NZS/AS 1100.401:1984
Incorporating Amendment 1

Technical drawing – Part 401: Engineering survey and engineering survey design drawing

This Australian Standard AS 1100.401:1984 has been adopted by the Standards Council of New Zealand for use in New Zealand, pursuant to the provisions of the Standards Act 1988.

NZS/AS 1100.401:1984

This Australian standard was prepared by Committee MS/32, Technical Drawing. It was approved on behalf of the Council of the Standards Association of Australia on 6 September 1983 and published on 3 January 1984.

The following interests are represented on Committee MS/32:

Association for Computer Aided Design Limited
Association of Consulting Engineers Australia
Australian Chamber of Commerce
Australian Gas Association
Bureau of Steel Manufacturers of Australia
Commonwealth Scientific and Industrial Research Organization
Confederation of Australian Industry
Department of Conservation, Forests and Lands, Victoria
Department of Defence
Department of Defence Support
Department of Housing and Construction
Department of Public Works, New South Wales
Electricity Supply Association of Australia
Institute of Draftsmen Australia
Institution of Engineers Australia
Institution of Production Engineers
Master Builders Federation of Australia
Royal Australian Institute of Architects
Society of Automotive Engineers, Australasia
Telecom Australia
University of Melbourne
University of New South Wales
University of Queensland

The following bodies also participated in the preparation of this standard:

Australian Federation of Construction Contractors
Department of Administrative Services
Department of Aviation
Department of Local Government and Lands, New South Wales
Department of Technical and Further Education, New South Wales
Institution of Surveyors Australia
Metropolitan Water Sewerage and Drainage Board, New South Wales
National Association of Australian State Road Authorities
Railways of Australia Committee
State Electricity Commission of Victoria
State Rivers and Water Supply Commission Victoria

This standard was issued in draft form for comment as DR 80121.

PREFACE

This standard was prepared by the Association's Committee on Technical Drawing. It constitutes Part 401 of a new multi–part standard designated AS 1100, Technical Drawing, which supersedes Parts 1 to 12 of the 13–part standard AS 1100, Drawing Practice.

Concurrent with this Part 401, Parts 101 and 201 are also published, viz:

Part 101—General Principles
Part 201—Mechanical Drawing.

Part 301 of this standard, Architectural Drawing, is in course of preparation and until such time as it is published, AS 1100 Part 13—1978, Architectural Drawing, will remain current.

It was in 1976 that the above committee decided that rather than have a standard of many parts it would be better if all aspects of technical drawing were consolidated into fewer parts that would embrace the entire discipline.

The designation AS 1100 has been retained for this new multi–part standard since it is already well established throughout industry and teaching institutions as the Australian standard number tor technical drawing. However, to identify these new editions from the previous ones, the designation of 3–digit part numbers has been employed.

The scope of this standard embraces both the preparation of survey plans for engineering works and the illustration of proposed, designed and executed engineering works based on such survey plans. Cadastral and topographic plans, while outside the scope, are recognized as important information bases which in many instances act as an ideal medium for the addition of extra detail to form an engineering survey plan.

Engineering survey includes the following:

(a) Data—the determination of dimensional data for planning engineering works.

(b) Control—the establishment of marks to control engineering works.

This standard deals with the method of representation on engineering survey and engineering survey design drawings of information appropriate to each of these functions and is in three sections. The first section deals with the scope of the standard, definitions and classification of documents. The second deals with matters of general application to all engineering survey and design drawings. These first two sections, taken together with Part 101 of AS 1100—1984, are intended to provide a common language for the inter–disciplinary communication of information by means of engineering survey and engineering survey design drawings. Section 3 deals with special applications, and provides symbols and abbreviations for use on special–purpose drawings. It is intended that reference to Section 3 will only be required for access to information relating to special purposes such as, for example, identification of details relating to a specific utility.

Consideration must be given to line thickness, symbol height and lettering to ensure that they are suitable for the drawing scale, sheet size and possible filing method, e.g. microfilm.

Care should be taken not to confuse the symbols given in this standard with the scaled plotting of features which should be the adopted practice where practicable.

As a general principle, vertical displacement from a datum plane is referred to in terms of 'height' rather than 'level', e.g. 'floor height'. However, there are some cases where the traditional use of the word 'level' is correct, as for example the 'full supply level' of a reservoir.

The following Supplements of typical drawings illustrating use of the conventions specified in the standard have been prepared; others may be forthcoming:

Supp. No 1 Aviation Facilities
Supp. No 2 Gas Distribution
Supp. No 3 Sewerage and Water Supply
Supp. No 4 Roads

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
TECHNICAL DRAWING

Part 401—ENGINEERING SURVEY AND ENGINEERING SURVEY DESIGN DRAWING

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard sets out recommendations for engineering survey and engineering survey design drawing practice.

1.2 APPLICATION. The standard indicates methods of presenting survey information on drawings before, during and after construction of engineering works. Such drawings would show a varying mixture of both natural and designed features above and below ground.

NOTES:

1. For example, a power station drawing would show only a few sets of local coordinates, a restricted number of heights and the transformation parameters to Australian Map Grid or State Survey Coordinates. The rest of the drawing would provide mechanical, electrical and civil engineering design features drawn in accordance with AS 1100. Such a drawing should nevertheless be termed an engineering survey and engineering survey design drawing within the scope of this standard with the intention of directing all those involved in other fields to standard drawing practice.
2. Some of the symbols prescribed in this standard for aviation facilities, electricity distribution, railways and communications are at variance with the electrotechnology symbols given in AS 1102, Part 8.

   This variance stems from two major sources as follows:

   (a) Traditional usage within the discipline, e.g. dashed lines to indicate a hidden object.

   (b) The use to which an engineering survey drawing is put, e.g. the existence of a runway light is all that is required; to indicate its type is superfluous and the size of the symbol prohibits details.

1.3 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

AS 1100	Technical Drawing Part 101—1984 General Principles Part 201—1984 Mechanical Drawing Part 13—1978 Architectural Drawing Supp. No 4 Roads
AS 1102	Graphical Symbols for Electrotechnology Part 8—Location Symbols—Power Supply Systems and Electrical Services for Buildings and Sites Part 12—Electric Traction
AS 1155	Metric Units for Use in the Construction Industry
AS 1348	Glossary of Terms Used in Road Engineering
AS 1726	SAA Site Investigation Code
AS 1743	Road Signs
AS 2144	Traffic Signal Lanterns
AS 2339	Traffic Signal Posts and Attachments
Chart 5011	Symbols and Abbreviations Used on Admiralty Charts*

1.4 DEFINITIONS. For the purpose of this standard, the following definitions apply:

1.4.1 Centreline—a reference line, at or near the centre or axis of work.

1.4.2 Contour—a line connecting a series of points at the same height, or a line representing this on a drawing.

1.4.3 Control line—a reference line from which dimensions are controlled.

1.4.4 Cross-section—a vertical section normal to the line of chainage viewed in the direction of ascending chainage.

NOTE: For drains and rivers, cross-sections are drawn facing down-stream with the left and right banks in the correct relative position.

* Published by the Hydrographic Department, Taunton, U.K.

1.4.5 Height—the vertical displacement of an object or point from a specified datum plane.

1.4.6 Longitudinal section—a vertical section along the line of chainage as viewed from the right-hand side of the line of chainage. The right-hand side is defined by looking along the line of chainage in the direction of ascending chainage.

1.4.7 Plan—that view of a subject from above, looking vertically downward.

1.4.8 Spot height—the height of a point.

1.5 CLASSIFICATION OF DOCUMENTS. The following types of drawing can be identified for the purpose of document classification:

(a) Engineering survey drawing(s)—drawing(s) showing topographical, control and cadastral information essential for design.

(b) Engineering survey design drawing(s)—drawing(s) including some but not necessarily all of the information contained on the survey drawing (omitting that part of such information which is not necessary for construction of the work envisaged), and all information necessary for construction.

(c) As-executed drawing(s)—drawings(s) detailing the works as carried out.

1.6 LEGENDS. Where appropriate, legends shall be provided in respect of the following:

(a) The notation used in the drawing.

NOTE: Standard symbols may be covered by reference to the appropriate standard.

(b) Project grid data:

(i) Origin of horizontal coordinates and adopted coordinates.

(ii) Adopted azimuth.

(iii) Azimuth variation relative to North.

(iv) Grid construction, e.g. plane rectangular.

(v) Origin of height datum.

(c) Survey and photogrammetry data:

(i) Field note references.

(ii) Photography date and scale.

(iii) Origin and authors of base mapping.

SECTION 2. GENERAL APPLICATION

2.1 DIMENSIONING.

2.1.1 Linear dimensioning.

2.1.1.1 *Units to be used.* Units used in dimensioning of drawings shall be consistent with AS 1100, Parts 101 and 201, and AS 1100, Part 13—1978, and AS 1155.

2.1.1.2 *Expression of height.* The following requirements shall apply to the expression of height:

(a) All heights shall be related to a specified datum. Where possible, this datum should be the Australian Height Datum or be related to it, and a reference to the datum points shall be given on the drawing.

(b) All heights shall be expressed in metres to comply with the requirements of Clause 2.1.1.1.

(c) The height and description of the bench mark or other starting point from which heights are derived shall be stated.

(d) The height of features, e.g. water tower or chimney, shall be expressed as either—

(i) HT (T)—height of the top of the feature above the Australian Height Datum, or

(ii) HT (B)—height of the base of the feature above the Australian Height Datum.

2.1.1.3 *Expression of area.* The units used for expressing areas shall be shown and shall be as follows:

(a) Areas of 10 000 m^2 and over, i.e. 1 ha and over, shall be expressed in hectares, and the value in hectares shall be rounded down to not more than four significant figures.

EXAMPLE: 654.39 ha would be shown as 654.3 ha
65.439 ha would be shown as 65.43 ha
6.5439 ha would be shown as 6.543 ha.

(b) Areas of less than 1 ha shall be expressed in square metres rounded down to not more than four significant figures, except that areas of less than 100 m^2 may be shown to one decimal place.

2.1.1.4 *Expression of volume.* The units used for expressing volume shall be shown and shall be—

(a) for solid volumes . . . . . cubic metres (m^3); and

(b) for fluid volumes . . . . . litres (L) and multiples thereof, e.g. kilolitres (kL), megalitres (ML).

2.1.1.5 *Expression of coordinates.* Where a coordinate system is used, coordinates shall be expressed with 'Eastings' preceding 'Northings'.

2.1.2 Arrangement of dimensions. Dimensions shall be arranged so as to be readable from the bottom or right-hand side of the drawing sheet.

Contour values shall be expressed to be read in the direction of ascending height.

Chainage lines shall be arranged so that the direction of ascending chainage is generally from left to right. All chainages shall be written to be readable from the bottom or right-hand side of the drawing sheet.

Chainages shall be expressed in accordance with either Method 1 or Method 2 as indicated in Fig 2.1.2(A).

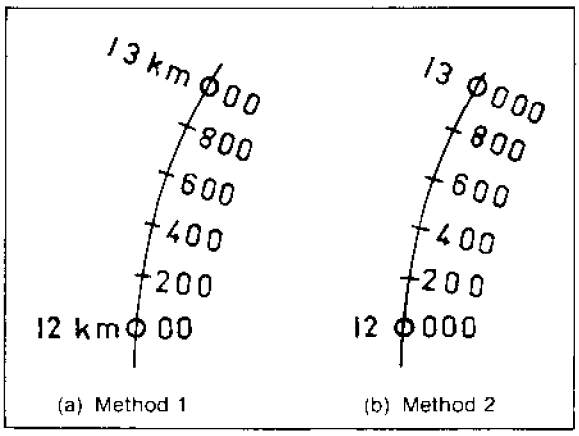

Fig. 2.1.2(A). EXPRESSION OF CHAINAGES