Time Problem 04

PreDesign Study

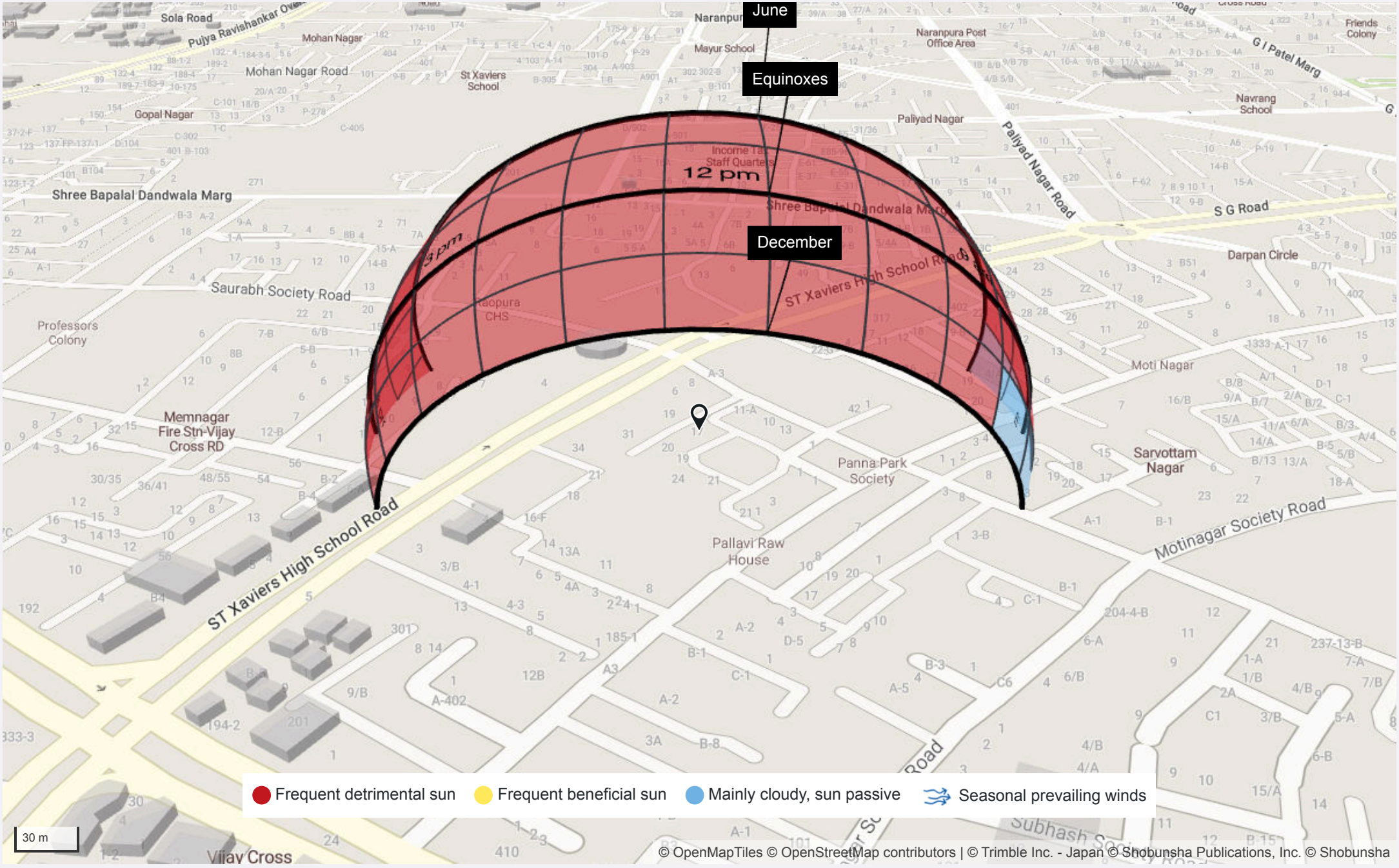
Building type:
Residential

Occupancy schedule:
Weekdays 6:00 to 22:00
Weekends 6:00 to 22:00

Location:
Ahmedabad, Gujarat, IN

Site Context

See how the sun and wind affect your site at different times of the year

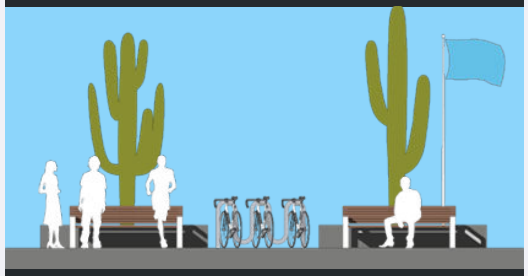


Seasons

Ahmedabad has a hot semi-arid climate

Hot & dry. Seasons distinguished by temperature, with a relatively mild winter.

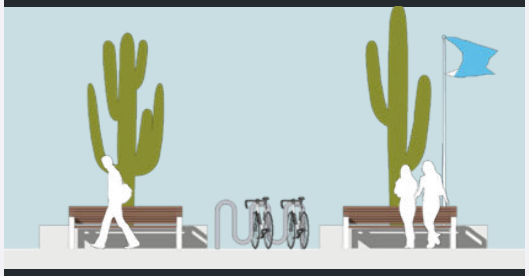
21 Dec to 20 Mar



Winter - warm, dry

Frequently glorious

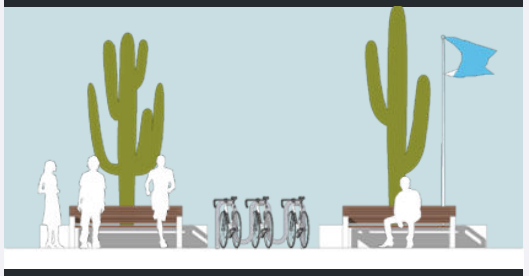
21 Mar to 20 Jun



Spring - very hot, dry

Blisteringly hot to changeable

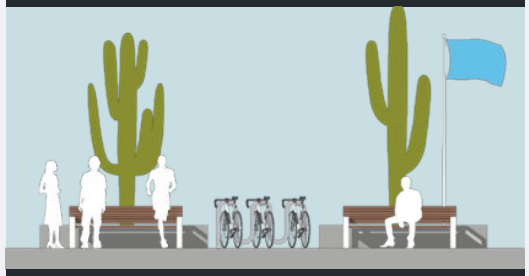
21 Jun to 20 Sep



Summer - hot, dry

Muggy to glorious

21 Sep to 20 Dec



Autumn - hot, dry

Glorious to hot and dry

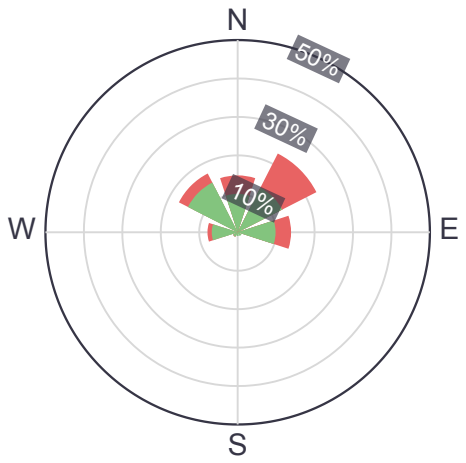
Weather

	21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Avg min	15°C	26°C	26°C	21°C
Avg max	29°C	39°C	33°C	34°C
Wind	Mainly breezy Occasionally calm, rarely strong winds	Overwhelmingly breezy Rarely calm or strong winds	Overwhelmingly breezy Rarely calm or strong winds	Usually breezy Sometimes calm, rarely strong winds
Precipitation	Negligible precipitation (10 mm over 2 days)	Very low precipitation (15 mm over 3 days)	Abundant precipitation (599 mm over 39 days)	Very low precipitation (31 mm over 4 days)
Snow	No snow	No snow	No snow	No snow

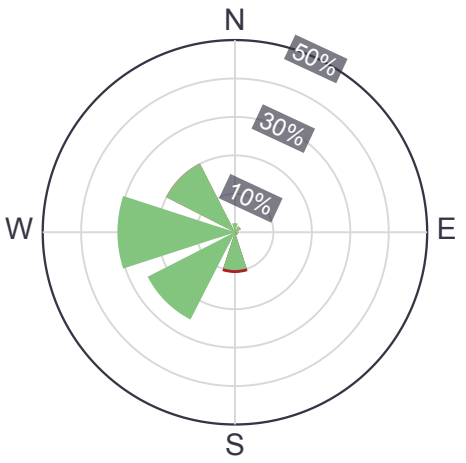
Seasons

21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Winter - warm, dry	Spring - very hot, dry	Summer - hot, dry	Autumn - hot, dry
Frequently glorious	Blisteringly hot to changeable	Muggy to glorious	Glorious to hot and dry

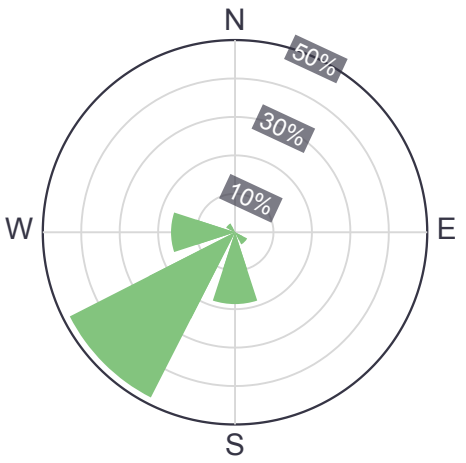
Impact of wind on comfort Cooling Chilling Too windy



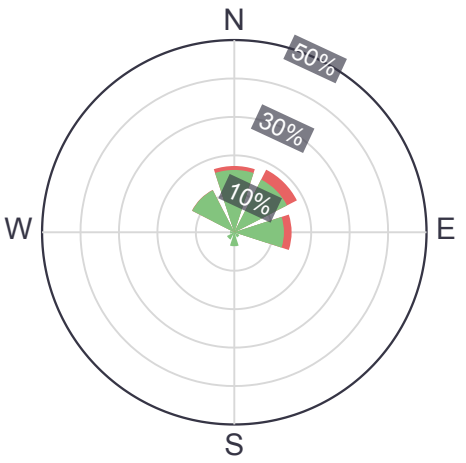
Calm 20% hrs



Calm 7% hrs



Calm 10% hrs



Calm 29% hrs

Daylight & sunshine

Daily daylight hrs
Avg 11.3 hrs

Avg daily sunshine 10.8 hrs
Avg daily cloud 0.5 hrs

Daily daylight hrs
Avg 13.0 hrs

Avg daily sunshine 11.9 hrs
Avg daily cloud 1.1 hrs

Daily daylight hrs
Avg 13.0 hrs

Avg daily sunshine 6.2 hrs
Avg daily cloud 6.9 hrs

Daily daylight hrs
Avg 11.3 hrs

Avg daily sunshine 10.3 hrs
Avg daily cloud 1.0 hrs

Seasons

21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Winter - warm, dry	**Spring - very hot, dry**	**Summer - hot, dry**	**Autumn - hot, dry**
Frequently glorious	Blisteringly hot to changeable	Muggy to glorious	Glorious to hot and dry

Likely heating & cooling need

	21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Heating frequency	0 days	0 days	0 days	0 days
Energy demand	5 of 5	5 of 5	5 of 5	5 of 5
Cooling frequency	55 days	90 days	90 days	90 days
Energy demand	3 of 5	5 of 5	4 of 5	3 of 5

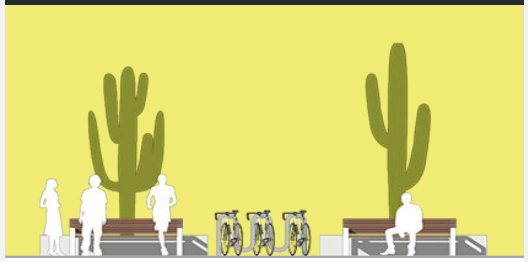
Air pollution Very low · Low · Medium · High · Very high

21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Overwhelmingly high or very high	Overwhelmingly high or very high	Overwhelmingly high or very high	Overwhelmingly high or very high

Architectural response

Impact of climate on architectural response

Want to be outside



Frequency (Occupied hrs)

47%

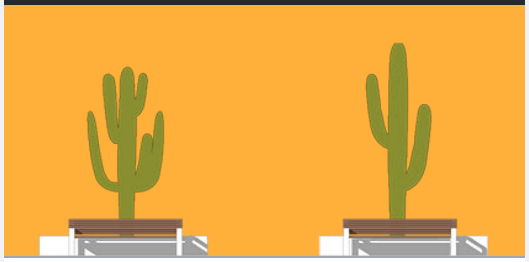
What it's like:

- Pleasant or warm
- Breezy or calm, not windy

What most humans want:

- To be outside
- To enjoy the weather

Too hot to be outside



Frequency (Occupied hrs)

45%

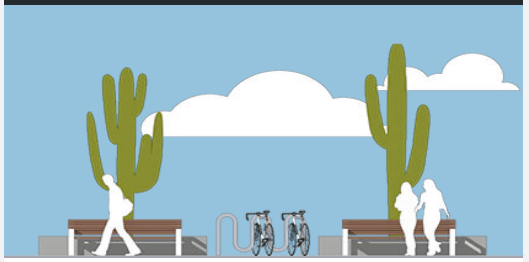
What it's like:

- Warm but windy
- Hot (or hotter)

What most humans want:

- Protection from the wind & sun
- To be cool

OK outside if sheltered



Frequency (Occupied hrs)

6%

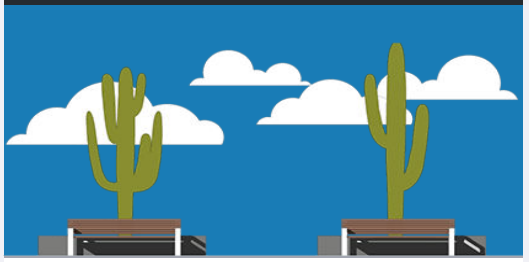
What it's like:

- Still but chilly
- Breezy and cool
- Windy but pleasant

What most humans want:

- Shelter when needed
- Some connectivity with outside

Too cold to be outside



Frequency (Occupied hrs)

2%

What it's like:

- Breezy and chilly
- Still and cold (or colder)

What most humans want:

- Shelter from the wind
- Warmth

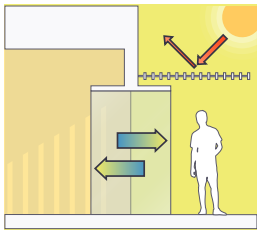
Architectural response

Best ways for architecture to respond to climate

Take the inside outside

- Large openings to connect inside with outside
- Shaded outside areas as alternative to inside space
- Larger glazing ratios
- Shading where needed

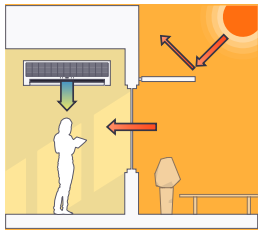
★★★



Provide shelter from heat

- Shaded glazing with solar control
- Limited unprotected glazing
- Efficient indoor cooling systems
- Shaded outdoor areas with fans and possibly misting

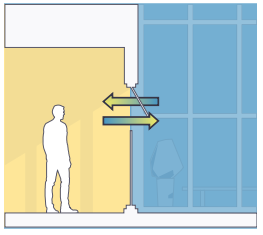
★★★



Bring the outside in

- Controlled openings for natural ventilation
- Sheltered outside spaces like courtyards & atriums
- Larger glazing ratios
- Shading as needed

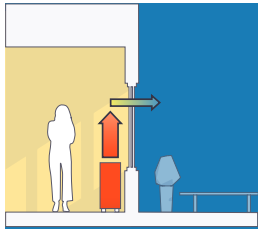
★☆☆



Provide shelter from the cold

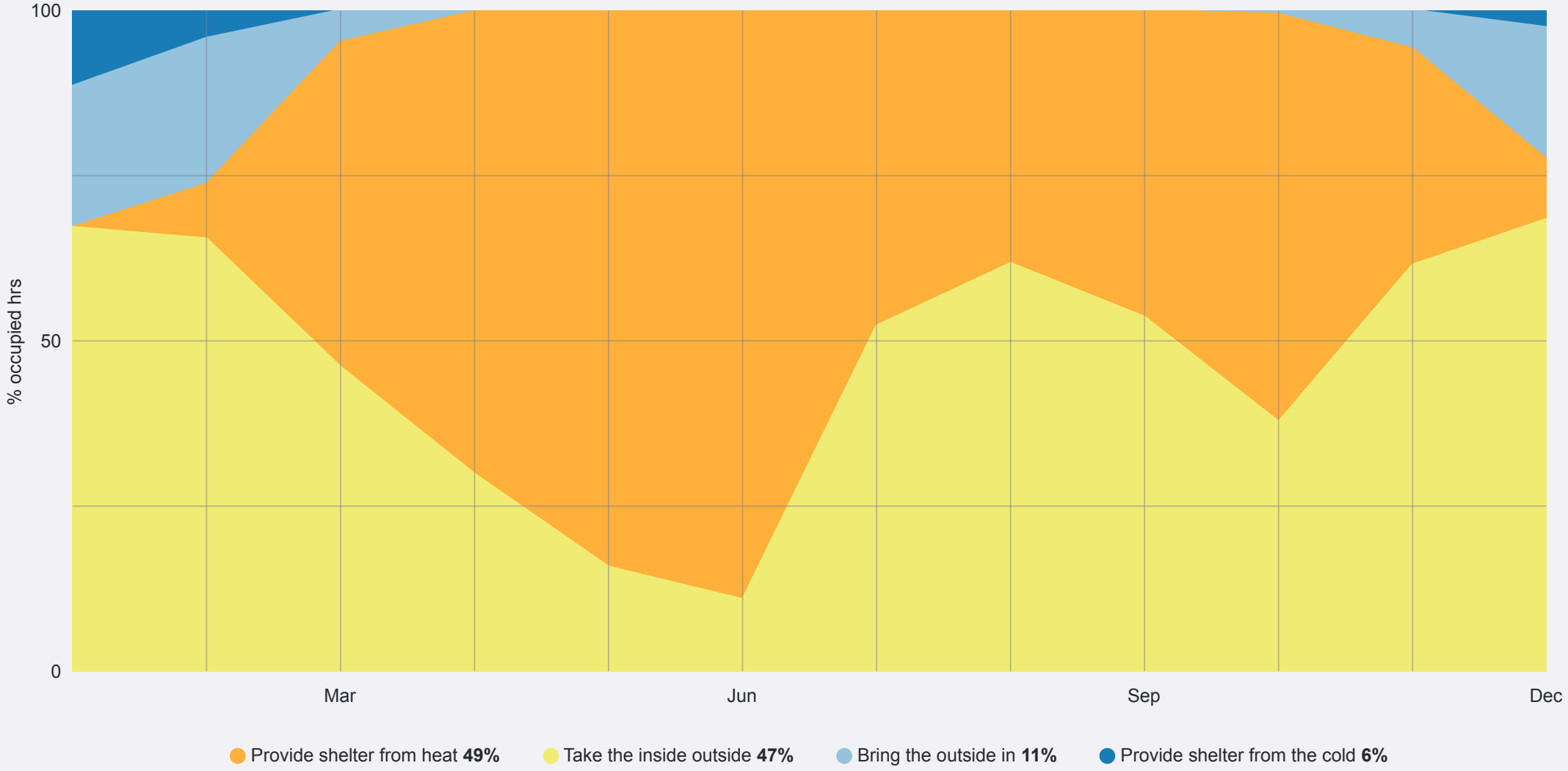
- Well-insulated glazing and envelope
- Good control of infiltration
- Massings with limited articulation
- Efficient & comfortable heating systems

☆☆☆



Architectural response

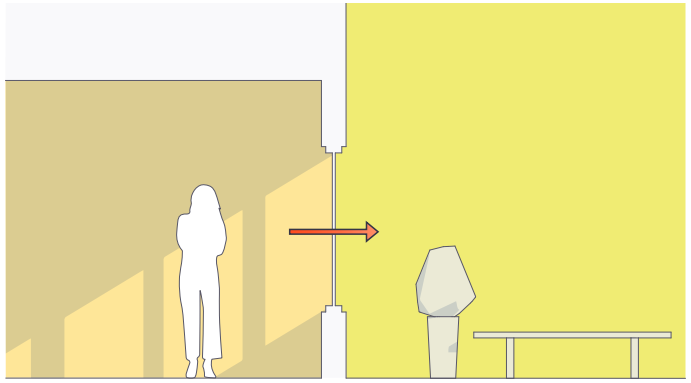
When architectural responses are most important



Glazing ratio: South facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

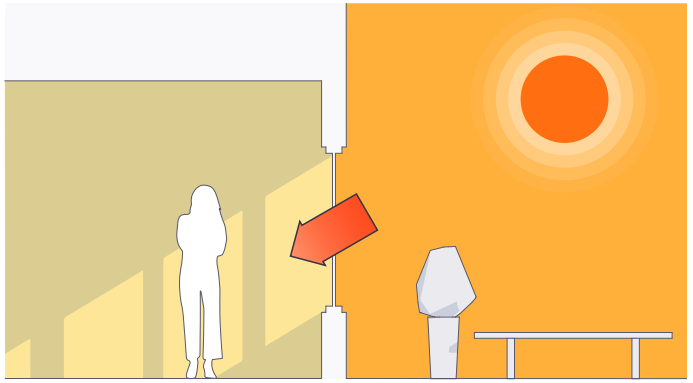


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
2,847 overheating hrs per year

Heat gain through glazing:
Very significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

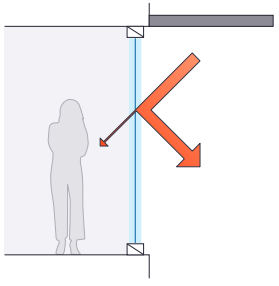
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

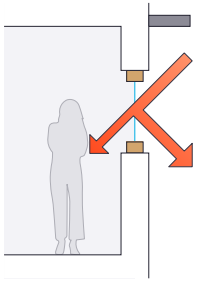
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

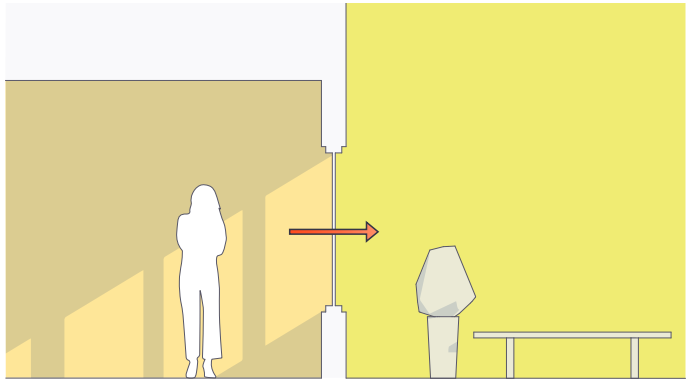
20%



Glazing ratio: South-west facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

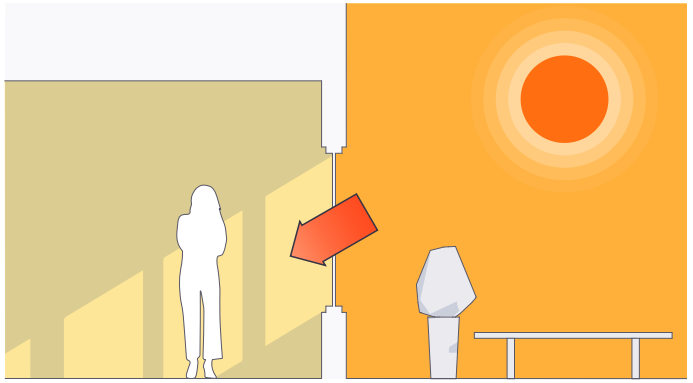


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
2,524 overheating hrs per year

Heat gain through glazing:
Extremely significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

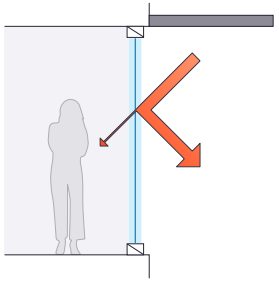
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

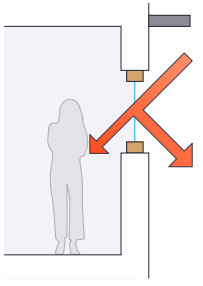
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

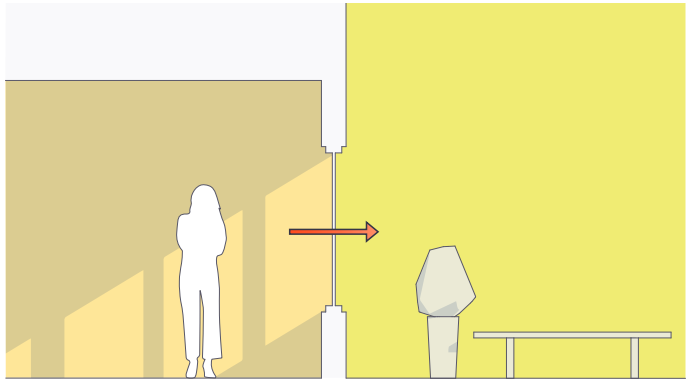
20%



Glazing ratio: West facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

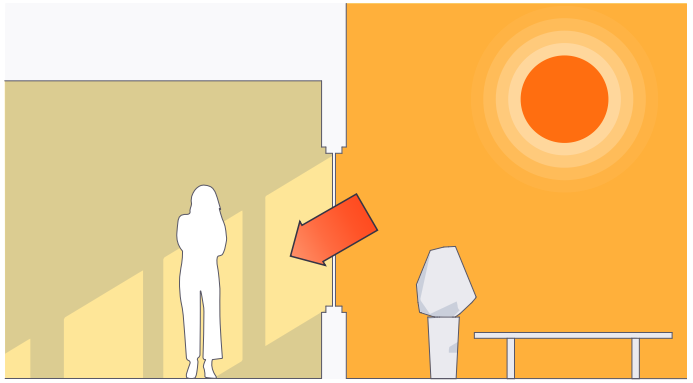


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
1,984 overheating hrs per year

Heat gain through glazing:
Extremely significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

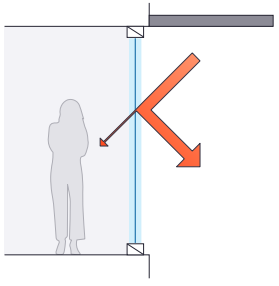
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

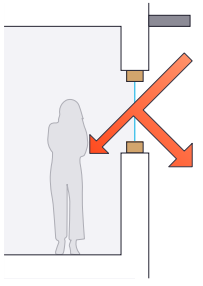
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

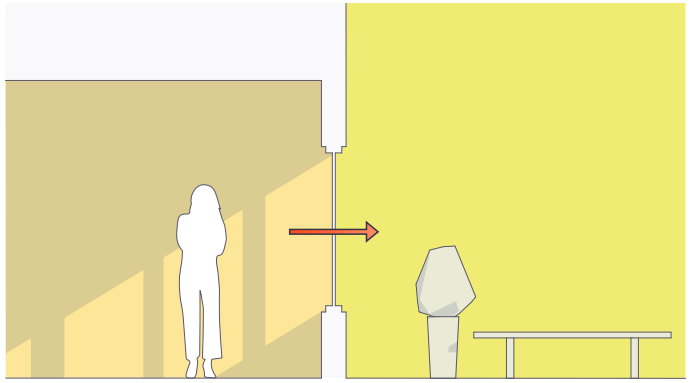
20%



Glazing ratio: North-west facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

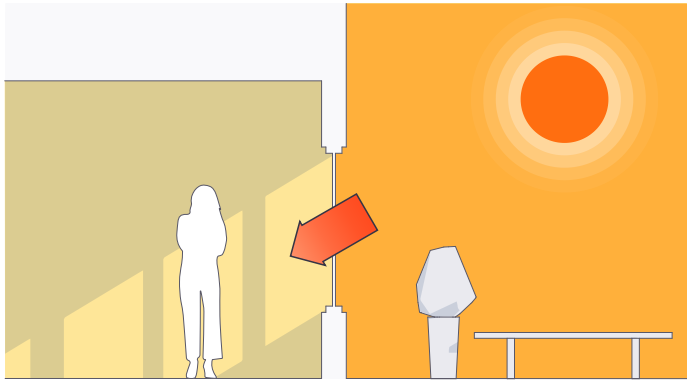


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
1,522 overheating hrs per year

Heat gain through glazing:
Extremely significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

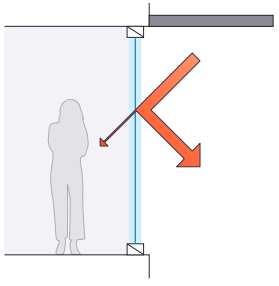
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

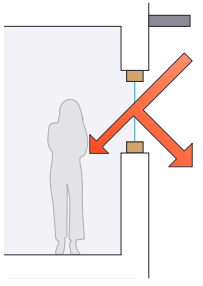
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

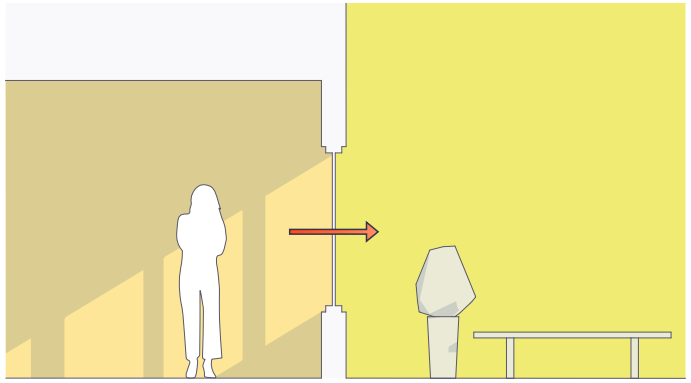
20%



Glazing ratio: North facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

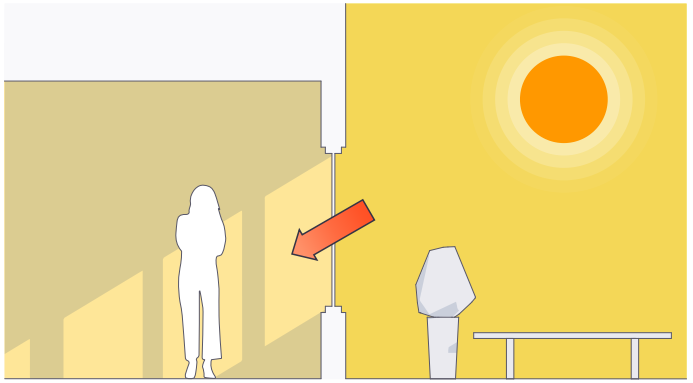


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
949 overheating hrs per year

Heat gain through glazing:
Quite significant

Impact on glazing ratio:
Moderate

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

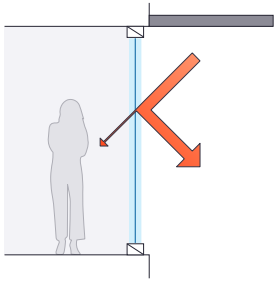
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

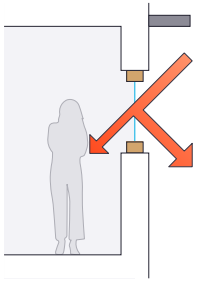
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

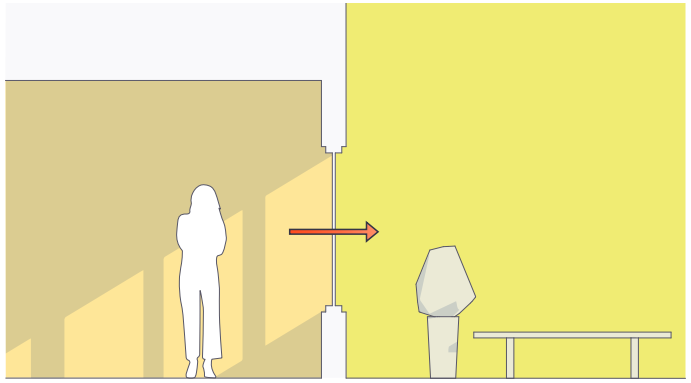
20%



Glazing ratio: North-east facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

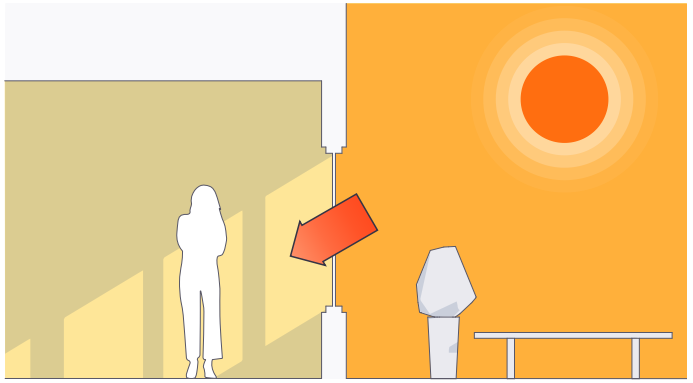


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
1,272 overheating hrs per year

Heat gain through glazing:
Very significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

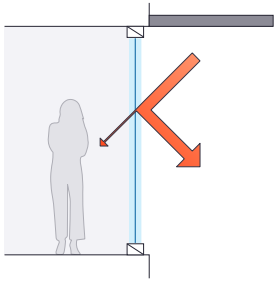
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

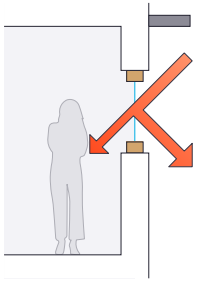
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

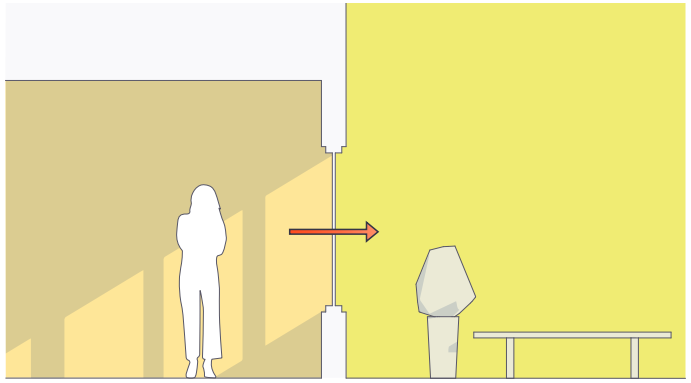
20%



Glazing ratio: East facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

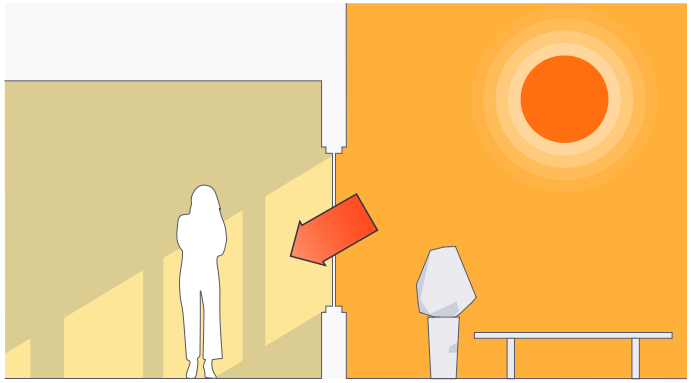


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
1,812 overheating hrs per year

Heat gain through glazing:
Very significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

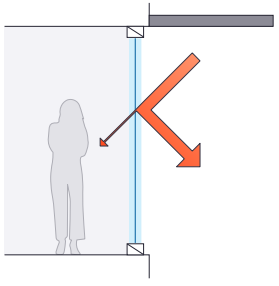
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

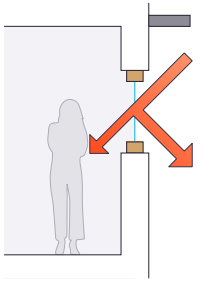
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

Maximum glazing

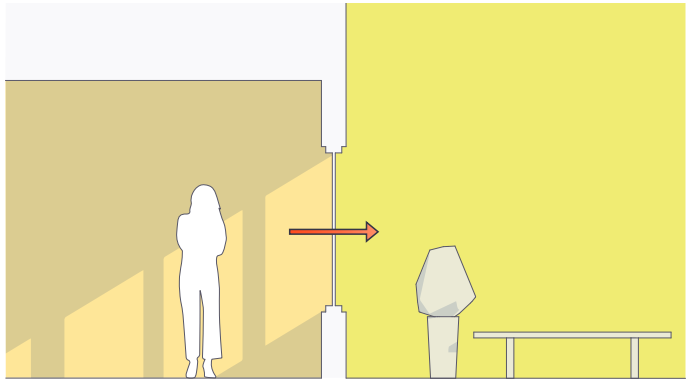
20%



Glazing ratio: South-east facade

Suggestions for maximum glazing ratio for this climate

Factors affecting glazing ratio

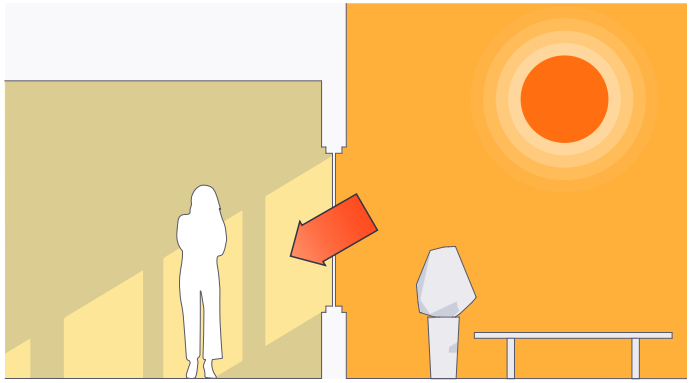


Cold weather leading to heat loss

Heat loss potential:
5 heating degree-days per year

Heat loss through glazing:
Negligible

Impact on glazing ratio:
Negligible



Detrimental sun leading to heat gain

Amount of overheating sun:
2,274 overheating hrs per year

Heat gain through glazing:
Very significant

Impact on glazing ratio:
Very High

Overall recommendation

Focus on strategies that reduce solar gain to maximise the amount of glazing you can use.

Adding shading and improving glazing solar performance will have the biggest impact.

Optimal strategy

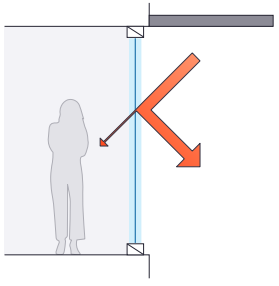
Laminate, metal - broken, extensive shading, great glazing

Insulation

Solar control

Maximum glazing

90%



Typical strategy

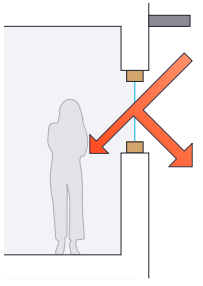
Single glazed, non-metal, partial shading, basic glazing

Insulation

Solar control

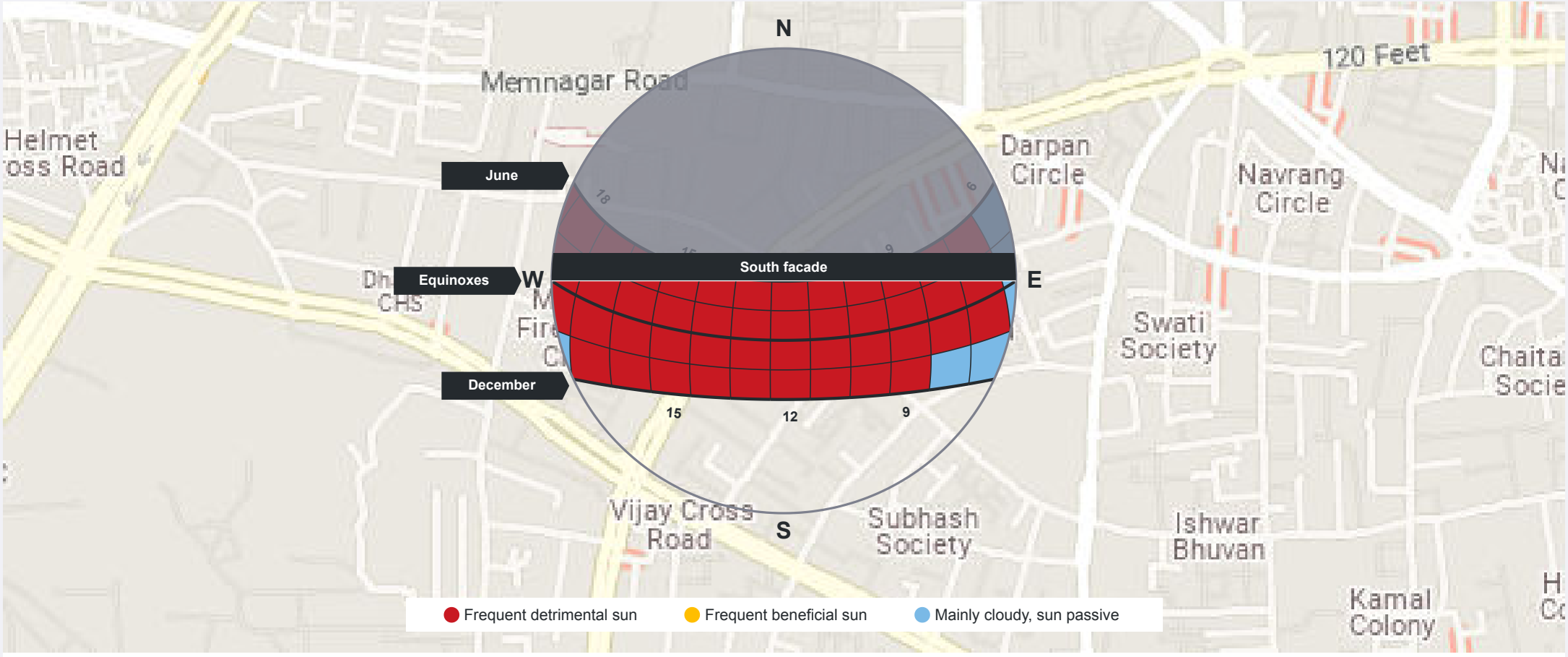
Maximum glazing

20%



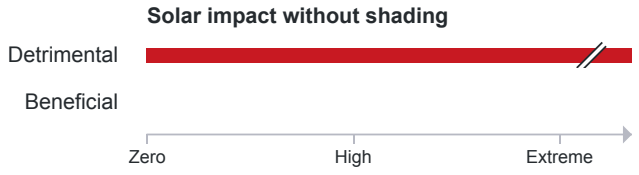
Shading: South facade

Annual solar impact



This facade sees a very high frequency of detrimental overheating hours.
When overheating happens, its impact can be very significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

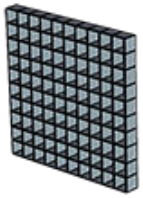
Shading strongly recommended

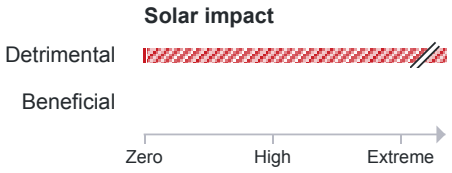
Shading: South facade

Effectiveness of different shading strategies

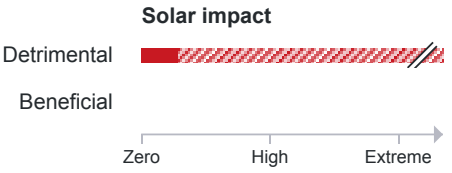
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Eggcrate ★★★

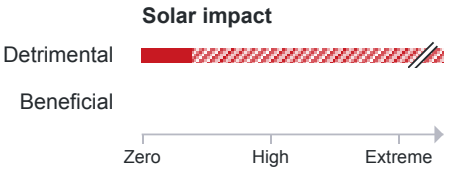




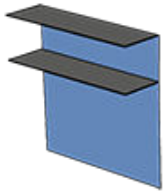
Automated Blinds ★★★

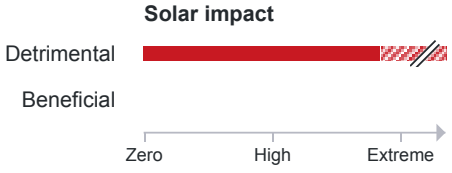


Brise Soleil ★★★

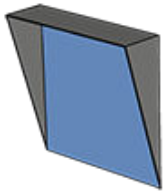


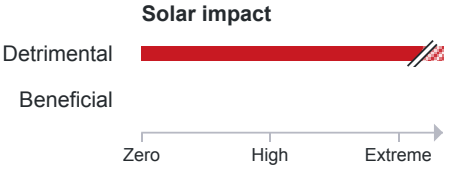
Double Overhang ★★☆



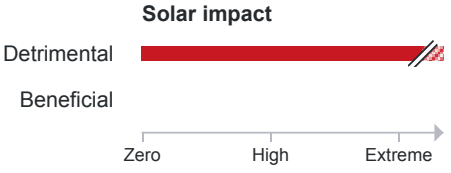


Hood ★★☆

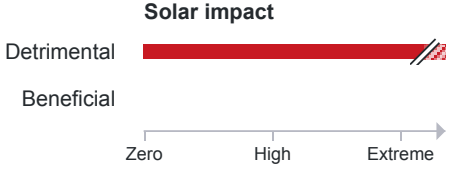




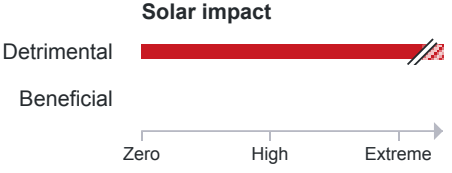
Overhang ★☆☆



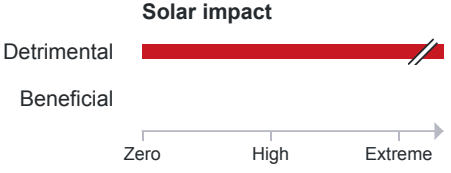
Offset Panel ★☆☆



Fins ★☆☆

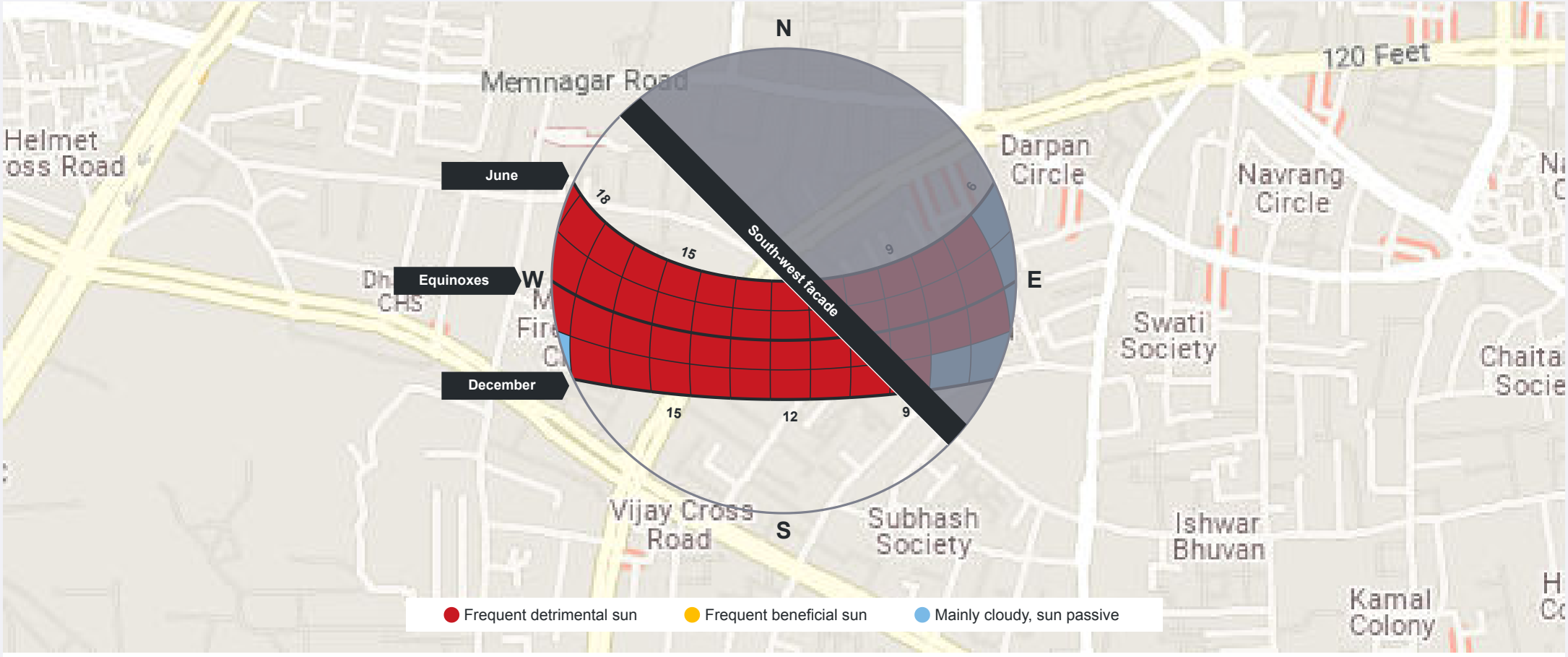


No shading ☆☆☆



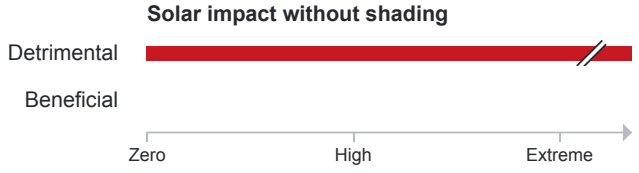
Shading: South-west facade

Annual solar impact



This facade sees a very high frequency of detrimental overheating hours.
When overheating happens, its impact is extremely significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

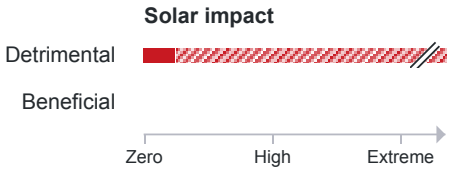
Shading strongly recommended

Shading: South-west facade

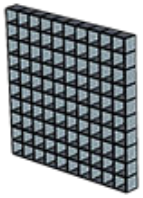
Effectiveness of different shading strategies

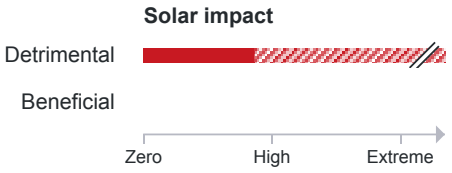
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Automated Blinds ★★★

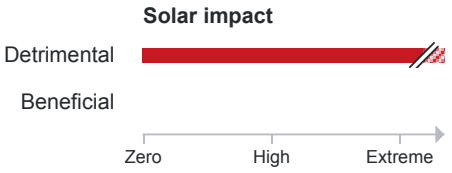


Eggcrate ★★★

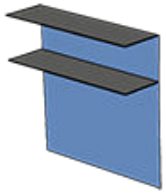


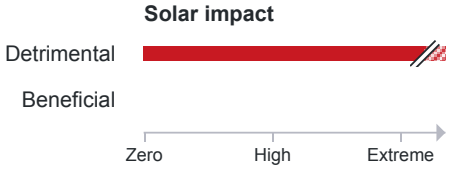


Brise Soleil ★★★

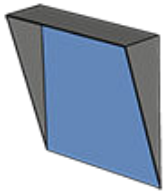


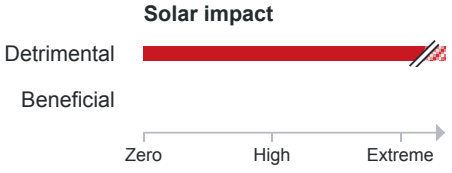
Double Overhang ★★☆



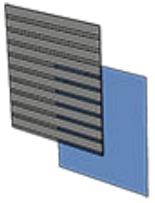


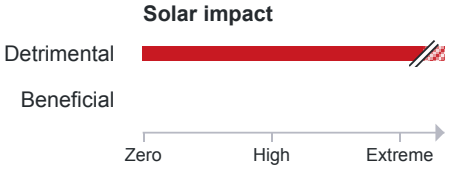
Hood ★☆☆



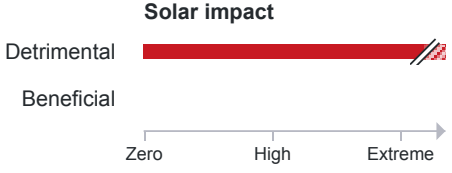


Offset Panel ★☆☆

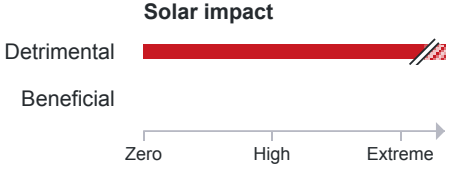




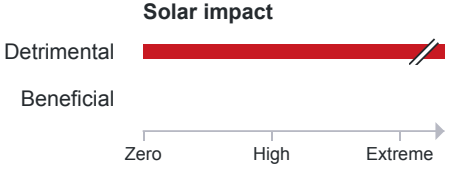
Overhang ★☆☆



Fins ☆☆☆

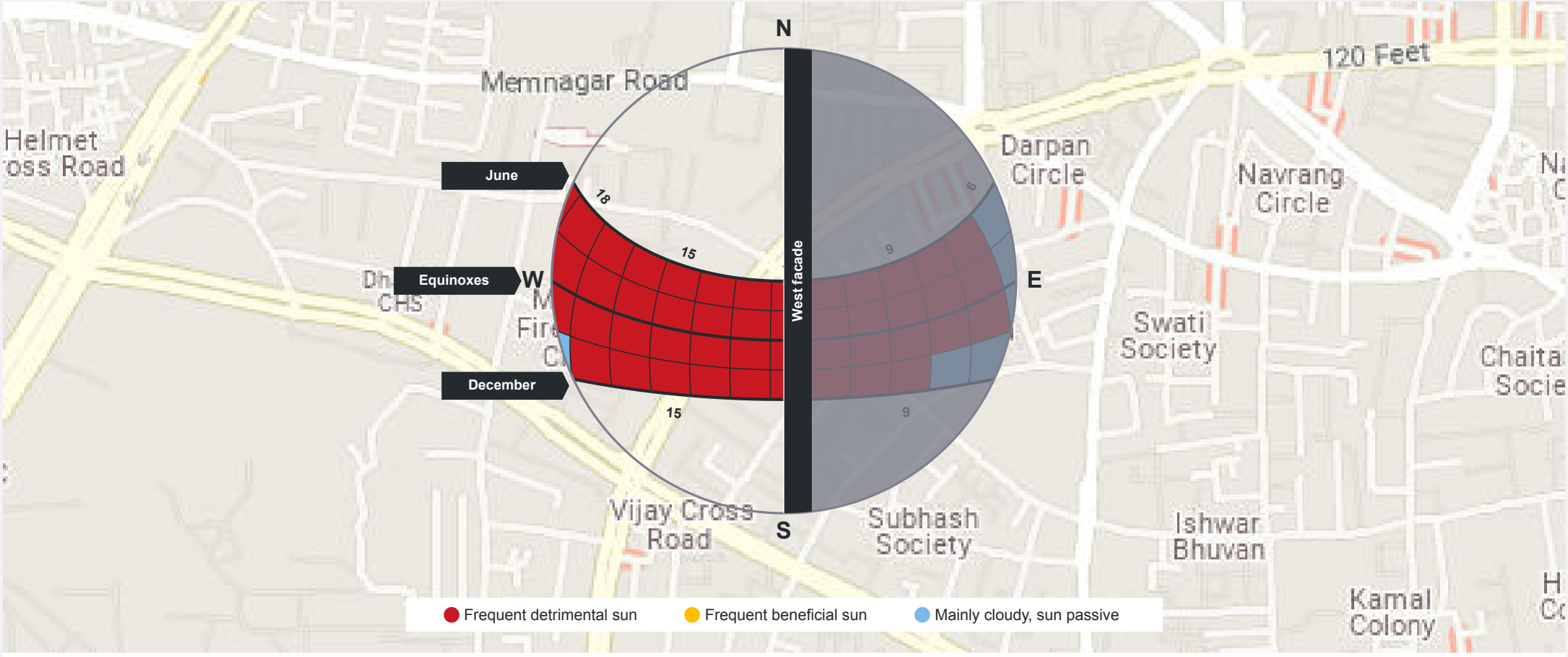


No shading ☆☆☆



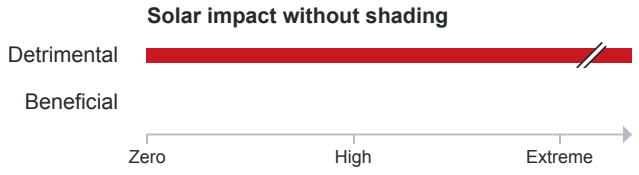
Shading: West facade

Annual solar impact



This facade sees a high frequency of detrimental overheating hours.
When overheating happens, its impact is extremely significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

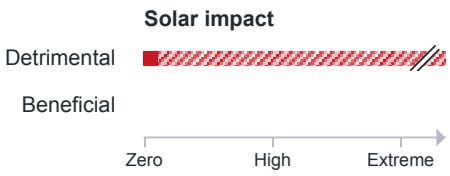
Shading strongly recommended

Shading: West facade

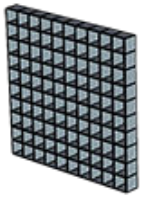
Effectiveness of different shading strategies

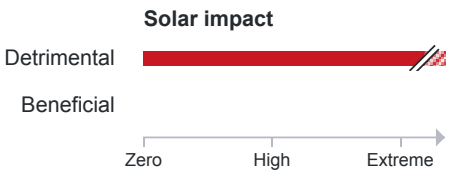
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Automated Blinds ★★★

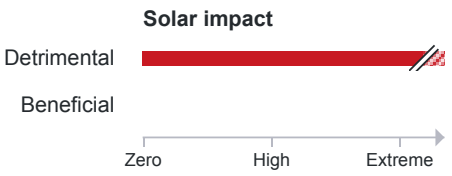


Eggcrate ★★★

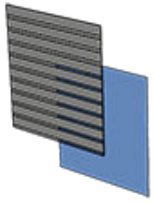


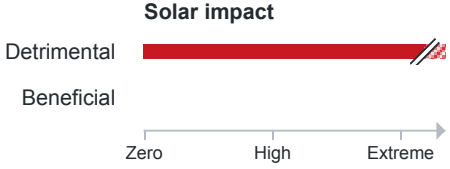


Brise Soleil ★★☆

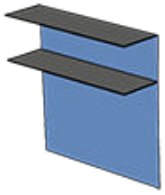


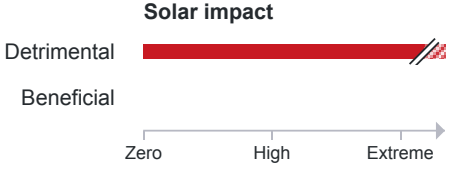
Offset Panel ★☆☆



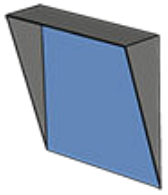


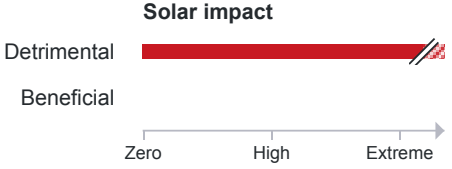
Double Overhang ★☆☆



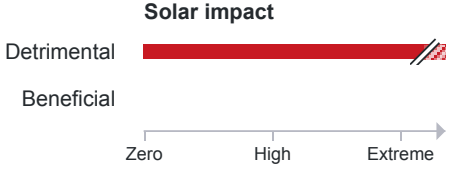


Hood ★☆☆

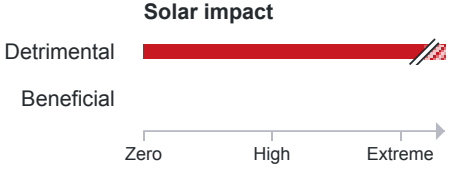




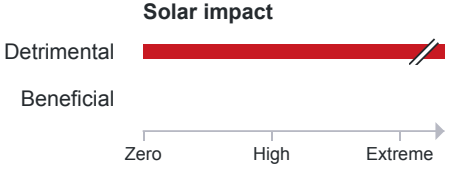
Overhang ★☆☆



Fins ☆☆☆

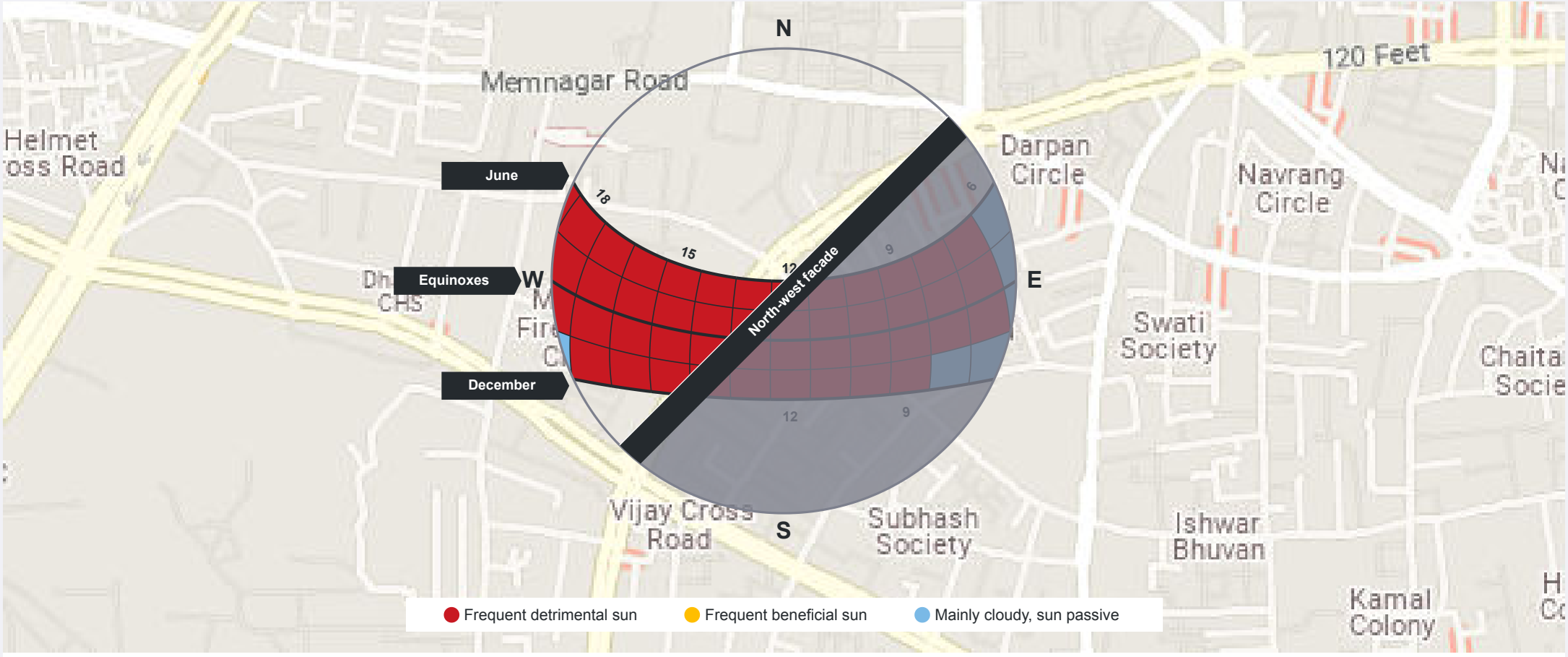


No shading ☆☆☆



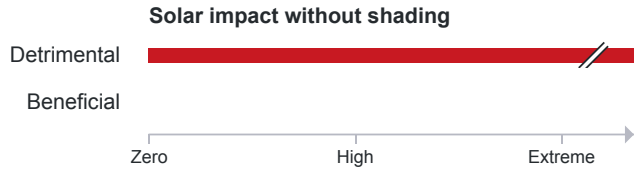
Shading: North-west facade

Annual solar impact



This facade sees a high frequency of detrimental overheating hours.
When overheating happens, its impact is extremely significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

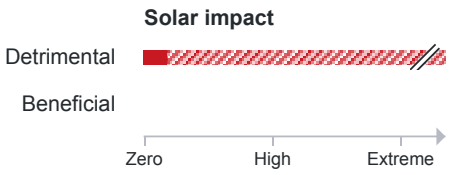
Shading strongly recommended

Shading: North-west facade

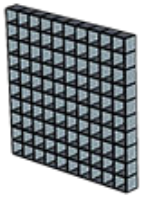
Effectiveness of different shading strategies

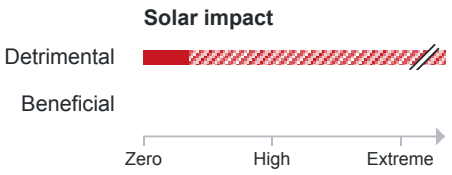
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Automated Blinds ★★★

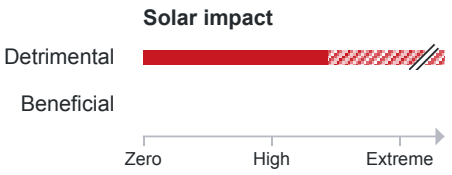


Eggcrate ★★★

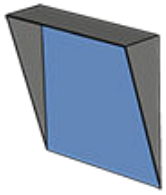


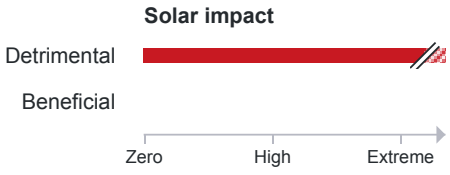


Brise Soleil ★★☆

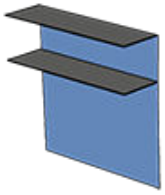


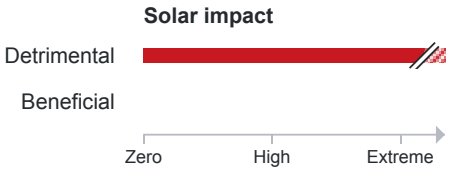
Hood ★☆☆



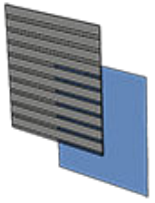


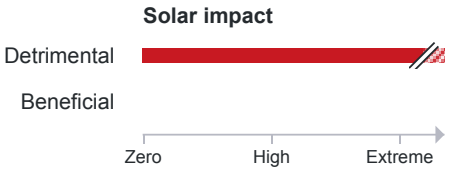
Double Overhang ★☆☆



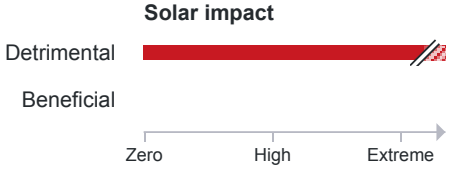


Offset Panel ★☆☆

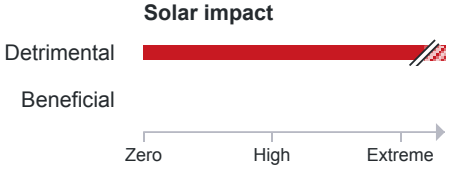




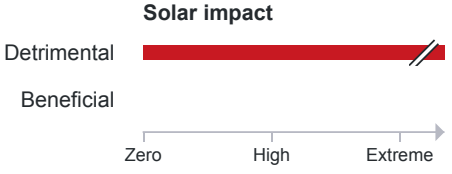
Overhang ★☆☆



Fins ★☆☆

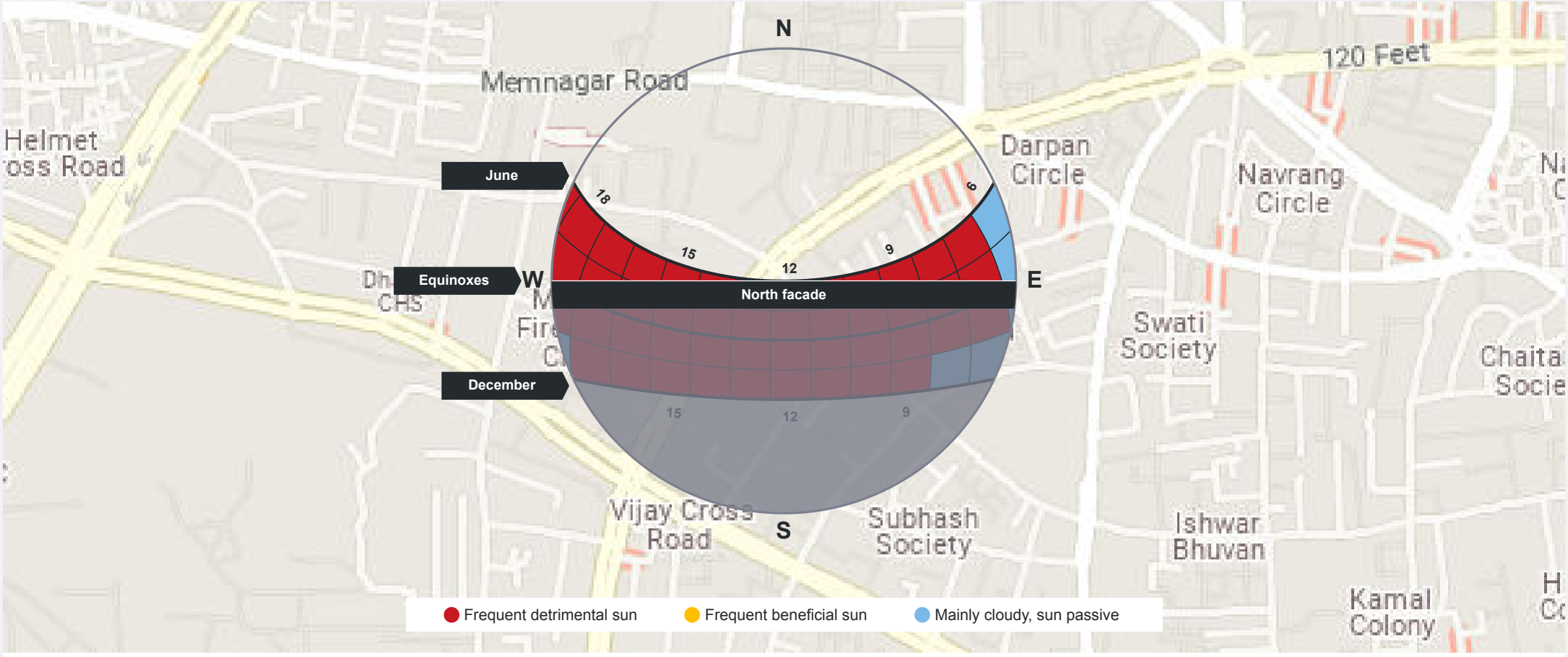


No shading ☆☆☆



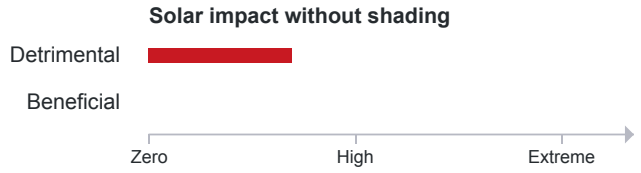
Shading: North facade

Annual solar impact



This facade sees a noticeable amount of detrimental overheating hours.
When overheating happens, its impact can be quite significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

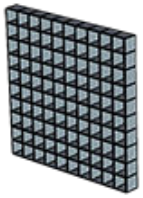
Consider shading or glazing with good solar control.

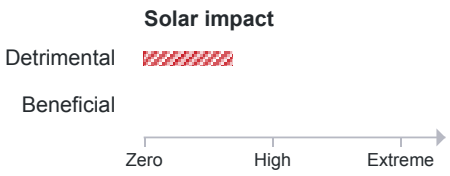
Shading: North facade

Effectiveness of different shading strategies

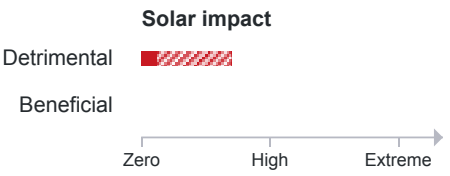
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Eggcrate ★★★

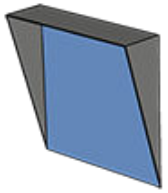


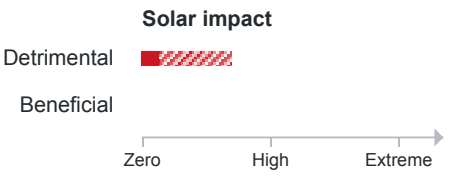


Brise Soleil ★★★

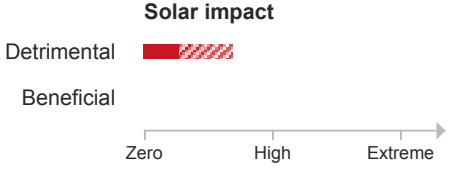


Hood ★★★

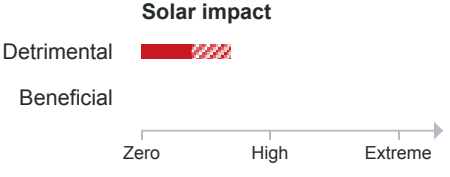




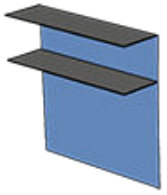
Fins ★★☆

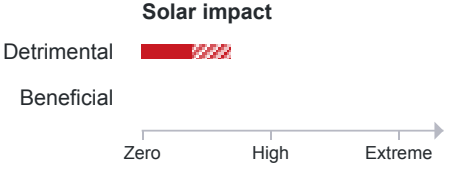


Automated Blinds ★☆☆

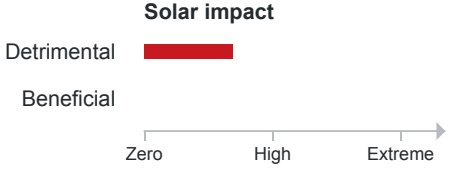


Double Overhang ★☆☆

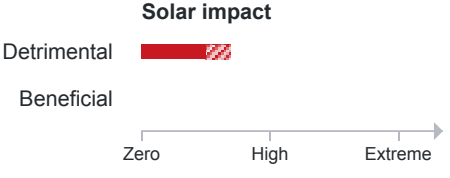




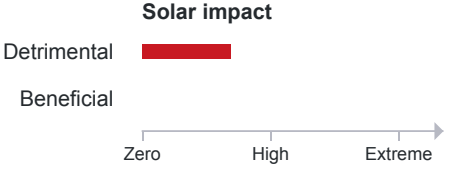
No shading ★☆☆



Overhang ☆☆☆

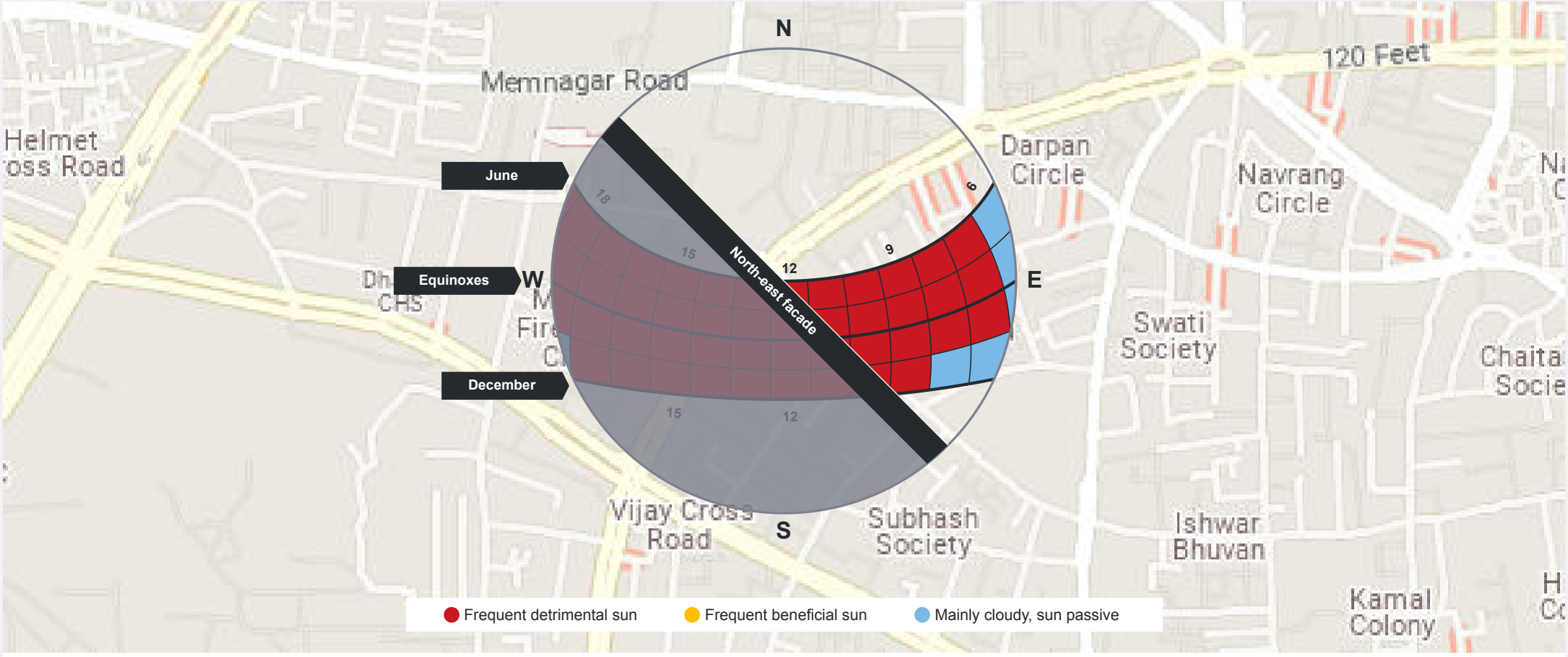


Offset Panel ☆☆☆



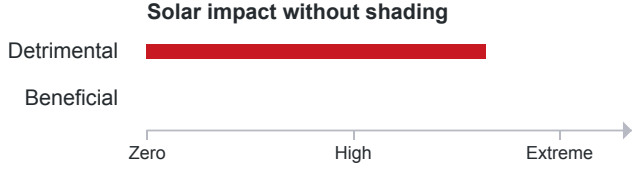
Shading: North-east facade

Annual solar impact



This facade sees a moderate amount of detrimental overheating hours.
When overheating happens, its impact can be very significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

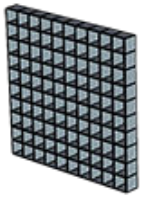
Shading strongly recommended

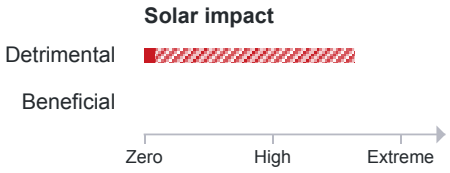
Shading: North-east facade

Effectiveness of different shading strategies

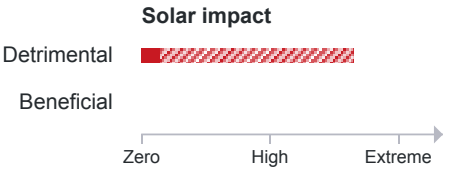
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Eggcrate ★★★

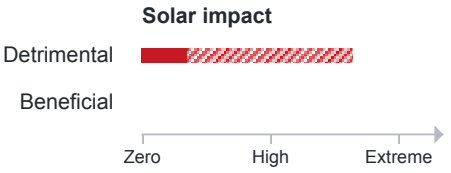




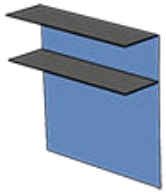
Automated Blinds ★★★

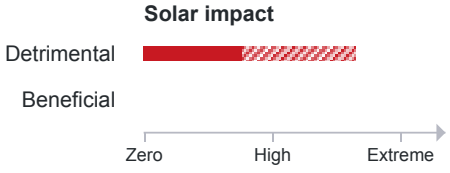


Brise Soleil ★★★

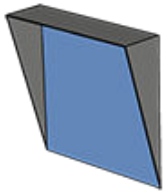


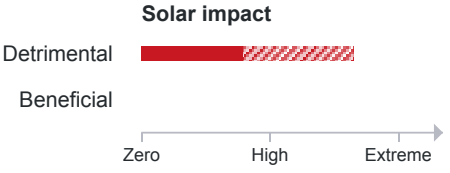
Double Overhang ★★☆



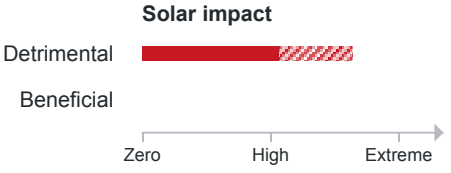


Hood ★★☆

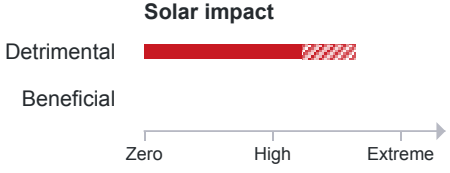




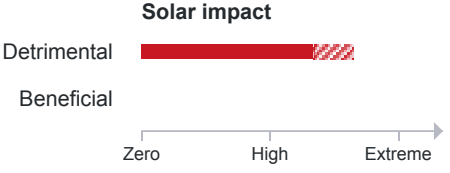
Overhang ★☆☆



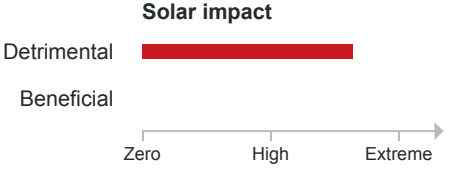
Offset Panel ★☆☆



Fins ☆☆☆

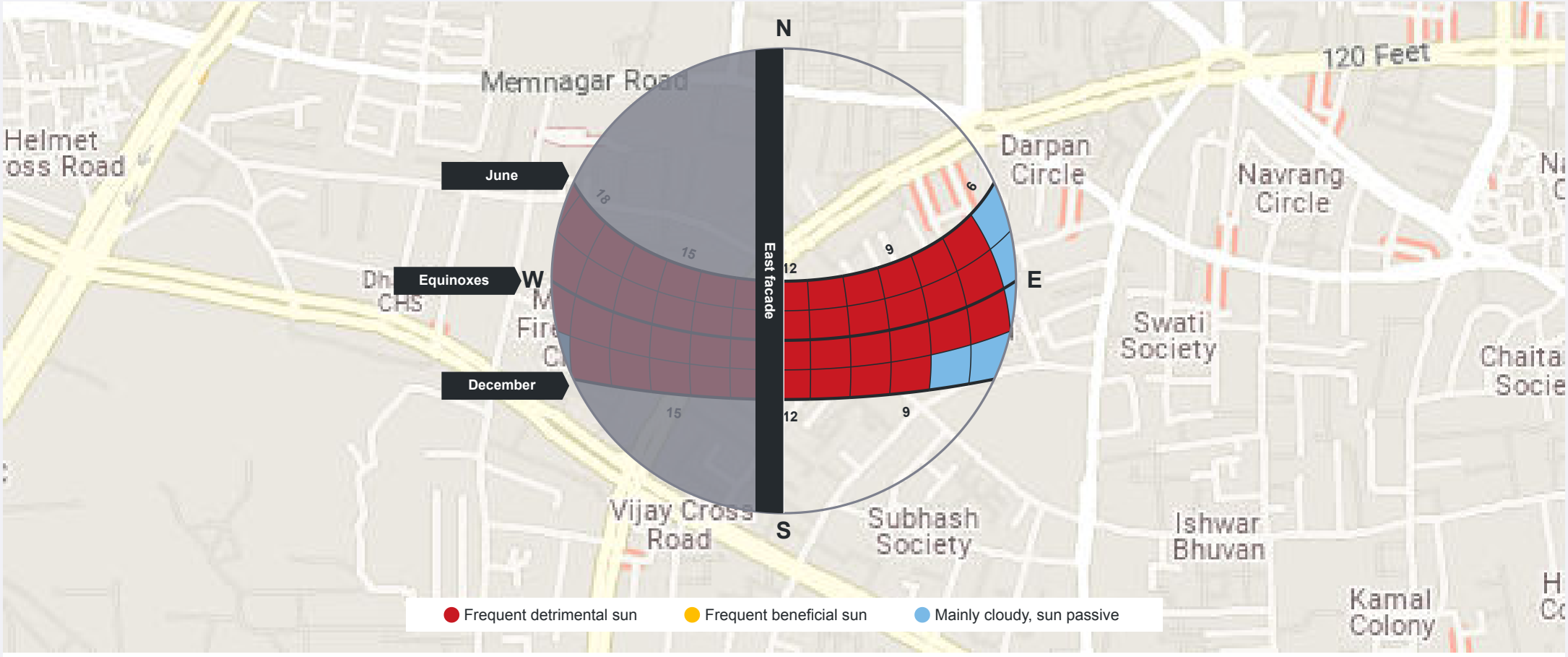


No shading ☆☆☆



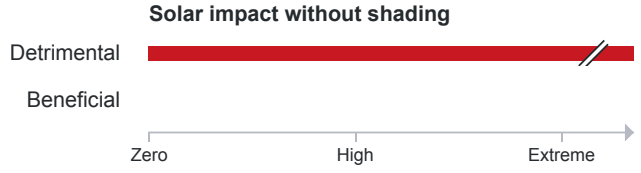
Shading: East facade

Annual solar impact



This facade sees a high frequency of detrimental overheating hours.
When overheating happens, its impact can be very significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

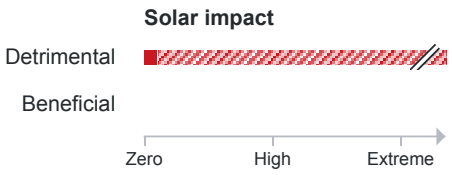
Shading strongly recommended

Shading: East facade

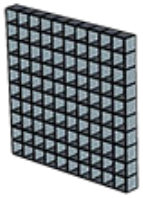
Effectiveness of different shading strategies

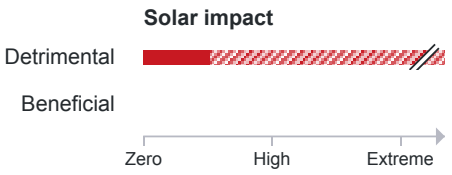
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Automated Blinds ★★★

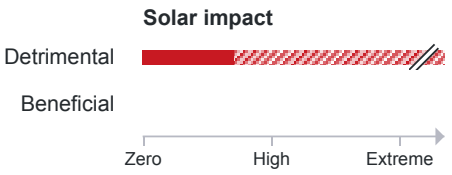


Eggcrate ★★★

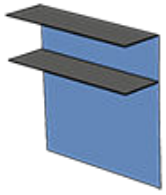


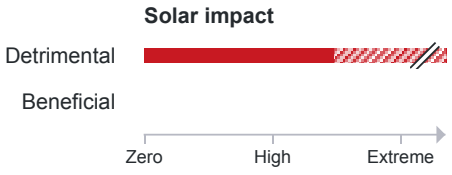


Brise Soleil ★★★

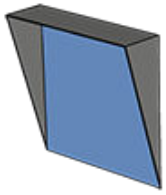


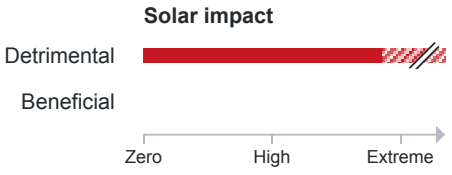
Double Overhang ★★☆



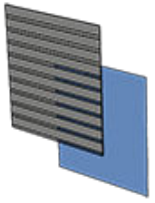


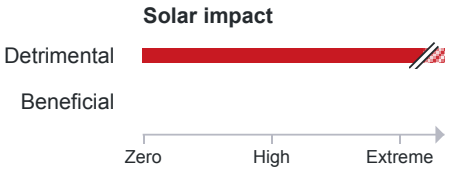
Hood ★☆☆



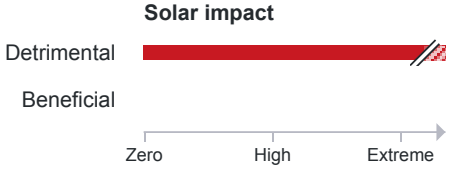


Offset Panel ★☆☆

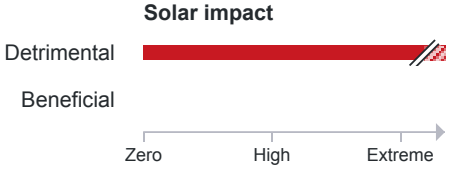




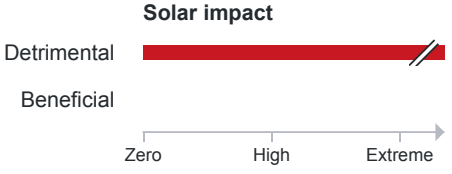
Overhang ★☆☆



Fins ☆☆☆

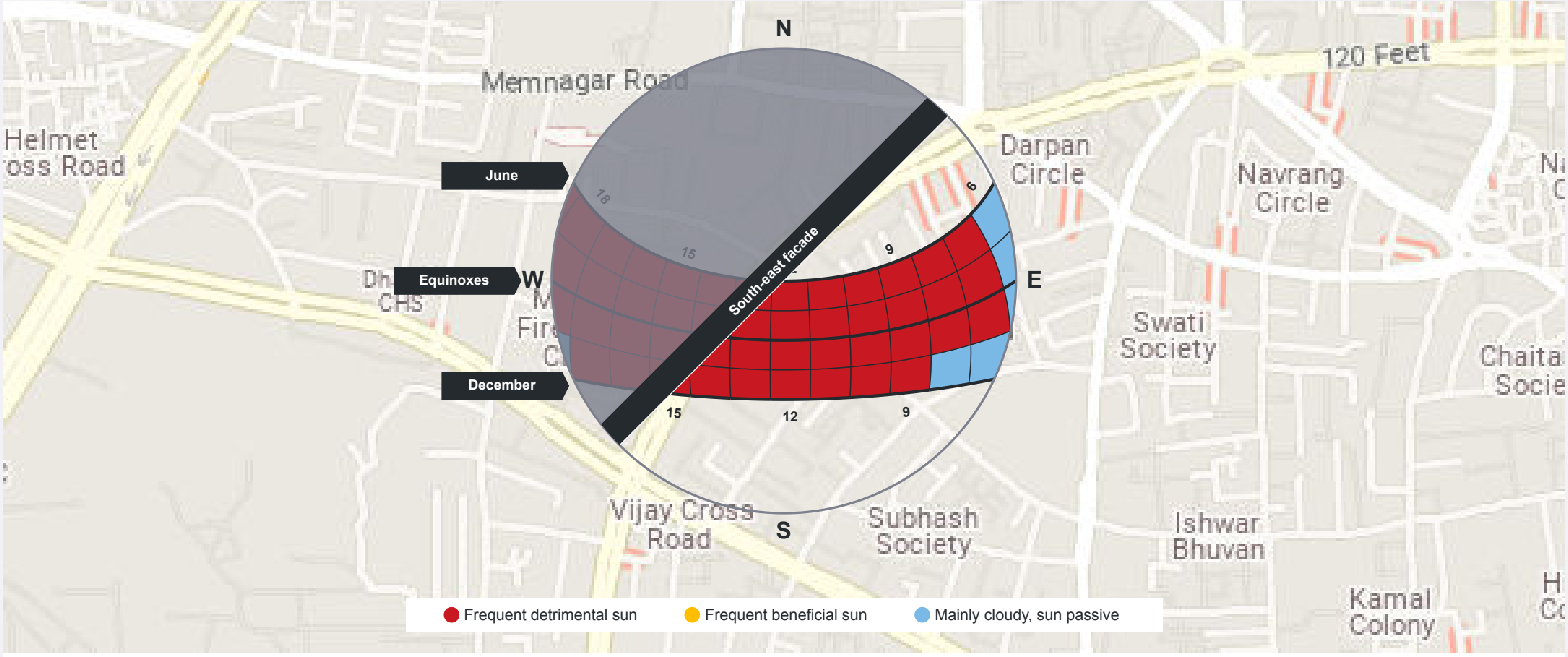


No shading ☆☆☆



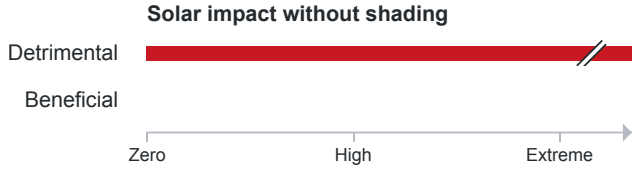
Shading: South-east facade

Annual solar impact



This facade sees a very high frequency of detrimental overheating hours.
When overheating happens, its impact can be very significant.

Beneficial warming from the sun is rare.
When warming sun happens, its benefit is low.



Overall recommendation

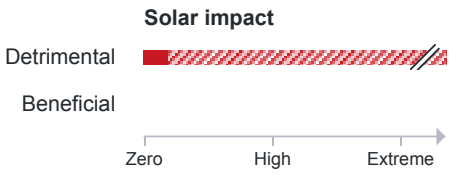
Shading strongly recommended

Shading: South-east facade

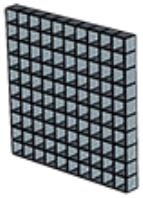
Effectiveness of different shading strategies

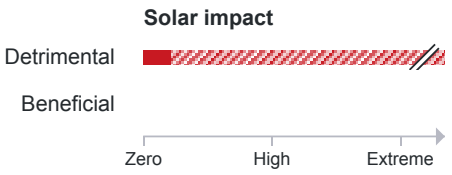
Detrimental sun let in | Detrimental sun blocked | Beneficial sun let in | Beneficial sun lost

Automated Blinds ★★★

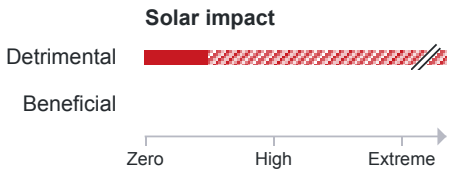


Eggcrate ★★★

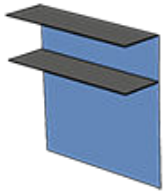


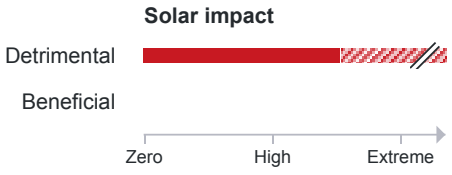


Brise Soleil ★★★

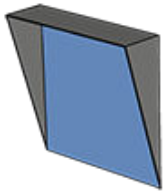


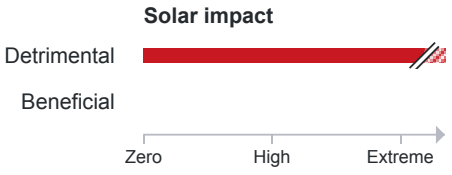
Double Overhang ★★☆



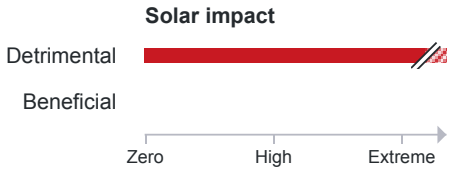


Hood ★★☆

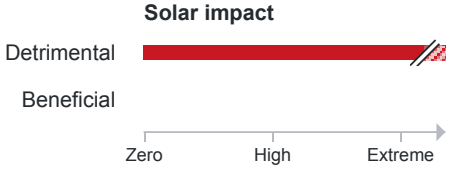




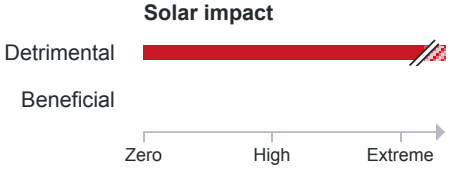
Overhang ★☆☆



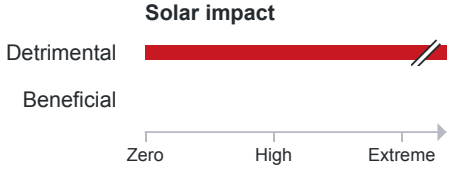
Offset Panel ★☆☆



Fins ☆☆☆



No shading ☆☆☆



Toplighting

Impact of sun on toplighting strategies

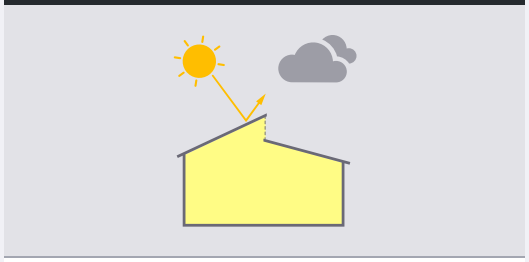
Beneficial sun

Not common in this climate.

Great for toplighting

- Mix of diffuse and direct sun
- Improved thermal comfort
- Better passive design
- Lower heating energy

Cloudy / Benign sky



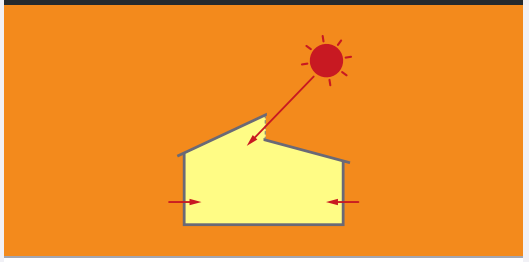
Predominant condition for:

- Clerestories facing N

Good for toplighting

- Mainly diffuse light
- Minimal overheating
- Low glare

Detrimental sun



Common problem for:

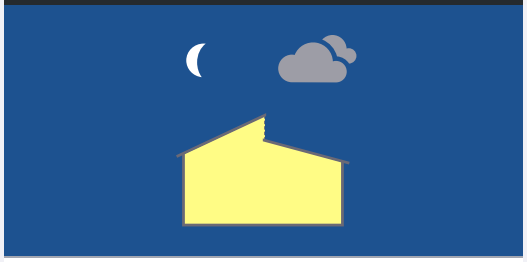
- Flat skylights
- Angled skylights facing N , E , S & W
- Clerestories facing E , S & W

Ideally avoided

Benefits of daylight outweighed by:

- Reduced thermal comfort
- Reduced natural ventilation potential
- Higher cooling energy

Low daylight



Frequency (Occupied hrs)

29%

As the residential schedule is often at night this % can be quite high.

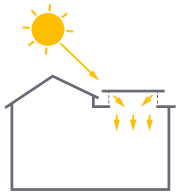
To consider during these times:

- Electric lighting will be required for adequate lighting inside
- Privacy may be needed
- Glazing may appear like a mirror from the inside

Toplighting

Suitability of different toplighting in this climate

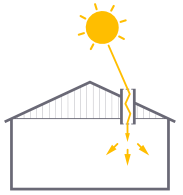
Monitor skylight



- Not much detrimental sun monitor works without overhangs.
- Likely to be more expensive than a simple skylight.

★★★

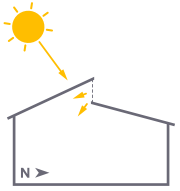
Light Pipes



- Small opening limits impact of overheating sun.
- Does not let in any beneficial warming sun.
- Daylight often good, from redirected sunlight.

★★★

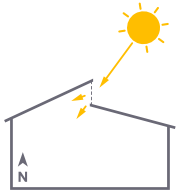
Clerestory facing north



- Prone to some detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight from a mix of direct sun and diffuse light.
- Glazing with excellent solar control is advised.

★★☆

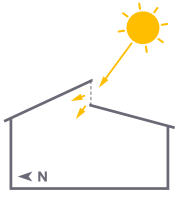
Clerestory facing east



- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

★☆☆

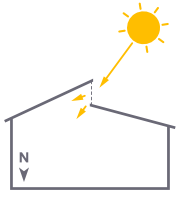
Clerestory facing south



- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

★☆☆

Clerestory facing west



- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

★☆☆

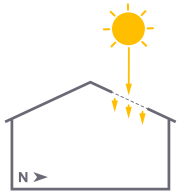
Toplighting

Suitability of different toplighting in this climate

Skylight angled north

- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

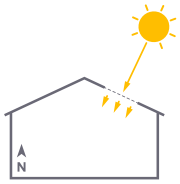
★☆☆



Skylight angled east

- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

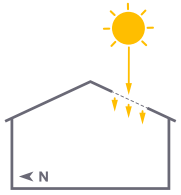
★☆☆



Skylight angled south

- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

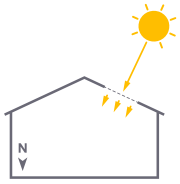
★☆☆



Skylight angled west

- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

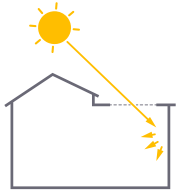
★☆☆



Unprotected skylight

- Lets in far too much detrimental sun.
- Hardly any sun provides beneficial warming.
- Daylight frequently from direct sun.

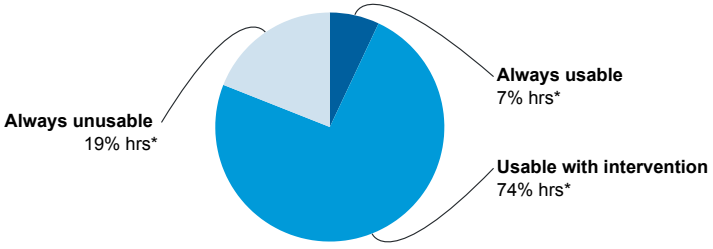
★☆☆



Outside spaces

How often outside space is usable

An outside space in this location without intervention will have limited use for seated periods of 20 minutes or more.

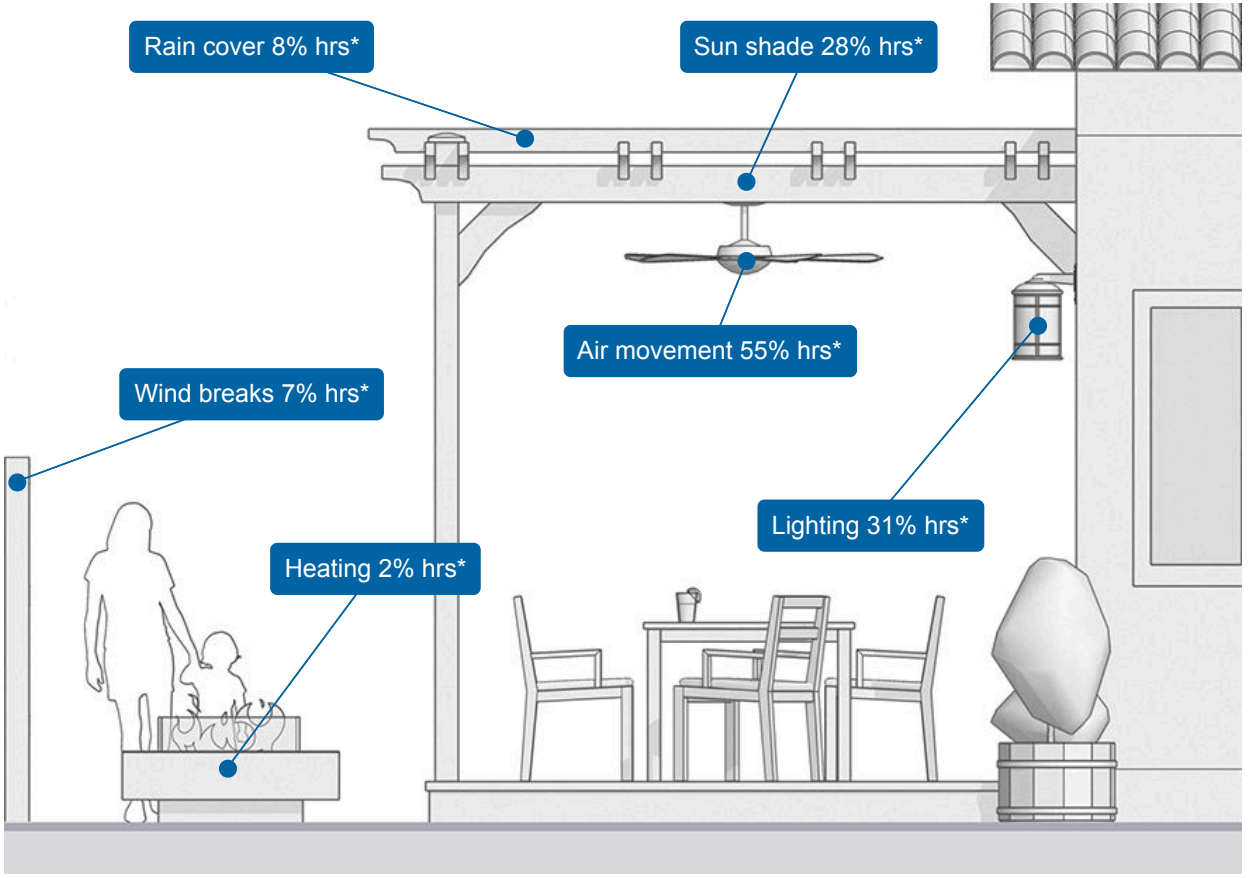


* Annual occupied hrs

Overall recommendation

- Combine lighting with wind breaks (+16% hrs*)
- Combine shading with air movement (+38% hrs*)

Maximum intervention usability

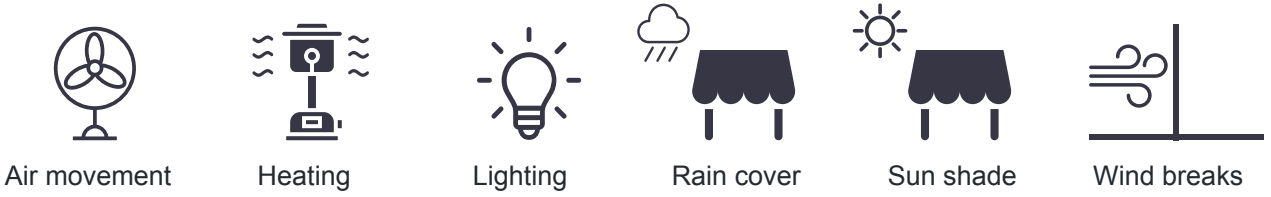


Outside spaces

Maximise the usability of an outside space

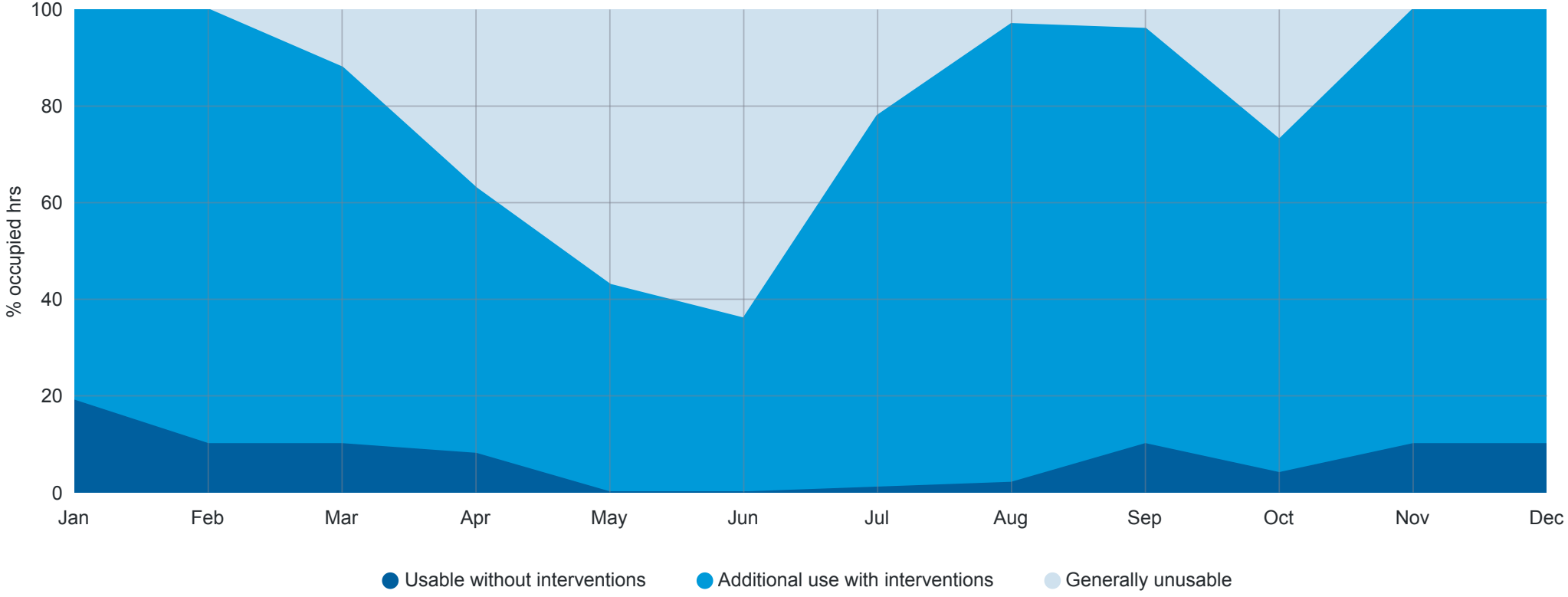
Selected interventions

* Annual occupied hrs



Annual usability: **81% hrs** *

An improvement of 4,324 hrs



Outside spaces

How this strategy compares

Intervention combinations							Usability*
Selected interventions	✓	✓	✓	✓	✓	✓	81%
Best 5 interventions	✓		✓	✓	✓	✓	79%
Best 4 interventions	✓		✓	✓	✓		74%
Best 3 interventions	✓		✓		✓		67%
Best 2 interventions	✓				✓		45%
Best single intervention	✓						18%
No intervention							7%

Climate Summary Report				
Name	Time Problem 04			
Location	Ahmedabad, Gujarat, IN			
Climate Zone Type	hot semi-arid			
Climate Description	Hot & dry. Seasons distinguished by temperature, with a relatively mild winter.			
Seasons				
Name	Winter	Spring	Summer	Autumn
Season dates	21 Dec to 20 Mar	21 Mar to 20 Jun	21 Jun to 20 Sep	21 Sep to 20 Dec
Weather and Temperature				
Prevailing weather conditions	Frequently glorious	Blisteringly hot to changeable	Muggy to glorious	Glorious to hot and dry
Average Minimum Temperature	15°C	26°C	26°C	21°C
Average Maximum Temperature	29°C	39°C	33°C	34°C
Precipitation				
Number of Rainy days	2	3	39	4
Seasonal Precipitation (mm)	10	15	599	31
Number of Snowy days	0	0	0	0
Seasonal Snow (cm)	0	0	0	0
Wind				
Most common wind condition	Mainly Breezy	Overwhelmingly Breezy	Overwhelmingly Breezy	Usually Breezy
Second most common wind condition	Occasionally calm, rarely strong winds	Rarely calm or strong winds	Rarely calm or strong winds	Sometimes calm, rarely strong winds
Daylight and Sunshine				
Average daylight (hrs)	11.3	13.0	13.0	11.3
Average daily sunshine (hrs)	10.8	11.9	6.2	10.3
Average daily cloud (hrs)	0.5	1.1	6.9	1.0
Likely Heating and Cooling				
% days needing heating	0	0	0	0
Heating Energy Demand	Negligible	Negligible	Negligible	Negligible
% days needing cooling	61.1	100	100	100
Cooling Energy Demand	Relatively low	Very high	High	Moderate
Pollution				
% days with high or very high air pollution	100	96.7	100	100

Time Problem		
Plot Description		
Description	Area	Unit
Existing Plot Area (BUA)	9,770.95	m2
Area U/Road	0.00	m2
Bal. Plot Area	9,770.95	m2
Basic F.S.I.	1.80	
Basic Allowed B/up Area	17,587.71	m2
Max. F.S.I.	3.60	
Max. Allowed B/up Area	35,175.42	m2
Area of Common Plot	977.095	m2
Development Zone	D1	
Zone	R1	
Dwelling Type	3	

Site Plan
1 : 500

MHD 4004

Raj Prasad Dani

Oikopolis VI: A New Beginning

Time Problem 04 (10.09.24)

PHD24288

Site Plan (Ground Floor)

1 : 500

MHD 4004

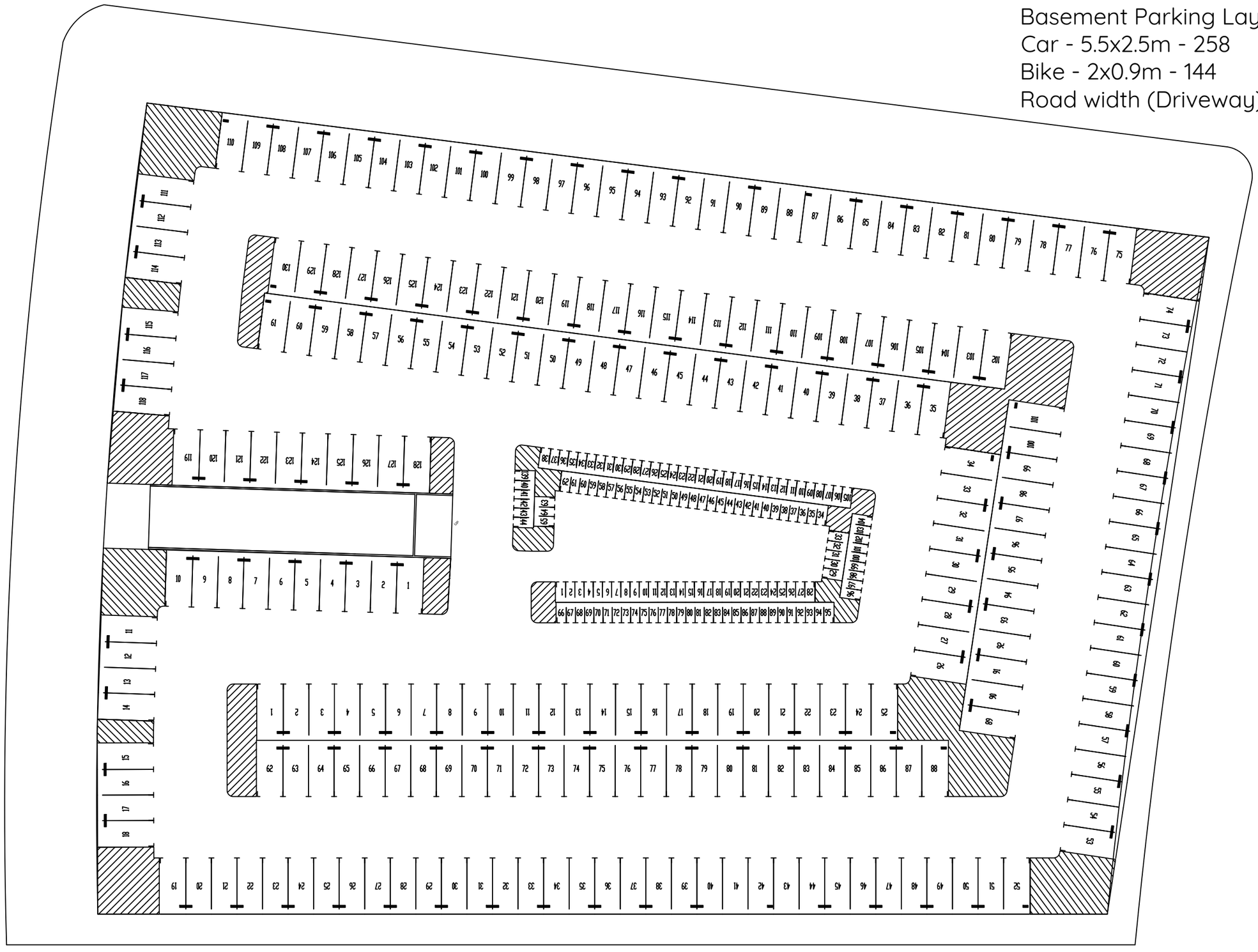
Raj Prasad Dani

Oikopolis VI: A New Beginning

Time Problem 04 (10.09.24)

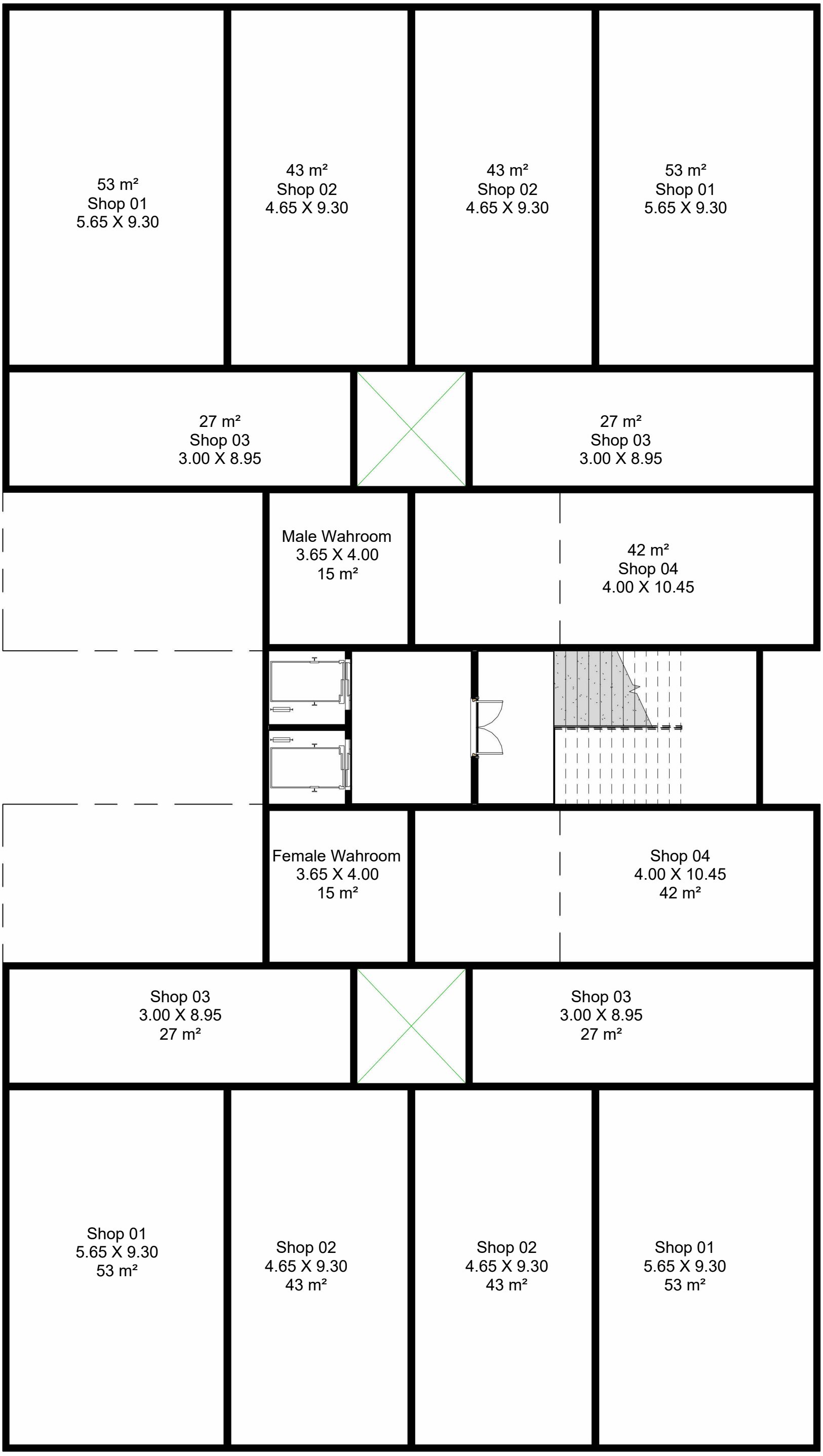
PHD24288

Basement Parking Layout
Car - 5.5x2.5m - 258
Bike - 2x0.9m - 144
Road width (Driveway) - 6m



MHD 4004 | Basement Design | Raj Prasad Dani

Oikopolis VI: A New Beginning | Time Problem 02 (15.08.24) | PHD24288



Typical Floor Plan (Commerical)

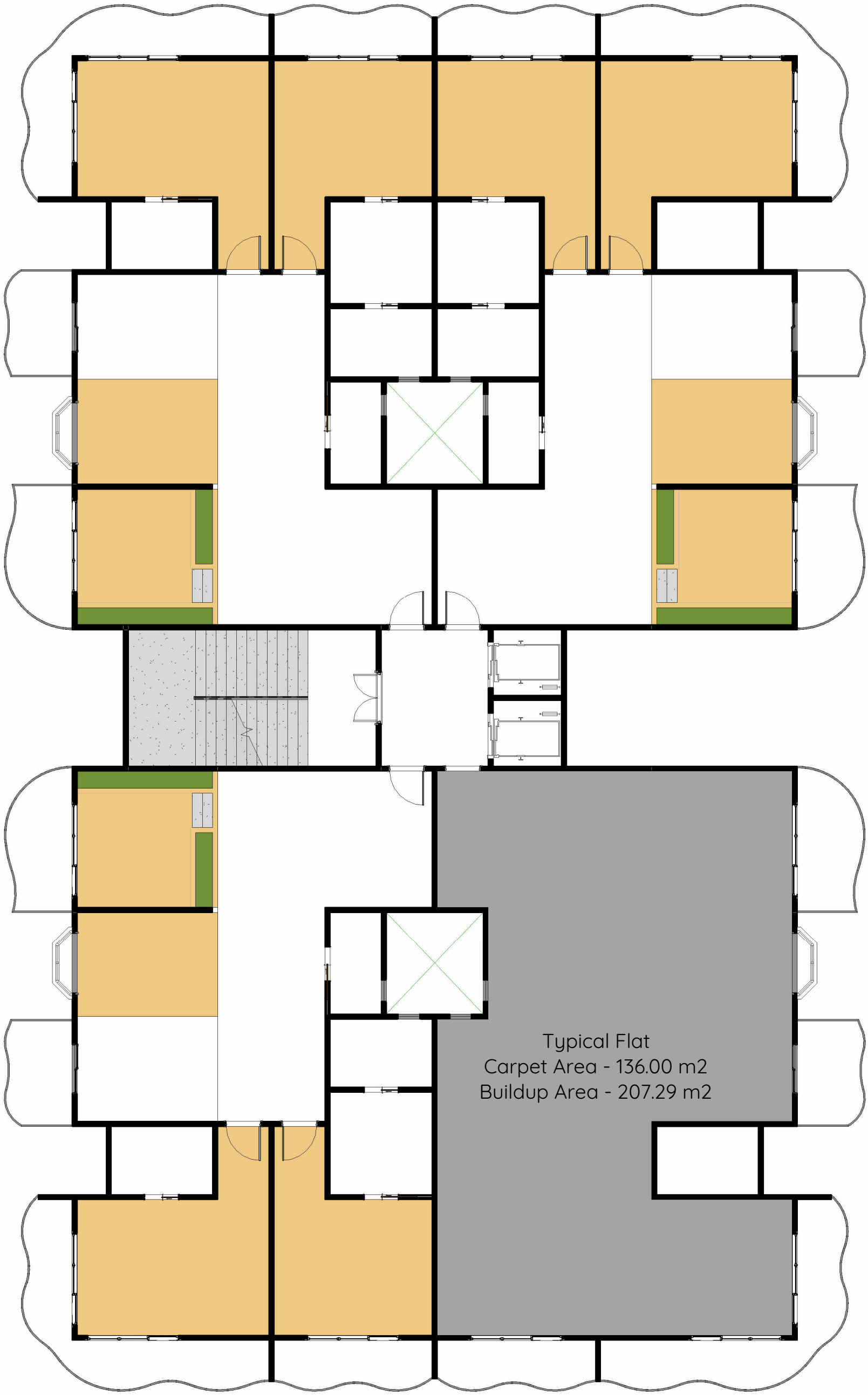
1 : 100

MHD 4004

Raj Prasad Dani

Oikopolis VI: A New Beginning Time Problem 03 (15.08.24)

PHD24288



Typical Alternative Floor Plan (01-03-05..))

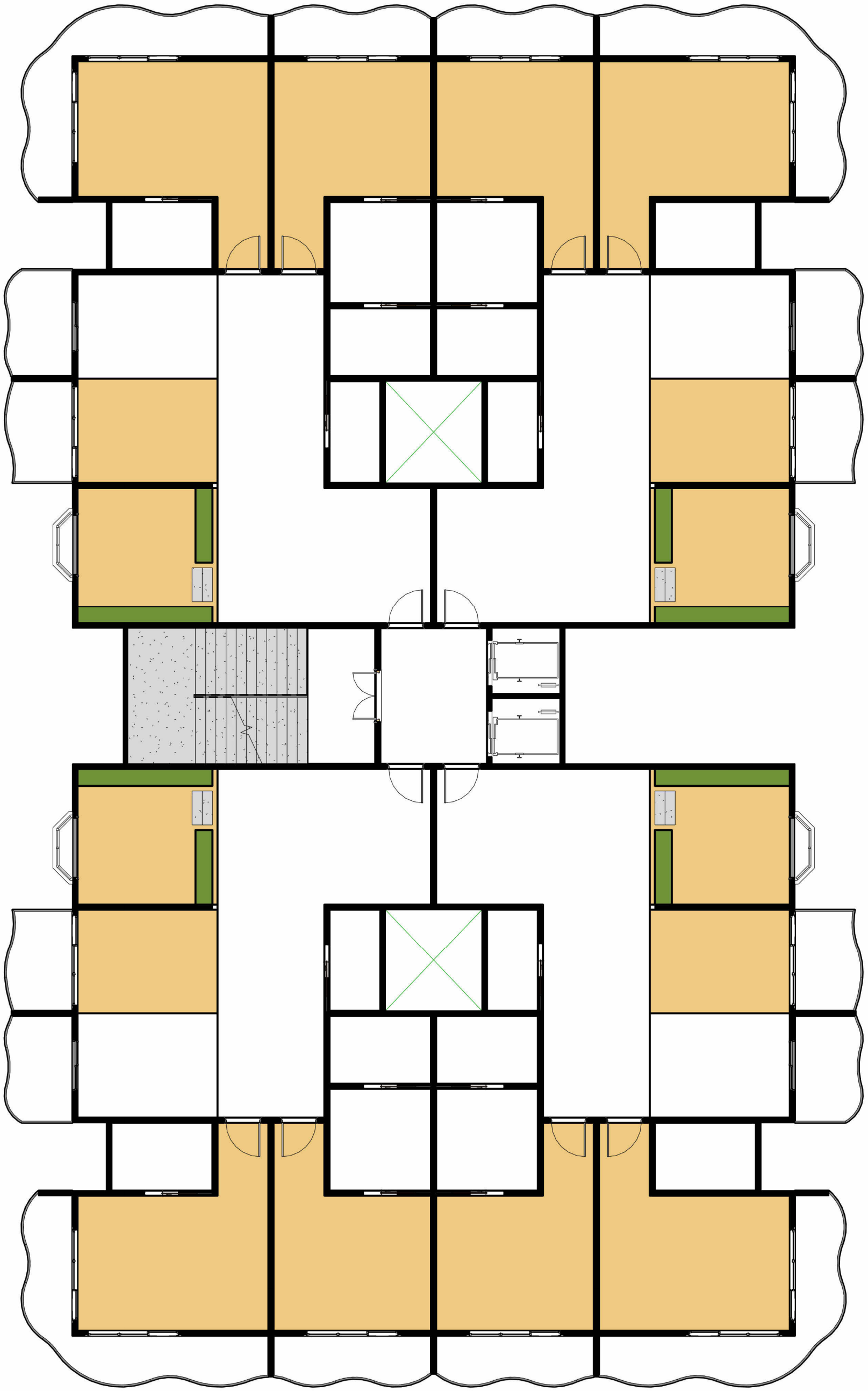
1 : 100

MHD 4004

Raj Prasad Dani

Oikopolis VI: A New Beginning Time Problem 03 (15.08.24)

PHD24288



Typical Alternative Floor Plan (02-04-06..))

1 : 100

MHD 4004

Raj Prasad Dani

Oikopolis VI: A New Beginning Time Problem 03 (15.08.24)

PHD24288