

## Survey Standards

**Archived Content**

# General Instructions for Surveys, e-Edition

## *Chapter D1 - OFFICIAL SURVEYS*

### Effective Date:

This Chapter is effective January 1, 1997. It was originally published as Chapter D1 of the Third Edition of the *Manual of Instructions for the Survey of Canada Lands*.

### Chapter Sections

- General
- Monumentation
  - Monument Markings
  - Ancillary Monumentation
  - Placing of Monuments
  - Cutting out and Blazing Lines
- Adjustment and Testing of Measuring Equipment
- Survey Methods
- Bearings
- Accuracy
- Connections
- Location of Natural Boundaries
- Surveys in Coordinated Survey Areas
- Official Field Notes
- Official Plans
  - Official Plans in Coordinated Survey Areas
  - Official Plans of Rights-of-Way
  - Approvals and Confirmation of Official Plans
- Returns of Survey
- Schedule D1-1, Table of Reference for Right-of-Way Areas
- Specimen Plans

### General

1. An official survey is a survey of Canada Lands for which a plan is confirmed under Part II or Part III of the *Canada Lands Surveys Act*.
2. Whether or not an official survey is required depends on the type of land transaction for which the plan will be used. The types of land transactions requiring official surveys are outlined in interdepartmental agreements between the Surveyor General and the government departments having administration and control of the land.
3. Specific survey instructions are required for official surveys.
4. If the boundary of the Canada Lands being surveyed is common to provincial lands then all

applicable provincial laws and regulations pertaining to surveys must also be followed. If there is any conflict between federal and provincial survey requirements, consult the regional office of Canada Centre for Cadastral Management. Generally the requirements leading to the higher standard of survey are to be followed.

### Monumentation

5. In normal ground conditions set CLS 77 posts (see figure 1) at all corners unless otherwise specified in these general instructions or in any specific instructions.

6. At block corners, for jurisdictional boundaries, and at other principal corners, CLS standard posts (see figure 2) may be used if available and authorized in specific survey instructions.

7. Alternative monumentation or equivalent provincial monumentation may be used if authorized in specific survey instructions. Monuments must be of magnetic metal, and should be not less than 75 cm in length and 2.0 cm square (or diameter).

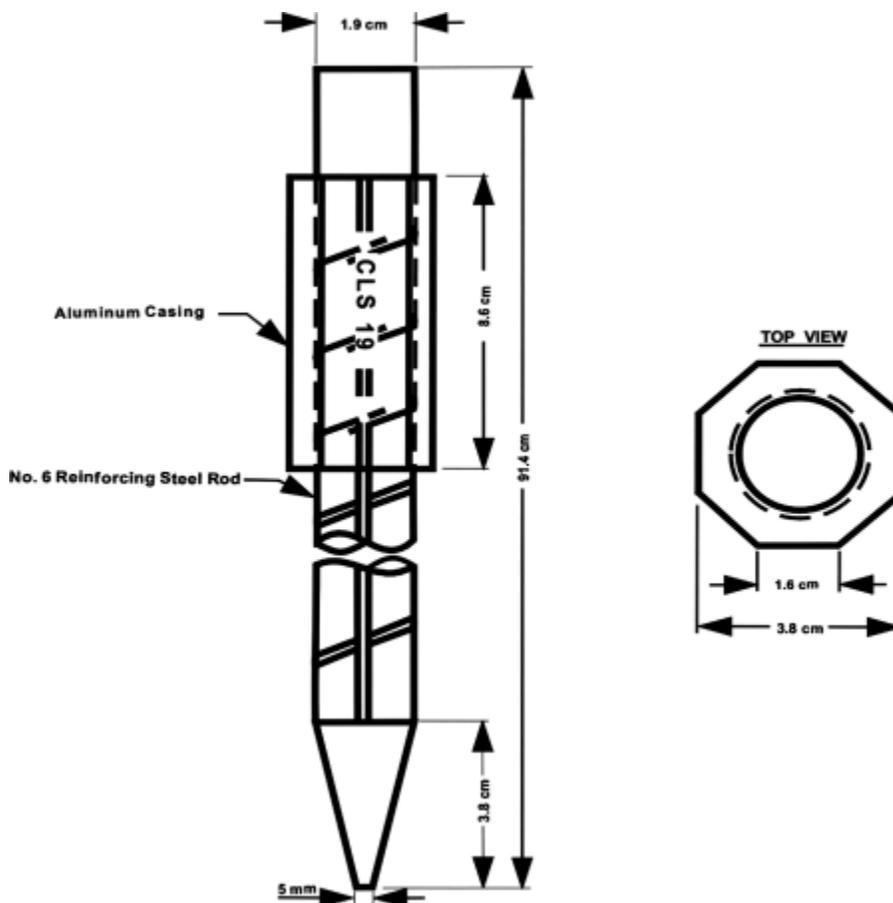


Figure 1  
CLS 77 Post

8. When bedrock or a large boulder is encountered less than 30 cm below the ground surface, cement a CLS standard rock post (see figure 3) in a hole drilled in the rock. Where a CLS standard rock post is not available a CLS 77 post, or provincial equivalent, may be cut down to 15 cm in length and cemented 8 cm into the rock. The top of the rock shall be cleared of all earth within a radius of one metre of the monument location.

9. In swamp or muskeg, a CLS standard rock post may be secured in the top of an iron pipe that is driven flush with the ground. Where a CLS standard rock post is not available a CLS 77 post, or

provincial equivalent, may be secured into the pipe. The pipe shall have an internal diameter of 25 mm and a minimum length of one metre, or longer to ensure stability.

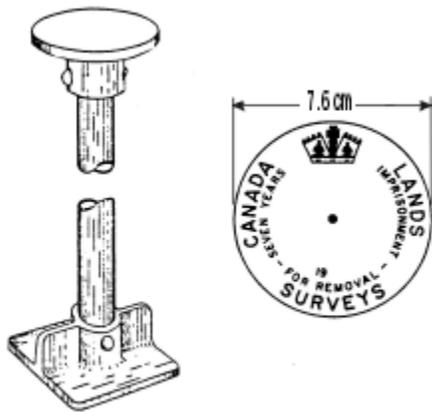


Figure 2 - CLS Standard Post

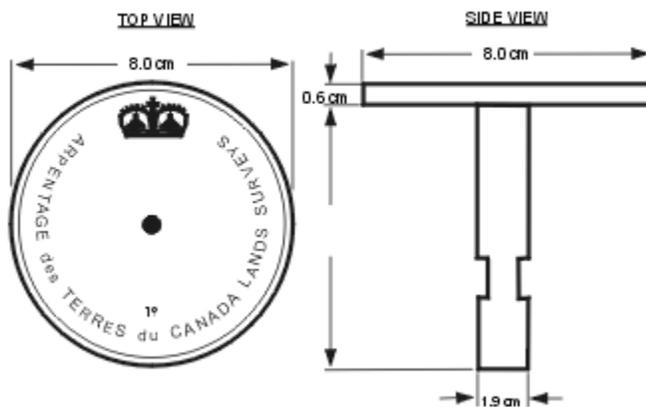


Figure 3 - CLS Standard Rock Post

10. Block corners, jurisdictional boundaries, and other principal corners which fall in concrete or asphalt shall be marked with CLS 77, standard or standard rock posts or approved alternatives. For other corners the following may also be used to mark or reference the corner: in concrete or similar surfaces a drill hole with a lead plug having a tack therein; or in asphalt an iron bar at least 30 cm long driven through the asphalt flush with the surface.

#### *Monument Markings*

11. Subject to paragraph 12, mark every monument placed in a survey as follows:

- a) with the letters "IR", for monuments on Indian Reserve boundaries, and "NP" for National Park boundaries;
- b) with the letters "R/ W" on the side of the monument facing the right-of-way, for monuments on right-of-way boundaries;
- c) with the letter "R" on the side of the monument facing the road, for monuments on road boundaries;
- d) with lot and block numbers, for monuments in subdivisions; and
- e) on capped posts, with the year when placed and lines indicating the directions of the

boundaries radiating from the post.

12. In addition to, or as an alternative to, paragraph 11 above, if authorized in specific survey instructions, mark every monument with a distinguishing letter or number.

13. Witness monuments shall be marked with the letters "WT" followed by the distance and the approximate direction from the monument to the witnessed corner (e. g. WT 15 N).

14. If monuments on Indian Reserve boundaries also define section and quarter section corners in a provincial township system, the monuments shall include markings in accordance with the provincial practice for section and quarter section monuments.

15. In the survey of a subdivision, if existing monuments are used to mark corners of new lots, the new lot numbers shall, if possible, be marked on the monument.

16. Mark monuments by stamping the inscriptions into them with marking dies.

17. If any of the above provisions regarding monument markings are impractical, marking requirements may be amended by specific survey instructions

#### *Ancillary Monumentation*

18. Ancillary monumentation may be:

- a) part of the monument such as pits and earth or stone mounds;
- b) reference devices such as bearing trees or reference posts which can be used to restore the position of the monument; or
- c) marker posts used to protect monuments from destruction and make them easier to find, or used to help locate the position of boundaries.

19. The surveyor shall determine the type of ancillary monumentation to be used considering the nature of the ground, the terrain, safety and local custom. Specific survey instructions may recommend or specify the type of ancillary monumentation to be used.

20. If new pits and earth or stone mounds are made then they must be made in accordance with the pattern in figure 4. If existing pits and mounds are restored then they must be restored to their original form.

21. If bearing trees are specified in the specific survey instructions, then they shall be made for monuments where there are suitable trees at reasonable distances from the monument. Three trees are preferred. Blaze the side of the tree facing the monument and scribe on the blaze the letters "BT". Record the description of the bearing tree (kind and diameter) and the horizontal distance and direction from the monument to the blaze. The direction shall be referred to the reference meridian used for the survey.

22. If reference posts are specified in the specific survey instructions, then they shall:

- a) be of magnetic content;
- b) be placed at approximate 120° to each other in relationship to the monument or control survey marker;

- c) be placed in as safe a place as possible;
- d) not protrude above ground level;
- e) be no smaller than 1.2 cm square (or diameter) x 45 cm;
- f) be placed in groups of three; and
- g) the type of reference posts placed, their markings and the horizontal distance and direction from the monument to each reference post shall be recorded.

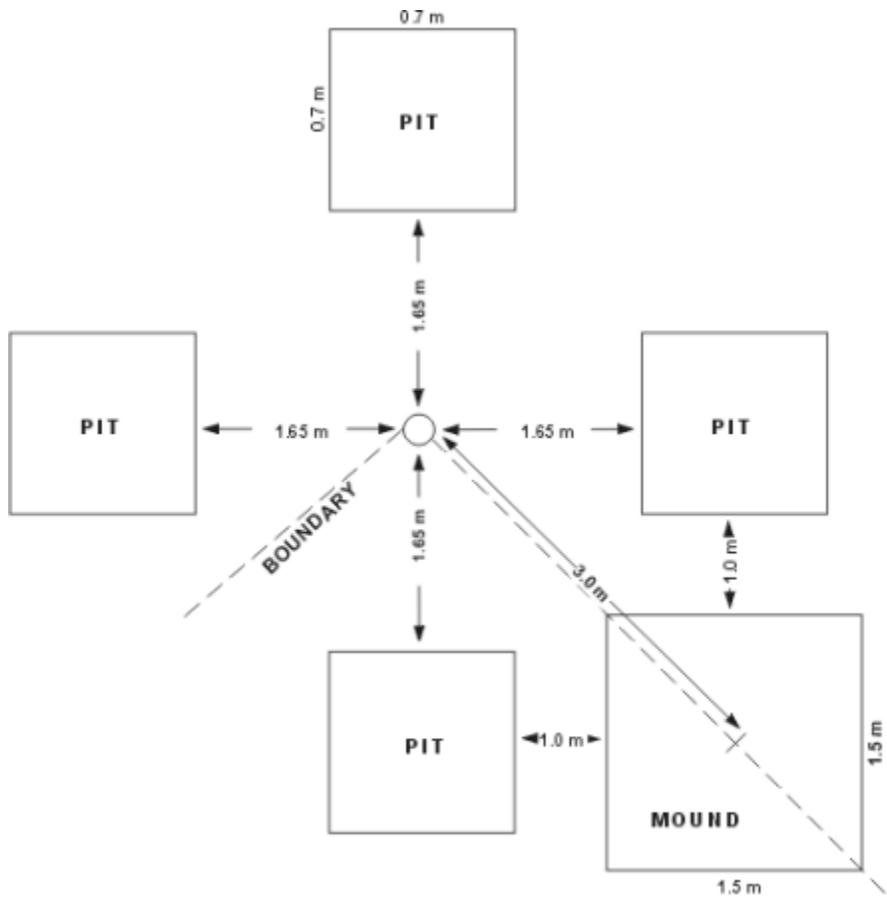


Figure 4 - Positioning of Pits and Mound

Notes:

1. Pits are 0.4 m deep.
2. Mound is pyramid shaped and 0.7 m high.
3. Rotate pits to avoid obstacles; if necessary one pit may be omitted.

23. Marker posts used to protect monuments and make them easier to find may consist of:

- a) a T-section, angle or similar type of fencing post about 2 m long firmly driven into the ground or cemented into a drilled hole in rock. It shall be placed, if possible, on the boundary 0.3 m from the monument. A plaque with suitable markings shall be attached to the marker. The plaque should face the monument. Record the markers position relative to the monument;
- b) a pressure treated wooden post at least 1.2 m long, 10 cm square, bevelled at the top. It shall be firmly planted if possible on the boundary approximately 0.3 m from the monument.

This marker shall be marked with the lot numbers and if on a boundary of an Indian Reserve with "IR". Record its position relative to the monument;

c) a wooden post 5 cm square, 60 cm long placed approximately 0.3 m from the monument. This marker is suitable for townsites and subdivisions. Its position does not need to be recorded; or

d) any other object, such as a stone mound, fibreglass marker etc., acceptable to Canada Centre for Cadastral Management.

24. Make ties to monuments from permanent features such as building corners, bridge abutments etc., to assist in finding or re-establishing the position of a monument in the future.

25. If marker posts are placed to help locate the position of boundaries they shall be placed on the boundaries at intervals of approximately 300 metres, or other distance as specified in the specific survey instructions, and may consist of the following:

a) a T-section, angle or similar type of fencing post about 2 m long firmly driven into the ground or cemented into a hole drilled in rock;

b) a pressure treated wooden post 10 cm square, 1.2 m long firmly planted into the ground; or

c) any other object acceptable to Canada Centre for Cadastral Management.

26. Markers on Indian Reserve or National Park boundaries may be augmented with an identification plaque attached to them. The plaque shall be inscribed with suitable wording such as "Indian Reserve Boundary" or "National Park Boundary".

#### *Placing of Monuments*

27. On all artificial boundaries being surveyed place monuments:

a) at each change of direction of straight line boundaries;

b) at the beginning and end of curves, at points of changes of curvature and at points where straight line boundaries intersect curves;

c) in the case of a spiral curve at the beginning and end of the spiral;

d) at intervals not exceeding one kilometre for straight line boundaries, and preferably in locations where the monuments are intervisible; and

e) at points of intersection with previously surveyed boundaries, except in the cases outlined in paragraphs 28 and 29.

28. The placing of monuments at points of intersection with previously surveyed boundaries may be exempted only by specific survey instructions and in the following situations:

a) where an existing parcel or subdivision is not being used, or is not likely to be used for any purpose, providing:

i) the boundary of the parcel or subdivision is not part of a main survey fabric, such as a section line or concession line;

- ii) there are no existing rights based on the parcel or subdivision;
- iii) the department administering the land agrees; and
- iv) sufficient connections are made to the parcel or subdivision to illustrate the relationship on the plan of survey;

b) where in the resurvey of a jurisdictional boundary such as the exterior boundary of an Indian Reserve or National Park, the boundaries of parcels adjoining the jurisdictional boundary do not affect the position of the jurisdictional boundary. However the monuments for the parcels adjoining the jurisdictional boundary must be searched for and the results of the searches reported; or

c) when the boundaries intersect surveyed mineral claims. In this case sufficient connections shall be made to the monuments marking the boundaries of the claim to illustrate the relationship on the plan of survey.

29. When surveying a right-of-way or road:

a) Only one limit of the right-of-way or road has to be monumented unless the right-of-way is over 30 m in width in which case both limits must be monumented. The requirement to monument both sides may be relaxed by specific survey instructions if the right-of-way crosses large areas of vacant crown land; and

b) If a right-of-way for a limited interest, such as an easement, crosses a series of adjoining lots, only the intersection with the first and last boundaries crossed, or with others as specified in the specific survey instructions, has to be monumented.

30. Where only one limit of a right-of-way is being monumented and a deflection point on that limit cannot be monumented or witnessed, monument the corresponding deflection point on the opposite limit. In addition, monument both limits at the next deflection point in either direction.

31. Monuments marking parcels being superseded by parcels of a new survey, that may cause confusion to the layperson should be removed if they are of no value for future surveys. Make or ensure that there are sufficient ties to enable the position of the monument to be maintained.

32. If it is impossible, or inadvisable, to monument a point of deflection or a point of intersection, then place a witness monument as near as practical to the true location, on one of the boundaries being surveyed. Do not place a witness monument if the corner is already defined by a witness monument. Record the distance and direction from the witness monument to the point of deflection or intersection and the reason why the point could not be monumented.

33. If the nature of the terrain prohibits the re-establishment of a monument on a straight line boundary in its original position, and it is not necessary to place a witness monument because the position does not mark a lot corner, then a new monument may be erected at a new location on the boundary as close as possible to the original position. Record the reason why the monument cannot be re-established in the original position.

34. Where an artificial boundary terminates at a natural boundary place a monument on the artificial boundary far enough from the natural feature so that it is reasonably safe from destruction. Measure and record to the nearest 0.1 m the distance, along the artificial boundary, from the monument to the natural boundary.

35. When placing a new monument on an existing monumented curve or straight line boundary, it shall be placed on the line joining the two adjacent monuments marking the boundary. Should the adjacent monuments be obliterated, lost or disturbed, they should be restored or re-established.

The distance and direction between the new monument and both of the adjacent monuments shall be measured.

36. Subject to paragraph 37, set CLS standard posts, CLS standard rock posts and other capped monuments flush with the ground. Other types of monuments should protrude enough to allow markings to be read.

37. If it is necessary to place a monument in a travelled road or trail, cultivated field or other location where it could be a hazard, then countersink the monument sufficiently to avoid injury or damage.

38. All obliterated, lost or disturbed monuments used during the course of the survey should be restored or re-established.

#### *Cutting out and Blazing Lines*

39. An environmental assessment and review process may be required by the administering department for line cutting and other survey work which may damage the environment. Before starting any line cutting work ensure that the requirements of any environmental assessment and review will be followed. In case of conflict with any survey standard, consult the regional office of Canada Centre for Cadastral Management.

40. For jurisdictional boundaries, in addition to the requirements in this part, all line cutting shall be done in accordance with provincial or territorial government requirements and in accordance with any requirements of the administering department.

41. When cutting and blazing boundaries take all reasonable precautions to avoid causing damage to private property. Every effort must be made to inform each owner affected and to respect any concerns they may have.

42. Unless otherwise specified in the specific survey instructions, in an environmental assessment and review process, or in any provincial or territorial government or administering department requirements, in undeveloped wooded areas:

a) cut out all boundary lines and blaze suitable trees to make the boundary recognizable as a cut line. Remove all fallen trees, logs, and brush from the cut line; and

b) blaze suitable trees within 2 metres and on both sides of a boundary. Blaze the side of the tree facing the boundary line and each of the sides at right angles to this side. The blazed trees are not intended to mark the boundaries or the limits of the parcels. They are blazed to assist in finding the boundaries.

43. If practical, survey along the actual boundaries so that only one line need be cut out. This will eliminate the possibility of traverse lines being mistaken for boundaries in the future. Where it is impractical to survey along the boundaries minimize cutting and, if possible, traverse along nearby clearings, roads, or trails.

44. Line cutting and blazing are not required in developed townsites or subdivisions, for rights-of-way, or where boundaries follow features such as fences, hedges, or tree lines.

45. In undeveloped multi-lot subdivisions consisting of lots and blocks, cut out all block outlines and the rear boundaries of all lots. For lots smaller than one hectare, it is only necessary to cut out every fifth sideline. For lots larger than one hectare every second sideline should be cut out.

46. In the township system, where road allowances are adjacent to Indian Reserves or National

Parks, the actual reserve or park boundary may not have been monumented or cut out in the original survey. Any new monumentation, boundary line cutting or blazing shall be done on the actual boundary.

47. The cutting of merchantable timber should be avoided. If merchantable trees are left on the boundary, they should be blazed with 3 blazes placed vertically (one above the other) on each side of the tree where the boundary line intersects the tree. Record the size and type of the tree and the distance from the nearest monument to the blaze.

#### **Adjustment and Testing of Measuring Equipment**

48. All equipment used in the survey must be in adjustment, in calibration and standardized. The surveyor must keep records of calibration and standardization results and carry out sufficient analysis of the data to prove that the equipment is operating to the manufacturer's specifications.

49. Records of calibration and standardization results and copies of any analysis carried out must be retained so that, if requested, they can be submitted as part of the returns of survey.

50. Indirect positioning systems, such as the Global Positioning System (GPS), must be tested on a control network acceptable to Canada Centre for Cadastral Management. Records of tests must be retained so that, if requested, they can be submitted as part of the returns of survey.

#### **Survey Methods**

51. A surveyor shall obtain and record sufficient corroborative evidence to show that a monument, or control survey marker, is in its original position before accepting it for the current survey.

52. It is preferable that straight lines, rather than curved lines, be used for boundaries. New spiral curve boundaries shall not be created. If it is legally possible, circular curves shall be substituted for existing spiral curves.

53. The preferred method of placing monuments and of determining the length and direction of boundaries is by direct measurement along the boundary.

54. Indirect measurements, such as radial ties or positions obtained by GPS, may be used to place monuments or to determine the length and direction of existing boundaries provided they are verified by an independent method, for example:

- a) incorporating the monuments in a closed traverse;
- b) comparing with measurements of the same boundary shown on a prior official plan; or
- c) making additional radial ties from another control survey marker or traverse point incorporated in the control network.

55. Survey traverses shall be closed by: making a loop closing on itself; closing on official control survey markers; or closing on connected monuments shown on official plans.

56. A surveyor may adopt the boundary of a prior official survey without actual retracement only if the surveyor personally measured that boundary and provided that:

- a) the field notes of the previous survey are recorded in the Canada Lands Surveys Records (CLSR);
- b) the accuracy of the previous survey achieves the accuracy requirements specified in

paragraphs 63 to 68 of this Chapter;

c) the monuments marking the boundary are in good condition, are in their original position, and a report of their condition is included in the field notes for the new survey; and

d) the field notes for the new survey indicate which measurements are adopted.

57. When a lot is to be created beside an unsurveyed road or portion of road, the limit of the road common to the lot must be surveyed and additional monuments placed on the road limit on either side of the lot to provide for any future extension thereof.

### **Bearings**

58. Bearings may in order of preference be controlled by or be derived from:

a) Coordinated Control Monuments in a Coordinated Survey Area;

b) federal or provincial control survey markers;

c) astronomic observations for azimuth providing that the accuracy requirements for legal surveys are attained; or

d) monuments established in a previous legal survey for which the plan is recorded in the CLSR. The distance between boundary monuments selected should be sufficient to enable legal survey accuracy standards to be met, and over 100 m, if possible.

59. No more than 30 courses shall be permitted between successive lines of bearing control.

60. Angles and bearings shall be expressed in degrees, minutes and seconds.

61. The maximum allowable angular misclosure is  $20\sqrt{n}$  seconds (n= number of angles measured in the traverse loop or between lines of bearing control).

62. If a meridian to which bearings are to be referred to is not specified in the specific survey instructions for the survey, refer the bearings to one of the following meridians:

a) the customary meridian in the area of the survey;

b) if the survey is located within a recognized coordinate system to the central meridian of the coordinate system; or

c) if one of the above two methods is not applicable, then to the meridian through a point, preferably monumented, central to the survey.

### **Accuracy**

63. The minimum accuracy standard for legal surveys is defined by the ellipse showing the 95% confidence region for the positioning of one station relative to another. The semi-major axis of this ellipse in centimetres (r) with respect to another station must be less than or equal to  $C(d + 0.25)$  where:

C = an assigned value depending on the accuracy requirement; and

d = the distance in kilometres to any station.

64. For surveys involving the surveyor's own work, C is assigned the value 8. The following table illustrates how various distances affect the semi-major axis of the 95% confidence region of one station with respect to another, parts per million (ppm) and the accuracy ratio for  $r = 8(d + 0.25)$ :

<b>d (km)</b>	<b>r (cm)</b>	<b>ppm</b>	<b>ratio</b>
0.01	2.1	2100	1/480
0.03	2.2	733	1/1360
0.10	2.8	280	1/3570
0.50	6.0	120	1/8033
1.00	10.0	100	1/10000

65. For surveys using the surveyor's own measurements combined with previous surveyors' measurements, C is assigned the value 15. The following table illustrates how various distances affect the semi-major axis of the 95% confidence region of one station with respect to another, parts per million (ppm) and the accuracy ratio for  $r = 15(d + 0.25)$ :

<b>d (km)</b>	<b>r (cm)</b>	<b>ppm</b>	<b>ratio</b>
0.01	3.9	3900	1/260
0.03	4.2	1400	1/710
0.10	5.3	530	1/1890
0.50	11.3	225	1/4420
1.00	18.8	190	1/5320

66. The surveyor shall use methods, procedures and equipment that will meet the accuracy standard and be satisfied that the survey will meet the standard. Any one station of the survey must meet the standard relative to all other stations.

67. If the accuracy for a connection, involving a previous surveyor's work does not meet legal survey standards, the connection shall be remeasured or verified using an independent method.

68. See Appendix E4 for additional information regarding the concept of confidence region for legal surveys and the application of this standard for legal surveys.

#### **Connections**

69. All surveys shall be connected to one, and preferably two, monuments of the closest existing legal survey provided a legal survey lies within one kilometre of the current survey.

70. All surveys shall be connected to existing federal or provincial survey control networks providing there are survey markers within one kilometre of the survey. Connections shall be made from at least two well separated monuments of the legal survey to at least two of the survey markers which best straddle the survey.

71. Where only one survey marker exists within one kilometre it is only necessary to connect to the one survey marker, however the connection should be made to at least two monuments of the survey.

72. If the connections specified in paragraphs 69 to 71 are not possible then connect to:

- a) the closest legal survey or survey marker; or
- b) a permanent feature easily identifiable, both on the ground and on a National Topographic System map (or provincial equivalent), or aerial photograph. The feature shall be identified on the plan of survey.

73. If the connection specified in subparagraph 72( a) is not practical then an authorized regional representative of the Surveyor General may approve a connection to another legal survey or survey marker.

74. When subdividing a previously surveyed parcel which has been integrated into existing federal or provincial survey control networks, new connections to the control network are not mandatory, however connections should be made to control survey markers within or near the parcel being subdivided, to ensure the survey fabric has not been disturbed.

75. Any structure, fence, hedge, or similar features which are close to, or encroach on a boundary being surveyed shall be tied in and related to the boundary.

#### **Location of Natural Boundaries**

76. The position of natural boundaries can be determined by any method, provided the boundary can be plotted at the final plan scale to an accuracy of 0.5 mm.

77. The following table shows the accuracy, at various plan scales, to which natural boundaries must be located using a plotting accuracy of 0.5 mm:

<b>Plan Scale</b>	<b>Accuracy</b>
1: 10,000	5.0 m
1: 5,000	2.5 m
1: 2,000	1.0 m
1: 1,000	0.5 m
1: 200	0.1 m

78. If a boundary of a parcel being surveyed and monumented is the limit of a reservation that is measured from a natural boundary then the natural boundary shall be located to an accuracy of at least 0.5 of a metre for plan scales greater than 1: 1,000.

79. If the natural boundary is plotted from aerial photographs, maps or other information source that the surveyor has not prepared, the surveyor shall inspect the boundary on the ground:

- a) to verify (including if necessary taking sufficient measurements) that the plotting accuracy of 0.5 mm at the final plan scale (or the accuracy specified for the establishment of the limit of a reservation) can be achieved; and
- b) to clearly mark the position of the natural boundary on the photograph, map or other information source.

80. Aerial photographs, maps or other information source that have the position of natural boundaries marked on them under subparagraph 79( b) must be signed and dated by the surveyor. They form part of the returns of survey and will be recorded in the CLSR.

81. Natural boundaries located from a photogrammetric or mapping process require the following support documentation:

- a) a signed and dated surveyor's report providing details of the method used;
- b) a manuscript showing the control points used to prepare the plot;
- c) descriptions for all control stations in a format acceptable to Canada Centre for Cadastral Management;
- d) aerial photographs and diapositives (if requested) from which the product was produced;
- e) if applicable, a copy of the numerical adjustment in a format acceptable to Canada Centre for Cadastral Management; and
- f) if requested, the coordinates of the natural boundary or a digital file of it in a form acceptable to Canada Centre for Cadastral Management.

#### **Surveys in Coordinated Survey Areas**

82. Every legal survey carried out within, or partly within, a Coordinated Survey Area shall be connected to Coordinated Control Monuments so that the survey can be closed through the connections. Connections shall be made from at least two well separated monuments of the legal survey to:

- a) the two Coordinated Control Monuments that best straddle the survey;
- b) all Coordinated Control Monuments within the perimeter of survey; and
- c) all Coordinated Control Monuments within 150 m of the survey.

83. Bearings shall be derived from one or more pairs of Coordinated Control Monuments or alternatively from monuments of a survey previously integrated in the Coordinated Survey Area.

84. When subdividing or consolidating previously surveyed parcels which have been integrated into a Coordinated Survey Area, new connections to the control network are not mandatory, however connections should be made to Coordinated Control Monuments within or near the parcel being subdivided.

85. If the surveyor finds that a Coordinated Control Monument is disturbed or if it appears that the coordinates are in error it shall not be used in the survey and the surveyor shall report the matter to the regional office of Canada Centre for Cadastral Management.

#### **Official Field Notes**

86. Fields records are the records made in the field during the course of the survey.

87. Official field notes are any field notes recorded in the Canada Lands Surveys Records (CLSR).

88. Keep field records of everything found, observed and done, including:

- a) the description and the location of the project;
- b) the names and duties of persons in the field party;
- c) the type and identification of survey equipment used;
- d) the date of observations;
- e) each quantitative observation or measurement;
- f) a complete description of every monument found, restored or placed, including markings and ancillary monumentation;
- g) searches made for monuments and other physical evidence;
- h) if applicable, reasons why monuments cannot be placed where specified in the instructions;
- i) the methods used to re-establish lost monuments; and
- j) searches made for documentary or verbal evidence.

89. Field record entries must not be erased or obliterated. Stroke out incorrect entries in such a way that they remain legible but are obviously discarded.

90. Unless specified otherwise in the specific survey instructions, official field notes may be prepared in whichever of the following forms is the most suitable for clarity and completeness:

- a) Plan form. Except where otherwise specified in this Chapter, follow the guidelines in Appendix E3;
- b) Incorporated with the plan of survey. This form is appropriate only where the boundaries have been directly measured and the addition of field note information does not clutter up the plan. The title of the plan should read "Plan and Field Notes of Survey of ....."; or
- c) Book form. This form shall be either the original field records if they are clear and easily understandable, or a clear and understandable compilation of the field records.

91. The field records shall be held by the surveyor, and, even though official field notes have been filed in the CLSR, a surveyor may still be required to submit the field records or copies of the field records.

92. Electronic field records may be submitted; however, they must be accompanied by a hard copy which is well organized with sufficient diagrams and annotations to be clear and easily understandable. The hard copy will be the official field notes and must comply with all provisions of this Chapter regarding official field notes.

93. Provide in the title of the official field notes:

- a) a descriptive heading as specified in the specific survey instructions;
- b) the section, township, and range or lot and concession in which the survey is located;
- c) the name of the Indian Reserve, National Park, etc., as applicable;

- d) the county, parish, or community and the province or territory in which the survey is located;
- e) in remote areas, the approximate latitude and longitude of the site of the survey;
- f) in the Yukon and Northwest Territories indicate the Quad sheet number( s); and
- g) the period in which the field work for the survey was carried out and the name and qualifications of the surveyor in the following form:

"This survey was executed during the period of *(date)* to *(date)*, by *(surveyor's name)* CLS."

94. Provide in the legend of the official field notes:

- a) a statement describing the type of bearings (e. g. astronomic), how the bearings were obtained (ie. the type of observations and points at which the observations were made or the line from which bearings were adopted) and the meridian to which the bearings are referred;
- b) the source of any derived data involved in the survey;
- c) the roll and photograph number and source of each aerial photograph, or the CLSR number of any plan or reference to other documents used to plot the position of any natural feature or boundary shown in the official field notes;
- d) if a coordinate system is used, a description of it, including a statement identifying the conversion factor used to convert ground level distance to the projection plane; and
- e) an explanation of all abbreviations used which are not listed in Schedule 3 of Appendix E3.

95. Show in the diagram of the official field notes:

- a) all control survey markers used or established in the survey with a description of the marker and any published coordinate values;
- b) balanced bearings and measured distances reduced to the horizontal at general ground level for every observed or measured boundary, traverse course, triangulation line, and offset line;
- c) the radius, arc length, chord length and chord bearing of each circular curve boundary and if the curve is non tangential, the radial bearing at the beginning and end of curve;
- d) the length, the starting point radius and the terminal point radius of each spiral curve boundary and the lengths and bearings of chords between adjacent monuments on the spiral curve boundary;
- e) all boundaries within the limits of and adjacent to the survey;
- f) all evidence searched for or placed indicating what was found, restored and placed;
- g) descriptions of the types, condition and the markings of monuments and ancillary monumentation;
- h) the designation of each lot, parcel, road, right of way, etc. involved in and adjacent to the survey;

- i) the surveyed connection to, and descriptions of, every structure, topographic feature, fence, hedge, or other similar improvement or feature tied in during the survey; and
- j) a north arrow.

96. Show in the official field notes the survey work carried out to verify measurements between monuments which differ from previous plans in an amount exceeding the accuracy requirements for legal surveys outlined in this Chapter.

97. For clarity, diagram information such as distances, directions and monument descriptions may be shown using detail insets, not necessarily to scale, or tables.

98. Add and execute the following affidavit or affirmation on the official field notes:

"I \_\_\_\_\_ of the \_\_\_\_\_ of \_\_\_\_\_, Canada Lands Surveyor, (*or provincial commission*) solemnly swear (*or affirm*) that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by these field notes (*and accompanying plan, or this plan and field notes*); and that the said field notes (*and accompanying plan, or this plan and field notes*) are correct and true to the best of my knowledge and belief. (*Add, in the case of an oath, SO HELP ME GOD*)."

*(signature of surveyor)*  
.....

Sworn (*or affirmed*) before me  
at .....  
this ..... day of....., 19.....

(signature of a Justice of the Peace, Notary Public, Commissioner for Oaths or Canada Lands Surveyor)  
.....

*(name in block letters)*

99. Any person signing or witnessing an affidavit or affirmation shall have their name printed in the affidavit or affirmation, or printed directly under the signature.

#### **Official Plans**

100. Official plans shall be prepared in accordance with the guidelines in Appendix E3.

101. An official plan shall be similar in form to the appropriate specimen plan SP1- 1 to SP1- 8.

102. An official plan must clearly document the nature and position of the boundaries dealt with by the official survey.

103. In certain situations, official plans may be compiled from existing survey information shown on field notes recorded in the CLSR; these plans may only be prepared under specific survey instructions.

104. Give in the title of the official plan a descriptive heading as specified in the specific survey instructions.

105. In the title block give the date of the survey and the name and qualifications of the surveyor in the following form:

"Surveyed by ....., CLS, in ....."

106. Provide in the legend:

- a) a statement describing the type of bearings (e. g. astronomic), how they were obtained (i. e. the type of observations and the points at which observations were made or the line from which bearings were adopted), and the meridian to which the bearings are referred;
- b) the roll and photograph number and source of each aerial photograph, or the CLSR number of any plan, or reference to other documents used to plot the position of any natural feature or boundary shown on the plan; and
- c) the CLSR number( s) of the field notes for the survey dealt with by the plan.

107. Show in the diagram of the plan:

- a) a heavy black line, between 1 and 1.5 mm in width coinciding with the exterior boundaries of the lands dealt with by the survey or, in the case of a boundary survey, the boundary;
- b) the type and position of all monuments used in the survey;
- c) the type, position, and identification number of any monument or control survey marker to which a surveyed connection has been made;
- d) the designation of each new lot, block, parcel, road, or right of way dealt with by the plan;
- e) the width of each road, right-of-way or easement dealt with by the plan;
- f) the designation, according to plans of record, including registration plans, of each previous lot, block, parcel, road, right of way or easement involved in and adjacent to the survey;
- g) plan numbers of other plans, such as registration plans or Regional Surveyor plans, for which a registry abstract was opened or for which an interest was issued, or which otherwise affects the survey;
- h) if lots are subdivided or consolidated, the designation of the underlying parent lots, the plan record numbers and lot boundaries in phantom. It is only necessary to show the last generation of underlying surveys;
- i) the nature and position of all significant natural and man-made features which are close to or encroaching on the boundaries of the lands being surveyed;
- j) names of features according to the *Canadian Gazetteer*, published government maps or local usage;
- k) the balanced bearing and the measured distance reduced to the horizontal at general ground level of each straight line boundary dealt with by the plan;
- l) distances and bearings along the boundary lines to monuments used to create or re-establish boundaries dealt with by the plan;
- m) the radius and arc length, and if necessary for clarity the chord bearing and distance, and if the curve is non tangential the radial bearing at the beginning and the end of the curve of each circular curve boundary dealt with by the plan;

n) the length, the starting point radius and the terminal point radius of each spiral curve boundary and the lengths and bearings of chords between adjacent monuments on the spiral curve boundary;

o) the area of each surveyed lot, road or right-of-way, except for roads within subdivisions where only a total area is required; and

p) for combined plan and field notes the calculated bearings and distances shall be identified by appending "( c)". Plans of survey do not normally identify calculated distances.

108. Where a lot is surveyed beside an unsurveyed road, only the lot should be dealt with on the plan and no reference to the road should be made in the title, however the survey of the road limit should be shown in the body of the plan.

109. If it is not apparent in the plan title or in the diagram of the plan that parcel( s) shown on a previous plan are to be superseded with parcel( s) shown on the new plan, then a prominent note should be added to the plan as follows:

"Parcel( s) ..... dealt with by this plan supersede( s) parcel( s) (or part( s) of) ..... dealt with by plan( s) ....."

*Official Plans in Coordinated Survey Areas*

110. In addition to the information outlined above, official plans in Coordinated Survey Areas shall also show:

a) in the legend, a statement identifying the combined conversion factor (the product of the elevation factor and the projection scale factor) used to convert ground level distance to the projection plane; and

b) in the diagram, all Coordinated Control Monuments relevant to the survey.

111. The integration of surveys into a Coordinated Survey Area shall be based on the principle of working from the whole to the part. When calculating coordinates, discrepancies shall be distributed proportionally in each part of the survey (the coordinates of Coordinated Control Monuments are to be assumed errorless unless there is evidence that a monument has been disturbed).

112. The plan shall show balanced bearings and measured distances reduced to the horizontal at general ground level.

113. The returns for official plans in Coordinated Survey Areas shall include with the report the coordinate datum, the date of the coordinates and a listing of coordinates of all relevant coordinated control monuments and boundary monuments found or established in the survey. This list shall be suitably annotated so that the monuments can be identified on the plan. In the case of extensive subdivisions only the main monuments, such as those located at block corners, curve terminations, deflection points and any other points required to obtain approximate maximum intervals of 150 m between coordinated points, need be tabulated.

*Official Plans of Rights-of-Way*

114. The following guidelines should be followed when showing rights-of-way on official plans:

a) the full extent of each of the underlying lots or parcels taken for the right-of-way shall be

defined on the plan;

b) if the official plan is prepared for the sole purpose of defining the extent of a right-of-way, the title shall be in the following form:

"Plan of Survey of  
(ROAD, PIPELINE, UTILITY) RIGHT-OF-WAY  
in LOTS 5, 6, and 7, etc."; and

c) if the official plan deals with other lots and/ or parcels in addition to the right-of-way and the right-of-way is a separate parcel, the title shall be in the following form:

"Plan of Survey of  
LOTS 5, 6, and 7 and  
(ROAD, PIPELINE, POWER LINE) RIGHT-OF-WAY".

115. If the right-of-way is monumented on one side only, it is sufficient to dimension only the monumented side if the other side is parallel to the monumented side. In addition, show the width of the right-of-way.

116. In surveys of long rights-of-way, bearings may be referred to more than one meridian but the convergence between these meridians must be clearly indicated on the plan.

117. If the right-of-way is for a limited interest such as an easement, access agreement or permit, which will not cause a severance of the lot or parcel in which it lies, the right-of-way should be shown on an explanatory plan. However, if satisfactory to the administering department, a right-of-way for a limited interest (whether monumented or not) may be shown on an official plan dealing with other parcels. In such a case:

a) the boundaries of the right-of-way should be shown by dashed lines so it is clear that a severance is not intended;

b) the plan should clearly show the lots or parcels that the right-of-way affects;

c) the right-of-way should be labelled on the diagram of the plan as Access Right-of-Way, Utility Right-of-Way, etc.; and

d) the title should not include a designation for the right-of-way.

118. A table of reference may be added to right-of-way plans to show areas of land taken from parent parcels of land (See Schedule D1- 1).

#### *Approvals and Confirmation of Official Plans*

119. Place the appropriate endorsement certificates in the spaces as indicated on the specimen plans.

120. The plan shall be approved by the duly authorized officer( s) of the department of the Government of Canada or commissioner administering the Canada lands.

121. Upon the approval of the plan as specified in paragraph 120, the Surveyor General or a person designated by the Surveyor General to confirm such plans, will confirm the plan if the survey and plan conform with these general instructions and the specific survey instructions. The plan will be deemed to be an official plan upon confirmation.

122. Official plans are recorded in the Canada Lands Surveys Records and a copy is sent to the appropriate land titles or land registry office.

### Returns of Survey

123. The returns of official surveys shall consist of:

- a) official field notes in one of the prescribed forms;
- b) a survey report as prescribed in Chapter D15;
- c) an official plan;
- d) plans or other documents pertaining to the survey that were obtained from sources other than the CLSR;
- e) a copy of any written authority required to carry out the survey (if not previously submitted);
- f) calibration or standardization results for instruments or equipment if requested by Canada Centre for Cadastral Management; and
- g) coordinate information required by paragraph 113, if applicable.

### SCHEDULE D1- 1 (*paragraph 118*)

#### Sample Table of Reference for Right-of-Way Areas

R/W Parcel	Area	Parent Lot	CLSR Plan	LTO Plan
1	154.8 m <sup>2</sup>	W-4	64239	M 13521
2	2.97 ha	G	45675	M 8116
3	6.49 ha	G	45675	M 8116
4	154.8 m <sup>2</sup>	W-5	64239	M 13521

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