COX/ATA

CUB Site, Chippendale

SUNLIGHT ACCESS TO APARTMENTS FOR RESIDENTIAL AMENITY

A discussion on planning controls and their practical application

November 2005

Revision C - 24 November 2005

Introduction

The publication of the rules of thumb in the Residential Flat Design Code has placed greater emphasis on housing amenity. However, the rules of thumb do not provide guidance on how compliance should be measured. They are also generalised, setting a common standard to be applied to wide range of circumstances and densities. At higher densities complying with the rules of thumb on sun access becomes a strong design generator, perhaps more strongly than anticipated.

The discussion reveals some difficulties arising from the intersection of the rules of thumb and part of a planning principle established by the Land and Environment Court for measuring sunlight access. It is based on practical experience and recommends a more robust control that strengthens the requirements for sun access amenity in residential buildings at higher densities.

Discussion

1 This paper discusses the planning controls for providing sun access to apartments applicable in Central Sydney and their practical application.

2 The purpose of the paper is to inform the making of new planning controls for the former Carlton and United Breweries site in Chippendale, but its findings may have wider application.

3 Given the variable and exacting location of the sun, Chippendale is used as the location for the calculation of the position of the sun. Nevertheless, the general outcomes would apply across the Sydney Metropolitan Area and probably other areas of New South Wales.

4 It is widely acknowledged that access to sunlight is a major factor in improving housing amenity. This is assumed to be the case for the purposes of this discussion.

5 Other benefits and disadvantages of providing sun access to apartments, for example, thermal comfort and the effect on household energy consumption, are not the subject of this discussion.

6 The effect of BASIX, in particular, its intersection with the planning controls referenced is not considered in this discussion.

7 Three documents are considered central to the discussion. They are: the Central Sydney DCP 1996 (DCP); the Residential Flat Design Code (RFDC) referenced in SEPP65; and, Technical Bulletin 13 Sunlight Indicators (TB13) published by the New South Wales Planning and Environment Commission.

8 The DCP contains a control for sun access at clause 6.1.4. It states: *Living rooms and private open space should be the main recipients of sunlight in dwelling units. Where possible, sun access should be for a minimum of two hours per day on the equinox (March 21) measured on the main window of the rooms or at the front edge of the open space. Buildings should be designed to maximise the number of dwelling units with sun access to the principal windows.*

9 The RFDC contains a Rule of Thumb for the control of sun access in part 03 on page 85. It states: *Living rooms and private open spaces for at least 70 percent of apartments in a development should receive a minimum of three hours direct sunlight between 9 am and 3 pm in mid winter. In dense urban areas a minimum of two hours may be acceptable*.

10 The RFDC covers development of residential flat buildings throughout New South Wales. Within the context of New South Wales, Central Sydney is a dense urban area and the site is currently zoned to have a density for housing at 5:1. It is therefore considered reasonable to assume the receipt of two hours of direct sunshine is acceptable.

11 The varying path of the sun at the equinox and mid winter and the differing requirements for the extent of compliance mean that meeting the requirements of either control does not ensure conformance to the other. In other words neither control is a refinement of the other. The DCP and RFDC controls are inconsistent.

12 The Land and Environment Court has established a Planning Principle on the impact on solar access of neighbours. This is found in the judgment of Parsonage v Ku-ring-gai (2004) NSWLEC 347 by Senior Commissioner Roseth. The key extracts of relevance here are as follows: … *Numerical guidelines dealing with the hours of sunlight on a window or open space usually leave open the question what proportion of the window or open space should be in sunlight, and whether the sunlight should be measured at floor, table or a standing person's eye level. Numerical guidelines should therefore be applied with the following principles in mind, where relevant: … To be assessed as being in sunlight, the sun should strike a vertical surface at a horizontal angle of 22.5º or more. (This is because sunlight at extremely oblique angles has little effect.) For a window, door or glass wall to be assessed as being in sunlight, half of its area should be in sunlight. For private open space to be assessed as being in sunlight, either half its area or a useable strip adjoining the living area should be in sunlight, depending on the size of the space. The amount of sunlight on private open space should be measured at ground level. · Overshadowing by fences, roof overhangs and changes in level should be taken into consideration* … .

13 The Planning Policy is provided in full at Appendix A. The judgment is available on the New South Wales Land and Environment Court website.

14 Although the circumstances of the case are not relevant to this discussion the Senior Commissioner's remarks on the measurement of sunlight are relevant and could be applied to a control that provides for sun access to apartments.

15 The judgment does not cite a reference for the angle of incidence of the sunlight or proportion of a window in sun. Elsewhere, the planning principle cites AMCORD. In the list of referenced documents attached to AMCORD, TB13 is cited.

16 TB13 defines effective sunlight at section 3. It states: *Sunlight is considered to be effective when … the horizontal angle between the sun's rays and the plane of the window is more than 22.5 degrees* … and … t*he sun has an altitude above the horizon of more than 5 degrees*. Furthermore: … *sunlight before … 7.30 a.m. in mid winter and after … 4.30pm in mid winter, should be disregarded*.

17 An extract including diagrams from TB13 is provided at Appendix B. TB13 can be found in the Department of Planning library at Q711.62 NEW (a).

18 While TB13 considers sunlight to be effective between 7.30 am and 4.30 pm in mid winter; the RFDC only considers the sunlight between 9am and 3pm.

19 If the time indicated in the RFDC is considered for a north facing window this reduces the potential effective sunlight in midwinter from more than 8 hours to 6 hours. For an east or west facing window the potential effective sunlight is reduced from more than 2.5 hours to less than 2 hours. Refer to the table in Appendix C and the diagrams in Appendix D.

20 If the combined effect of the RFDC and TB13 is considered east and west facing windows cannot meet the rule of thumb in the RFDC.

21 Residential developments in Central Sydney have a mix prescribed by the DCP at Clause 6.1.27. It states: *All residential developments in excess of 20 dwellings shall provide the*

following mix of units: Studio apartments Maximum of 15%, 1 bed apartments Maximum of 30%, 2 bed apartments Minimum of 40%, 3+ bed apartments Minimum of 15%,

22 The size of Units within Residential and Serviced Apartment developments is prescribed in clause 6.1.34 of the DCP. It states: *All units within residential and serviced apartment developments are to, provide the following minimum unit sizes, Studio apartments 40sqm, 1 bed apartments 55sqm, 2 bed apartments 80sqm, 3+ bed apartments 100sqm*.

23 Combined 21,22 and current market analysis predict an average apartment size of around 75m2 ± 5m2 for the CUB site.

24 At the current zoned density for the site, multi storey continuous frontage residential apartment buildings, slab or tower, is the only practical building form.

25 The RFDC rules of thumb limit apartment depth to a maximum of 18 metres and width to a minimum of 4 metres. They require private open space, i.e. a balcony, to be directly accessible from the principle living area. The proportion of single sided apartments is limited to 40%. A minimum floor to ceiling height of 2.7 metres is required. Balconies are required to have a minimum depth of 2 metres.

26 The product of 23 to 25 is that the width of each apartment would generally not exceed 6 metres and would often be 4 metres. The depth of balconies is unlikely to exceed 3 metres.

27 When 21 to 26 are considered in concert with a reasonable consideration of construction practice they generally limit practical apartment configurations to have living rooms on the sunlight available side of the building forms, stacked vertically with balconies in front of them. The balconies partially obstruct sunlight to the balconies and living room windows below. The balconies often require solid fin walls to ensure privacy. The fin walls will also partially obstruct sun access to windows and balconies.

28 If this arrangement is considered in relation to the mid winter sun then north facing apartments with 2 metre deep 6 metre wide balconies would allow 50% of a window to receive sunlight for 2 hours if the outer sides of the glazing are reduced slightly. However, 3 metre deep balconies, 4 metre wide apartments or east and west facing apartments would not meet the requirement without substantial reductions in the height and width of glazing. This is illustrated in Appendix E.

29 With careful design the 50% requirement may be met with small, carefully placed windows (unusually low in the wall and to one side if facing east and west or low and centrally placed if facing north). This would include limiting glazing to the doors linking the living room and balcony. Generally, limiting glazing would mean a reduction in overall sunlight in order to meet the proportional requirement in mid winter. Large reductions of the glazed area would reduce daylight, outlook and communication between living rooms and their associated balconies. The resultant residential amenity would be reduced.

30 If the sunlight was measured at the face of the balcony, then sunlight amenity would be ensured for the balcony areas and, in turn, a variable proportion would consequentially be available to the glazing to the living room without prejudicing the extent of glazing or the depth of the balcony.

31 It may be presumed that twisting east and west facing balconies and windows towards north or staggering balconies may provide a solution. A few versions of this are shown in Appendix F. The illustrated versions fail to meet the 50% criterion. This is not an exhaustive study. If a solution is found along these lines of investigation it would likely be singular, and therefore, repetitive. It would probably compromise residential amenity in internal planning or outlook. Based on the studies attempted it is doubtful that a reasonable solution exists.

32 If east and west facing apartments are eliminated and north facing blocks are spaced in parallel such that 70% of apartments receive effective mid winter sunlight then by necessity certain consequences follow. These include: a significant lowering of density; and, an urban morphology that is not easily adapted to specific conditions. Such specific conditions would include the spacing of existing streets, a desire to provide continuous street frontage to north south streets and a desire for variety. Therefore, such solutions are not considered reasonable except in a limited number of circumstances.

33 A simple practical development control to provide sun access would:

- **replace the current DCP and RFDC controls**; (refer to paragraph 11)
- **include the definition of effective sunlight from TB13**; (16)
- **delete reference to the times of the day contained in the RFDC**; (18 – 20)
- **maintain the proportion of 70%, the date at mid winter, and the period of 2 hours from the RFDC**; (9 - 10)
- **measure sun access at the main window of the room or at the front edge of the open space as in the DCP**; (8 and 28 - 30) and,
- **require a minimum of 50% of the measured area receive sunlight**. (12)

Peter John Cantrill

COX/ATA

November 2005

Appendix A

Parsonage v Ku-ring-gai [2004] NSWLEC 347

Planning principle: impact on solar access of neighbours

6 The Australia-wide resource document for residential development, *AMCORD*, suggests that a development should not reduce the sunlight received by the north-facing windows of living areas of neighbouring properties to less than 3 hours between 9am and 5pm at the winter solstice. The NSW-specific *Residential Flat Design Code*, which applies only to apartment buildings of three storeys and over, recommends 3 hours of sunlight to the living rooms and private open spaces of 70% of apartments between 9am and 3pm, reducing it to 2 hours in dense urban areas. The Code does not specifically deal with the impact on sunlight received by neighbouring buildings, though one may assume that the same criteria apply. Where local controls contain numerical guidelines, they usually require the retention for neighbouring properties of 3-4 hours of sunlight on living room windows and private open spaces between 9am and 3pm at the winter solstice.

7 The Court must, of course, take into account whatever guidelines are relevant to an application. However, numerical guidelines should be applied with a great deal of judgment. Consider a dwelling that now receives sunlight all day. Taking away that sunlight from 9am till noon would satisfy most guidelines; and yet the occupants of such a dwelling are likely to perceive it as a devastating impact on their dwelling's amenity. The other side of the coin is that the impact on a neighbour's sunlight must be assessed in the context of the reasonable development expectations of the proposal and the constraints imposed by the topography and the subdivision pattern. Preserving 3 hours of sunlight on a neighbouring site may require an unreasonable reduction in the development potential of the proposal.

8 Numerical guidelines dealing with the hours of sunlight on a window or open space usually leave open the question what proportion of the window or open space should be in sunlight, and whether the sunlight should be measured at floor, table or a standing person's eye level. Numerical guidelines should therefore be applied with the following principles in mind, where relevant:

• The ease with which sunlight access can be protected is inversely proportional to the density of development. At low densities, there is a reasonable expectation that a dwelling and some of its open space will retain its existing sunlight. (However, even at low densities there are sites and buildings that are highly vulnerable to being overshadowed.) At higher densities sunlight is harder to protect and the claim to retain it is not as strong.

• The amount of sunlight lost should be taken into account, as well as the amount of sunlight retained.

• Overshadowing arising out of poor design is not acceptable, even if it satisfies numerical guidelines. The poor quality of a proposal's design may be demonstrated by a more sensitive design that achieves the same amenity without substantial additional cost, while reducing the impact on neighbours.

• To be assessed as being in sunlight, the sun should strike a vertical surface at a horizontal angle of 22.5º or more. (This is because sunlight at extremely oblique angles has little effect.) For a window, door or glass wall to be assessed as being in sunlight, half of its area should be in sunlight. For private open space to be assessed as being in sunlight, either half its area or a useable strip adjoining the living area should be in sunlight, depending on the size of the space. The amount of sunlight on private open space should be measured at ground level.

• Overshadowing by fences, roof overhangs and changes in level should be taken into consideration. Overshadowing by vegetation should be ignored, except that vegetation may be taken into account in a qualitative way, in particular dense hedges that appear like a solid fence.

• In areas undergoing change, the impact on what is likely to be built on adjoining sites should be considered as well as the existing development.

Dr John Roseth

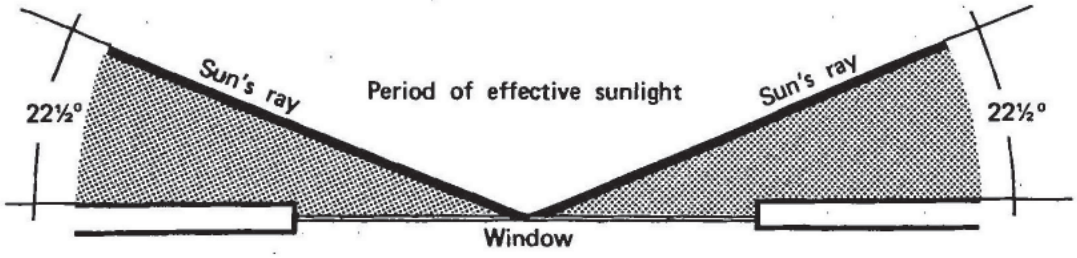
Senior Commissioner

Appendix B

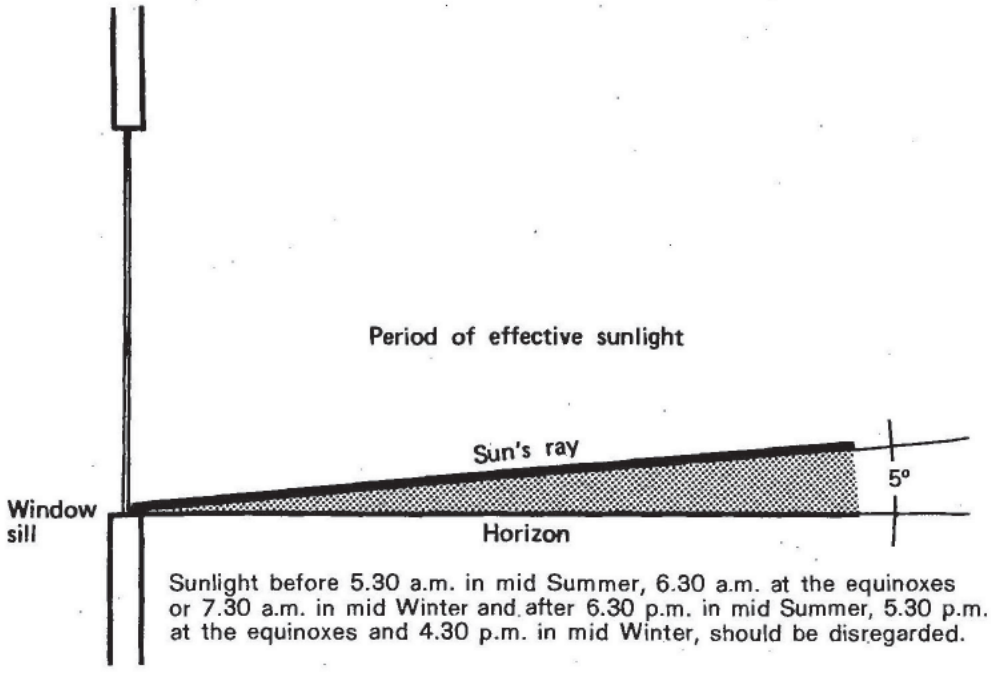
3. PERIODS OF EFFECTIVE SUNLIGHT

Sunlight is considered 'effective' when —

- there is no landform such as a mountain or other obstruction which would block sunlight reaching the window.
- the horizontal angle between the sun's rays and the plane of the window is more than 22.5 degrees. If the angle is less than this, most of the rays are reflected off the window surface or are blocked by the side of the window opening.



- the sun has an altitude above the horizon of more than 5 degrees. If the altitude is less than this, obstructions such as hills, buildings, and the earth's atmosphere will reduce the amount of sunlight reaching the window.



Sunlight before 5.30 a.m. in mid Summer, 6.30 a.m. at the equinoxes or 7.30 a.m. in mid Winter and after 6.30 p.m. in mid Summer, 5.30 p.m. at the equinoxes and 4.30 p.m. in mid Winter, should be disregarded.

Appendix C

Sunlight to windows in Chippendale*, June 21, 2005

Time	Solar azimuth	Effective east facing	Effective RFDC east facing	Effective north facing	Effective RFDC north facing	Effective west facing	Effective RFDC west facing	Solar altitude
0730	57°43′12″	-	N/A	-	N/A	-	-	4°43′08″
0800	53°05′39″	Yes #	N/A	Yes	N/A	-	-	9°45′31″
0900	42°33′51″	Yes	Yes	Yes	Yes	-	-	18°57′08″
0930	36°32′46″	Yes	Yes	Yes	Yes	-	-	22°54′35″
1000	29°58′40″	Yes	Yes	Yes	Yes	-	-	26°19′16″
1030	22°51′59″	Yes	Yes	Yes	Yes	-	-	29°05′24″
1100	15°16′14″	-	-	Yes	Yes	-	-	31°07′26″
1200	359°09′46″	-	-	Yes	Yes	-	-	32°41′40″
1300	343°08′20″	-	-	Yes	Yes	-	-	30°46′16″
1330	335°38′04″	-	-	Yes	Yes	Yes	Yes	28°34′46″
1400	328°37′54″	-	-	Yes	Yes	Yes	Yes	25°40′16″
1430	322°10′38″	-	-	Yes	Yes	Yes	Yes	22°08′25″
1500	316°16′07″	-	-	Yes	Yes	Yes	Yes	18°04′56″
1600	305°55′40″	-	-	Yes	N/A	Yes	N/A	8°44′32″
1630	301°22′37″	-	-	-	N/A	-	N/A	3°40′30″
Period of available sunlight		>2.5hr	<2hr	>8hr	6hr	>2.5hr	<2hr	

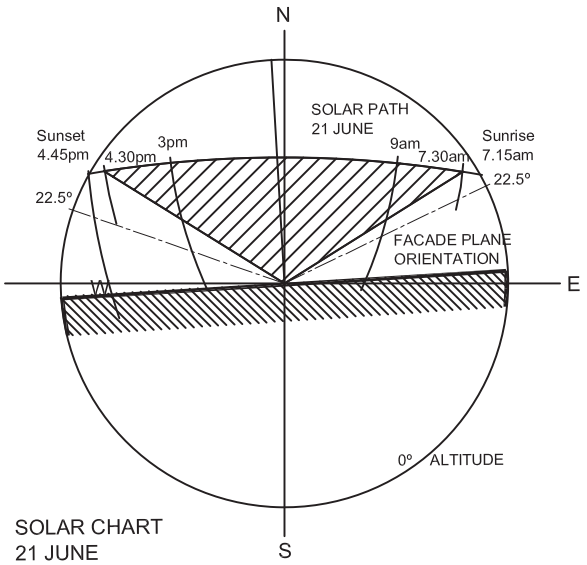
* Sun positions calculated using Geosciences Australia website http://www.ga.gov.au

Yes indicates available sunlight.

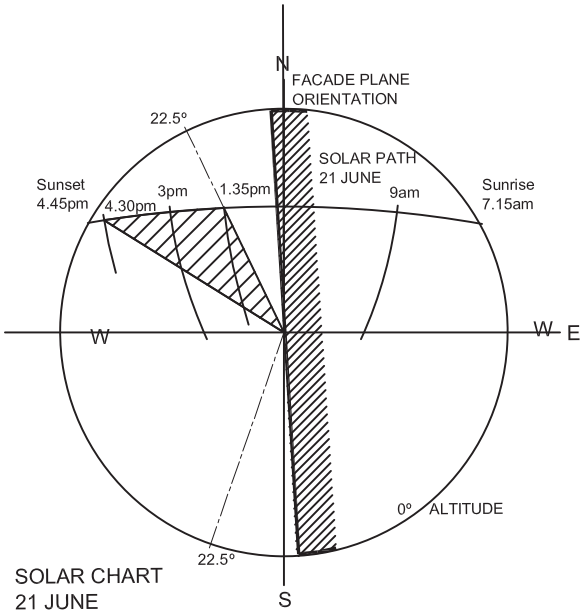
Appendix D

Site Reference Plan

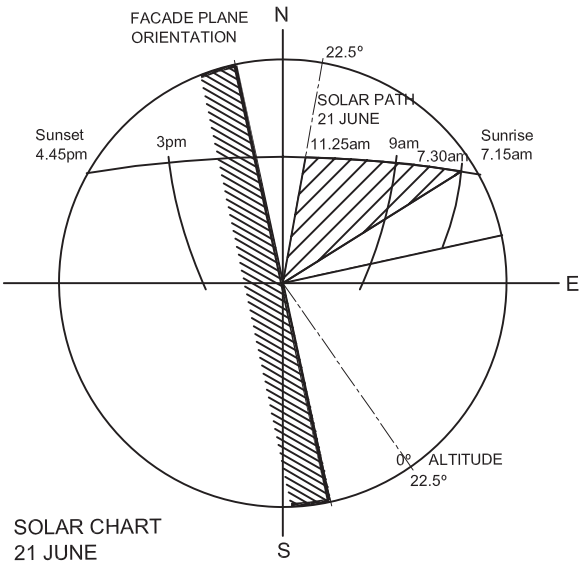
Appendix D Continued



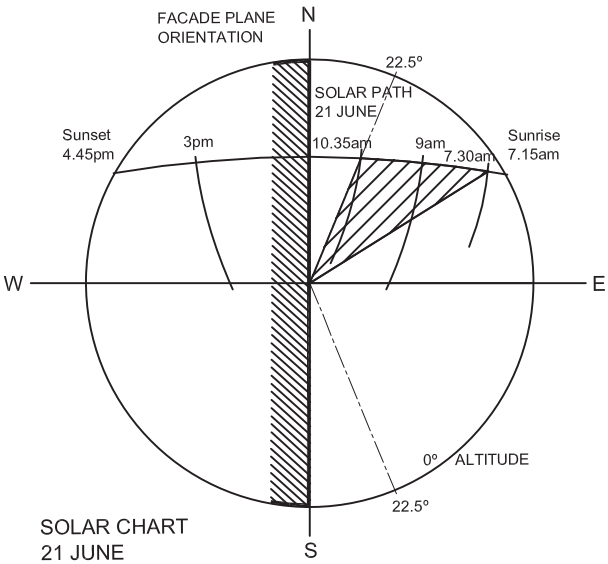
SOLAR CHART
21 JUNE
Building H-1
North Facade



SOLAR CHART
21 JUNE
Building H-1
West Facade

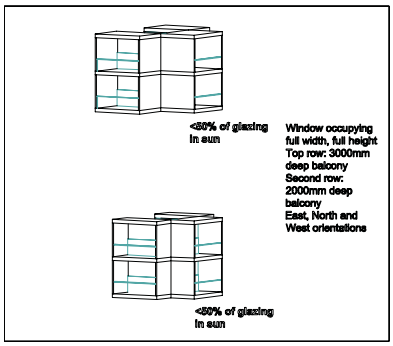


SOLAR CHART
21 JUNE
Building I-2
East Facade

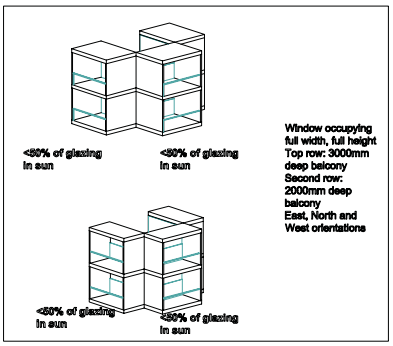


SOLAR CHART
21 JUNE
Buildings L-3, L-4
East Facade

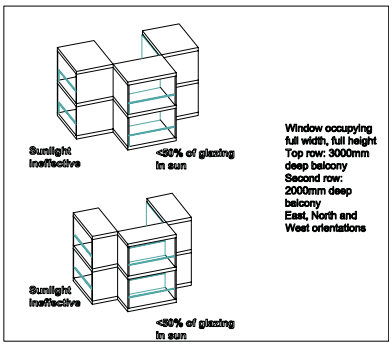
Appendix E



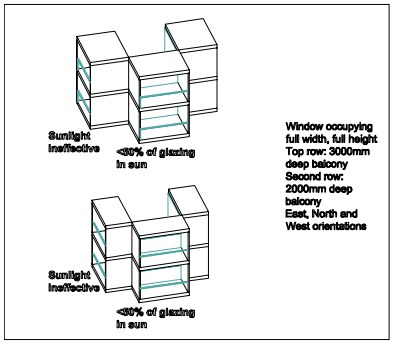
Projected sun aspect at 7.30am, 21 June
4m wide balcony



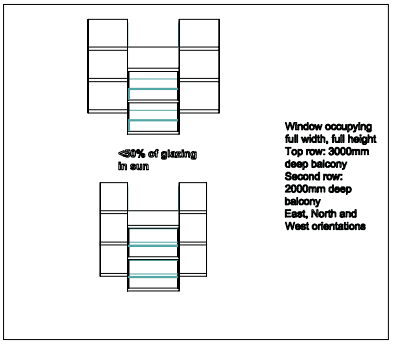
Projected sun aspect at 9am, 21 June
4m wide balcony



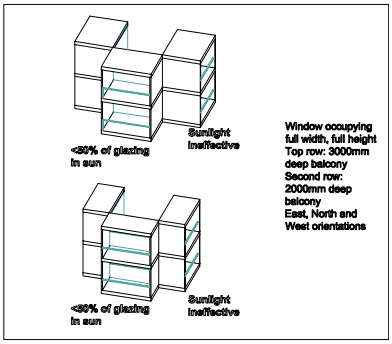
Projected sun aspect at 10.35am, 21 June
4m wide balcony



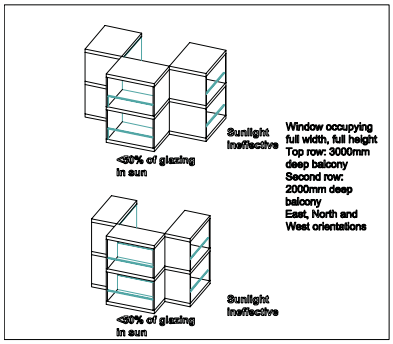
Projected sun aspect at 11 am, 21 June
4m wide balcony



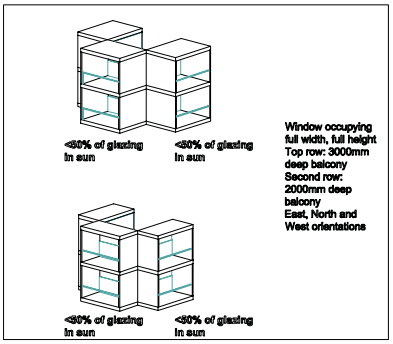
Projected sun aspect at 12pm, 21 June
4m wide balcony



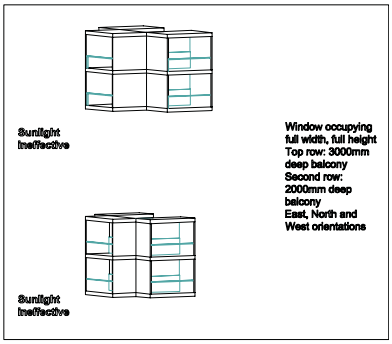
Projected sun aspect at 1 pm, 21 June
4m wide balcony



Projected sun aspect at 1.25pm, 21 June
4m wide balcony

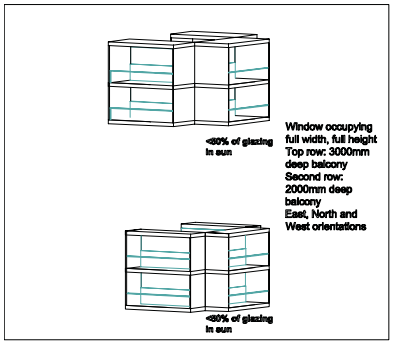


Projected sun aspect at 3pm, 21 June
4m wide balcony

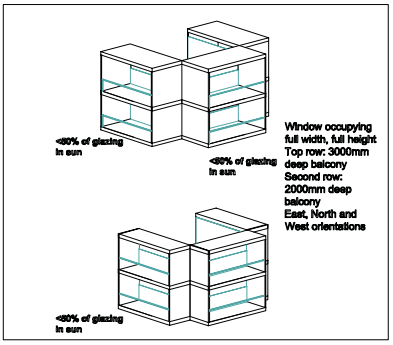


Projected sun aspect at 4.30pm, 21 June
4m wide balcony

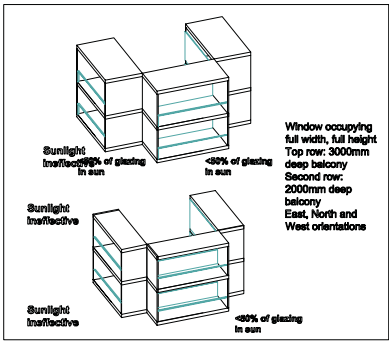
Appendix E Continued



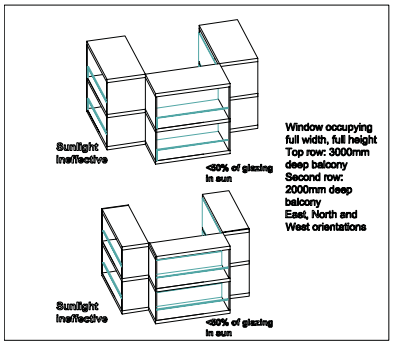
Projected sun aspect at 7.30am, 21 June
6m wide balcony



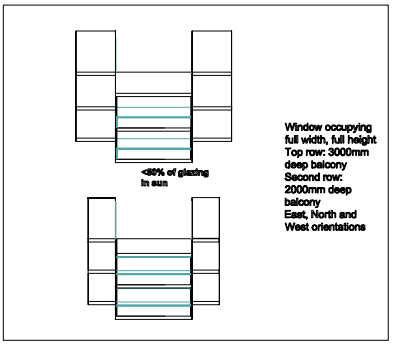
Projected sun aspect at 9am, 21 June
6m wide balcony



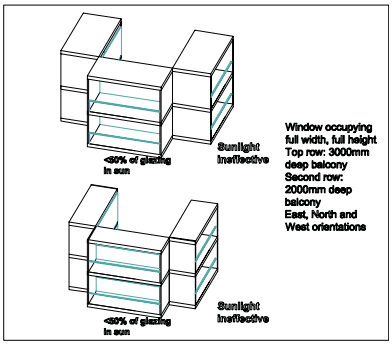
Projected sun aspect at 10.35am, 21 June
6m wide balcony



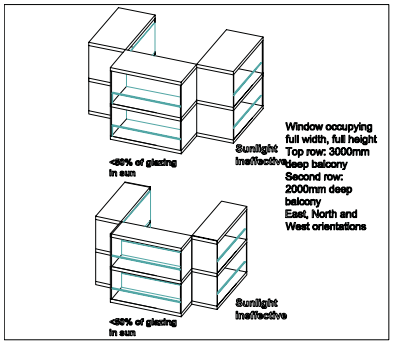
Projected sun aspect at 11 am, 21 June
6m wide balcony



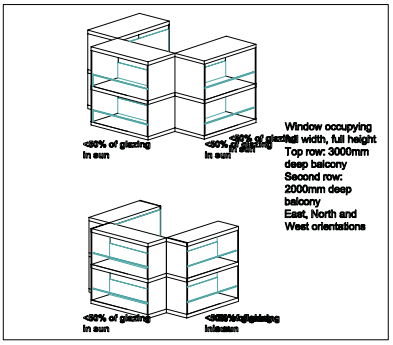
Projected sun aspect at 12pm, 21 June
6m wide balcony



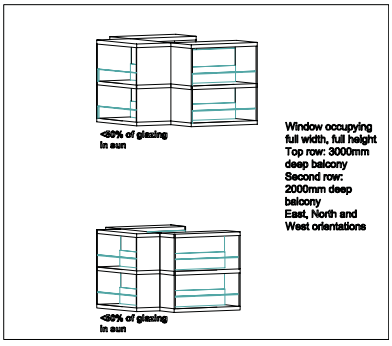
Projected sun aspect at 1pm, 21 June
6m wide balcony



Projected sun aspect at 1.25pm, 21 June
6m wide balcony



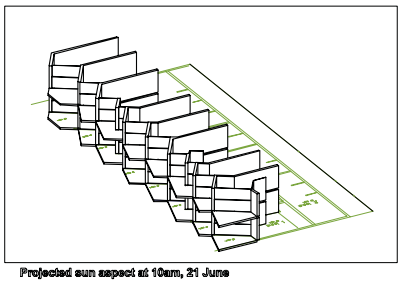
Projected sun aspect at 3pm, 21 June
6m wide balcony



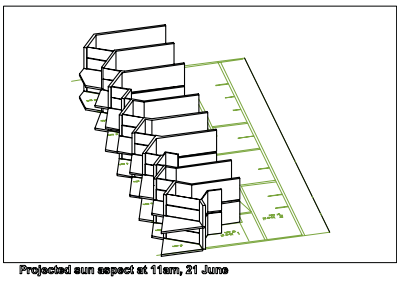
Projected sun aspect at 4.30pm, 21 June
6m wide balcony

Appendix F

Projected sun aspect at 9am, 21 June

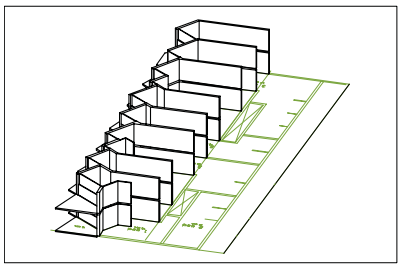


Projected sun aspect at 10am, 21 June

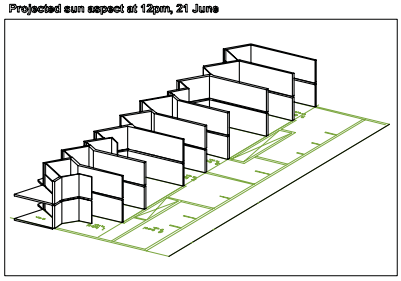


Projected sun aspect at 11am, 21 June

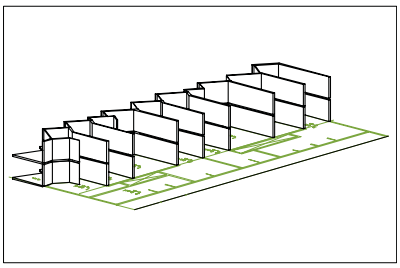
Projected sun aspect at 12pm, 21 June



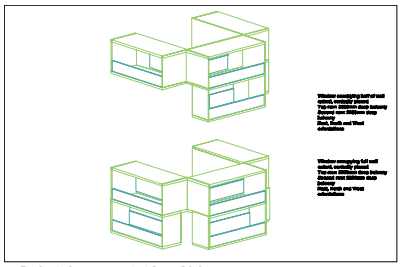
Projected sun aspect at 1pm, 21 June



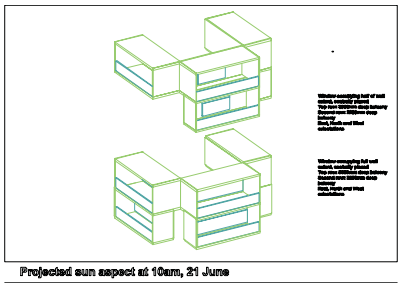
Projected sun aspect at 2pm, 21 June



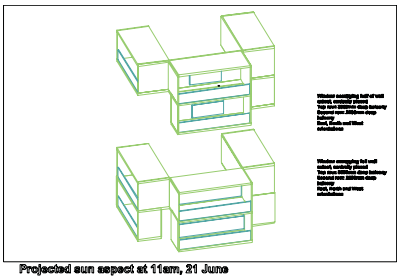
Projected sun aspect at 3pm, 21 June



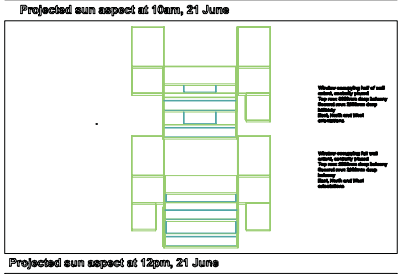
Projected sun aspect at 9am, 21 June



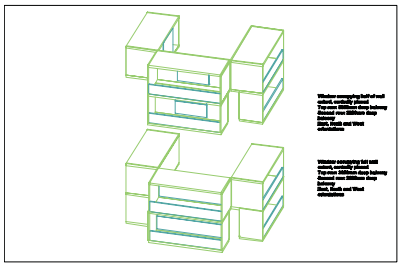
Projected sun aspect at 10am, 21 June



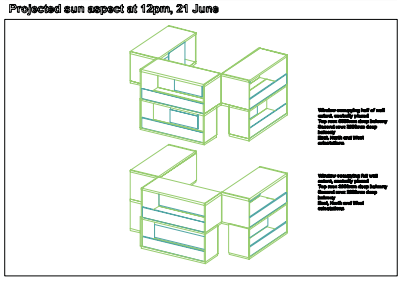
Projected sun aspect at 11am, 21 June



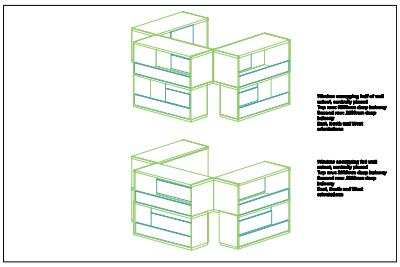
Projected sun aspect at 12pm, 21 June



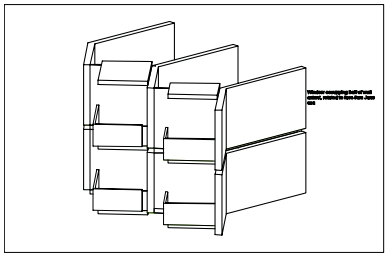
Projected sun aspect at 1pm, 21 June



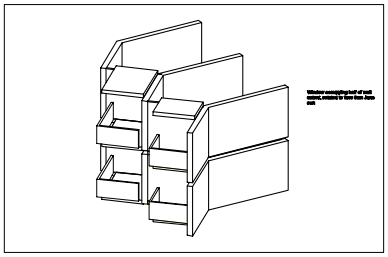
Projected sun aspect at 2pm, 21 June



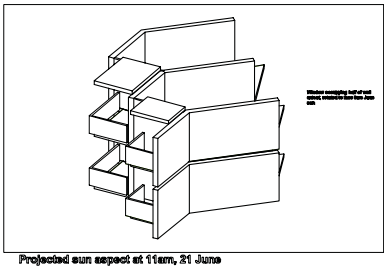
Projected sun aspect at 3pm, 21 June



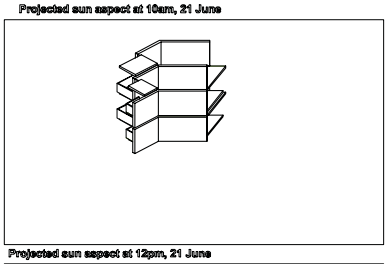
Projected sun aspect at 9am, 21 June



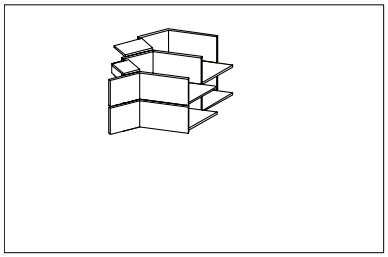
Projected sun aspect at 10am, 21 June



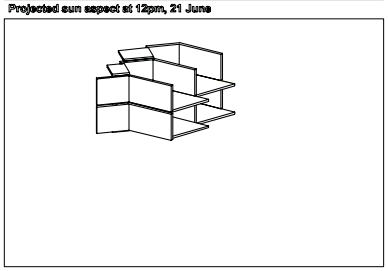
Projected sun aspect at 11am, 21 June



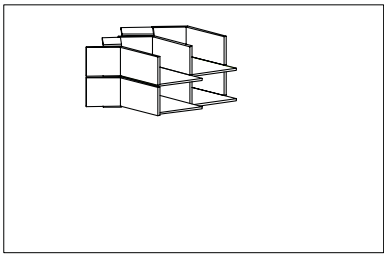
Projected sun aspect at 12pm, 21 June



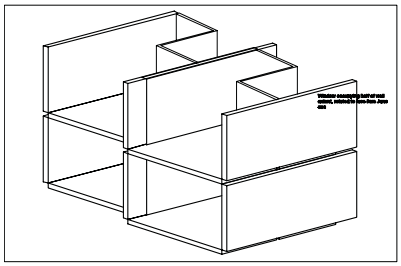
Projected sun aspect at 1pm, 21 June



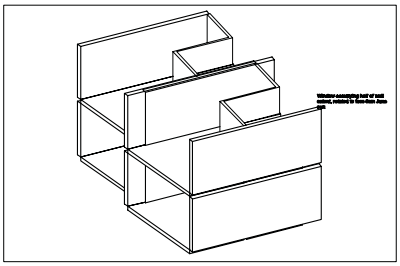
Projected sun aspect at 2pm, 21 June



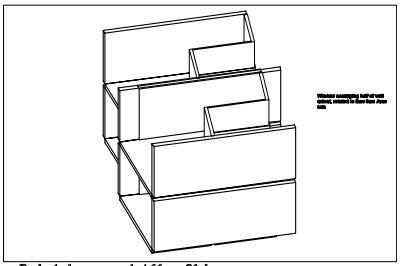
Projected sun aspect at 3pm, 21 June



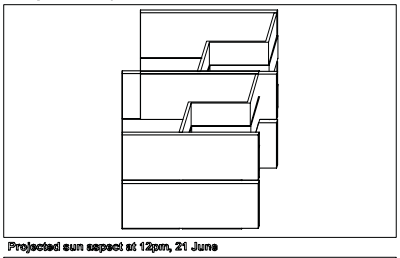
Projected sun aspect at 9am, 21 June



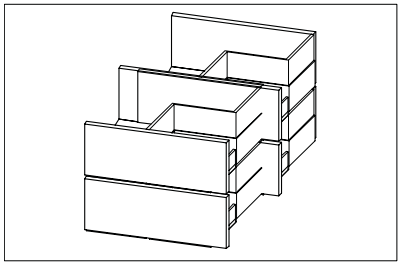
Projected sun aspect at 10am, 21 June



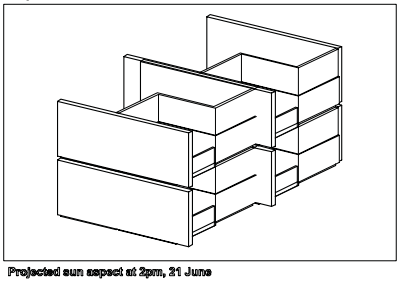
Projected sun aspect at 11am, 21 June



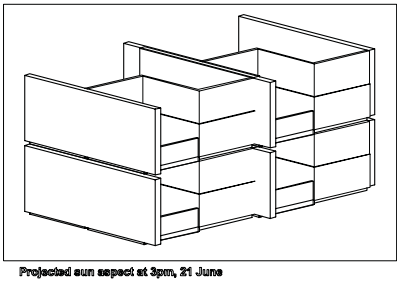
Projected sun aspect at 12pm, 21 June



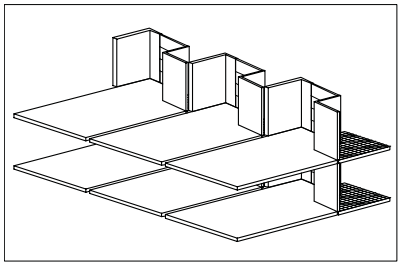
Projected sun aspect at 1pm, 21 June



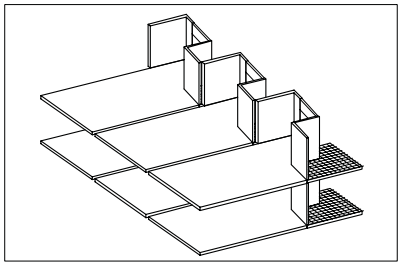
Projected sun aspect at 2pm, 21 June



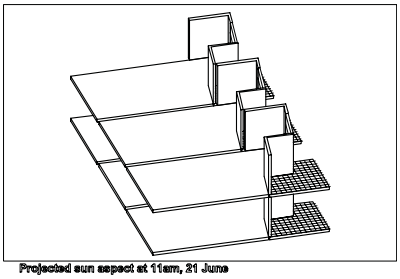
Projected sun aspect at 3pm, 21 June



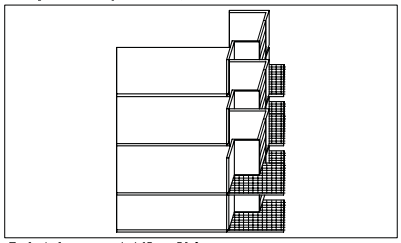
Projected sun aspect at 9am, 21 June



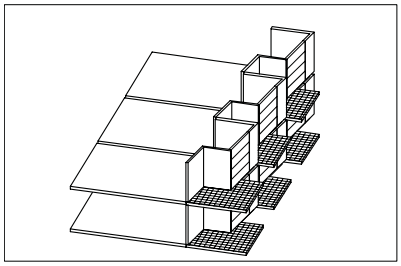
Projected sun aspect at 10am, 21 June



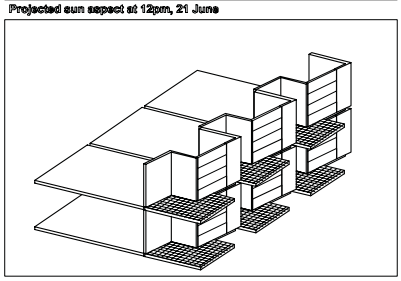
Projected sun aspect at 11am, 21 June



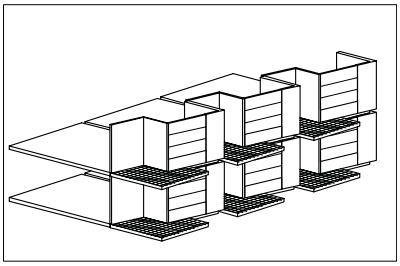
Projected sun aspect at 12pm, 21 June



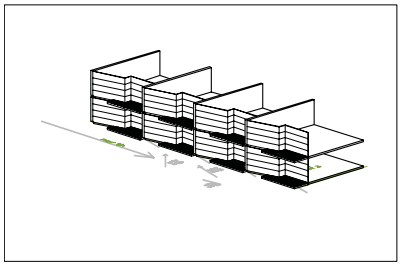
Projected sun aspect at 1pm, 21 June



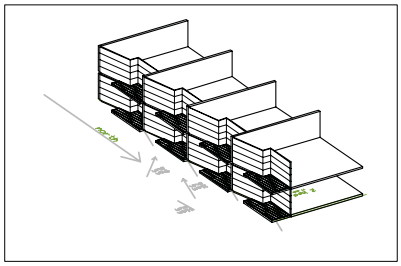
Projected sun aspect at 2pm, 21 June



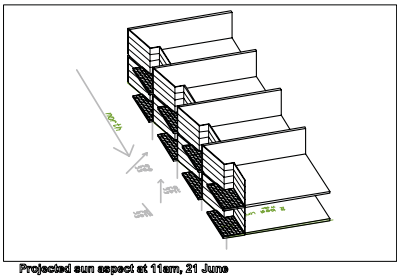
Projected sun aspect at 3pm, 21 June



Projected sun aspect at 9am, 21 June

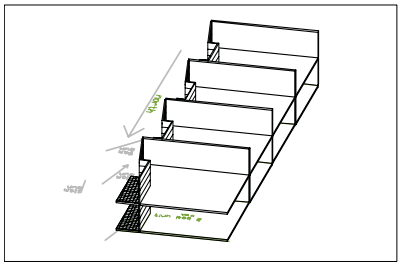


Projected sun aspect at 10am, 21 June

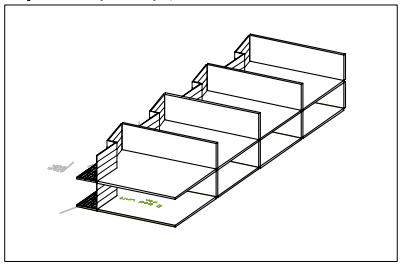


Projected sun aspect at 11am, 21 June

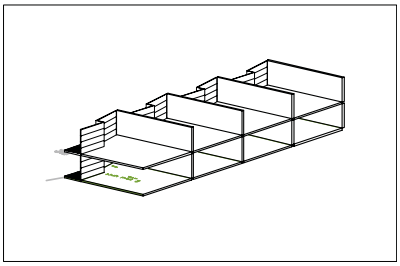
Projected sun aspect at 12pm, 21 June



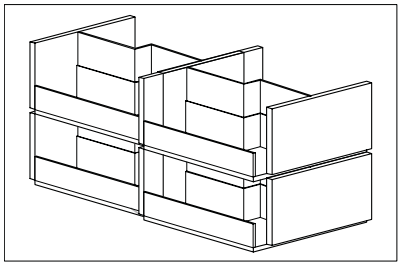
Projected sun aspect at 1pm, 21 June



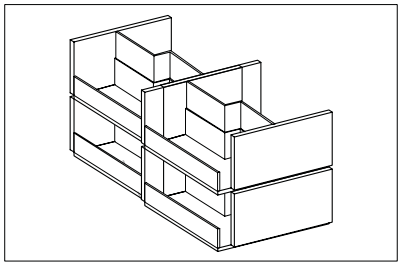
Projected sun aspect at 2pm, 21 June



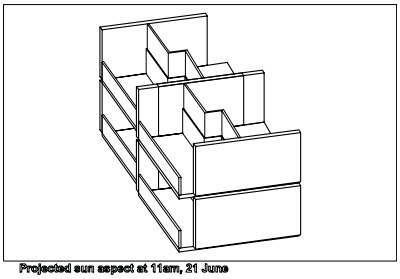
Projected sun aspect at 3pm, 21 June



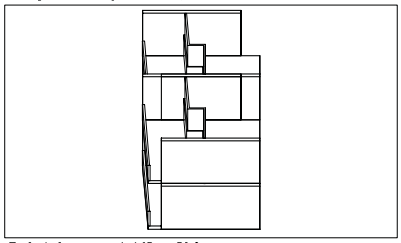
Projected sun aspect at 9am, 21 June



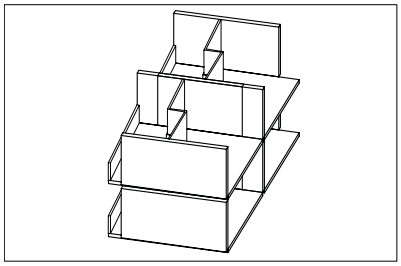
Projected sun aspect at 10am, 21 June



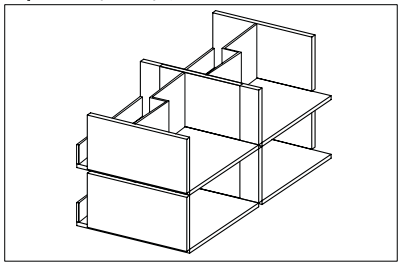
Projected sun aspect at 11am, 21 June



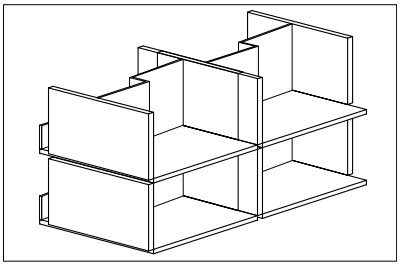
Projected sun aspect at 12pm, 21 June



Projected sun aspect at 1pm, 21 June



Projected sun aspect at 2pm, 21 June



Projected sun aspect at 3pm, 21 June