example 8: Subdivision of the Remaining Portion of Lot 123 involving resumed portion(s) with no designation(s) (Lot 123 has been subdivided previously)

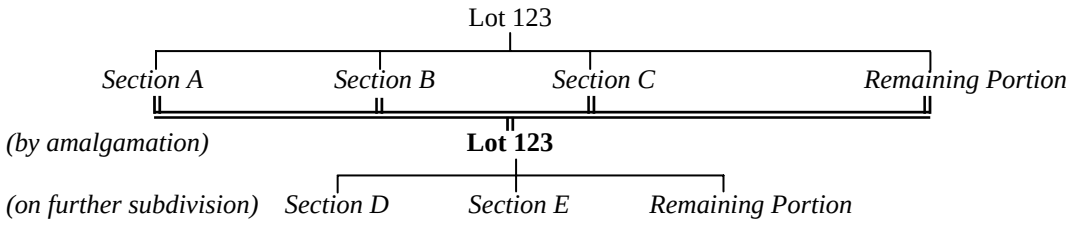


Example 9: Subdivision of the Remaining Portion of Section A of Lot 123 involving resumed portion(s) with no designation(s) (Section A of Lot 123 has been subdivided previously)

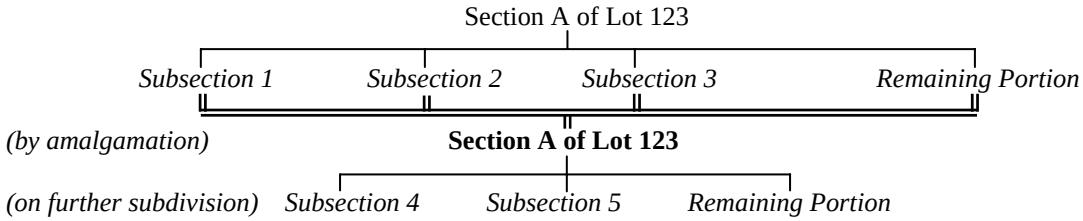


58. Sections/subsections of a lot created in previous subdivisions may sometimes be amalgamated to form a new parcel of land. The resultant land parcel shall be assigned with a new designation except when all the subdivided portions of a lot/section/ subsection are involved in the amalgamation, in which case, the original lot/section/subsection will deem to have been "re-established" by means of amalgamation and the original designation shall be adopted. On further subdivision of the re-established lot/section/subsection, the new sections/subsections shall be designated in the manner as described in Paragraph 56 above to avoid confusing them with the old sections/subsections which existed prior to amalgamation (see Examples 10 and 11).

Example 10: Amalgamation involving all subdivided portions of Lot 123

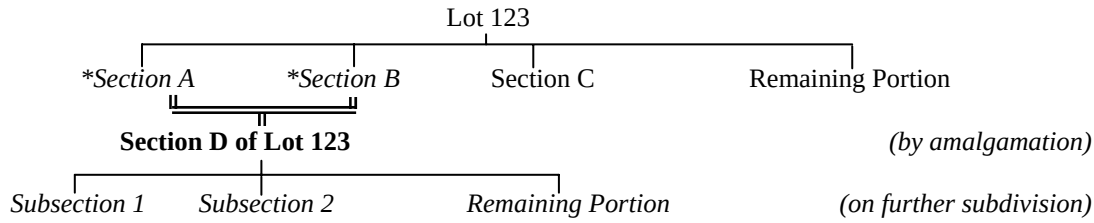


Example 11: Amalgamation involving all subdivided portions of Section A of Lot 123



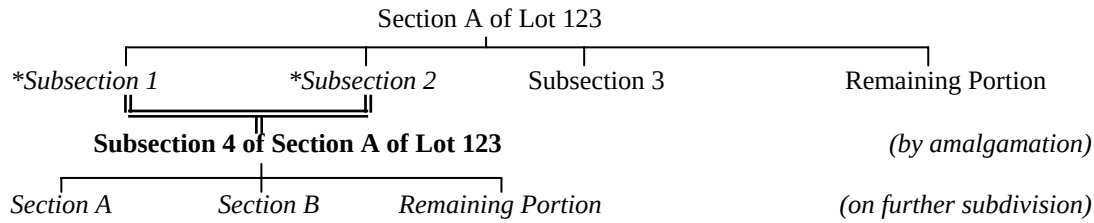
59. When the amalgamation involves only some of the subdivided portions of a lot/section/subsection, the resultant land parcel will be regarded as a new section or subsection of the original lot/section/subsection depending on the highest level of the subdivided portions in the subdivision tree involved. It will be a section if the highest level of subdivided portions in the amalgamation involves sections. It will be a subsection if the highest level of subdivided portions in the amalgamation involves subsections. The resultant land parcel shall be designated by a letter (for section) or a number (for subsection) following on from the last letter or number used in the previous subdivision at that highest level. On further subdivision of the resultant land parcel, the new sections/subsections shall be designated in the manner as described in Paragraphs 54 and 55 (see Examples 12, 13, 14 and 15).

Example 12: Amalgamation involving some of the subdivided sections of Lot 123 (excluding the Remaining Portion of Lot 123)



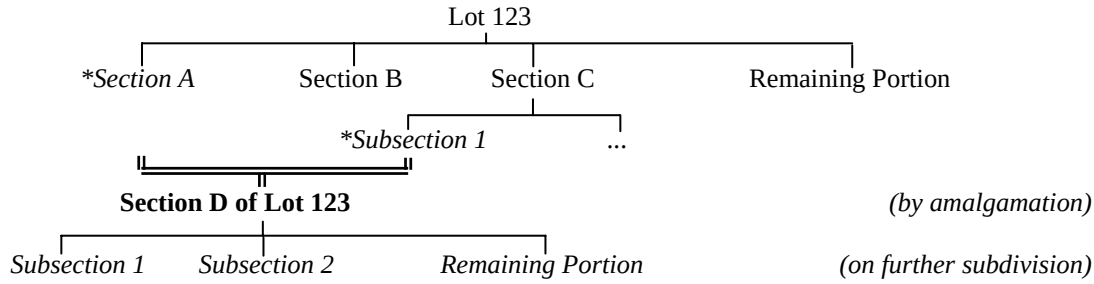
* subdivided land parcels involved in the amalgamation

Example 13: Amalgamation involving some of the subdivided subsections of Section A of Lot 123 (excluding the Remaining Portion of Section A of Lot 123)



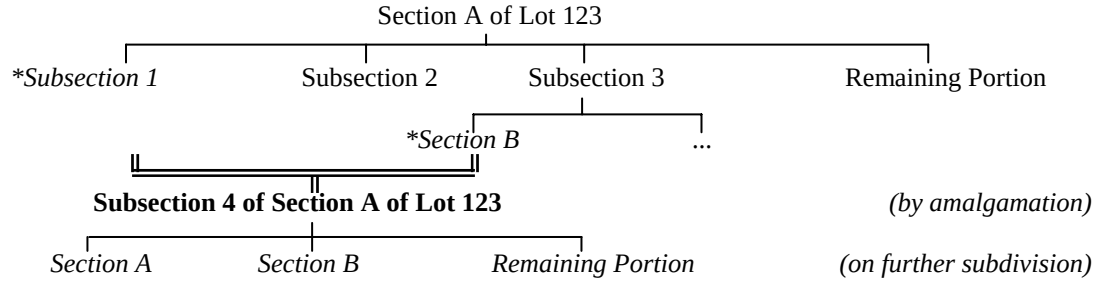
* subdivided land parcels involved in the amalgamation

Example 14: Amalgamation involving some of the subdivided portions of Lot 123 (excluding the Remaining Portion of Lot 123)



* subdivided land parcels involved in the amalgamation

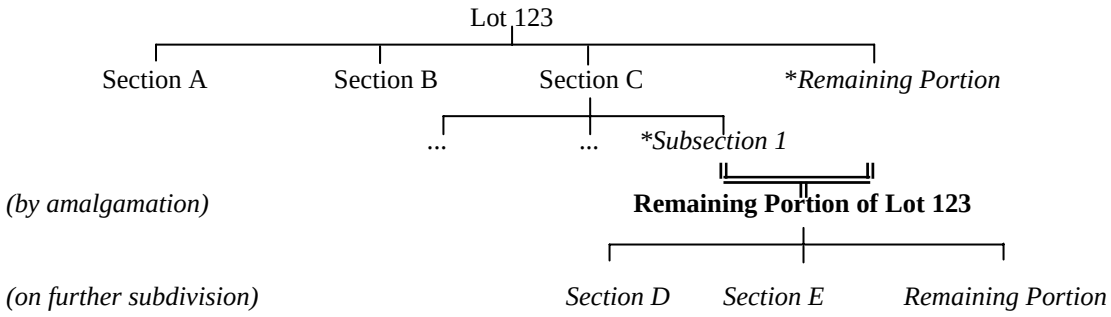
Example 15: Amalgamation involving some of the subdivided portions of Section A of Lot 123 (excluding the Remaining Portion of Section A of Lot 123)



* subdivided land parcels involved in the amalgamation

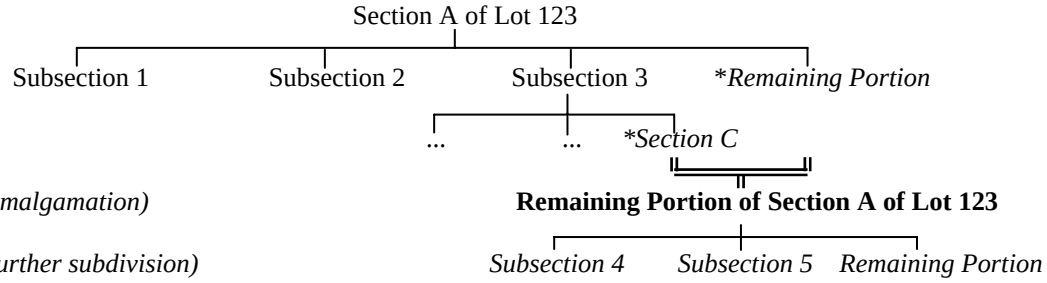
60. The resultant land parcel shall be designated as the Remaining Portion of the original lot/section/subsection if the highest level of the subdivided portions in the amalgamation involves the Remaining Portion of that lot/section/subsection. On further subdivision of the resultant land parcel, the new sections/subsections shall be designated in the manner as described in Paragraph 56 above (see Examples 16 and 17).

Example 16: Amalgamation involving some of the subdivided portions of Lot 123 (including the Remaining Portion of Lot 123)



* subdivided land parcels involved in the amalgamation

Example 17: Amalgamation involving some of the subdivided portions of Lot 123 (including the Remaining Portion of Section A of Lot 123)



* subdivided land parcels involved in the amalgamation

61. For any further subdivision of a section/subsection/Remaining Portion that was subdivided not following any one of the patterns of lot designation as described in Paragraphs 53 to 60, the authorized land surveyor shall decide the lot designation for the new subdivision as appropriate.

62. The following abbreviations shall be used for the designations of the subdivided lots shown on survey record plans and land boundary plans.

(a)	Section	- S.
(b)	Subsection	- ss.
(c)	Remaining Portion	- RP

e.g. Lot 123 S.O ss.1 S.I RP - The Remaining Portion of Section I of Subsection 1 of Section O of Lot 123

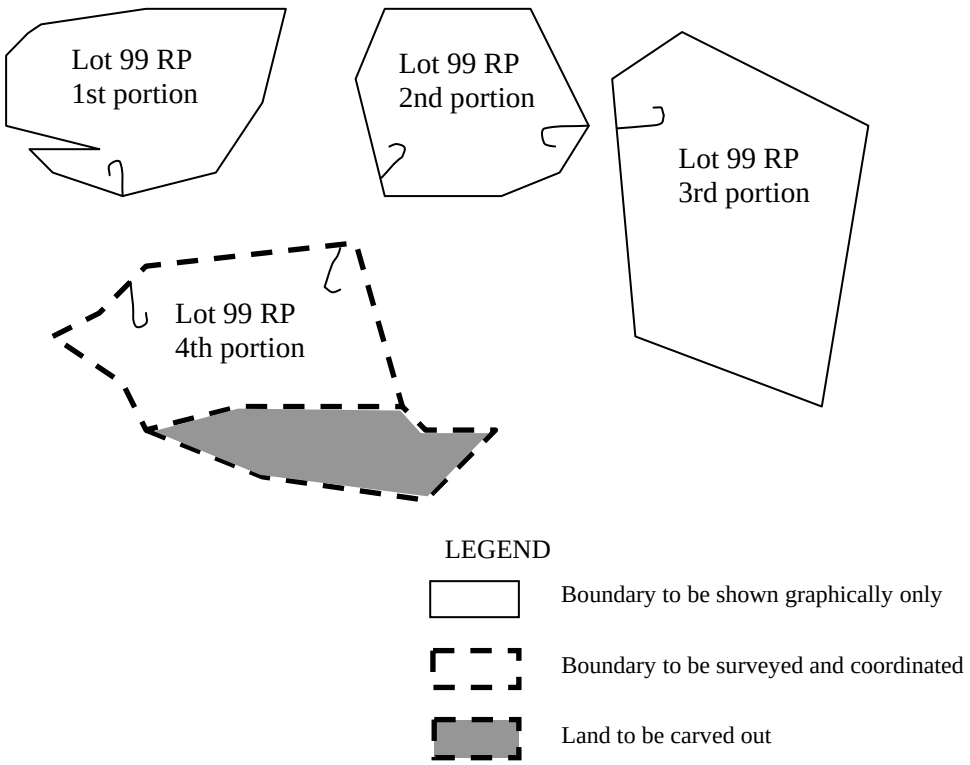
(B) Subdivision of a Land Parcel of Special Configuration

63. The boundaries of a land parcel shall be precisely defined by survey prior to a subdivision. The exact area of the land parcel to be subdivided must be derived and ascertained by the survey. However, for land parcels which consist of separating pieces of land or are enclosing some other lots/sections, to establish the boundaries of these parcels would very often require considerable survey input in terms of both field work and land record search. If a subdivision belongs to either one of the two cases as described in Paragraphs 64 or 65 below, the following principles shall be adopted for the subdivision survey:-

64. Case 1: Subdivision of land parcels consisting of separating pieces of land

For cases where it is only required to subdivide from one of the separating pieces of a land parcel, it is acceptable to just define the boundaries of that piece of land in question. The boundaries of the other pieces of land would only need to be shown graphically on the land boundary plan and survey record plan.

Example 1



Areas to be shown on SRP/LBP

Section	Area	
Lot 99 S.A	100.0m^2	
Lot 99 RP	1899.4m^2	[588.4 m^2 (Surveyed) + 1311m^2 (Scaled)]

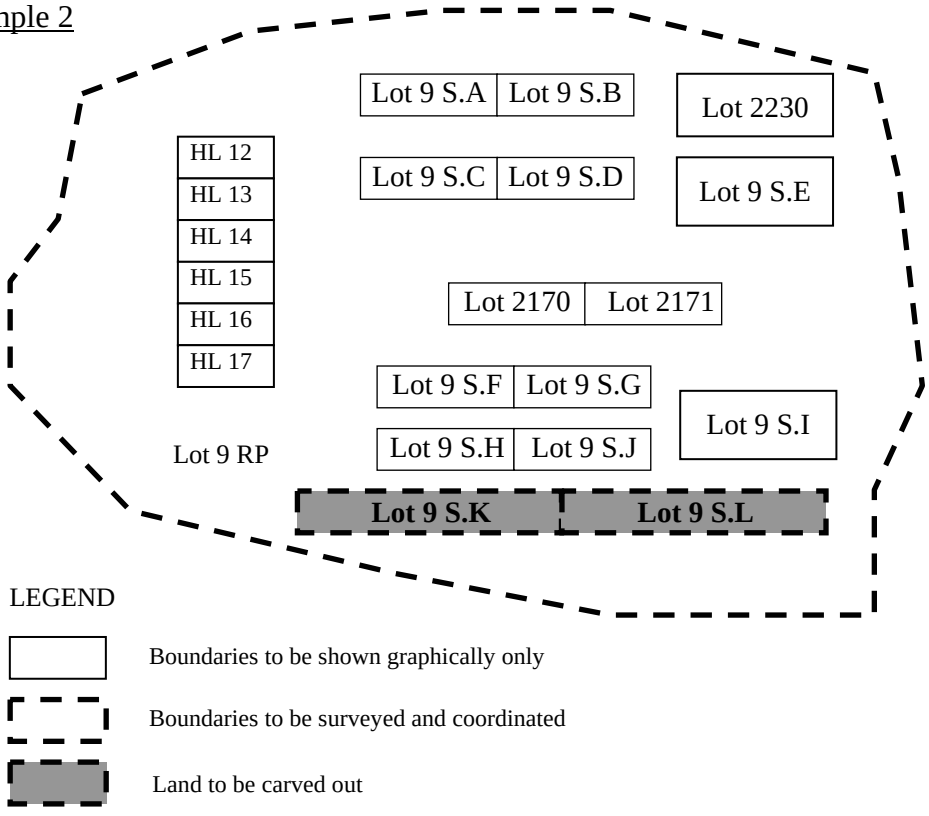
Area computation for the remaining portion (to be shown in the survey report only)

Land Parcel	Area	Remarks
1st portion	301m^2	Scaled
2nd portion	230m^2	Scaled
3rd portion	780m^2	Scaled
4th portion	588.4m^2	Surveyed (less the area of the new section)
	1899.4m^2	(total)

65. Case 2: Subdivision of land parcels which are enclosing other lots or sections

Where sections are to be carved out from a land parcel which is enclosing other lots or sections, it is acceptable to just define the peripheral boundaries of the subject land and the boundaries of the new sections, provided that the boundaries of the new sections being defined will not prejudice the boundary definition of all other existing lots/sections enclosed by the subject land. As a general guideline, the existing lots/sections enclosed by the subject land will need to be surveyed with their boundaries precisely defined if they fall within 3 metres from any boundary line of the new sections. Existing lots/sections which fall outside this clearance limit would only need to be shown graphically on the land boundary plan and survey record plan.

Example 2



Areas to be shown on SRP/LBP

Section	Area
Lot 9 S.K	80.0m^2
Lot 9 S.L	80.0m^2
Lot 9 RP	1234.5m^2 [2114.5m^2 – 880m^2 (Scaled)]

Area computation for the Remaining Portion (to be shown in the survey report only)

Existing Lots/Sections	Area	Remarks
Lot 9 RP (peripheral)	2114.5m^2	Surveyed
HL12	40.5m^2	Scaled
HL13	40.5m^2	Scaled
.		Scaled
.		Scaled
.		Scaled
Lot 9 S.K	80.0m^2	Surveyed
Lot 9 S.L	80.0m^2	Surveyed
	1234.5m^2	(by deduction)

66. The surveyed and/ or scaled areas of the remaining portion of the subject lot shall be shown on the land boundary plan and survey record plan. For clarity, a detailed breakdown showing the area computation for the remaining portion of the subject lot shall be included in the survey report.

SPECIFICATIONS FOR SURVEY MARKS

1. **Iron tube** shall consist of a galvanised iron pipe at least 350 mm long and 20 mm in diameter, driven vertically into the ground.

2. **Lead plug** shall consist of a hole drilled or punched into hard surface filled with lead and centred with a tack. The hole should be at least 8 mm in diameter and at least 15 mm deep.

3. **Iron spike** shall be at least 100 mm in length and 12 mm in diameter, driven into the ground to finish either flush with the ground surface or beneath it.

4. **Survey nail** shall be at least 40 mm in length, 4 mm in diameter and should have a head of at least 7 mm in diameter.

5. **Wooden peg** shall be made from hardwood and can be of two sizes:

(a) 25 mm square and 150 mm long, or
(b) 70 mm square and 400 mm long.

The position of the boundary corner will be marked on the top of the peg by a small metal tack.

6. **Cut mark** shall consist of a hole 5 mm in diameter and at least 10 mm deep, drilled into hard surface. It should be surrounded by a triangle shaped groove with equal sides 100 mm long and at least 2 mm deep.

7. **Permanent Survey Mark (PSM):** Any of the survey marks 1 to 4 above fixed on a permanent feature may be used as a PSM. Alternatively a well defined physical feature may be used as a Permanent survey mark as long as the feature chosen can be positively identified from a simple description or diagram on a survey record plan.

DRAUGHTING SPECIFICATIONS FOR SURVEY RECORD PLANS

1. Plan form

1.1 All survey record plans shall be fair drawn in black ink, on the specified survey record plan form in a standard transparent format, size A2 (420 mm x 594 mm). The length of this form may be extended from 594 mm to 700 mm to include a second column for tabulation of bearings and distances where required. A3 (297 mm x 420 mm) size may also be used for those plans at a scale of not less than 1:400.

1.2 A survey record plan shall be drawn on one plan form unless a reduction in scale will adversely affect the quality of the plan. Should two or more plan forms be required, each sheet shall be boldly labelled 'sheet .... of .... sheets' and clear joining lines will be shown between sheets.

2. Scale

2.1 All survey record plans shall be produced at a preferred metric scale e.g. 1:2000; 1:1000; 1:500; 1:200; 1:100 or 1:50, that will suitably and clearly illustrate the full details of the survey. Where necessary, intricate and cluttered detail shall be clarified by an enlarged and/or distorted diagram.

3. Grid (plotting) lines

3.1 Plans shall normally be plotted on a grid parallel to the sides of the plan form, north uppermost. However, when the orientation of the survey dictates otherwise, the grid may be tilted, but never be more than 90° from the normal north pointing.

3.2 The position of the grid lines shall be indicated by intersecting cuts at the plan border and at least two meridians and two perpendiculars, suitably spaced, shall be shown. The co-ordinate value of each grid line should be shown.

4. Plan drawing and detail

4.1 All survey record plans shall be drawn, either by computer plotter, by hand, or by a combination of both.

4.2 The plans shall clearly show all traverses run, information adopted from previous surveys used for the boundary definition. Boundary and traverse lines adopted shall be annotated as such on the face of the plan. If possible, traverse bearings and distances shall be shown on the face of the plan but may also be tabulated with co-ordinates of the radiated points in the margin of the plan.

4.3 All survey marks used shall be described on the face of the plan by type and number. In the case of old marks found or adopted, a reference to the adopted survey record plan shall be included, either beside the mark, or if all the old marks originate from the same survey, in the margin. Details of the ground placement of all marks except those placed flush in concrete roads and footpaths and those adopted should be shown. e.g. IS3 (road edge of channel); OIT7 (buried 0.10m).

4.4 New traverse survey marks shall be numbered consecutively, commencing from Arabic numeral 1. Boundary marks shall be labelled alphabetically in consecutive order in a clockwise direction from the most northerly north-west corner. If Z is reached, then the sequence shall be continued by prefixing A to the alphabet, then B, and so on. e.g. Z, AA, AB, etc. The letters I and O should not be used.

4.5 The legal description of the subject lot or parcel and its abuttals as well as all relevant road and street names shall be shown on the face of the plan.

4.6 Areas of all land parcels shall be shown on the face of the plan and qualified with the word 'about'.

4.7 Radiation lines which have been observed but not measured shall be annotated 'obs only'.

4.8 A standard north point, as specified at Paragraph 6(1)(h) of this specification, shall be shown on all survey record plans.

4.9 The plan number of survey record plan used for reference shall be shown on the face of the plan.

5. Symbols and abbreviations

5.1 The following symbols shall be used to indicate the type of survey mark placed, found or adopted :-

		New/Adopted	Old mark found
(a)	Boundary stone	□	■
(b)	Geodetic survey station	◎	◉
(c)	Permanent Survey Mark	⏆	⏆
(d)	All other survey marks	○	●

5.2 The following abbreviations shall be used when referring to specific survey marks:-

(a)	Boundary stone	- BS
(b)	Survey nail	- Nail
(c)	Cut mark	- CM
(d)	Iron spike	- IS
(e)	Iron tube	- IT
(f)	Lead plug	- LP
(g)	Wooden peg	- Peg
(h)	Permanent Survey Mark	- PSM
(i)	Picket box (over any mark)	- PB
(j)	Urban survey mark	- USM
(k)	Concrete pillar	- CP

Additionally all existing survey marks found, with the exception of boundary stones, will be prefixed with O, for old e.g. OIT.

5.3 Other allowable abbreviations are:-

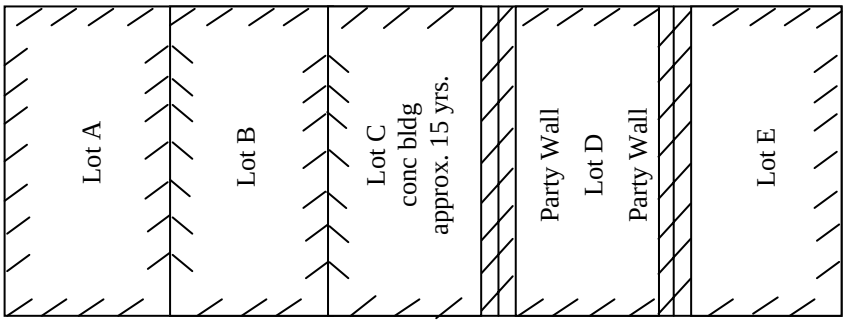
(a)	Adopted	- adpt
(b)	Boundary	- bdy
(c)	Building	- bldg
(d)	Calculated	- calc
(e)	Concrete	- conc
(f)	Observed	- obs

6. Line work and lettering

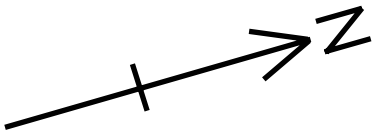
6.1 Line work on survey record plans shall be standardised as follows:-

	Line	Recommended Gauge	Shown
(a)	Measured and, or, observed lines; and origins of bearings	0.25 mm	– – – – – – –
(b)	Adopted or calculated lines and grid lines	0.25 mm	———
(c)	Boundary lines of subject lot or parcel	0.7 mm	▬▬▬
(d)	Boundary lines, other than (c) above, sheet joining lines	0.5 mm	– – – – –

	Line	Recommended Gauge	Shown
(e)	Road/street alignments	0.5 mm	———
(f)	Fences (Annotate “fence on boundary” if appropriate)	0.25mm	—|—|—|—|—|—
(g)	Building or structures (Describe fully - add approximate age)	0.25 mm	(see below)



(h) Standard north point symbol 0.5 mm (see below)



6.2 Specifications for lettering and figure work are:

	Item	Recommended Height	Recommended Gauge
(a)	Descriptions and areas of subject lots, road names, plan titles, sheet numbers and sheet joining line labels	7 mm	0.7 mm
(b)	Descriptions of abuttals, etc., diagram titles, specific usage names or descriptions, standard data in bottom panels and SRP reference	5 mm	0.5 mm
(c)	All other lettering and figure work	2.5 mm	0.25 mm

Appendix C

RECOMMENDED FORMAT FOR SURVEY REPORTS

All survey reports on land boundary survey should contain the following elements:-

1. Purpose

Give information for identification of the subject lot such as designation, location and purpose of survey.

2. Background

Give background information and root of title or history of the subject lot. For sections, provide a 'family tree' of the history of divisions and subdivisions in terms of designations and areas extracted from legal documents.

3. Documentary Evidence

List all documentary evidence searched, including any conflicting information, plans, etc. obtained from the Land Registry and the District Survey Office.

4. Survey Origin

Indicate the survey origin, e.g. traverse stations used.

5. Ground Evidences

List or describe the ground evidence surveyed including previous survey marks.

6. Local Enquiries

Report findings.

7. Verification of Correlated Boundary on Lot Index Plan

Verify the boundary as shown on the Lot Index Plan based on the available evidence.

8. Evaluation of Boundary Evidence

Compare the boundary evidence. Describe any form of checking for agreement of the boundaries between the subject lot and the adjacent lots. Indicate if any investigation has been made on checking the areas and/or dimensions of the adjoining lots. Report any irregularities found, e.g. inconsistencies of boundary evidence, possible encroachments, etc. Also give your views on the merits of each piece of evidence as to its reliability and weighting. In case of significant discrepancy, give your opinion on the suspected cause.

9. Conclusion

Describe how each section of the boundary is determined and give reasons for accepting or rejecting evidence. Compare the registered area, DD plan area, Lot Index Plan area and surveyed area of the subject lot.

10. Enclosures

Enclose all documents that have been based on to define the boundary together with the land boundary plan, survey record plan and traverse computation sheet.

11. Authorized Land Surveyor's Certification

(1) Except for cases under Sub-paragraph (2) below, the survey report should bear the certificate signed by the authorized land surveyor in the following form:-

I, …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey for the definition of Lot …… has been carried out by me, or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that this report correctly represents my work completed on the …… day of ……. 20…… .
Dated this …… day of …… 20…… .

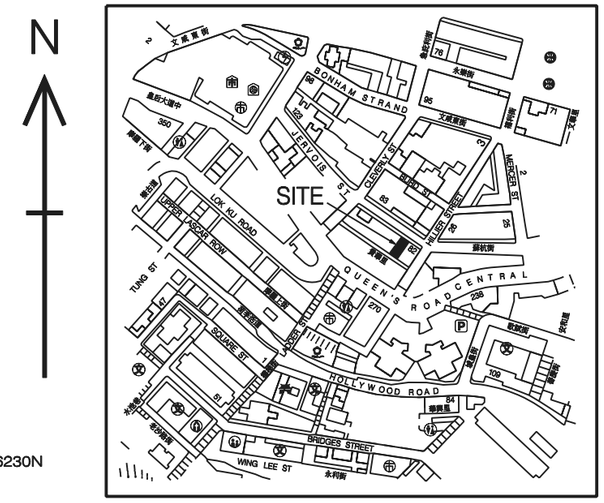
……
Authorized Land Surveyor

(2) Where the land boundary survey is carried out partly by or under the supervision or direction of another authorized land surveyor, the survey report should bear the certificate signed by the authorized land surveyor in the following form:-

I, …… , an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey for the definition of Lot …… has been carried out partly by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and partly by or under the supervision or direction of another authorized land surveyor, and that this report correctly represents my work completed on the …… day of ……... 20…... .
Dated this …… day of …… 20…... .

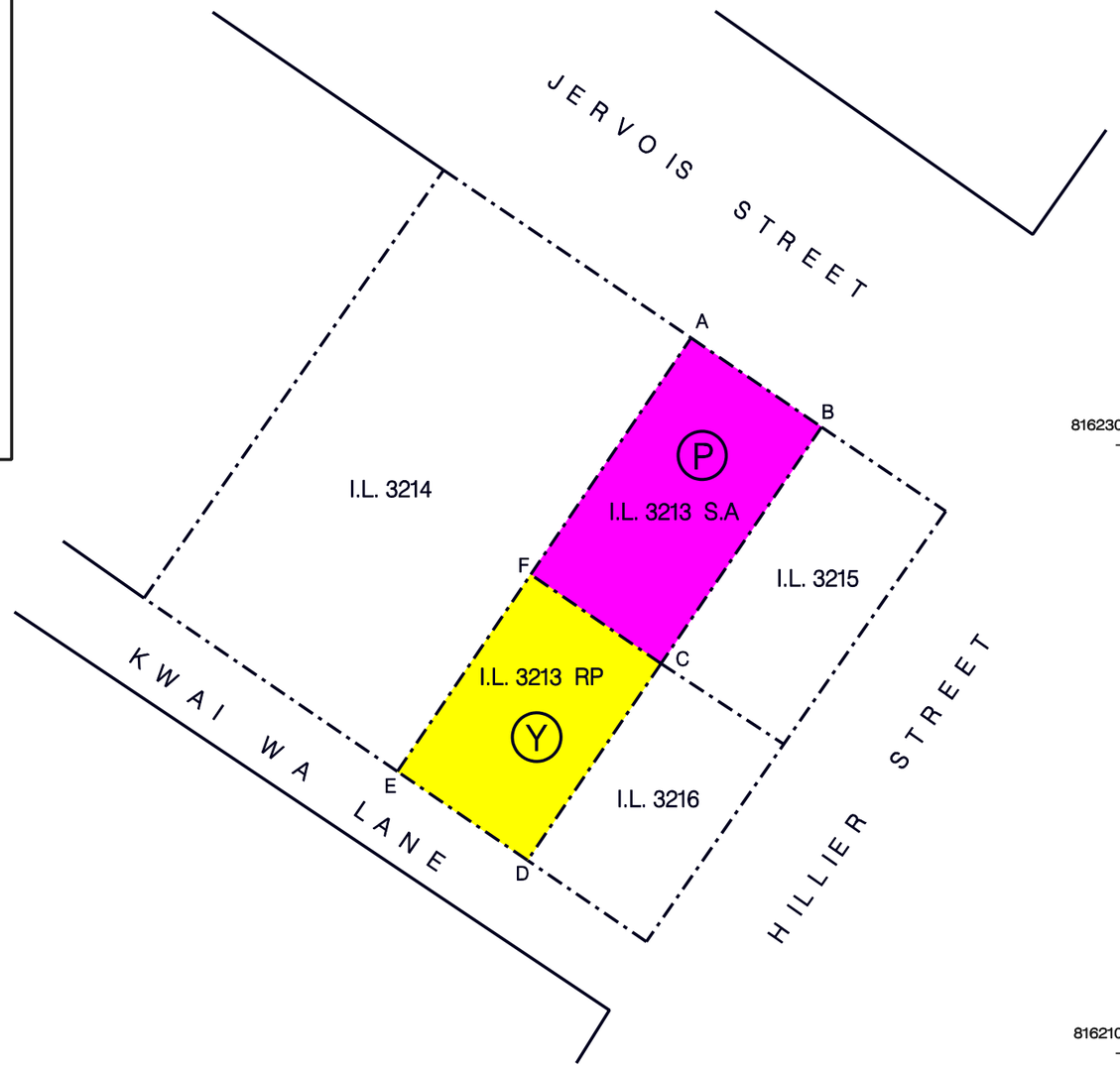
……
Authorized Land Surveyor

LOCATION PLAN



SCALE 1 : 5000

SAMPLE PLAN ONLY



Ref	Colour
B	BROWN
G	GREEN
I	INDIGO
O	ORANGE
P	PINK
R	RED
V	VIOLET
Y	YELLOW
GY	GREY
'L'	Prefixes light shades of above

SCALE 1:200

METRES 5 0 5 10 15 20 METRES

LOT COORDINATES & DIMENSIONS

Boundary Point	Bearing ° ′ ″	Distance in metres	Northing	Easting
I.L. 3213 S.A				
A			816233.529	833612.616
B	124 22 00	5.200	816230.594	833616.908
C	214 10 00	9.400	816222.816	833611.629
F	304 22 00	5.189	816225.745	833607.346
A	34 06 00	9.400	816233.529	833612.616
I.L. 3213 RP				
F			816225.745	833607.346
C	124 22 00	5.189	816222.816	833611.629
D	214 10 00	7.819	816216.346	833607.239
E	304 20 00	5.181	816219.268	833602.960
F	34 06 00	7.822	816225.745	833607.346

Table of Subdivisions

SECTION		AREA
I.L. 3213 S.A	(Coloured pink)	48.8 m² (About)
I.L. 3213 RP	(Coloured yellow)	40.6 m² (About)
Total Area		89.4 m² (About)

I, Chan Tai Man, an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this land boundary plan has been prepared from land boundary surveys that were carried out by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance , and that this plan correctly represents that survey completed on the 1st day of November, 2003 .

Dated this 7th day of November, 2003 .

Chan Tai Man
.....
Authorized Land Surveyor

District : HONG KONG
Date of Survey : NOVEMBER 2003
Survey Sheet No. : 11–SW–8A
Survey Record Plan No. : SRP/HK/888/0001/D1

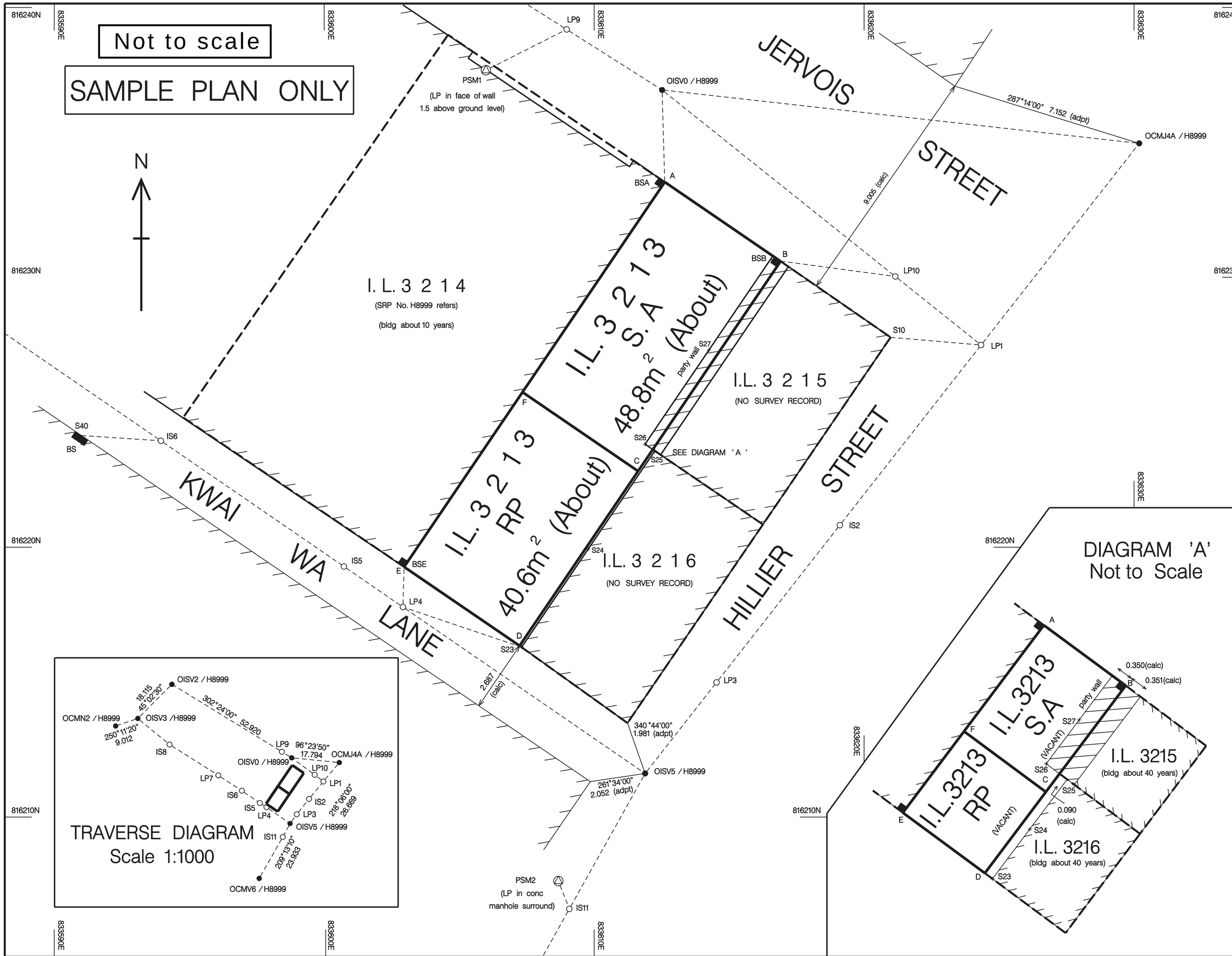
PLAN OF INLAND LOT Nos. 3213 S.A & RP
BEING SUBDIVISION OF INLAND LOT NO. 3213

FOR OFFICIAL USE

Land Boundary Plan No.: LBP/HK/888/0001/D1

Not to scale

SAMPLE PLAN ONLY



Notes:

SUBJECT LOT COORDINATES & DIMENSIONS:

Boundary Point	Bearing	Distance	N	E
SUBJECT LOT NO.- I.L. 3213 S.A				
A			816233.529	833612.616
B	124°22'00"	5.200	816230.594	833616.908
C	214°10'00"	9.400	816222.816	833611.629
F	304°22'00"	5.189	816225.745	833607.346
A	34°06'00"	9.400	816233.529	833612.616
SUBJECT LOT NO.- I.L. 3213 RP				
F			816225.745	833607.346
C	124°22'00"	5.189	816222.816	833611.629
D	214°10'00"	7.819	816216.346	833607.239
E	304°20'00"	5.181	816219.268	833602.960
F	34°06'00"	7.822	816225.745	833607.346

TRAVERSE:

Station	Bearing	Distance	N	E
OCMJ4A/H8999			816234.964	833630.193
LP1	218°06'00"	9.497	816227.490	833624.334
IS2	218°06'00"	8.480	816220.816	833619.102
LP3	218°06'00"	7.403	816214.990	833614.535
OISV5/H8999	218°06'00"	4.289	816211.614	833611.889
OISV5/H8999			816211.614	833611.889
LP7	304°30'10"	32.640	816230.099	833584.993
IS8	304°02'40"	21.791	816242.295	833566.939
OISV3/H8999	310°33'00"	15.694	816252.496	833555.016
OISV5/H8999			816211.614	833611.889
LP4	304°30'10"	10.889	816217.782	833602.915
IS5	304°30'10"	2.651	816219.283	833600.730
IS6	304°30'10"	8.228	816223.943	833593.950
LP7	304°30'10"	10.868	816230.099	833584.993
LP1			816227.490	833624.334
LP10	308°40'20"	4.070	816230.032	833621.156
OISV0/H8999	308°40'20"	11.062	816236.942	833612.517
OISV5/H8999			816211.614	833611.889
IS11	209°13'10"	5.750	816206.596	833609.082
OCMV6/H8999	209°13'10"	18.183	816190.726	833600.206
OISV0/H8999			816236.942	833612.517
LP9	302°24'00"	4.188	816239.186	833608.981
OISV2/H8999	302°24'00"	48.732	816265.294	833567.833
OISV2/H8999			816265.294	833567.833
OISV3/H8999	225°02'30"	18.115	816252.496	833555.016
OCMN2/H8999	250°11'20"	9.012	816249.442	833546.537

PSM RADIATIONS:

Surveyed Point	Bearing	Distance	N	E
Fr.LP9			816239.186	833608.981
To PSM1	243°10'00"	3.352	816237.673	833605.990
Fr.IS11			816206.596	833609.082
To PSM2	338°26'20"	1.112	816207.630	833608.673

RADIATIONS:

Surveyed Point	Bearing	Distance	N	E
Fr.LP1			816227.490	833624.334
To S10	274°54'00"	3.364	816227.777	833620.982
Fr.LP4			816217.782	833602.915
To S23	108°40'20"	4.643	816216.296	833607.314
To S24	72°36'50"	7.194	816219.932	833609.781
To S25	58°12'10"	10.981	816223.568	833612.248
To S26	56°04'20"	10.810	816223.815	833611.884
To S27	49°58'30"	14.804	816227.303	833614.251
To BSE	01°46'00"	1.481	816219.262	833602.961
Fr.IS6			816223.943	833593.950
To S40	273°47'00"	2.947	816224.137	833591.009
Fr.OISV0/H8999			816236.942	833612.517
To BSA	178°22'00"	3.421	816233.522	833612.615
Fr.LP10			816230.032	833621.156
To BSB	277°38'00"	4.291	816230.602	833616.903

I Chan Tai Man, an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey record plan has been prepared from land boundary surveys that were carried out by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that this plan correctly represents that survey completed on the 1st day of November 2003 .

Dated this 5th day of November 2003 .

Chan Tai Man
.....
Authorized Land Surveyor

District	: HONG KONG
Date of Survey	: NOVEMBER 2003
Scale : 1 : 100	Field Bk : 888
Survey Sheet	: 11–SW–8A
Reference SRP's	: H8999

PLAN OF I.L. 3213 S.A AND RP
BEING SUBDIVISION OF I.L. 3213

TABLE OF SUBDIVISIONS

SECTION	AREA
I.L. 3213 S.A	48.8 m^2 (About)
I.L. 3213 RP	40.6 m^2 (About)
TOTAL AREA	89.4 m^2 (About)

FOR OFFICIAL USE

Survey Record Plan No.: SRP/HK/888/0001/D1

Specifications and Practice Guide for Establishing GPS Control Stations for Land Boundary Surveys

October 2004

Version 2.0

Survey and Mapping Office
Lands Department
The Government of the Hong Kong Special Administrative Region

Preface

This document has two parts.

Part I (**Specifications)** states the mandatory requirements in accuracy standard and quality requirements for establishing GPS control stations for land boundary surveys.

Part II (**Practice Guide)** sets out the recommended practice for survey staff of the Survey and Mapping Office, Lands Department in establishing GPS control stations and maintaining survey records for quality checking.

Contents

Part I

Specifications

1 Accuracy standard

The standard error of any GPS baseline measurement shall not exceed σ, where

$\sigma = \sqrt{[10^2 + (3L)^2]}$ mm, *(Note: L = length of baseline in km)* or

σ = 30mm;

whichever is the less.

2 Control origin

A new station to be fixed by GPS technique shall be connected to at least two Hong Kong GPS Control Stations established by the Geodetic Survey Section of Lands Department and situated within 20 km from the new station.

A GPS control station shall be checked before it is adopted as a control origin. The discrepancy between any measured baseline component and the respective computed baseline component derived from published values shall be less than 2σ.

(i.e. $dLat_{obs} - dLat_{comp} < 2\sigma$ and

$dLong_{obs} - dLong_{comp} < 2\sigma$)

3 Station connection

Every new GPS station shall be fixed by at least 3 independent GPS baselines connected directly to, at least, two GPS control stations.

4 Observation sessions

At least two sessions of observations shall be made for each GPS baseline. The time lapse between observation sessions shall not be less than 30 minutes at different times of day.

5 GPS Baseline processing

All GPS baseline solutions shall be integer ambiguity fixed solutions.

The discrepancy of any baseline component of repeated baselines (i.e. dLat maximum – dLat minimum, dLong maximum – dLong minimum or equivalent) shall be less than $2\sqrt{2}\sigma$.

6 Least squares network adjustment

All GPS baselines used for computing the solution shall be independent baselines.

Every new GPS station shall be fixed by at least 3 independent baselines obtained from not less than 2 observation sessions.

The residuals of GPS baseline components (i.e. V_{Lat}, V_{Long} or equivalent) shall be less than 2σ.

- End of Part I -

Part II

Practice Guide

1 Equipment

Single-frequency or dual-frequency GPS receivers capable of making carrier phase observations can be used for establishing control stations for land boundary surveys. However, for a task with baselines longer than 5 km, it is recommended that dual-frequency GPS receivers should be used.

GPS equipment should be calibrated and records of calibration should be maintained.

2 Control origin

Every new station to be fixed by GPS technique shall be connected to at least two Hong Kong GPS Control Stations established by the Geodetic Survey Section of Lands Department and situated within 20 km from the new station.

Under normal circumstances, the operating Satellite Positioning Reference Stations nearest to the new station should be used as control origin.

3 Location of a new station

The site for a new station should

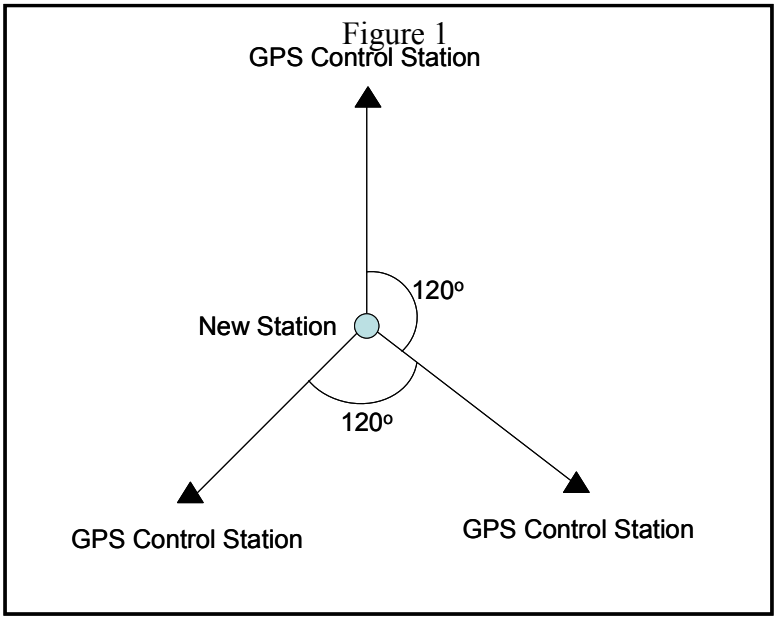
a) have an open sky window;
b) be stable;
c) be clear from significantly reflective surfaces;
d) be located away from radio transmission sources; and
e) preferably be inter-visible with other survey stations.

4 Observation scheme

4.1 Station connection and network geometry

Every new station should be fixed by at least 3 independent GPS baselines and be connected to, at least, two GPS control stations. The intersection angle of the baselines connecting the new station to GPS control stations should be geometrically strong (preferably within the range of 30^{o} to 150^{o}). An example of good network geometry is illustrated in Figure 1.

Figure 1



4.2 Observation sessions

Every new station should be fixed by two or more observation sessions separated by a time lapse of not less than 30 minutes at different times of day. This will allow independent observations under different satellite constellations be obtained and enable errors due to multi-path effect be detected. An example illustrating the observation sessions and corresponding independent baselines is shown in Figure 2 below :

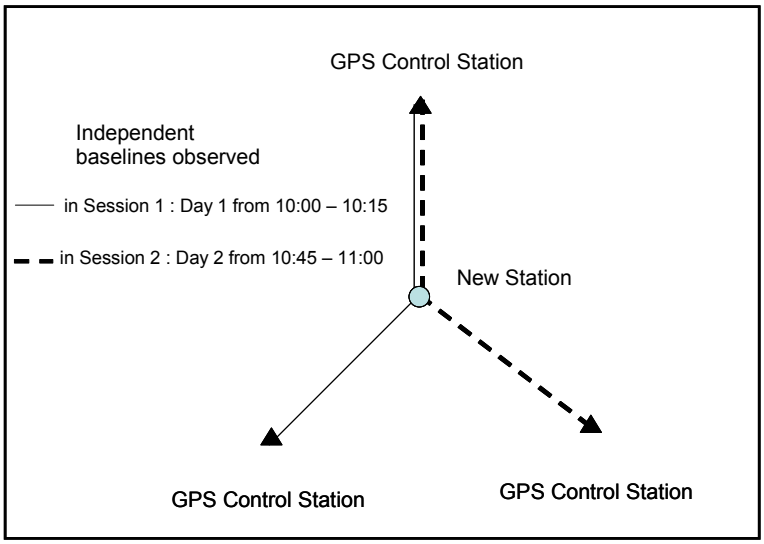


Figure 2

5 Reconnaissance and mission planning

Obstruction diagrams should be prepared during reconnaissance. Up-to-date satellite almanac should be referred in mission planning to identify suitable time slots for taking GPS observations.

6 Recommended practice for GPS observations

The following practice is recommended:

a) Receiver setting:
   (i) The number of satellites≥ 5
   (ii) Elevation mask ≥ 15°
   (iii) Epoch rate = 5 seconds;
b) Antenna should be oriented to north;
c) Antenna should be re-setup for every observation session;
d) Antenna height (from ground mark to Antenna Reference Point (ARP)) should be measured and recorded to the nearest millimetre;
e) Each observation session ≥ 15 minutes with GDOP < 5;
f) Information to be recorded in field notes:
   (i) Date of survey
   (ii) Start/Stop time
   (iii) Equipment ID
   (iv) Antenna height
   (v) Elevation mask angle
   (vi) GDOP during observation
   (vii) No. of satellites observed
   (viii) Any special event which may affect the quality of the observation (such as bad weather condition).

7 Measurements for independent check

New stations fixed by GPS should be independently checked by means of angular and linear measurements whenever practicable.

8 GPS data processing

8.1 Pre-processing

The purpose of pre-processing is to ensure that the station names, antenna heights and antenna calibration models have been entered correctly. (Note: The antenna calibration models can be obtained from the Geodetic Survey Section of Lands Department.)

8.2 GPS baseline processing

Particular attention should be paid to the following points during baseline processing:

a) The processing parameters (e.g. ephemeris, ionospheric and tropospheric models etc.) shall be appropriately set;
b) The initial coordinates of GPS control stations for baseline processing should be the geodetic coordinates (i.e. Latitude, Longitude and Ellipsoidal Height) in the global reference frame : International Terrestrial Reference Frame 96 (ITRF 96);
c) Only those baselines with fixed integer ambiguity solution should be accepted;
d) The discrepancy of any horizontal component of repeated baselines (e.g. dLat maximum – dLat minimum, dLong maximum – dLong minimum) should be less than $2\sqrt{2}\sigma$. Otherwise, the processing parameters should be examined and the observation data should be checked and cleaned for re-processing;
e) The following types of data and parameters should be critically examined in the course of data cleaning:
    i) Data with poor satellite geometry (GDOP > 5)
    ii) Data with many cycle slips
    iii) Data with large phase residuals
    iv) Processing parameters used; and
f) Excessive data cleaning should always be avoided.

8.3 Least squares network adjustment

All GPS baselines used for computing the solution shall be independent baselines. Every new GPS station shall be fixed by at least 3 independent baselines obtained from not less than 2 observation sessions.

The observations shall be properly weighted.

The residual (i.e. correction) of each baseline component (e.g. V_{Lat}, V_{Long}) shall be less than 2σ.

8.4 Datum transformation and map projection

The datum transformation and map projection parameters provided by the Geodetic Survey Section of Lands Department should be used for transforming the geodetic coordinates in ITRF 96 into geodetic coordinates in Hong Kong 1980 Geodetic Datum and further into Hong Kong 1980 Grid Coordinates.

9 Independent check

The network adjustment result should be checked against the terrestrial observations. If the discrepancy between an observed value (of an angle or a distance) and its corresponding computed value (derived from the network adjustment result) exceeds the survey tolerance as stipulated in the Land Boundary Survey Regulation, further investigation should be made.

10 Survey records

Survey records should include the following items:

a) GPS control diagrams;
b) Obstruction diagrams;
c) Field notes (as described in 6(f));
d) Softcopy of full set of raw data in RINEX (Receiver Independent Exchange) Format;
e) GPS control station summary;
f) New survey station summary;
g) Baseline processing parameters;
h) Baseline processing results;
i) Checking of control origin;
j) Comparison of repeated baselines;
k) Least square network adjustment results (including residuals of all observations);
l) Final coordinates of new GPS stations:
    (i) ITRF96 Geodetic Coordinates
    (ii) HK 1980 Grid Coordinates;
m) Independent check by terrestrial measurements; and
n) Backup of the GPS computation work project in digital form.

- End -

Appendix

Sample of GPS Survey Records

a) GPS control diagrams；

b) Obstruction diagrams；

c) Field notes (as described in 6(f))；

d) Softcopy of full set of raw data in RINEX (Receiver Independent Exchange) Format；

e) GPS control station summary；

f) New survey station summary；

g) Baseline processing parameters；

h) Baseline processing results；

i) Checking of control origin；

j) Comparison of repeated baselines；

k) Least squares network adjustment results (including residuals of all observations)；

l) Final coordinates of new GPS stations:

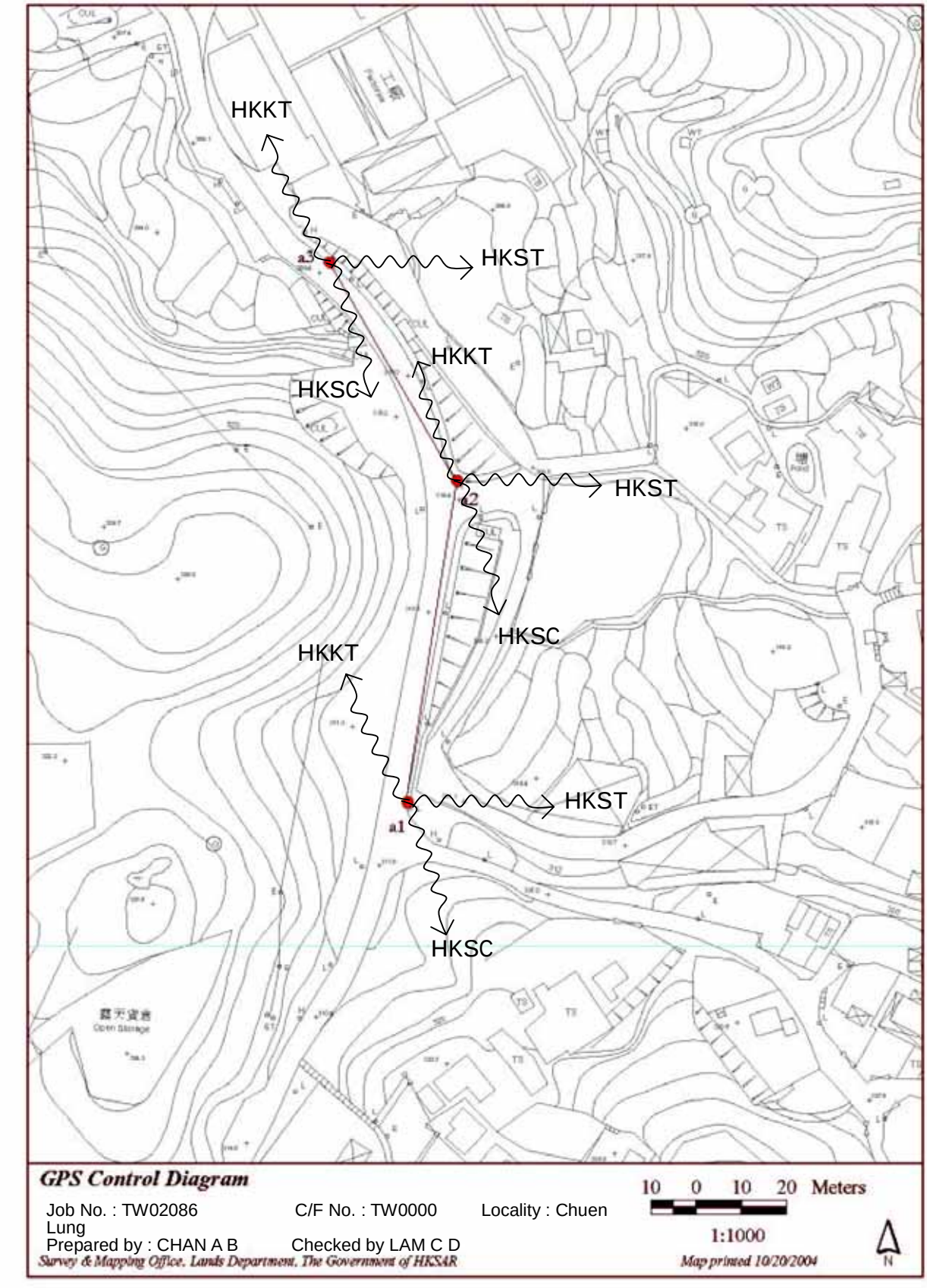
(i) ITRF96 Geodetic Coordinates；

(ii) HK1980 Grid Coordinates；

m) Independent check by terrestrial measurements；and

n) Backup of the GPS computation work project in digital form.

GPS control diagrams Appendix a



GPS SURVEY MISSION PLANNING FORM

(This form is used for determining the suitable time for taking GPS observation)

Station No.: a2 Location: Chuen lung Comp. Folder No./Job No.: TW0000

Step 1: Select suitable station position for GPS observation.
Step 2: Use an abney level and magnetic compass to measure the azimuth and elevation of the obstruction around the survey station.
Step 3: Record the azimuth and elevation of the obstruction in the following table and plot the obstruction in the Obstruction Diagram below. No need to record obstruction below 15° if the elevation mask is set to 15°. If there is no obstruction then indicate "No Obstruction" in the following table.

Azimuth	Elevation	Azimuth	Elevation	Azimuth	Elevation	Azimuth	Elevation
210	8	340	20				
246	25	345	12				
250	45	16	11				
255	25	60	17				
310	13	160	10				

Step 4: Record the parameters for mission planning in the following table.

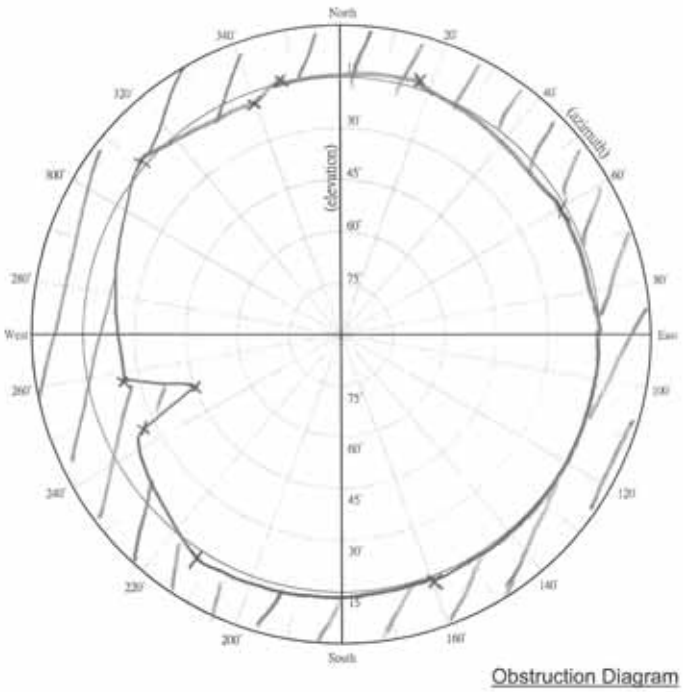
Approximate Station Position	Latitude :	22° 23'
	Longitude :	114° 06'
	Height :	300
Note: The approximate position can be estimated by scaling the position from a map		

Elevation Mask	(e.g. 15°)	15
GDOP	(e.g. < 5)	5
No of Satellite	(e.g. > 5)	5
Date of Almanac		10.12.2002

Step 5: Use the mission planning software to determine the suitable time for observation, then indicate the planned observation time below.

Time suitable for taking GPS observation

	Date	Starting time	Ending time
1	11.12.2002	08:30	11:45
2	11.12.2002	12:10	16:00
3			
4			
5			



Obstruction Diagram

Notes for mission planning:
- The purpose of mission planning is to determine the suitable time for taking GPS observation which can satisfy the satellite geometry requirement.
- When determining satellite availability for simultaneous GPS observation at several stations, the surveyor shall consider the effect of the obstruction at all the stations where simultaneous observations are taken.
- Up-to-date satellite almanac information (preferably collected within a few days before the survey) shall be used for mission planning in order to have an accurate prediction of the number of satellites available for observation during the observation session.
- The number of satellites observed shall be at least 5.
- The GDOP value shall not be greater than 5.
- The elevation mask shall be 15°.

Notes for selecting station position for GPS observation:
- The environment preferably has an open sky window. This criterion can be checked by mission planning.
- The ground shall be stable.
- The station shall be clear from significantly reflective surfaces to avoid multi-path effect.
- The station shall be located away from radio transmission sources to avoid signal interference.
- The stations shall preferably be inter-visible among one another so that observation between stations can be made using terrestrial survey equipment.

Remarks: _____

Prepared by : CHAN A B Checked by : LAM C D
Date : 11.12.2002 Date : 18.12.2002

Field Sheet for GPS Measurement

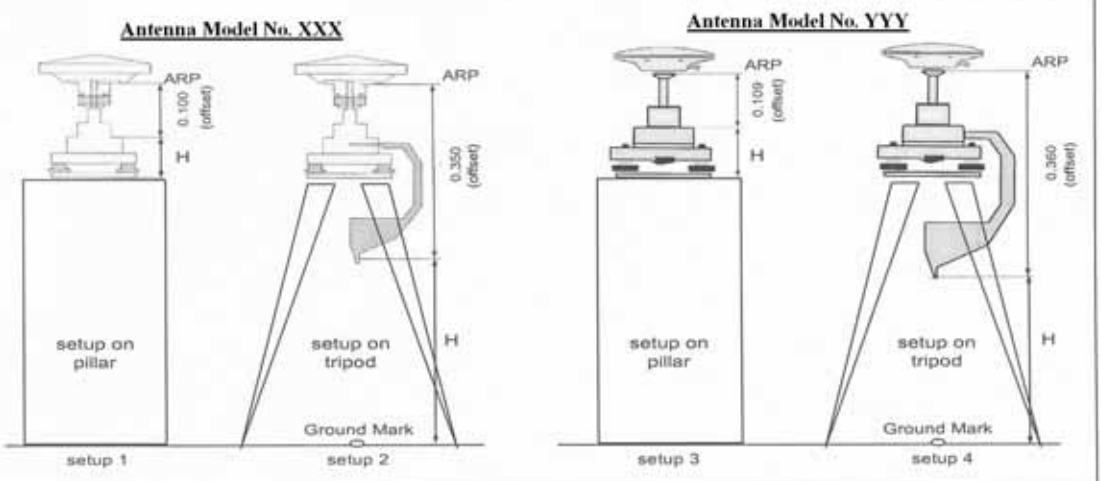
STATION INFORMATION :

Station Name : a2 Station 4-Character Code : cla2 Location : chuen lung

Instrument No.: TW01 Job No.: TW02086 Date : 11.12.2002

Instrument Operated by : Chan A B Field Notes Checked by : Lam C D

ANTENNA HEIGHT DIAGRAM (tick as appropriate) Setup type : 1 ☐ 2 ☐ 3 ☐ 4 ☑



ANTENNA HEIGHT MEASUREMENT (The antenna reference point (ARP) is at the bottom of the antenna.)

Notes: Field staff shall measure the vertical distance from the top of station to the intermediate point (H) at the beginning and ending of the GPS observation session.

		Time	Height Measurement to Intermediate Point (H)
Session 1	Starting	12 : 41	1.357
	Ending	12 : 56	1.357

Antenna Height Vertical distance from the top of station to ARP = 1.357 (mean (H)) + 0.360 (Offset from Intermediate Point to ARP) = 1.717

		Time	Height Measurement to Intermediate Point (H)
Session 2	Starting	13 : 53	1.162
	Ending	14 : 09	1.162

Antenna Height Vertical distance from the top of station to ARP = 1.162 (mean (H)) + 0.360 (Offset from Intermediate Point to ARP) = 1.522

ELEVATION MASK (tick as appropriate) ☐ 10° ☑ 15° ☐ 20° ☐ Others please specify _____

EQUIPMENT AND MEASUREMENT STATUS DURING OBSERVATION

Staff manning the GPS receiver shall check the operation of the receiver at regular interval (e.g. 5 minutes) and record the status of the equipment in the following table.

Time	No of Satellite	GDOP Value	Power Status (OK / not OK)	Remark
12 : 41	6	2.5	ok	
12 : 50	6	2.5	ok	
12 : 56	6	2.5	ok	
13 : 55	5	3.0	ok	
14 : 00	6	3.0	ok	
14 : 09	6	3.0	ok	


```
     2                OBSERVATION DATA    G                   RINEX VERSION / TYPE
                                          1-11-4 14:17        PGM / RUN BY / DATE
SMO                   LANDS DEPT., HK                         OBSERVER / AGENCY
a2                                                            MARKER NAME
a2                                                            MARKER NUMBER
23255                                     0.00                REC # / TYPE / VERS
                                                              ANT # / TYPE
 -2410314.8173  5385515.5632  2414923.3201                   APPROX POSITION XYZ
        1.5630        0.0000        0.0000                   ANTENNA: DELTA H/E/N
L1Pha0ff:   0.0618  L2Pha0ff:   0.0654                       COMMENT
     1     1                                                  WAVELENGTH FACT L1/2
     4    C1    L1    P2    L2                              # / TYPES OF OBSERV
  2002    12    11     4    17   55.000000                   TIME OF FIRST OBS
  2002    12    11     4    33   15.000000                   TIME OF LAST OBS
    13                                                        LEAP SECONDS
     6                                                        # OF SATELLITES
                                                              END OF HEADER
  2 12 11  4 17 55.0000000  0  6G 1G 2G 3G13G25G31
  20904911.046   109856044.64248  20904916.295    85602136.70149
  21780890.466   114459340.37248  21780895.349    89189123.74549
  20141175.216   105842583.70249  20141180.233    82474762.57349
  23573574.888   123879968.56247  23573582.214    96529881.68448
  22168162.210   116494464.65348  22168170.620    90774938.58349
  21440087.770   112668429.86648  21440096.302    87793615.95849
.
.
.
  2 12 11  4 18  0.0000000  0  6G 1G 2G 3G13G25G31
  20903989.763   109851203.29449  20903995.017    85598364.22449
  21781524.667   114462673.09348  21781529.551    89191720.66549
  20140561.693   105839359.65049  20140566.709    82472250.32749
  23570869.231   123865750.36647  23570876.559    96518802.60248
  22169377.035   116500848.47848  22169385.452    90779912.95949
  21437317.005   112653869.52348  21437325.538    87782270.26949
```

SATELLITE POSITIONING REFERENCE STATION SUMMARY

STATION NO. : HKAB *(FORMER NO.* :) *CLASS* :

TRIG. NAME : KAM TIN SATELLITE POSITIONING REFERENCE STATION *LOCALITY* : KAM HING WAI, KAM TIN

HK 80 DATUM

HK 1980 GRID COORDINATES : N = 833 946.144 m , E = 824 913.093 m , Ht = 38.062 m (1)

Note (1) : Height is above the HKPD and measured to the top of Station Reference Point.

LEVEL ACCURACY :

SCALE FACTOR : + 1.7 ppm to measured distance to give Grid Distance

GRID CONVERGENCE : - 2°37.3" to Grid Bearings to give Azimuth

WGS 84 DATUM

GEOGRAPHICAL COORDINATES : Lat 22° 26'41.66192"N, Long 114° 3'59.63457" E, Ht= 34.564 m (2)

Note (2) : Height is above the WGS 84 Ellipsoid and measured to the top of Station Reference Point.

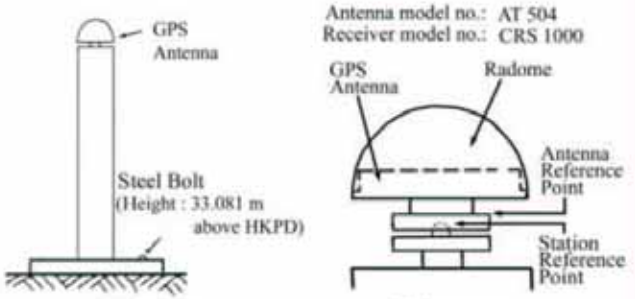
GPS ACCURACY : *REFERENCE FRAME* : ITRF96

UTM GRID COORDINATES : 2 485 026 mN 198 068 mE

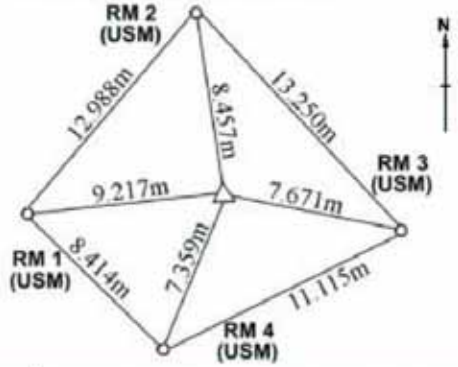
UTM GRID REFERENCE : 50Q JK 981 850

STATION DIAGRAM

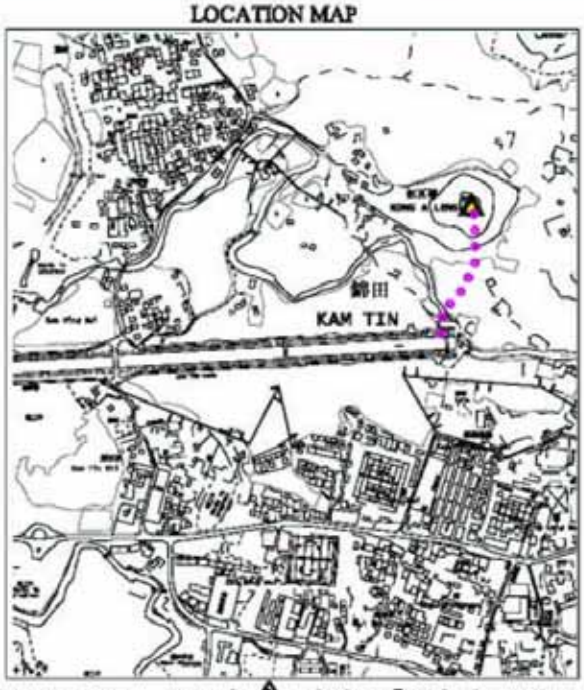
Date of Construction : 01/11/2000



REFERENCE MARKS DIAGRAM



LOCATION MAP



Scale : 1:10000 Legend : △ = Station °o°o° = Access Route

GRID BEARINGS TO ADJACENT TRIGS.

LAST MAINTENANCE RECORD :

Last visit on : 01/06/2003

REMARKS :

1) The Station Reference Point (horizontal & vertical) is at the top of the nipple of the lower antenna mount.
2) The height from the Station Reference Point to the Antenna Reference Point (bottom of antenna) is 0.008m.
3) The HK1980 grid coordinates of this station are transformed from GPS surveyed geodetic coordinates.

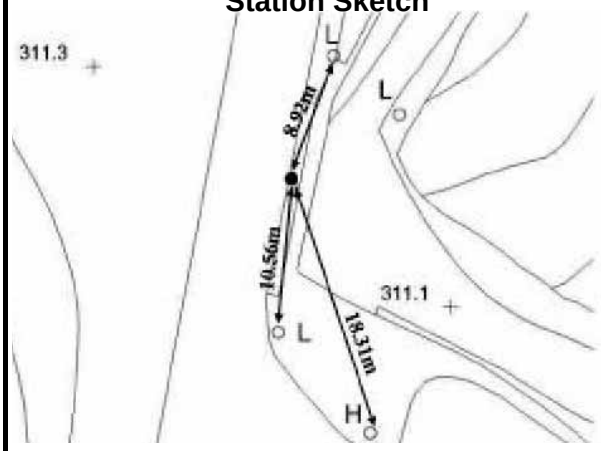
Prepared by : CHAN X Y **Checked by** : LI W Z **Approved by** : WONG I T **Date** : 2006-09-29

Geodetic Survey Section
SMO, Lands Department

STATION SUMMARY

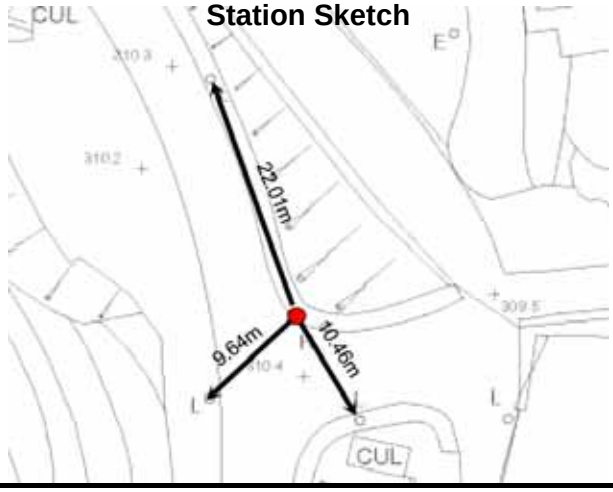
Station No. : a1
Type of Marks : Lead Plug
Location : Chuen Lung
HK1980 Grid Coordinates
Northing : 828 241.291 N
Easting : 829 488.856 E
ITRF96 Geodetic Coordinates
Latitude : 22° 23'36.28626" N
Longitude: 114° 06' 39.74880"E

Station Sketch



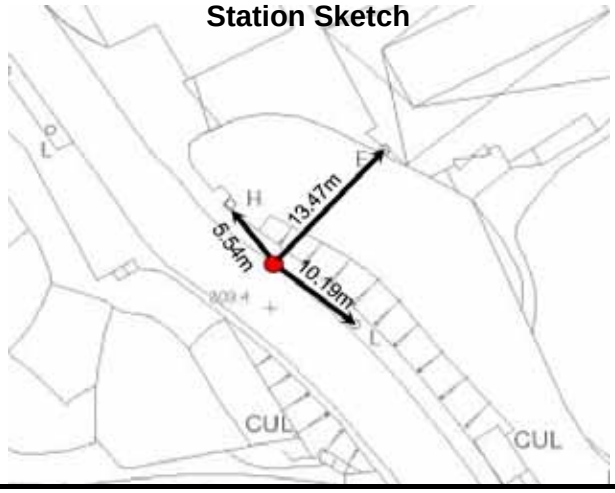
Station No. : a2
Type of Marks : Lead Plug
Location : Chuen Lung
HK1980 Grid Coordinates
Northing : 828 304.097 N
Easting : 829 499.546 E
ITRF96 Geodetic Coordinates
Latitude : 22° 23'38.32821" N
Longitude : 114° 06' 40.12158"E

Station Sketch



Station No. : a3
Type of Marks : Lead Plug
Location : Chuen Lung
HK1980 Grid Coordinates
Northing : 828 351.879 N
Easting : 829 471.307 E
ITRF96 Geodetic Coordinates
Latitude : 22° 23'39.88118" N
Longitude : 114° 06' 39.13363"E

Station Sketch



Job No :	TW02086	**C/F No.**	TW0000
Prepared by :	CHAN A B	**Checked by:**	LAM C D
Date :	11.12.2002	**Date :**	18.12.2002

Baseline processing parameters Appendix g

Processing Summary

TW0000

Project Information

Project name:	TW0000
Date created:	20/10/2004 11:37:09
Time zone:	8h 00'
Coordinate system name:	7P_ITRF_HK80_V1.0
Application software:	
Start date and time:	11/12/2002 12:17:55
End date and time:	11/12/2002 14:31:20
Manually occupied points:	18
Processing kernel:	
Processed:	04/11/2004 15:38:52

Processing Parameters

Parameters	**Selected**
Cut-off angle:	15°
Ephemeris type:	Broadcast
Solution type:	Automatic
Frequency:	IonoFree (L3)
Fix ambiguities up to:	20 km
Min. duration for float solution (static):	5' 00"
Sampling rate:	Use all
Tropospheric model:	Hopfield
Ionospheric model:	Automatic
Use stochastic modelling:	Yes
Min. distance:	1 km
Ionospheric activity:	Medium

Points of Results 2003.01.07 09.45.15 of Project: TW0000

Reference Id	Rover Id	Stored St...	Ambig...	Start	Duration	Type	dLat	dLon	dHgt	Slope Distance
HKKT	a1	Yes	yes	11/12/2002 12:41:00	15' 10"	STS	- 3' 05.37554"	2' 40.11438"	273.7933	7318.4989
HKKT	a1	No	no	11/12/2002 13:53:50	15' 20"	STS	- 3' 05.36972"	2' 40.08031"	273.4585	7317.7372
HKKT	a2	Yes	yes	11/12/2002 12:17:55	15' 20"	STS	- 3' 03.33382"	2' 40.48708"	272.7586	7276.3440
HKKT	a2	Yes	yes	11/12/2002 13:35:25	15' 00"	STS	- 3' 03.33367"	2' 40.48713"	272.7657	7276.3415
HKKT	a3	Yes	yes	11/12/2002 14:16:25	14' 55"	STS	- 3' 01.78064"	2' 39.49911"	272.0600	7221.4651
HKKT	a3	Yes	yes	11/12/2002 13:05:25	15' 05"	STS	- 3' 01.78064"	2' 39.49929"	272.0771	7221.4690
HKST	a1	Yes	yes	11/12/2002 13:53:50	15' 20"	STS	- 6.68840"	- 4' 23.52135"	49.6248	7541.0566
HKST	a1	Yes	yes	11/12/2002 12:41:00	15' 10"	STS	- 6.68812"	- 4' 23.52152"	49.6324	7541.0612
HKST	a2	Yes	yes	11/12/2002 12:17:55	15' 20"	STS	- 4.64636"	- 4' 23.14880"	48.5894	7528.9270
HKST	a2	Yes	yes	11/12/2002 13:35:25	15' 00"	STS	- 4.64601"	- 4' 23.14897"	48.5892	7528.9316
HKST	a3	Yes	yes	11/12/2002 14:16:25	14' 55"	STS	- 3.09336"	- 4' 24.13686"	47.8951	7556.4157
HKST	a3	Yes	yes	11/12/2002 13:05:25	15' 05"	STS	- 3.09315"	- 4' 24.13664"	47.8907	7556.4094
HKSC	a1	Yes	yes	11/12/2002 13:53:50	15' 20"	STS	4' 16.46671"	- 1' 48.52755"	288.1274	8483.0749
HKSC	a1	Yes	yes	11/12/2002 12:41:00	15' 10"	STS	4' 16.46682"	- 1' 48.52759"	288.1349	8483.0787
HKSC	a2	Yes	yes	11/12/2002 12:17:55	15' 20"	STS	4' 18.50820"	- 1' 48.15266"	286.9901	8537.5715
HKSC	a2	Yes	yes	11/12/2002 13:35:25	15' 00"	STS	4' 18.50881"	- 1' 48.15511"	287.0969	8537.6180
HKSC	a3	Yes	yes	11/12/2002 13:05:25	15' 05"	STS	4' 20.06180"	- 1' 49.14277"	286.4020	8592.3338
HKSC	a3	Yes	yes	11/12/2002 14:16:25	14' 55"	STS	4' 20.06421"	- 1' 49.14206"	286.4425	8592.3968

Page: 1 of 1 Date: 20/10/2004 Time: 12:01:37

Checking of control origin Appendix i.1

Points of Results 2003.01.07 09.39.37 of Project: TW0000

Referenc...	Rover Id	Stored St...	Ambig...	Start	Duration	Type	dLat	dLon	dHgt	Slope Distance
HKST	HKSC	Yes	yes	11/12/2002 12:00:00	2h 34' 40"	STS	- 4' 23.15499"	- 2' 34.99386"	-238.5032	9232.9993
HKST	HKKT	Yes	yes	11/12/2002 12:00:00	2h 35' 05"	STS	2' 58.68809"	- 7' 03.63620"	-224.1525	13306.1270

Page: 1 of 1 Date: 21/10/2004 Time: 09:13:17

Form for Checking GPS Control Origin

		Latitude			Longitude			Remark
		deg	min	sec	deg	min	sec	
Station Name	HKSC	22	19	19.81950	114	8	28.27647	(1) known value
	HKST	22	23	42.97438	114	11	3.27022	(2) known value
Baselines component computed from known value		- 0	04	23.15488	- 0	02	34.99375	(3) = (1) - (2)
Measured baseline component		- 0	04	23.15499	- 0	02	34.99386	(4)
Diff. (mm) (0.0001" = 3mm)		ok origin accepted		-3			-3	(5) = (3) - (4)
Allowable difference (mm)				58			58	

		Latitude			Longitude			Remark
		deg	min	sec	deg	min	sec	
Station Name	HKKT	22	26	41.66192	114	3	59.63457	(1) known value
	HKST	22	23	42.97438	114	11	3.27022	(2) known value
Baselines component computed from known value		0	02	58.68754	- 0	07	3.63565	(3) = (1) - (2)
Measured baseline component		0	02	58.68809	- 0	07	3.63620	(4)
Diff. (mm) (0.0001" = 3mm)		ok origin accepted		17			17	(5) = (3) - (4)
Allowable difference (mm)				60			60	

		Latitude			Longitude			Remark
		deg	min	sec	deg	min	sec	
Station Name								(1) known value
								(2) known value
Baselines component computed from known value								(3) = (1) - (2)
Measured baseline component								(4)
Diff. (mm) (0.0001" = 3mm)								(5) = (3) - (4)
Allowable difference (mm)								

		Latitude			Longitude			Remark
		deg	min	sec	deg	min	sec	
Station Name								(1) known value
								(2) known value
Baselines component computed from known value								(3) = (1) - (2)
Measured baseline component								(4)
Diff. (mm) (0.0001" = 3mm)								(5) = (3) - (4)
Allowable difference (mm)								

Job No : TW02086 **C/F No.** TW0000

Prepared by : CHAN A B **Checked by:** LAM C D

Date : 11.12.2002 **Date :** 18.12.2002

Comparison of repeated baselines Appendix j

Reference Id	Rover Id	Stored S...	Ambig...	Start	Duration	Type	dLat	dLon	dHgt	Slope Distance
BRST	s1	rejected	yes	11/12/2003 12:41:00	15' 15"	STS	-3° 05.373584"	2° 40.11438"	122.7933	2118.4989
BRST	s1	No	no	11/12/2003 13:53:30	15' 20"	STS	-3° 05.369052"	2° 40.08031"	123.4585	2117.7972
BRST	s2	Yes	yes	11/12/2003 13:17:53	15' 20"	STS	-3° 05.335982"	2° 40.46038"	122.7986	2126.5440
BRST	s2	Yes	yes	11/12/2003 13:39:23	15' 00"	STS	-3° 05.335887" 6	2° 40.46018" 3	122.7827	2126.5415
BRST	s3	Yes	yes	11/12/2003 14:18:23	14' 53"	STS	-3° 01.780854"	2° 39.49011"	122.0800	2121.4681
BRST	s3	Yes	yes	11/12/2003 13:03:23	15' 05"	STS	-3° 01.780854" 0	2° 39.49033" 3	122.0771	2121.4690
BRST	s1	Yes	yes	11/12/2003 12:53:30	15' 20"	STS	-4.688840"	-4° 23.52035"	48.6248	2141.0566
BRST	s1	Yes	yes	11/12/2003 12:41:00	15' 15"	STS	-4.688812" 5	-4° 23.52012" 6	48.6034	2141.0612
BRST	s2	Yes	yes	11/12/2003 13:17:53	15' 20"	STS	-4.648385"	-4° 23.14887"	48.5994	2128.9270
BRST	s2	Yes	yes	11/12/2003 13:39:23	15' 00"	STS	-4.648324" 9	-4° 23.14897" 3	48.5992	2128.9318
BRST	s3	Yes	yes	11/12/2003 14:18:23	14' 53"	STS	-3.060385"	-4° 24.13885"	40.8881	2158.4157
BRST	s3	Yes	yes	11/12/2003 13:03:23	15' 05"	STS	-3.060315" 6	-4° 24.13864" 6	40.8807	2158.4094
BRSC	s1	Yes	yes	11/12/2003 12:53:30	15' 20"	STS	-4° 16.465871"	-3° 48.52035"	288.1374	8483.0349
BRSC	s1	Yes	yes	11/12/2003 12:41:00	15' 15"	STS	-4° 16.465852" 3	-3° 48.52030" 0	288.1349	8483.0387
BRSC	s2	rejected	yes	11/12/2003 13:17:53	15' 20"	STS	-4° 16.303830"	-3° 48.15005"	286.9901	8537.5715
BRSC	s2	Yes	yes	11/12/2003 13:39:23	15' 00"	STS	-4° 16.303841" 18	-3° 48.15011" 7.5	287.0949	8537.6180
BRSC	s3	Yes	yes	11/12/2003 13:03:23	15' 05"	STS	-4° 16.056140"	-3° 49.14077"	286.4830	8582.3938
BRSC	s3	rejected	yes	11/12/2003 14:18:23	14' 53"	STS	-4° 16.056421"	-3° 49.14008"	286.4825	8582.3968

Difference of repeated baseline component in mm
(Note 0.0001" = 3 mm)

Least squares network adjustment results Appendix k.1

3D constrained network on WGS 84 ellipsoid

STATIONS

Number of (partly) known stations	3	
Number of unknown stations	3	
Total	6	

OBSERVATIONS

Directions	4	
Distances	0	
Zenith angles	0	
Azimuth angles	0	
Height differences	0	
GPS coordinate differences	45	(15 baselines)
Known coordinates	9	
GPS transformation parameters	0	
Total	58	

UNKNOWNS

Coordinates	18	
Orientations	1	
Scale factors	0	
Vertical refraction coefficients	0	
Azimuth offsets	0	
GPS transformation parameters	0	
Deflections of the vertical	0	
Additional transformation parameters	0	
Total	19	

Degrees of freedom	39	

ADJUSTMENT

Number of iterations	1	
Max coord correction in last iteration	0.0000 m	

TESTING

Alfa (multi dimensional)	0.5205	
Alfa 0 (one dimensional)	0.0500	
Beta	0.80	
Critical value W-test	1.96	
Critical value T-test (3 dimensional)	1.89	
Critical value T-test (2 dimensional)	2.42	
Critical value F-test	0.97	
F-test	0.202	accepted

Results based on a-posteriori variance factor

ELLIPSOID CONSTANTS

Ellipsoid	WGS 84
Semi major axis	6378137.0000 m
Inverse flattening	298.257223563

INPUT OBSERVATIONS

	Station	Target	St ih	Tg ih	Reading
DX	HKKT	a1			-5171.3559 m
DY					347.3950 m
DZ					-5166.8966 m
DX	HKKT	a2			-5170.9219 m
DY					320.3270 m
DZ					-5109.2210 m
.					
.					
.					
R0	a2	a3	1.6080	1.7580 m	217 07 27.0 dms
S0					55.5010 m desel
Z0					90 42 59.9 dms desel

INPUT STANDARD DEVIATIONS OF OBSERVATIONS

	Station	Target	Sd abs	Sd rel	Sd tot
DX	HKKT	a1	0.0086		m
DY			-0.6134	0.0126	cor m
DZ			-0.5141	0.6236	0.0093 cor cor m
.					
.					
.					
R0	a2	a3	0 00 05.0	0 00 00.0	0 00 09.7 dms dmskm
S0			0.0020	2.0	desel m ppm
Z0			0 00 05.0	0 00 00.0	desel dms dmskm
R0	a2	a3	0 00 05.0	0 00 00.0	0 00 09.7 dms dmskm
S0			0.0020	2.0	desel m ppm
Z0			0 00 05.0	0 00 00.0	desel dms dmskm

COORDINATES (CONSTRAINED NETWORK)

Station		Coordinate	Corr	Prec(68.3%)
HKKT	Latitude	22 26 41.66191 N*	0.0000	fixed m
	Longitude	114 03 59.63457 E*	0.0000	fixed m
	Height	34.5639*	-0.0000	fixed m
HKSC	Latitude	22 19 19.81950 N*	0.0000	fixed m
	Longitude	114 08 28.27650 E*	0.0000	fixed m
	Height	20.2270*	-0.0000	fixed m
HKST	Latitude	22 23 42.97438 N*	0.0000	fixed m
	Longitude	114 11 03.27022 E*	0.0000	fixed m
	Height	258.7161*	0.0000	fixed m
a1	Latitude	22 23 36.28626 N	0.0003	0.0014 m
	Longitude	114 06 39.74880 E	-0.0011	0.0013 m
	Height	308.3526	-0.0002	0.0035 m
a2	Latitude	22 23 38.32821 N	-0.0002	0.0014 m
	Longitude	114 06 40.12158 E	0.0022	0.0010 m
	Height	307.3168	-0.0003	0.0034 m
a3	Latitude	22 23 39.88118 N	-0.0004	0.0015 m
	Longitude	114 06 39.13363 E	-0.0011	0.0014 m
	Height	306.6226	-0.0002	0.0039 m

ADJUSTED OBSERVATIONS

	Station	Target	Adj obs	Resid	Resid(ENH)	Sd
DX	HKKT	a1	-5171.3568	0.0009	0.0009	0.0024 m
DY			347.3993	-0.0042	0.0021	0.0039 m
DZ			-5166.8971	0.0005	-0.0037	0.0026 m
DX	HKKT	a2	-5170.9232	0.0013	-0.0010	0.0021 m
DY			320.3275	-0.0005	-0.0050	0.0038 m
DZ			-5109.2152	-0.0058	-0.0031	0.0023 m
DX	HKKT	a2	-5170.9232	-0.0019	0.0004	0.0021 m
DY			320.3275	0.0034	-0.0004	0.0038 m
DZ			-5109.2152	0.0012	0.0040	0.0023 m
DX	HKKT	a3	-5137.4306	-0.0074	0.0039	0.0025 m
DY			314.6733	0.0069	0.0016	0.0040 m
DZ			-5065.3112	0.0056	0.0108	0.0024 m

Least squares network adjustment results Appendix k.3

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.
.
DX          HKSC          a3      3985.5834     -0.0023      0.0021     0.0027 m
DY                                -1259.0658     -0.0001      0.0026     0.0043 m
DZ                                 7507.1998      0.0031      0.0019     0.0027 m
RO          a2            a1     77 22 01.7   0 00 01.3                0 00 02.7 dms
RO          a2            a1     77 22 01.7   0 00 01.3                0 00 02.7 dms
RO          a2            a3    217 07 28.6   0 00 01.6                0 00 03.0 dms
RO          a2            a3    217 07 28.6   0 00 01.6                0 00 03.0 dms

GPS BASELINE VECTOR RESIDUALS

            Station       Target    Adj vector       Resid        Resid ppm

DV          HKKT          a1        7318.5001     0.0044 m        0.6 ppm
DV          HKKT          a2        7276.3408     0.0060 m        0.8 ppm
DV          HKKT          a2        7276.3408     0.0040 m        0.6 ppm
DV          HKKT          a3        7221.4673     0.0115 m        1.6 ppm
DV          HKKT          a3        7221.4673     0.0067 m        0.9 ppm
DV          HKST          a1        7541.0613     0.0061 m        0.8 ppm
DV          HKST          a1        7541.0613     0.0089 m        1.2 ppm
DV          HKST          a2        7528.9255     0.0051 m        0.7 ppm
DV          HKST          a2        7528.9255     0.0090 m        1.2 ppm
DV          HKST          a3        7556.4114     0.0062 m        0.8 ppm
DV          HKST          a3        7556.4114     0.0056 m        0.7 ppm
DV          HKSC          a1        8483.0786     0.0047 m        0.6 ppm
DV          HKSC          a1        8483.0786     0.0053 m        0.6 ppm
DV          HKSC          a2        8537.6137     0.0067 m        0.8 ppm
DV          HKSC          a3        8592.3321     0.0039 m        0.5 ppm

TEST OF OBSERVATIONS

            Station       Target         MDB          Red    BNR    W-test    T-test

DX          HKKT          a1        0.0106 m         63     2.2     -0.16      0.70
DY                                  0.0149 m         49     2.5     -1.34
DZ                                  0.0114 m         66     2.2      0.90
.
.
.
DX          HKST          a3        0.0115 m         73     1.7     -0.71      0.91
DY                                  0.0149 m         63     1.8     -1.63
DZ                                  0.0120 m         80     1.5      1.01
DX          HKST          a3        0.0126 m         80     1.4      1.42      1.60
DY                                  0.0173 m         88     1.4      1.89
DZ                                  0.0106 m         64     2.0     -1.79
DX          HKSC          a1        0.0106 m         64     2.2     -0.84      0.39
DY                                  0.0145 m         50     2.4     -0.22
DZ                                  0.0111 m         69     2.1      0.25
DX          HKSC          a1        0.0148 m         85     1.2     -0.59      0.30
DY                                  0.0195 m         91     1.3     -0.25
DZ                                  0.0127 m         74     1.6     -0.53
DX          HKSC          a2        0.0115 m         74     1.6      1.88      1.25
DY                                  0.0153 m         69     1.9      1.23
DZ                                  0.0114 m         60     2.2     -0.20
DX          HKSC          a3        0.0119 m         64     2.1     -0.95      0.68
DY                                  0.0155 m         54     2.3     -1.14
DZ                                  0.0123 m         70     1.9      1.13
RO          a2            a1   0 00 15.2 dms         53     1.7      0.46
RO          a2            a1   0 00 15.2 dms         53     1.7      0.46
RO          a2            a3   0 00 16.7 dms         53     1.9     -0.50
RO          a2            a3   0 00 16.7 dms         53     1.9     -0.50

[End of file]
```

Final coordinates of new GPS stations Appendix l.1

ITRF96 Geodetic Coordinates

Points of Project TW0000

Point Id	Point Class	Epoch	Latitude	Longinade	Ellip. Hgt.	Sd. Latitude	Sd. Longitude	Sd. Height
HKKT	Control	11/12/2002 12:00:00	22° 26' 41.66191" N	114° 03' 59.63457" E	34.5639	0.0050	0.0050	0.0200
HKSC	Control	11/12/2002 12:00:00	22° 19' 19.81950" N	114° 08' 28.27650" E	20.2270	0.0050	0.0050	0.0200
HKST	Control	11/12/2002 12:00:00	22° 23' 42.97438" N	114° 11' 03.27022" E	258.7161	0.0050	0.0050	0.0200
a1	Adjusted	21/01/2003 10:00:36	22° 23' 36.28626" N	114° 06' 39.74880" E	308.3526	0.0014	0.0013	0.0035
a2	Adjusted	21/01/2003 10:00:36	22° 23' 38.32821" N	114° 06' 40.12158" E	307.3168	0.0014	0.0010	0.0034
a3	Adjusted	21/01/2003 10:00:36	22° 23' 39.88118" N	114° 06' 39.13363" E	306.6226	0.0015	0.0014	0.0039

Final Network Adjustment Results

(Geodetic Coordinates)

Page: 1 of 1 Date: 20/10/2004 Time: 12:18:25

Final coordinates of new GPS stations Appendix l.2

HK1980 Grid Coordinates

Points of Project TW0000

Point Id	Point Class	Epoch	Northing	Easting	Ellip. Hgt.	Sd. Northing	Sd. Easting	Sd. Height
HKKT	Control	11/12/2002 12:00:00	833946.1433	824913.0929	38.0865	0.0050	0.0050	0.0200
HKSC	Control	11/12/2002 12:00:00	820351.3888	832591.3211	23.1287	0.0050	0.0050	0.0200
HKST	Control	11/12/2002 12:00:00	828445.5551	837026.6530	261.6189	0.0050	0.0050	0.0200
a1	Adjusted	21/01/2003 10:00:36	828241.2912	829488.8555	311.5597	0.0014	0.0013	0.0035
a2	Adjusted	21/01/2003 10:00:36	828304.0970	829499.5458	310.5248	0.0014	0.0010	0.0034
a3	Adjusted	21/01/2003 10:00:36	828351.8786	829471.3073	309.8329	0.0015	0.0014	0.0039

(HK80 Grid Coordinates)

Page: 1 of 1 Date: 20/10/2004 Time: 12:19:25

Form for Independent Checking of GPS Measurements
by Terrestrial Measurements

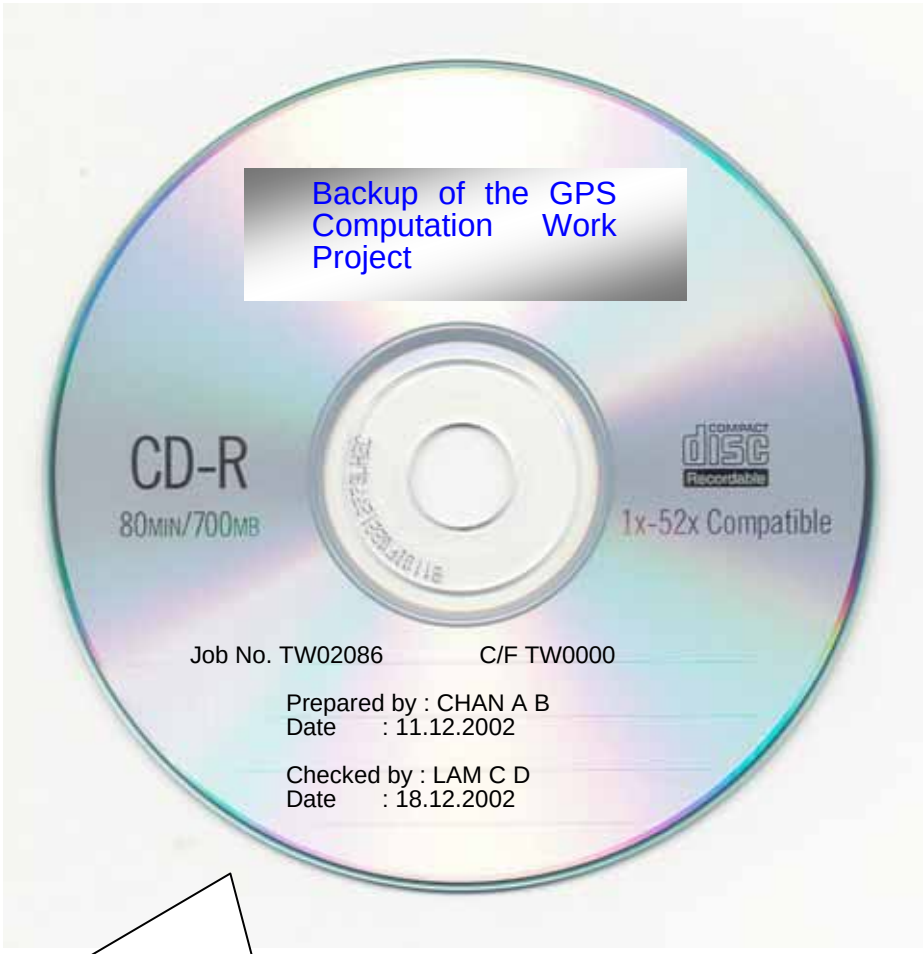
Station Name	GPS Survey Results		Remark
	Northing (m)	Easting (m)	
a1	828 241.291	829 488.856	Final results for checking
a2	828304.097	829499.546	
a3	828351.879	829471.307	

	Computed distance (1)	Directly measured distance by terrestrial method (2)	Diff (1)-(2) (mm)	Allowable diff. (15+0.1D) mm
Distance a1-a2	63.709	63.716	-7	21
Distance a2-a3	55.502	55.499	3	21
Distance				

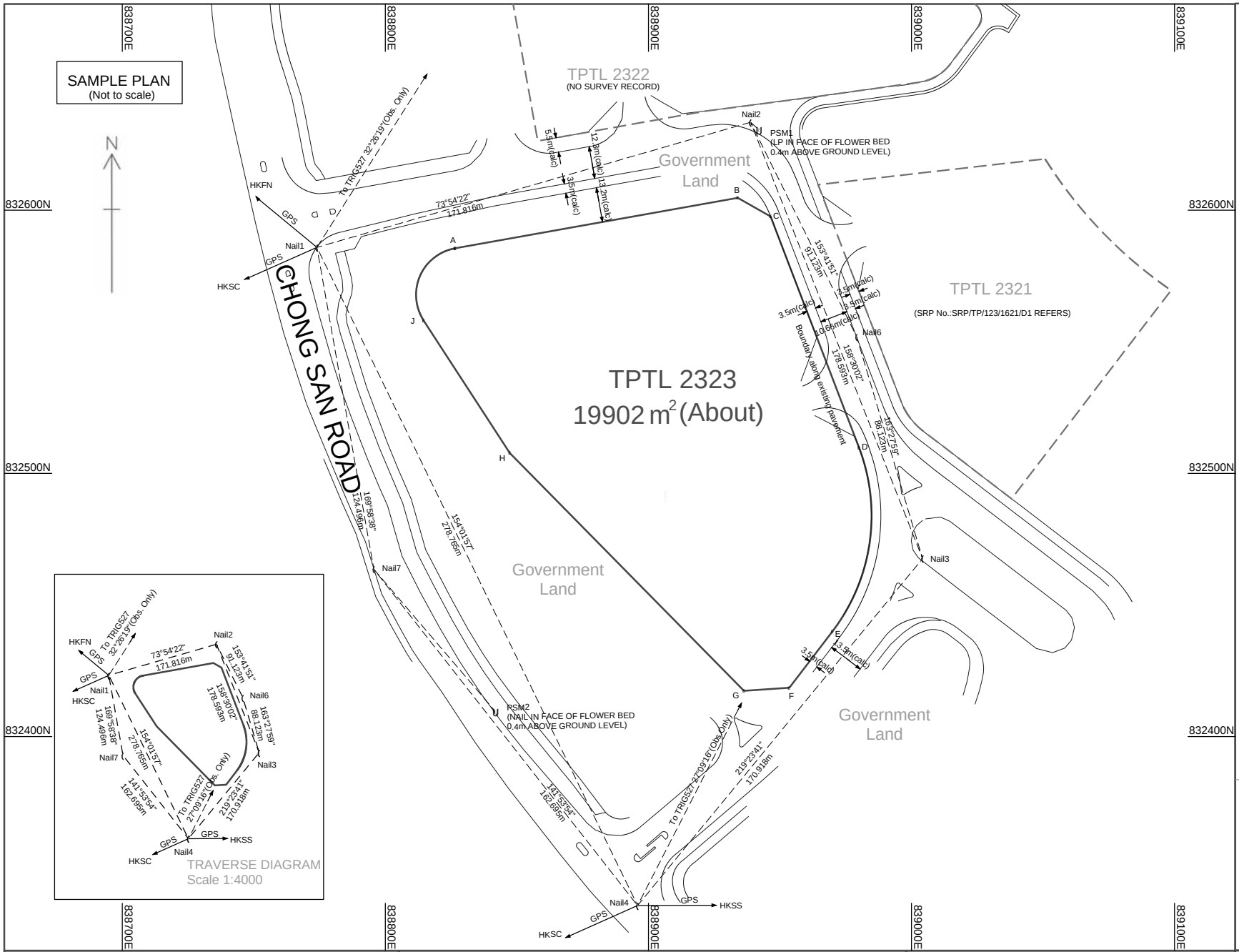
	Computed Angle (3)	Directly measured Angle by terrestrial method (4)	Diff (3)-(4)	Allowable diff.
Angle a1-a2-a3	139°45′27″	139°45′24″	3″	60″
Angle				
Angle				

Prepared by : CHAN A B Checked by : LAM C D
Date : 18.122002 Date : 18.12.2002

Backup of the GPS computation work project in digital form Appendix n



Name	Location	Last Used	Coordinate System
lamma gps (2 hour)	C:\user\ywmok\lamma_gps (2 hour)\	07/05/2004 11:22:12	WGS 1984
lamma gps	C:\user\ywmok\lamma_gps\	27/08/2004 14:22:37	7P_ITRF_HK80_V1.0
hksl12	C:\user\CYT\hksl12\	06/09/2004 10:15:44	WGS 1984
hksl	C:\user\csc\hksl\	23/08/2004 12:23:41	WGS 1984
gfs	C:\Projects\gfs\	23/02/2004 15:50:25	7P_ITRF_HK80_V1.0
emergency 2004	C:\user\ywmok\emergency_2004\	20/10/2004 16:52:25	7P_ITRF_HK80_V1.0
dosyl 4.12.2003	C:\user\csc\dosyl_4_12_2003\	31/03/2004 10:35:57	7P_ITRF_HK80_V1.0
cmet data	C:\user\csc\cmet_data\	16/08/2004 11:30:07	7P_ITRF_HK80_V1.0
TW0000	C:\user\csc\TW0000\	01/11/2004 13:43:43	7P_ITRF_HK80_V1.0
TIDE STATION RINEX IMORT	C:\user\ywmok\TIDE_STATION_RINEX_I...	20/10/2004 16:52:27	WGS 1984
T6	C:\user\csc\T6\	19/05/2004 16:57:17	7P_ITRF_HK80_V1.0
T3	C:\user\csc\T3\	26/04/2004 16:25:08	7P_ITRF_HK80_V1.0
T2	C:\user\csc\T2\	19/04/2004 11:16:01	7P_ITRF_HK80_V1.0
T1	C:\user\csc\T1\	23/07/2004 15:53:55	7P_ITRF_HK80_V1.0
SunsetPeak	C:\user\chankw\SunsetPeak\	27/05/2004 10:04:19	WGS 1984
PennyBay	C:\user\csc\penny bay\	20/07/2004 11:23:55	7P_ITRF_HK80_V1.0
Highways	C:\user\csc\Highways_GPS\Highways\	23/02/2004 15:50:02	WGS 1984
H_model_ITRF96	C:\user\csc\H_model_ITRF96\	27/08/2004 15:50:52	WGS 1984
H_model_HK80	C:\user\csc\H_model_HK80\	11/03/2004 14:25:35	TP
HQ307103A (3)	C:\temp\temp_HYD\Project 2\BK_net 2-HQ...	17/07/2003 10:03:33	7P_ITRF_HK80_V1.0
HQ307103A (2)	C:\Projects\BK_BL before inactive -HQ3071...	03/09/2003 12:02:58	7P_ITRF_HK80_V1.0
HQ307103A	C:\temp\temp_HYD\Project 2\BK_net 4-HQ...	15/07/2003 11:40:29	7P_ITRF_HK80_V1.0
GPS Pillars at Ap Lei Chau4	C:\user\Temp\	27/05/2004 15:12:39	WGS 1984
GPS Pillars at Ap Lei Chau3	C:\user\Temp\	27/05/2004 14:43:16	WGS 1984
GPS Pillars at Ap Lei Chau (2)	C:\temp\GPS Pillars\	27/05/2004 15:09:04	7P_ITRF_HK80_V1.0
GPS Pillars at Ap Lei Chau	C:\user\chankw\GPS Pillars\	04/10/2004 15:11:43	WGS 1984
Emergency drill2004	C:\user\chankw\Emergency_drill2004\	04/10/2004 15:10:40	WGS 1984



Notes:

(N, E) = 1980 Grid Coordinates
(Lat, Long) = ITRF 96 Geodetic Coordinates

SUBJECT LOT COORDINATES & DIMENSIONS:

Boundary Point	Bearing	Distance	N	E
SUBJECT LOT NO.- TPTL2323				
A			832585.713	838826.049
B	79°53'20"	109.302	832604.902	838933.653
C	119°32'44"	14.362	832597.820	838946.148
D	159°04'00"	94.185	832509.851	838979.799
E	ch188°15'07"	ch70.864	832439.720	838969.628
F	217°26'14"	26.888	832418.371	838953.283
G	266°10'35"	17.290	832417.218	838936.031
H	315°26'37"	127.018	832507.726	838846.914
J	326°58'05"	60.171	832558.172	838814.114
A	ch23°25'43"	ch30.016	832585.713	838826.049

BOUNDARY CURVE DATA:

Arc	Arc Len.	Radius	Incl.Angle	N (Centre)	E
D-E	74.024	72.661	58°22'14"	832483.890	838911.933
J-A	35.487	18.006	112°55'15"	832567.987	838829.210

GPS Survey Control Station:

Station	Lat	Long
HKSS	22°25'51.84451"	114°16'09.45642"
HKFN	22°29'40.87008"	114°08'17.40609"
HKSC	22°19'19.81950"	114°08'28.27647"

New GPS Survey Station:

Station	N	E
Nail1	832586.061	838773.471
Nail4	832335.439	838895.531

TRAVERSE:

Station	Bearing	Distance	N	E
Nail1			832586.061	838773.471
Nail2	73°54'22"	171.816	832633.690	838938.553
Nail3	158°30'02"	178.593	832467.523	839004.006
Nail4	219°23'41"	170.918	832335.439	838895.531
Nail2			832633.690	838938.553
Nail6	153°41'51"	91.123	832552.002	838978.929
Nail3	163°27'59"	88.123	832467.523	839004.006
Nail1			832586.061	838773.471
Nail7	169°58'38"	124.496	832463.465	838795.138
Nail4	141°53'54"	162.695	832335.439	838895.531

PSM RADIATIONS:

Surveyed Point	Bearing	Distance	N	E
Fr. Nail2			832633.690	838938.553
To PSM1	132°16'35"	4.494	832630.667	838941.878
Fr. Nail7			832463.465	838795.138
To PSM2	139°28'54"	71.479	832409.127	838841.578

RADIATIONS:

Surveyed Point	Bearing	Distance	N	E
Fr. Nail1			832586.061	838773.471
To A	90°22'45"	52.579	832585.713	838826.049
J	124°27'28"	49.291	832558.172	838814.114
Fr. Nail4			832335.439	838895.531
To G	26°20'47"	91.258	832417.218	838936.031

I, .Chan Tai Man...., an Authorized Land Surveyor registered under the Land Survey Ordinance (Cap. 473), hereby certify that this survey record plan has been prepared from land boundary surveys that were carried out by me or under my direct supervision in conformity with the Code of Practice approved by the Land Survey Authority under the above Ordinance, and that this plan correctly represents that survey completed on the .....2nd.. day of ....August 2006..

Dated this..5th... day of August 2006

.....Chan Tai Man.....
Authorized Land Surveyor

Survey District: TAI PO
Date of Survey: August 2006
Scale 1: 1000 Field BK: D234567, D289123-4
Survey Sheet: 7-NE-11D , 7-NE-12C
Reference SRP's: SRP/TP/123/1621/D1

PLAN OF TPTL 2323

TABLE OF AREA	
LOT	AREA
TPTL 2323	19902 m² (About)

FOR OFFICAL USE

Survey Record Plan No.: SRP/TP/222/0001/D1