Appendix A1

DRAWINGS - Materials, Sheet Sizes and Layouts

A1.1 Materials

A1.1.1 Media

A drawing or a graphic presentation can be viewed either in a hard copy form or on a visual display unit.

Hard copy forms are prepared on opaque or translucent sheets, the choice depending on the use for the drawing, and the method of reproduction to be used.

If opaque sheets are used, then reproduction by photographic copying using reflected light from the original will be required. Opaque sheets cannot be used in normal drawing copying processes, such as diazo, where a print is made by exposing sensitized material to light transmitted through a positive translucent original. Opaque materials include paper, boards and some drafting films, and are used for some original drawings, legal documents, art work, and project illustrations.

Translucent sheets, which are translucent under normal conditions but become transparent when viewed against a strong light source, can be used for all methods of reproduction. Translucent materials include paper and film. Because of its greater versatility, translucent material is currently used for most drafting work.

A1.1.2 Requirements

Drafting materials come in a wide range of handling qualities, surface finish, dimensional stability, weight or thickness, and as single sheets or rolls of various lengths and widths.

Papers and boards are not dimensionally stable with changes in temperature and humidity and are not waterproof; they are being superseded by drafting film for many purposes. With normal handling, tracing paper of 85 to 95 g/m² is suitable for much drafting work. Detail paper is cheaper than tracing paper, but is not suitable for work to be reproduced.

Note: Grammage is the term used for expressing the mass of a sheet of paper in relation to its area. It is expressed in grams per square metre (g/m² or, colloquially, gsm).

Drafting films are polyester based materials with prepared matt surfaces which are suitable for either ink or pencil. Films are available with either one or both surfaces matt, and in thicknesses range from 0.05 mm to approximately 0.2 mm. These films are, in general, highly translucent, dimensionally stable for most purposes, waterproof, static free, very resistant to impact shocks, not easily torn and do not become brittle with age; nor do they leave "ghosts" after erasures. It is recommended that a minimum thickness of 0.07 mm be used to ensure satisfactory handling in diazo printing.

All drafting material should possess the following properties:

- Surface suitable for the application and retention of either pencil or ink.
• Ability to withstand repeated erasures without abrasion or ghosting.

• Sufficient strength to withstand considerable handling.

• Good resistance to ageing (if retention for a considerable period is required).

• Tone such that maximum contrast between drawn matter and background is achieved.

• Surface sufficiently matt so that light reflection does not affect photographic reproduction.

• Surface free from obvious grain, body structure, stains or water mark.

In addition, translucent media should have good transparency to ultra violet light so that reproduction by contact printing will give sharp images.

A1.1.3 Pre-printed Sheets

Standard size sheets that are pre-printed with border lines, title blocks and other routine information may economise on drafting time. Pre-printing should be executed on the front of the translucent sheets. Work on the back of the sheet may involve some loss of quality in microfilm reproduction unless special photographic techniques are employed.

A1.1.4 Intermediates (or Reproducibles)

Intermediates (or reproducibles) are sensitised and translucent paper or film sheets which may be used for producing additional copies by the plan printing process. These additional copies may be used instead of, or in addition to, the original drawing.

The use of intermediates greatly reduces drafting and tracing time in an office although this is of decreasing concern as computer produced drawings are now the norm. These sheets may be used for producing a modified version of a drawing while retaining the unaltered original, for transferring a paper drawing to film for permanent retention and for production of duplicate originals. The use of edge binding to protect drawings is not recommended unless the binding and the drafting materials are compatible for shrinkage.

A1.2 Sheet Sizes

Standardization of drawing sheets sizes offers definite advantages in economies of cut-paper sizes, filing systems material and furniture, and in reproduction.

AS 1100 Part 101 - Section 2 - Materials, Sizes and Layout of Drawing Sheets emanates from the system of paper sizes recommended by the International Standards Organization and while it refers particularly to engineering drawings, it has equal application to survey drawings.

This standard lists the Preferred Series which comprises all the A series from A0 to A4, and the B series in sizes B1 to B4 which is the Non-preferred Series.
With some flexibility of approach, the A series can be adapted to a wide range of applications in the many fields of surveying.

International sizes comprise the series known as A, B and C. In each series the shape of the basic size and all normal subdivisions is the same, so that the sides are always in the proportion \(1: \sqrt{2}\), i.e. 1:1.414 approximately. The A and B series are used in stationery, drawings and posters, and the C series is used only for envelopes. Further information is available in AS 1612 - Paper Sizes.

The Survey Co-ordination (Survey) Regulations 1992, made pursuant to the Survey Co-ordination Act 1958, now require that drawings must conform to one of the sizes A0-A4 in the range of International Paper Sizes. See Table A1.1.

The A and B series drawing sheets are well suited to reduction onto 35 mm microfilm. Their aspect ratio being 1: \(\sqrt{2}\), throughout the ranges, is the same as the aspect ratio of the microfilm frame. The normal subdivision of the basic size in the A series, A0 (841 mm x 1189 mm) which occupies an area of 1m\(^2\), is shown in Fig. A1.1. This system of paper sizes is built on the basis that each series of paper sizes consists of a range of sizes formed by dividing the size immediately above into two equal parts, the division being parallel to the shorter side. The areas of two successive sizes are then in the ratio 2:1.

![Fig. A1.1 A Series Drawing Sheets](image)

**A1.2.1 Preferred and Non-preferred Sheets**

Unlike traditional Imperial sizes, International Standards are stated as trimmed sizes.

Table A1.1 gives designations and sizes of Preferred International sheet sizes which have application in various branches of surveying.

Table A1.2 gives designations and sizes of the Non-preferred sheet sizes, some of which have a limited application in Victoria.
A1.2.2 Oversize Sheets

Tables A 1.3 and A 1.4 give sizes and corresponding ordering designations for oversize sheets for use where wider borders are required for purposes which may include pre-printing considerations, edge binding or a frame for subsequent trimming of prints.

### TABLE A1.3 Dimensions of Preferred Sheets (With wider borders)

<table>
<thead>
<tr>
<th>Ordering Purposes Only</th>
<th>Designation</th>
<th>Cut Sheet Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA0</td>
<td>A0</td>
<td>860 x 1220</td>
</tr>
<tr>
<td>RA1</td>
<td>A1</td>
<td>610 x 860</td>
</tr>
<tr>
<td>RA2</td>
<td>A2</td>
<td>430 x 610</td>
</tr>
<tr>
<td>RA3</td>
<td>A3</td>
<td>305 x 430</td>
</tr>
<tr>
<td>RA4</td>
<td>A4</td>
<td>215 x 305</td>
</tr>
</tbody>
</table>

### TABLE A1.4 Dimensions of Non-Preferred Sheets (With wider borders)

<table>
<thead>
<tr>
<th>Ordering Purposes Only</th>
<th>Designation</th>
<th>Cut Sheet Dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB1</td>
<td>B1</td>
<td>720 x 1019</td>
</tr>
<tr>
<td>RB2</td>
<td>B2</td>
<td>510 x 723</td>
</tr>
<tr>
<td>RB3</td>
<td>B3</td>
<td>361 x 510</td>
</tr>
<tr>
<td>RB4</td>
<td>B4</td>
<td>255 x 361</td>
</tr>
</tbody>
</table>

A1.2.3 Roll Drawings

Where roll drawings are required, they should be 860 mm or 610 mm wide. Lengths of the roll drawing sheets are determined by the individual requirements of each drawing. In choosing the length of a roll drawing, care should be exercised in selecting a length which is suitable for microfilming (See AS 1203), and folding purposes.
A1.2.4 Tolerances
The cut sheet dimensions in Tables A1.1 and A1.2 are subject to the following tolerances:

- For dimensions up to and including 600 mm: ± 2 mm
- For dimensions greater than 600 mm: ± 3 mm

Neither diagonal of any cut sheet shall exceed the diagonal of a sheet which has the maximum length and width, nor shall it be less than the diagonal of a sheet which has minimum length and width.

For the purposes of checking sheet sizes, the material shall be conditioned at 20 ± 2° C at a relative humidity of (65 ± 2) per cent and measured under these conditions.

A1.3 Layout of Drawing Sheets

It is essential that certain basic information be shown on every drawing. If the display of this information is standardized as to size and location, the interchange of information and the filing of drawings will be facilitated.

A typical layout of a drawing sheet which basically conforms to AS 1100 Part 1. This layout has been adapted to contemporary practice in Victoria as shown in Appendix A8, Plan No.s 1, 4 and 5.

(It should be appreciated that plans of subdivision formats are controlled under the Subdivision Act. (Refer to examples in Layout of Plans No.9 in Appendix A8).

A1.3.1 Size of Borders

It is customary for the drawing area to be enclosed within a frame. The sizes and locations of drawing frames on drawing sheets, with and without a filing margin, are shown in Figs. A1.2 and A1.3. All dimensions shown are in millimetres.

Where borders are required for roll drawings, the borders of sheets should conform to the dimensions shown in Table A1.5.

<table>
<thead>
<tr>
<th>Standard Width of Roll (mm)</th>
<th>Nominal Width of Borders (mm)</th>
<th>Width of Rectangular Drawing Frame (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top and Bottom a</td>
<td>On Both Sides b</td>
</tr>
<tr>
<td>860</td>
<td>29.5</td>
<td>28 M IN</td>
</tr>
<tr>
<td>610</td>
<td>22</td>
<td>20 M IN</td>
</tr>
</tbody>
</table>

A1.3.2 Print Trimming Line

Where oversize drawing sheets are used, a method of indicating the trimming line should be marked on the sheets. This may be by means of broken lines forming a frame dimensioned to the cut sheet dimensions of regular size sheets or by other suitable means. International Standard ISO 5457-1980 provides two alternatives:
Fig. A1.2 Size and location of drawing frame on drawing sheets with filing margin. (Dimensions are nominal).
Fig. A1.3 Size and location of drawing frame on drawing sheets without filing margin.
(a) Corner marks in the form of isosceles triangles with sides of approximately 10 mm, or

(b) Corner marks which have been reduced to two small strokes with a width of 2 mm.

The ISO alternatives relate to machine trimming equipment where the heavier symbols are used for machine sensing of trimming boundaries. Symbols with less visual impact will suit most applications.

### A1.3.3 Alpha-NumericReferencing

Drawings may be divided into zones by a reference system based on lettered and numbered divisions to assist in readily locating a particular dimension or feature, especially on large drawings concerning construction surveys. If used in conjunction with a table of additions and amendments, these are not only more easily located, but provide a chronological sequence of all additions and amendments etc. during the life of the project. If this system is used, it should be placed inside the drawing frame.

Where an alpha-numeric reference is required, it is recommended that a scheme be used, where:

- vertical zones are designated numerically reading from left to right

- horizontal zones are designated by capital letters starting with A and reading from top to bottom, but omitting the letters I and 0.

- the number of zones and the width of the margin in which they are inserted should be in accordance with Table A1.6, depending on the size of the drawing.

Note: This alpha-numeric system of reference is described as "Grid Referencing" in AS 1100.101-1984. Throughout this Handbook, the term “grid reference” will be reserved for Australian Map Grid (AMG) or other grid co-ordinates determined by survey.

<table>
<thead>
<tr>
<th>TABLE A1.6 Details of Alpha-NumericReferences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Detail</strong></td>
</tr>
<tr>
<td>Number of vertical zones designated 1, 2, etc.</td>
</tr>
<tr>
<td>Number of horizontal zones designated A, B, etc.</td>
</tr>
<tr>
<td>Widths of margins for reference characters</td>
</tr>
<tr>
<td><strong>Size of Drawing (mm)</strong></td>
</tr>
<tr>
<td>A0 B1</td>
</tr>
</tbody>
</table>

Note: This alpha-numeric system of reference is described as "Grid Referencing" in AS 1100.101-1984. Throughout this Handbook, the term “grid reference” will be reserved for Australian Map Grid (AMG) or other grid co-ordinates determined by survey.
A1.3.4 Sheet Designation and Title Blocks

The sheet size designation number should be indicated on the drawing, preferably in the title block, the normal position of which is at the bottom right hand comer of the sheet. See examples in Appendix 8.

Provision should be made in all title blocks for the following information:

- Name of firm, department etc.
- Title or description of drawing
- Drawing number
- Sheet number and size
- Scale
- Signatures and dates
- AMG Reference
- Bar Scales
- Lengths are in metres

(Note: Refer to Appendix A8, Layout of Plans Nos 1, 4, 5, 6 & 7.)

Elsewhere and adjacent to the title block, provision should be made for:

- Certificates required by law
- Notations and amendments with dates.

Standard information relating to units of measurement and the system of projection used in engineering drawings may be included in the title block.

Prominent figures and letters, preferably upper case Gothic style, are recommended for the drawing number and the title.

Titles of drawings should be as concise as possible, consistent with adequate description. Recording and cross-referencing is simplified by the use of a planned system of titling.

A1.3.5 Drawing Numbers

The drawing number is located in the bottom right hand comer of the title block.

The drawing number may be repeated in other comers of the sheet or along the sides of the sheet to ensure that it is visible when the drawing is filed or stored.

A1.3.6 Revisions

All revisions should be indicated and recorded on the drawing and each new issue of the drawing should be identified.

The method of recording may vary in detail, but commonly the necessary information is entered in a table. An example plan possessing a revision table is Plan No. 4, the Survey and Feature Plan, in Appendix A8. Identification of a change on a drawing may be by symbol, usually a number or
letter enclosed within a circle, square or triangle, which is placed in proximity to the revised dimension or detail. Reference is made to this number or letter in the recorded details of the change. When zoning is used the position of the change may be given by the appropriate alpha-numeric reference in the revision table.

Irrespective of the manner by which changes are identified and recorded, details of dimensional changes and of other changes when practicable, should provide a record of the previous size, feature etc.