APPENDIX 6

BULK IN RELATION TO BOUNDARY

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BULK IN RELATION TO BOUNDARY

The following explanation is divided into two parts -

Part 1. **A preliminary explanation of the nature of the indicator system and why it is used.**

Part 2. **A technical explanation of the application of the indicators.**

1.0 PRELIMINARY EXPLANATION

Parts of the Residential 7 zone allow maximum heights up to 20m but this would rarely be achievable if buildings had to comply with the recession planes of the height-to-boundary system. A more flexible system is therefore necessary in this zone.

The indicator system is a very flexible and relatively simple system for ensuring that properties which adjoin new building developments still receive an adequate minimum amount of daylight.

The Auckland District Plan system is derived from, but not identical to, the system used in British Standard Code of Practice C.P.3 - a standard dating back to 1949.

The concept assumes that a point in the middle of a room, which has only one window facing a new development, will receive adequate daylight if a minimum sized patch of sky can be seen from that point over or around the new building. It is assumed that the sky has an even grey luminance as on an overcast day. The system is based entirely on daylight and takes no account of direct sunlight. It also has no indirect control on privacy or building dominance in the way that recession planes do.

An alternative to the use of indicators might be a requirement for a minimum "*sky factor"* at a standard point at a standard distance inside a standard window. "*Sky factor*" is the proportion of the sky which is visible compared with the whole hemisphere of thesky. The District Plan uses indicators as an easier method which avoids tedious sky factor calculations.

The use of the term *bulk-to-boundary indicators* in the District Plan is to signal that they are not the same as the daylight indicators of C.P.3 and that the height of buildings that they control is different from the maximum height for the particular zone. They could, however, equally be called 'daylight indicators', 'permissible height indicators' or 'permissible obstruction indicators'. The choice of name depends on the perception of the user - whether a designer seeking to maximise the size of a proposed building - or a neighbour seeking to minimise loss of daylight.

In Auckland City fences or walls up to 2m high may be erected on any boundary without any form of consent. It was decided therefore to apply the indicators 2m above the ground level at the boundary rather than to the ground itself as in the original system. This also has the advantage that the angle of the No.1 indicator aligns with the 2m and 45° recession plane of the height-to-boundary controls.

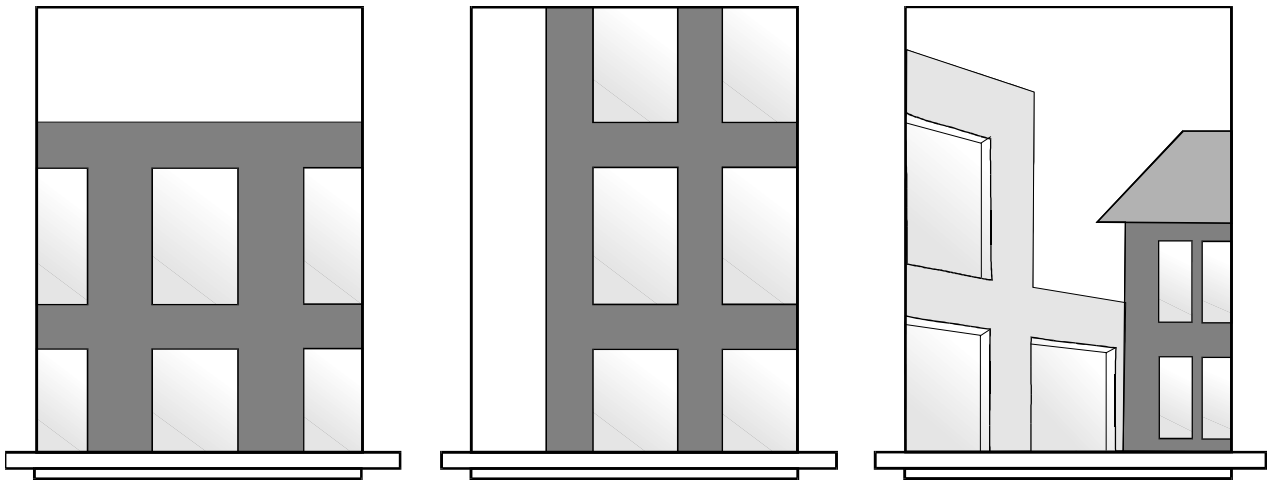
One can then imagine the neighbour of a new building walking along just inside his own boundary with his eye level with the top of the 2m high fence making sure that at every point enough sky can be seen over and around the new building so that the minimum standard of daylight penetrates well into his rooms which face the new building.

The neighbour's minimum patch of visible sky might be a wide strip over the top of a long building (and hence measured by the No.1 indicator) or a tall narrow strip visible around the side of a tall building (and measured by the No.4 indicator) or the minimum patch of visible sky might be of irregular shape and made up to the equivalent of a whole indicator segment from parts of the full range of the four indicators.

The advantage of the indicator system is that it allows buildings which are tall or have complex outlines provided that an adequate standard of daylight reaches neighbouring properties.

These diagrammatic views through a typical window illustrate these circumstances:

Figure 1



The great flexibility of the system does however mean that it is not possible to pre-determine a maximum building envelope as can readily be done with the recession planes of the height-to-boundary system. There are an infinite number of maximum building envelopes all of different shapes. This means that designers must use a trial and error method to take advantage of the flexibility.

Good news to most users of the indicators is that probably more than 90% of proposed developments comply with the indicators in either of two very simple ways:

1. They are long low buildings which are below a 2m and 45° recession plane and hence comply with the No.1 indicator

or;

2. They are tall buildings which on plan, subtend an angle of less than 110° at the boundary and hence comply with the No.4 indicator.

The use of the No.2 and No.3 indicators and circumstances where parts of several indicators are used at one point are comparatively rare.

2.0 TECHNICAL EXPLANATION

How to Use the Bulk-to-Boundary Indicators

2.1 INFORMATION REQUIRED

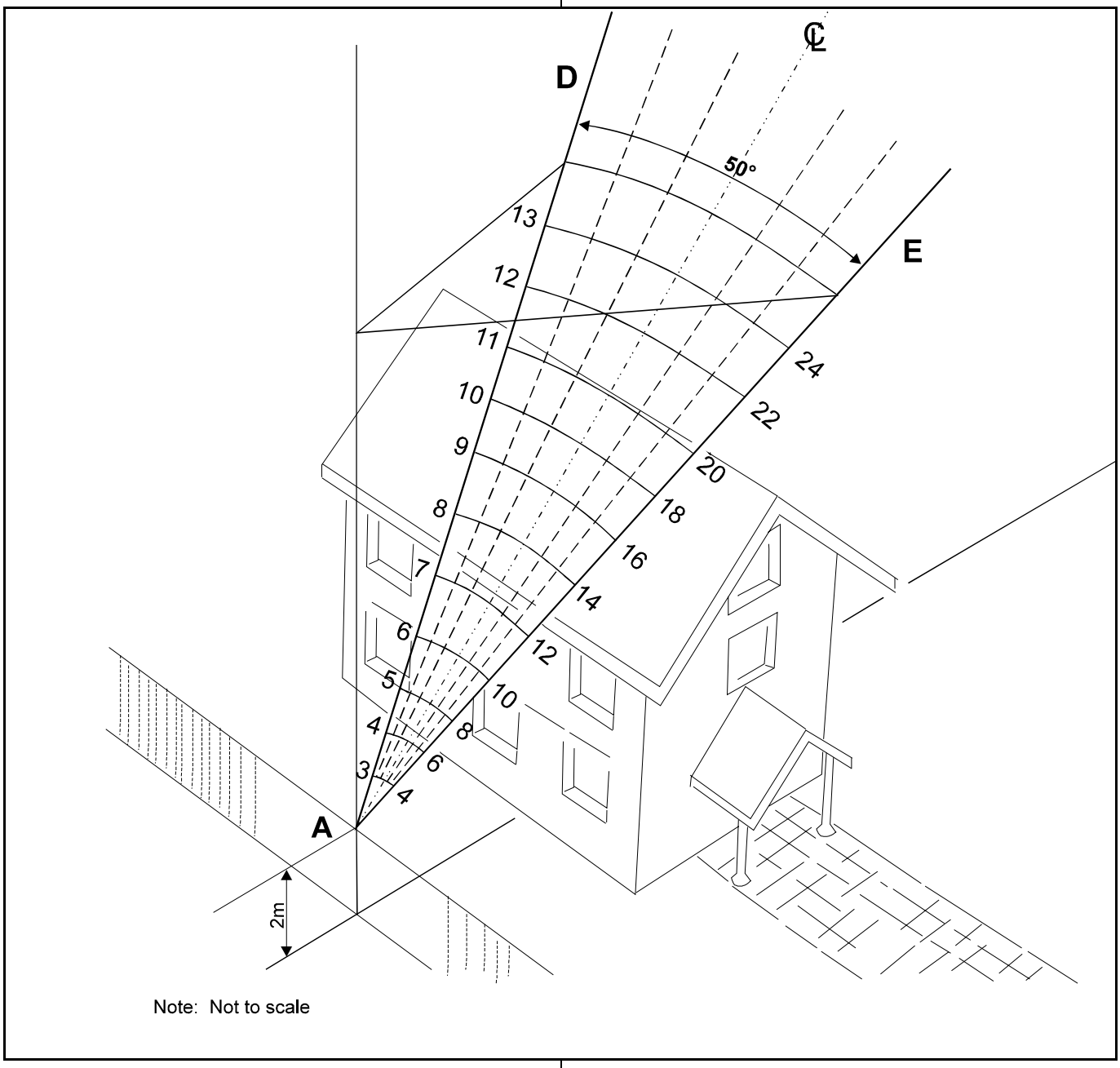
When bulk-to-boundary indicators are used an accurate site plan with accurate ground levels on critical parts of the boundaries is necessary. Levels to the same datum are also required at critical points on roof edges, ridges, parapets, etc.

2.2 THE INDICATORS

The designer is permitted a choice of four indicators. Each indicator is a segment of a different cone. The No.1 indicator is a wide segment of a fairly steep cone and the No.4 indicator a narrow segment of a rather shallow cone. The No.2 and 3 indicators are intermediate segments between the No.1 and the No.4. These conical segments are presented as flat plans in this appendix but they represent three dimensional figures rising from 2m high at point A up to the arc A-D.

The perspective sketch below attempts to show the shape of a typical indicator in three dimensions so that the concept can be more readily understood

Figure 2



The indicators are defined by angle in plan and the angle at which the segment rises as set out in the following table:

Indicator	Angle of rise	Angle of arc
No.1	45º	70º
No.2	35º	50º
No.3	25º	35º
No.4	15º	20º

Maximum heights are set out on the indicators at scales of 1:100 on one side and 1:200 on the other for the convenience of users but the indicators are not dependent on scale. It can be helpful to visualise the shape by regarding the curved height lines on the indicators as contours similar to a topographical map.

For practical use the indicators should be reproduced on a transparent medium so that they can be used as overlays on a site plan.

2.3 TESTING A PROPOSED DEVELOPMENT FOR COMPLIANCE

The equivalent of a whole indicator must be able to pass over or around all the buildings on the site (both existing and proposed) and reach every point on each boundary.

The edge of the indicator must be at an angle of at least 25º to the boundary being tested. Place point A of an indicator on a site boundary so that the indicator lies over the site, align AB or AC with the boundary and rotate about point A but do not allow AB or AC to cross the boundary. Ensure by using the permissible height lines on the indicator that at least the equivalent or one whole indicator can reach point 'A' unobstructed.

The most favourable of the four indicators should be selected and it may be split vertically so that parts of the indicator reach point A from different directions. Further than that, parts of various indicators may be used provided they do not overlap, to make up the equivalent of a whole indicator reaching point A.

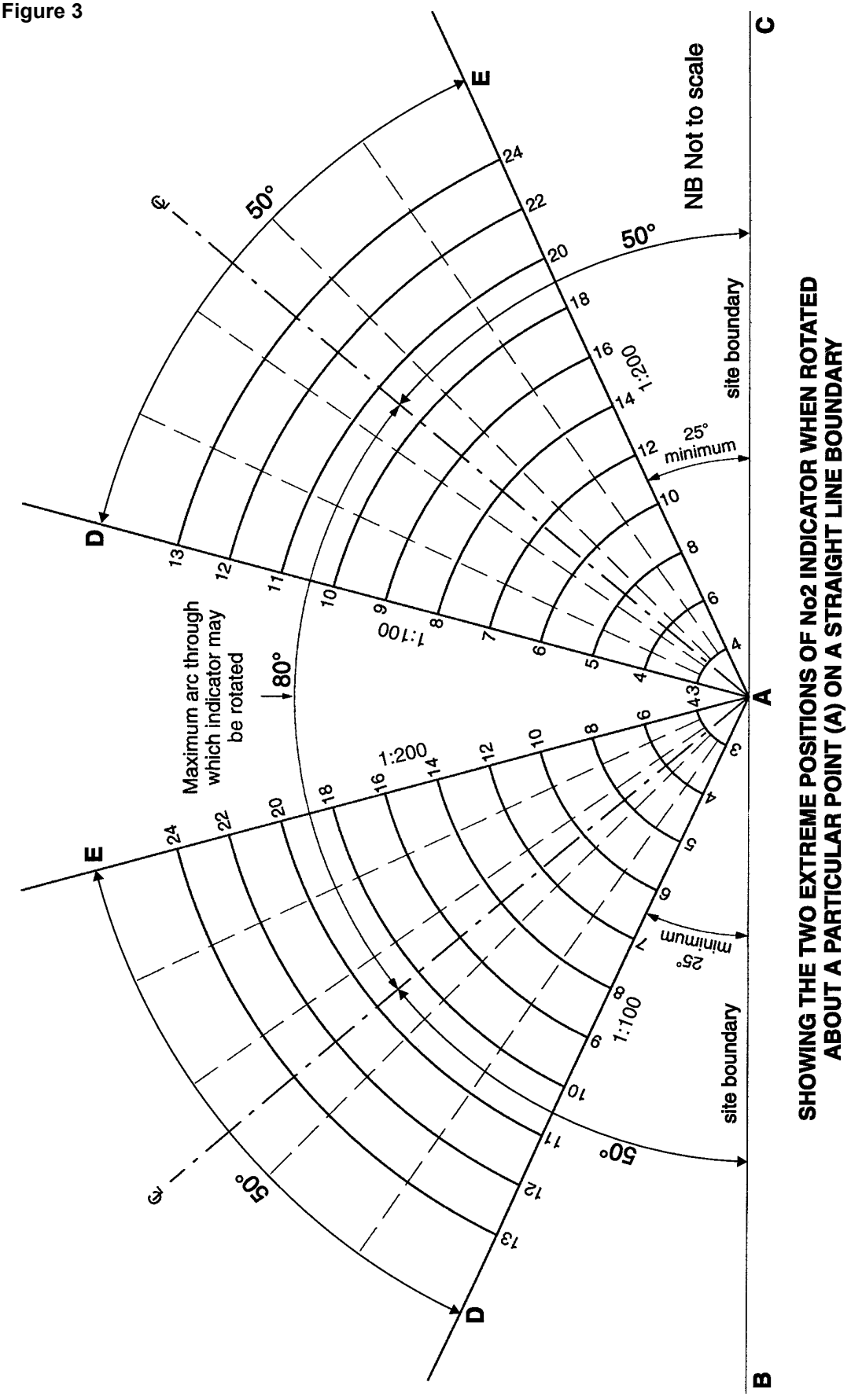
In practice the No.1 indicator is the most favourable for testing long low buildings when the indicator will pass over the top and the No.4 indicator most favourable for testing tall buildings when the indicator can pass around the sides.

2.4 DIVIDED INDICATORS

Any indicator may be divided vertically and used partly on one side of a proposed building and partly on the other. Provided the unobstructed portions of the indicator add to a whole indicator the required daylight will reach point 'A'.

The No.4 indicator is commonly used in this way around a tall building taking 'A' opposite the middle of the building and checking to see that 50% of the indicator is unobstructed around each side. If the mid point complies then all the other points opposite the building will also comply but in proportions of 60% to 40%, 90% to 10% etc. If a building complies in this way the only limitation on height is the zone height.

Figure 3


SHOWING THE TWO EXTREME POSITIONS OF No2 INDICATOR WHEN ROTATED
ABOUT A PARTICULAR POINT (A) ON A STRAIGHT LINE BOUNDARY
NB Not to scale
site boundary
site boundary
Maximum arc through which indicator may be rotated
80°
50°
50°
50°
50°
25° minimum
25° minimum
1:200
1:200
1:100
1:100
A
B
C
D
D
E
E

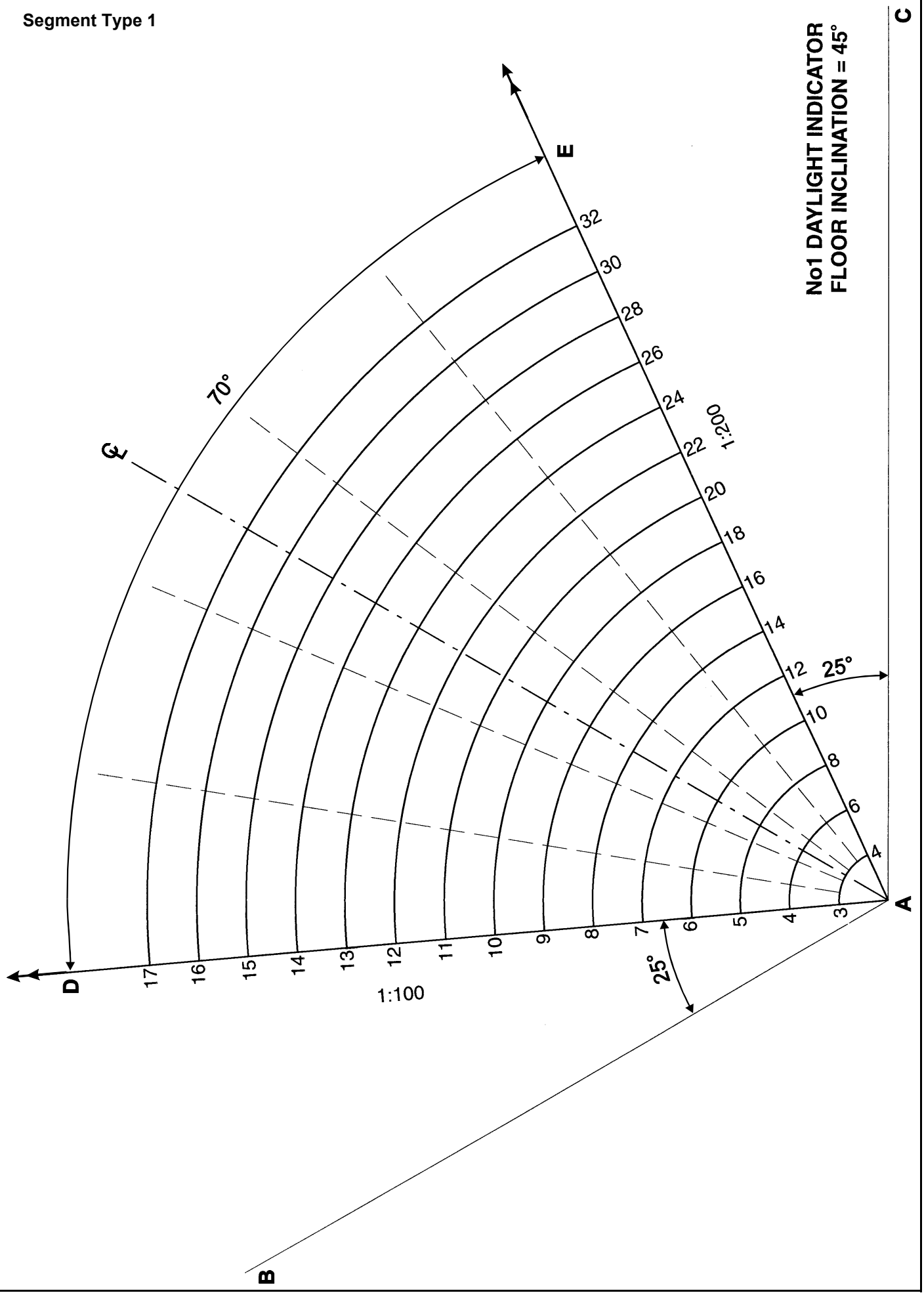
2.5 USING TWO DIFFERENT INDICATORS AT ONE POINT

Where a tall building has a low wing attached it may be possible to achieve the required light as a combination of light around the tall part using the No.4 indicator and light around the other side of the tall part but also over the lower wing using the No.1 or No.2. indicator.

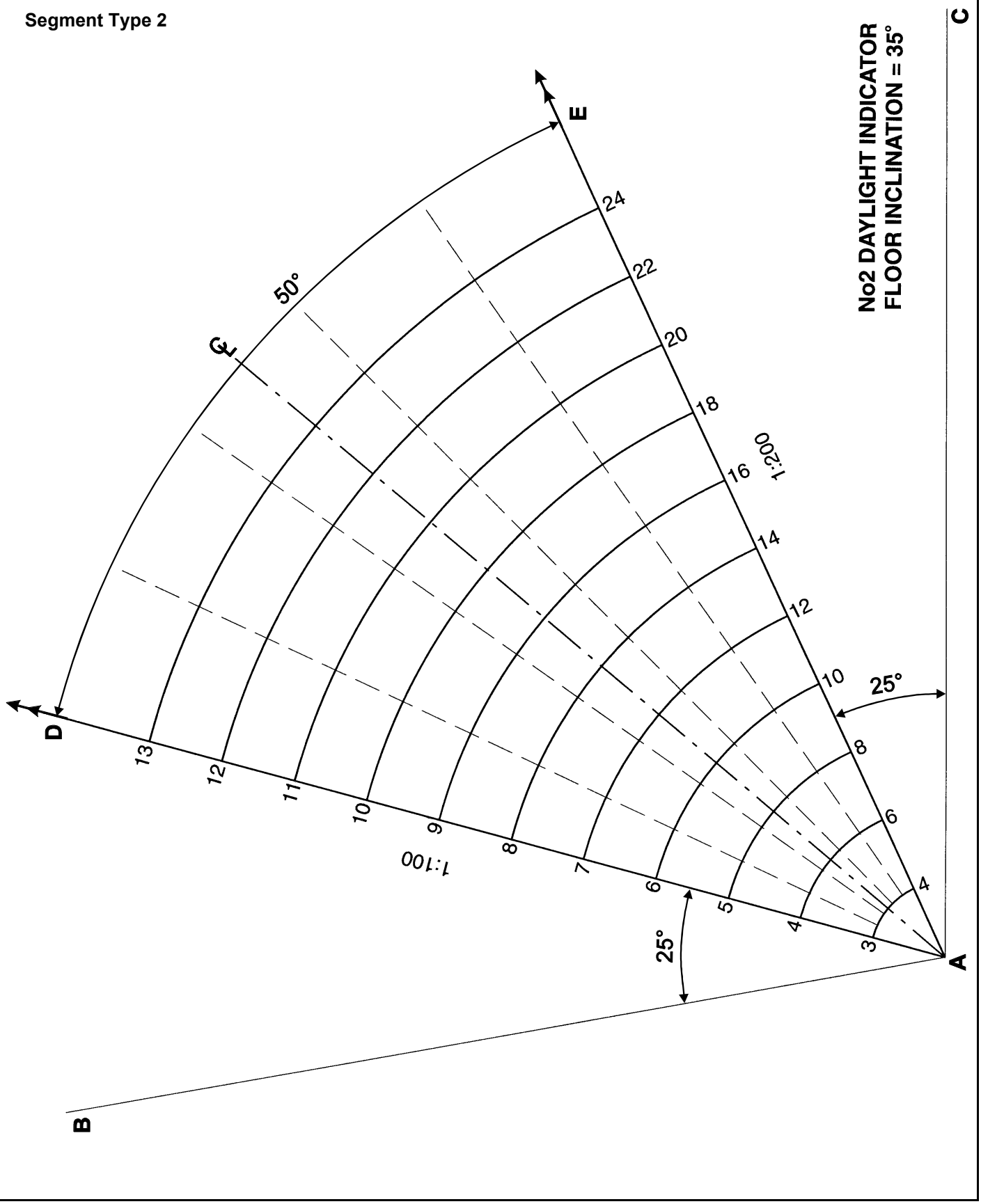
2.6 CONCLUSION

In theory, all points on the site boundaries require testing to ensure that at least the equivalent of a whole indicator reaches every point on all boundaries unobstructed by buildings. In practice, however, only critical parts of boundaries need be tested and much of the boundary lengths can be seen to comply by inspection.

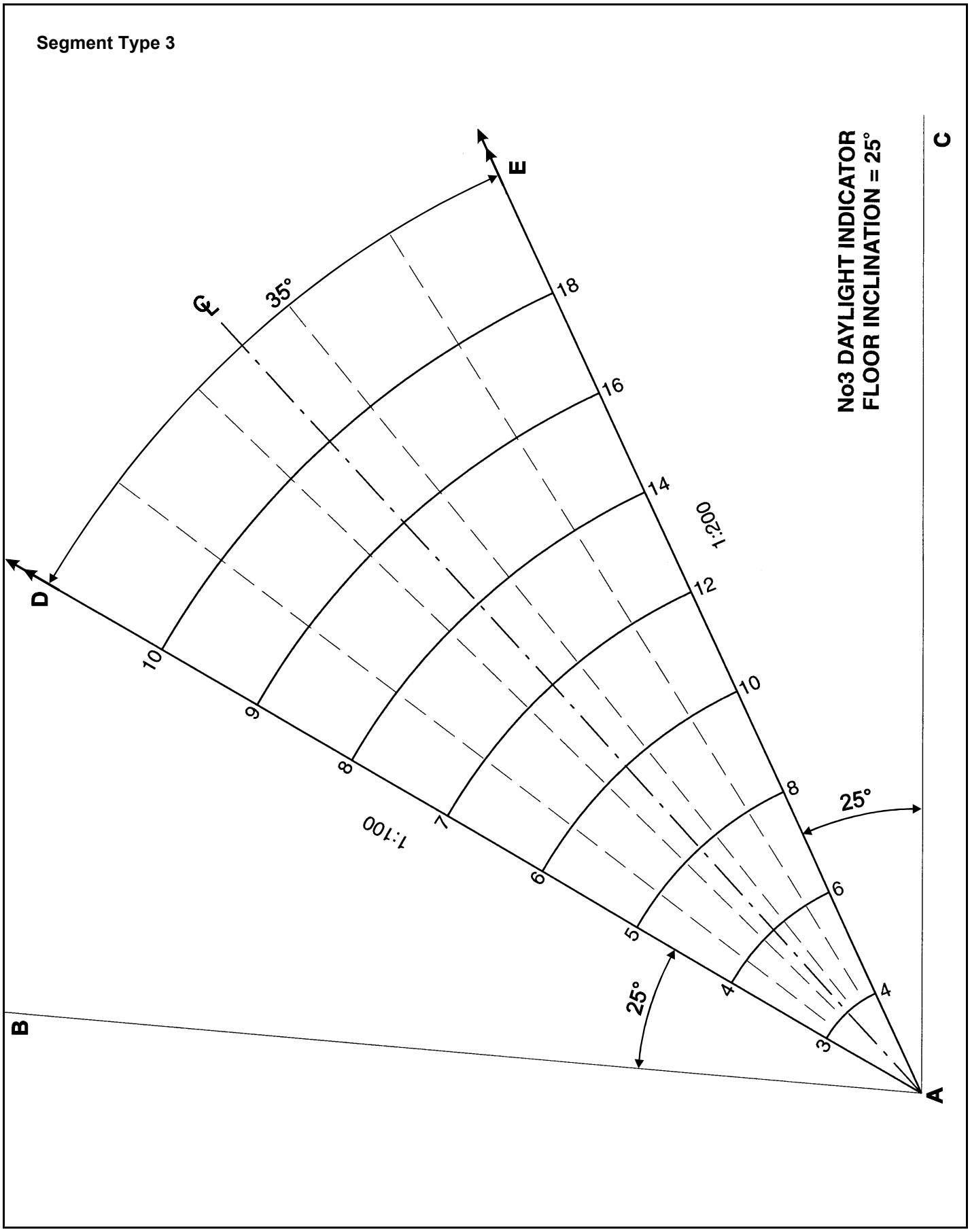
Segment Type 1

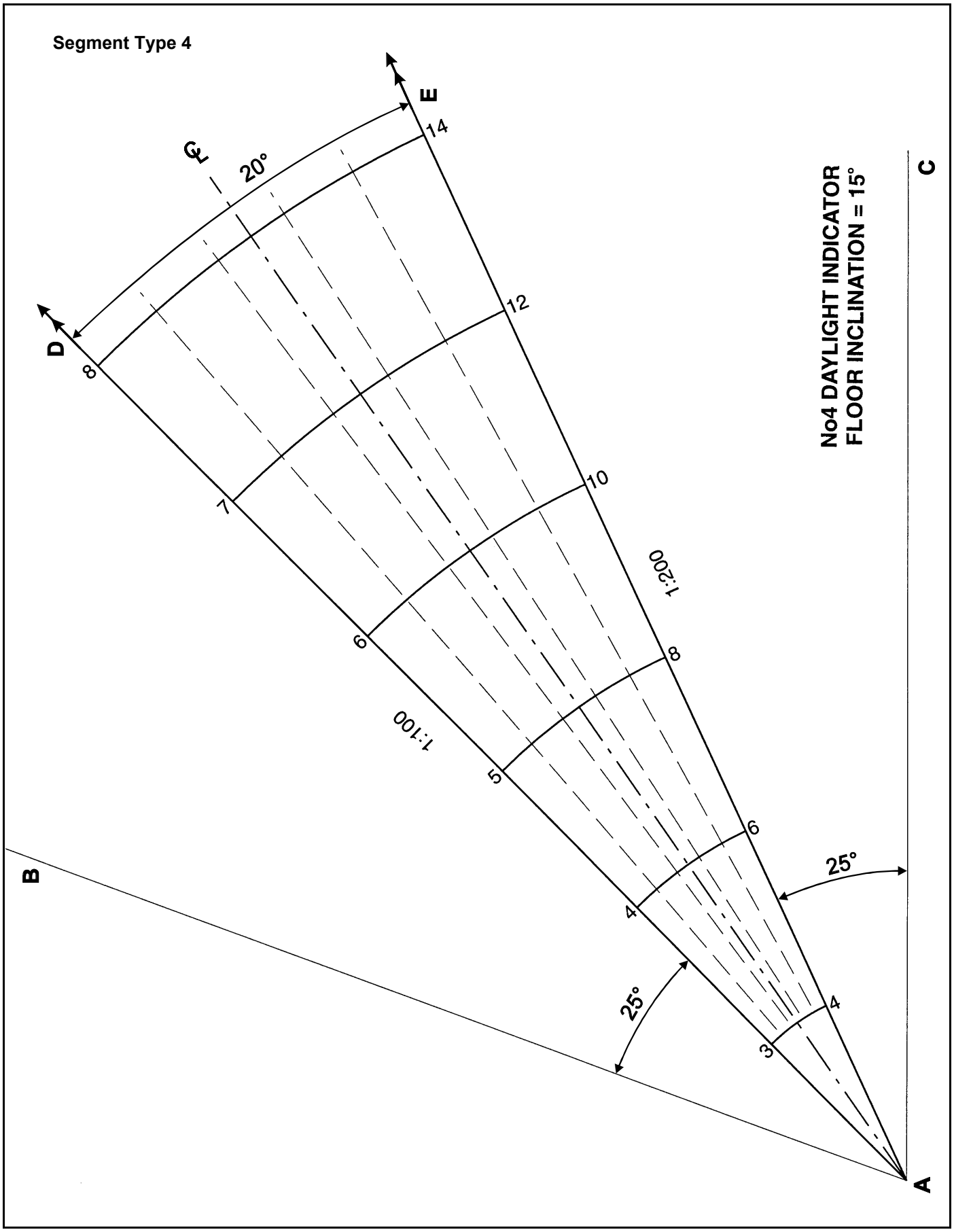


Segment Type 2



Segment Type 3




Segment Type 4
No4 DAYLIGHT INDICATOR
FLOOR INCLINATION = 15°
A
B
C
D
E
℄
20°
25°
25°
1:100
1:200
3
4
5
6
7
8
4
6
8
10
12
14