Daylight study
L-shaped room, New Damietta

Radiance simulation of an existing single-aspect room, its measured limits, and what can and cannot be done about them.

Prepared for Mahmoud

Site New Damietta, Egypt · 31.44°N, 31.65°E

Simulation engine Radiance 6.0.2 (LBNL-ETA, build 6.0.c1700d56cc)

Climate data EGY_DT_Damietta.623300_TMYx.epw (WMO 623300)

Analysis grid 852 sensors, 80 cm work plane, 20 cm spacing

Variants simulated 60 · **ray-tracing runs** 292

Contents

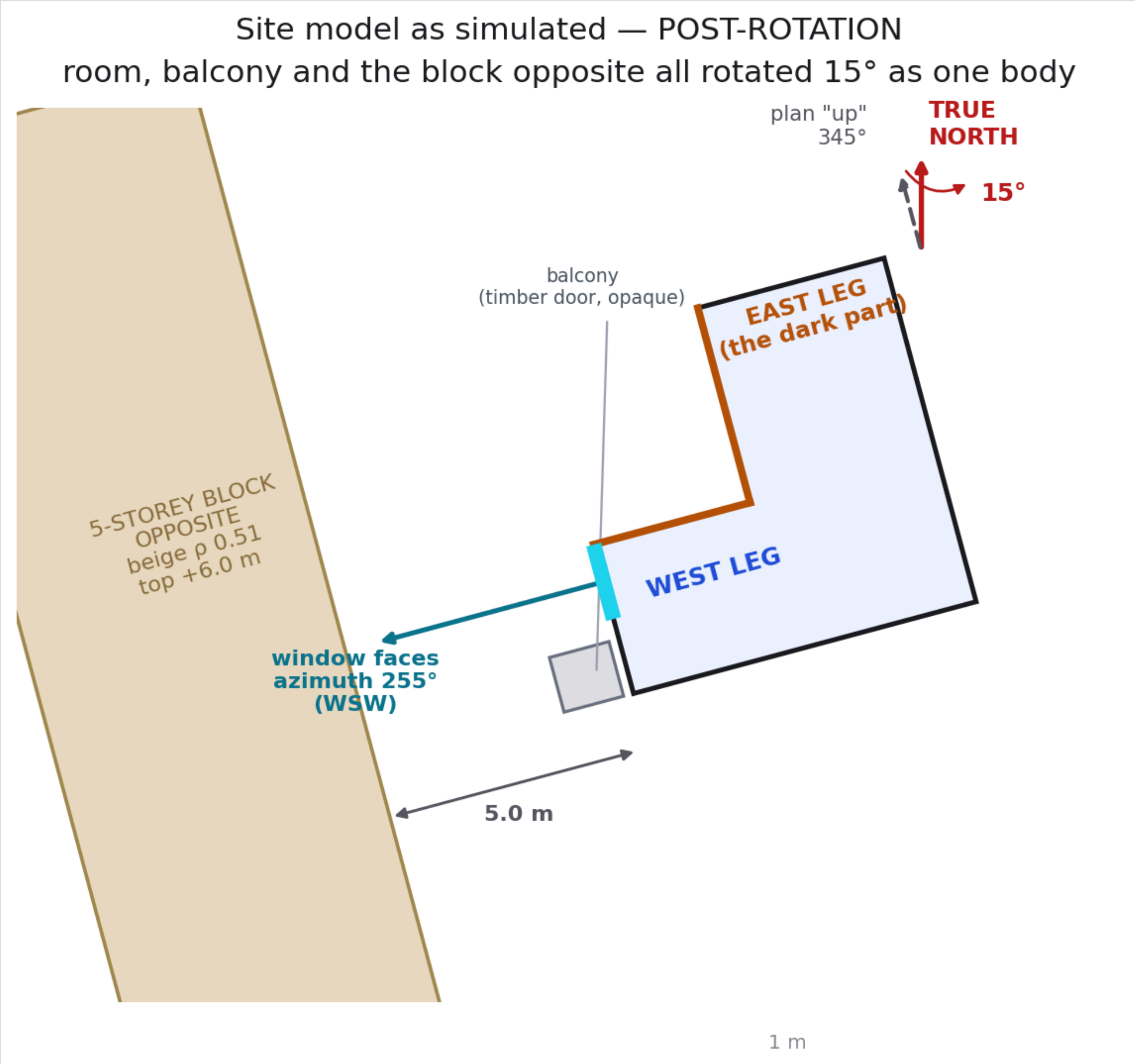
1. The constraint that governs everything

W5 is the only exterior wall this room has. Three metres of it, facing azimuth 255° (west-south-west), with a blank five-storey block standing five metres away.

W0 (south, 690 cm), W1 (east, 692 cm) and W2 (north, 375 cm) all have rooms behind them. W3 (392 cm) and W4 (315 cm) are the two faces of the internal notch. Every lux this room will ever receive arrives through one wall, and part of that wall is currently a solid timber balcony door.

This single fact explains the shape of every result that follows:

- **Reflectance beats geometry here.** The block opposite leaves 50.2° of sky visible from the window centre, so most light reaching the work plane — and effectively all light reaching the far leg — has bounced three or more times. Each bounce multiplies by the surface reflectance ρ. Going from ρ 0.20 to 0.85 changes the third-order term ρ^3 from 0.008 to 0.61, a factor of 76. No geometric move available on a three-metre wall buys leverage of that order.
- **The east leg is starved by geometry, not by shortage of effort.** It has no line of sight to the only aperture in the room. Its light must turn the internal corner at (315, 300) after several reflections.
- **There is a hard ceiling on what can be achieved.** A second aperture was the one move that would have changed the answer, and the plan forecloses it.



The site model as simulated. Room, balcony and the opposite block are rotated 15° as one body; true north is shown against the plan's own "up" direction.

Second apertures were tested and ruled out. North on W2, east on W1 and south on W0 were each modelled and priced before their status was confirmed. A south opening on W0 would have been the strongest of the three — south is the best orientation available at 31°N, easily shaded with a horizontal overhang, and for $x > 315$ the plan runs continuously from $y = 0$ to $y = 692$, so a south window at the eastern end would have looked straight up the length of the dark leg with nothing in the way. All three walls turned out to be interior. Those cases cannot be built and their numbers are not reported.

2. Method, and how to reproduce it

item	value
Engine	Radiance 6.0.2, build `6.0.c1700d56cc` (2026-02-02), official LBNL-ETA macOS arm64 build
Weather	`EGY_DT_Damietta.623300_TMYx.epw`, WMO 623300, from climate.onebuilding.org
Site	New Damietta, 31.44°N 31.65°E; `.wea` header rewritten to the site coordinates
Time base	Local standard time, UTC+2, standard meridian 30°E. **No daylight saving applied**
Work plane	80 cm, 20 cm grid spacing, sensors ≥10 cm clear of walls
Grid	**852 sensors representing 34.08 m²** of the 35.40 m² plan
Variants	**64** built and simulated (plus 7 more for second-aperture options later ruled out)
Point-in-time runs	**292** illuminance fields — 64 variants × up to 16 sky conditions
Annual runs	10 variants by the daylight-coefficient method (146- and 2306-bin skies)
Glare	54 DGP evaluations — 6 variants × 4 eye positions × 5 sky conditions

Point-in-time settings, identical for every variant so comparisons hold:

```
rtrace -I+ -h -w -n 10 -ab 12 -ad 10000 -lw 2e-6 -aa 0 \ -dp 4096 -ds 0.05 -dt 0.02 -st 0.02 -lr -20
```

`-ab 12` was adopted after a convergence sweep: the mean moved +1.8% from `-ab 7` to `-ab 9`, +0.7% to `-ab 12`, and +0.1% to `-ab 15`. A deeply obstructed room is dominated by high-order interreflection, so the usual `-ab 5` is not sufficient. Ambient caching is switched off (`-aa 0`) so no interpolation artefacts appear across the grid. `-ad 10000` sits within 0.9% of `-ad 20000` at half the cost.

Annual metrics use the daylight-coefficient method: `rcontrib` against a Tregenza (MF:1, 146-bin) sky for total illuminance, and against a Reinhart (MF:4, 2306-bin) sky with `-ab 1` for the unreflected direct component used by ASE. Sky matrices come from `gendaymtx` on the Damietta `.wea`. Occupied period 08:00–18:00 daily (3650 h), per IES LM-83.

Glare is Daylight Glare Probability from `evalglare` on 180° fisheye renders at four eye positions.

Solar gain uses daylight coefficients against the **total-solar** sky matrix (`gendaymtx -O1`), multiplied by glazed area and by SHGC.

Validation performed before any result was trusted

check	expected	measured
Sky luminous efficacy, 14 daylit skies	105–115 lm/W	**104.8 – 111.0 lm/W**
CIE overcast horizontal illuminance	10 000 lx	**9 984 lx** (–0.16%)
Vertical illuminance, unobstructed façade, overcast	49.6% of horizontal (39.6% sky + 10.0% ground)	**48.96%**
Total-solar sky, unobstructed horizontal plane	EPW GHI = 2 032 kWh/m²·yr	**1 982** (97.5%)
Daylight Factor invariance under the 15° site rotation	unchanged	49.417 → 49.511 lx (**+0.19%**)
Plan closure from the given vertices	six edges match the stated lengths	**all six exact**; area 35.40 m²
Solar position vs `gensky`, six seasonal points	agreement	within **0.6° altitude, 1.5° azimuth**

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3. What you gave me, and what I assumed

3.1 Given — used exactly as supplied

item	value
Plan	counter-clockwise from the SW corner: (0,0) → (690,0) → (690,692) → (315,692) → (315,300) → (0,300)
Area	35.40 m², independently verified
Ceiling	300 cm; floor at z = 0
Orientation	true north is 15° clockwise of the plan's "up" ⇒ plan-up at azimuth 345°, W5 window facing **255°**
Walls	W0, W1, W2 and W5 named; **W0, W1, W2 interior**; W3 and W4 internal partitions; **W5 the only exterior wall**
Window	on W5, 150 × 150 cm, sill 100 cm, flush against W4 ⇒ y = 150 → 300 cm
Shutter and mesh	insect mesh plus a shutter; open aperture effectively ≈ 100 cm
Balcony door	solid timber, no glazing
Block opposite	5 storeys, ~5 m away, beige, **blank — no openings**
Our building	5 storeys; room on the 4th with one occupied floor above
Work plane	80 cm

3.2 Where your own inputs conflicted, and how it was resolved

One genuine conflict was found, not two.

The window position was stated two ways. First as *100 cm from the south end* of W5 (y = 100–250), later as *flush against W4* (y = 150–300). The two differ by 50 cm. Flush-to-W4 was adopted: it describes something directly observable rather than a remembered offset, and the earlier reading leaves an implausible 50 cm sliver of solid wall between window and partition. Both were simulated. **The sweep shows window position on W5 is among the weakest parameters in this room (×1.15 across its full range), so the ambiguity costs almost nothing.**

No closure error was found in the plan. Every one of the six stated wall lengths matches the distance between the vertices exactly — 690, 692, 375, 392, 315, 300 — the polygon closes, and the shoelace area comes to 35.40 m² against the 35.40 m² stated. The two consistency identities also hold: W5 + W3 = 692 = W1, and W4 + W2 = 690 = W0. If a 15 cm discrepancy exists somewhere, it is not in the dimensions I was given, and I would want to see where it arises before writing it into a report.

3.3 Assumptions — every one of them mine, not yours

Storey counting. "Five storeys, we are on the fourth with one above" is only self-consistent if the ground floor counts as storey 1. Storey height assumed **3.00 m**, so the room floor sits **9.00 m** above street level and both roofs sit at **+6.00 m** relative to it.

Sky-view angle — the number that governs the room. Horizontal distance glass to opposite façade 5.10 m, its top at +6.00 m, window centre at z = 1.75 m:

$$\text{blocked below} = \arctan\frac{6.00 - 1.75}{5.10} = 39.8°$$

point on the window	blocked below	sky angle remaining
head (2.50 m)	34.5°	55.5°
centre (1.75 m)	**39.8°**	**50.2°**
sill (1.00 m)	44.4°	45.6°

Roof parapet opposite — assumed absent, and this is the most consequential open assumption. A single 1 m parapet raises the obstruction to 45.8° and cuts the sky angle to 44.2°, which is enough to remove the March afternoon sun patch entirely.

Glazing and mesh. Single clear float glass ~6 mm, $\tau_{vis} = 0.88$. The insect mesh is modelled as a **lumped transmittance reduction, τ = 0.60**, not as wire geometry — standard fibreglass screen (18 × 16 threads/inch, 0.28 mm fibre) has ~60% open area and measured normal-incidence transmittance of 0.60–0.70, falling towards 0.50–0.55 with off-normal incidence and coastal dust. Net **τ = 0.528**. A realistic open-weave replacement was modelled at $\tau_{mesh} = 0.78$ (net 0.686).

> **Limit of this treatment.** A lumped transmittance gets the *quantity* of transmitted light right but does not reproduce the mesh's effect on view and contrast, nor the way a real mesh softens the edge of a direct sun patch. Full fidelity would need a measured BSDF.

Balcony. 1.20 m deep, spanning y = 0 to 110 cm, **solid** parapet 105 cm, 15 cm slab, with a matching balcony on the floor above whose slab sits at z = +3.00 m; surfaces ρ 0.40. This is not decorative: measured at 21 March 15:00, it costs **17% of the light** (663.6 lx with it, 798.9 lx without).

Structural limit on opening W5. Assumed RC frame: 25 cm column at the W5/W0 corner, 15 cm pier at the W5/W4 junction, 30 cm beam under the slab, 10 cm upstand. **Maximum plausible opening 2.60 × 2.60 m**

= 6.76 m², i.e. 75% of the wall. If W5 is load-bearing masonry rather than infill, this ceiling drops sharply.

Reflectances.

surface	ρ_vis	basis
ceiling	0.80	white emulsion on plaster
walls, interior face	0.61	light cream/beige paint
partitions W3/W4	0.61	same paint, independent parameter
floor	0.30	mid-tone ceramic, slight gloss
timber door	0.23	mid-dark timber
our own façade outside	0.45	light external render
block opposite	**0.51**	beige/sand external paint on a **blank** wall
street	0.20	asphalt and paving
balcony surfaces	0.40	tile and render

How W3 and W4 were treated. As opaque, solid partitions with interior reflectance on the face the room sees. Beyond them is adjacent occupied space, not outdoors, and no light is exchanged because they contain no openings. Partition thickness is therefore irrelevant and they are modelled with zero thickness. Reclassifying them from "exterior wall" to "internal partition" changed no number — an opaque surface of the same reflectance behaves identically to rays that never leave the room. The moment an opening is cut in either, the adjacent room and its own window would have to be modelled.

3.4 What was not modelled

- **Furniture, curtains and occupants.** An empty room is the convention for this analysis, and it is optimistic. Furniture and soft furnishings typically reduce work-plane illuminance by 10–20% and lower effective floor reflectance.
- **Dirt on the glazing.** Clean glass is assumed. A maintenance factor of 0.9 would be normal, and would scale every result down by roughly a tenth.
- **Openings, balconies or setbacks in the block opposite.** Modelled as a flat blank slab, which matches what you confirmed. Any recess or side street would raise the results.
- **Spectral or coloured light.** Neutral RGB reflectances throughout; the beige façade is modelled with a slight warm bias but no colour rendering analysis was performed.
- **Electric lighting**, and therefore no daylight-linked dimming or energy calculation.
- **Thermal simulation.** The solar-gain figures are transmitted energy, not a cooling load. They are directionally reliable and are not a substitute for an energy model.

4. Errors found and corrected during the work

These are listed because they are what makes the rest of the numbers credible. Each was caught by a check, not by inspection.

1. **The solar azimuth function was mirrored**, computing east-facing access instead of west. Caught by testing against `gensky` at six seasonal points. After correction, agreement is within 0.6° in altitude and 1.5° in azimuth.
2. **The north wall W2 was generated at a constant x instead of a constant y**, leaving the room open to the north. The east-leg result read 3 639 lx; the correct figure was 318.8 lx. Caught because the number was physically impossible for a 2.25 m² window.
3. **The direct-sun coefficient matrix returned all zeros.** `sky_glow` is a `glow` material with maxrad 0, invisible to Radiance's direct-source calculation, and `-ab 0` traces no ambient rays at all. Fixed with `-ab 1`, which admits rays that reach the sky without a bounce and excludes those that reach it after one — exactly the unreflected component ASE requires.
4. **Solar gain was computed from the visible sky matrix** (`gendaymtx -O0`) instead of the total-solar one (`-O1`), reading about 40% low. Caught by the one check that can be exact: an unobstructed horizontal plane must recover the EPW's own GHI. It now does, to 97.5%.
5. **Solar-gain sensors were placed only on the west plane**, so a north-facing window's gain was being evaluated with west-façade irradiance — which inverts the conclusion of that branch.
6. **Ranking was initially by mean illuminance.** At 21 March 15:00 a direct sun patch peaks near 27 000 lx; the as-built room's mean is 694 lx against a median of 130 lx. A mean-based ranking measures how many grid points happen to fall inside the patch, which varies with room shape rather than with daylight quality. All rankings now use the median.
7. **The "east leg" was defined per variant.** Removing the notch silently grew the region to include floor next to the window, making it appear to improve tenfold. The region is now fixed once, by the as-built corner (x > 315, y > 300), and applied unchanged everywhere.
8. **A claim was carried past its evidence.** "Brighter in the morning than the afternoon" came from an early geometry in which the block opposite was assumed at +9 m. The confirmed five-storey height inverted it and the conclusion was not revised when the numbers were. See §5.
9. **Glare was declared imperceptible on the strength of one eye position.** A worst-case probe closer to the window found DGP 1.000. See §10.

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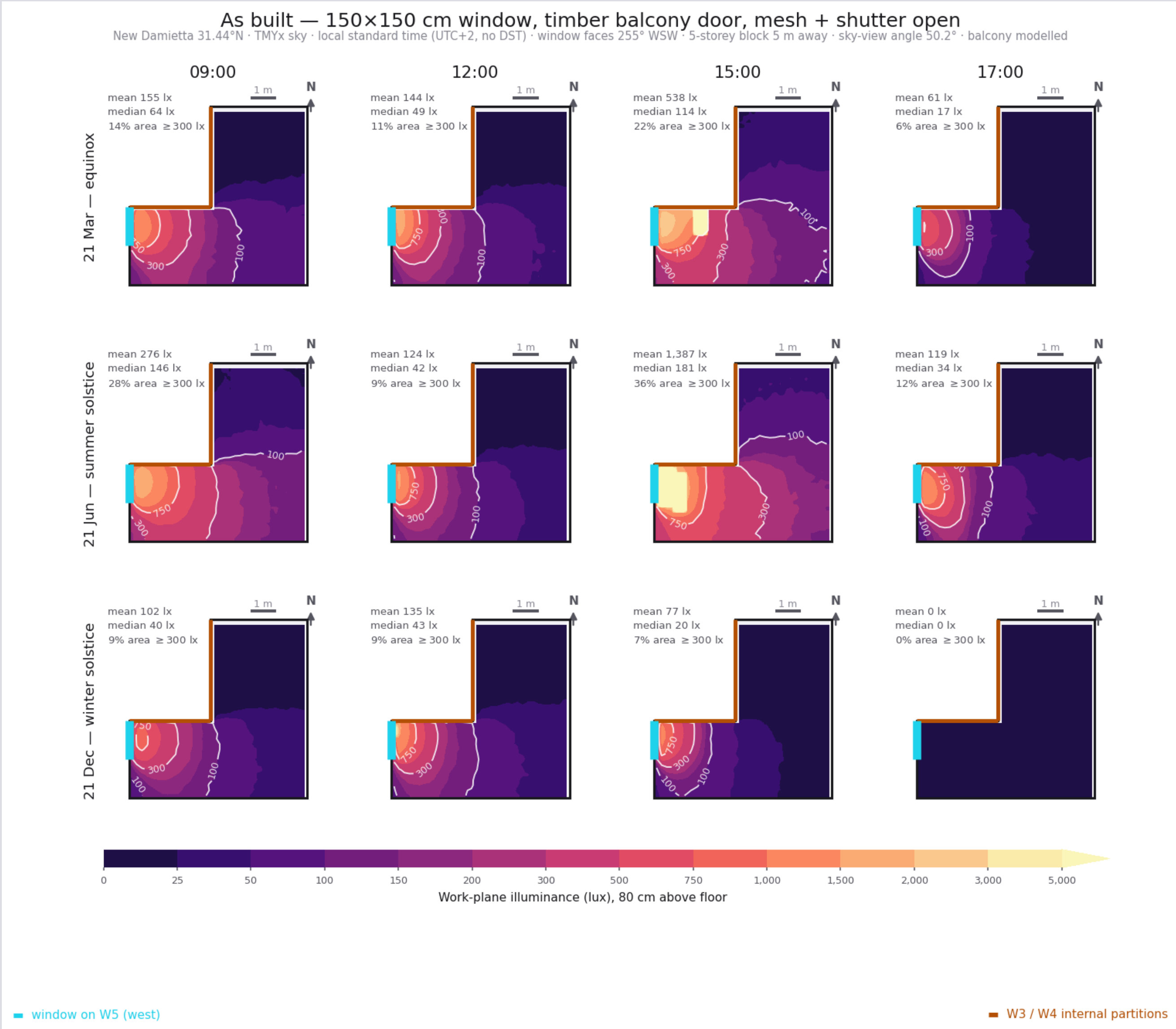
5. The room as it stands



Work-plane illuminance as built: three dates by four hours, one colour scale throughout.

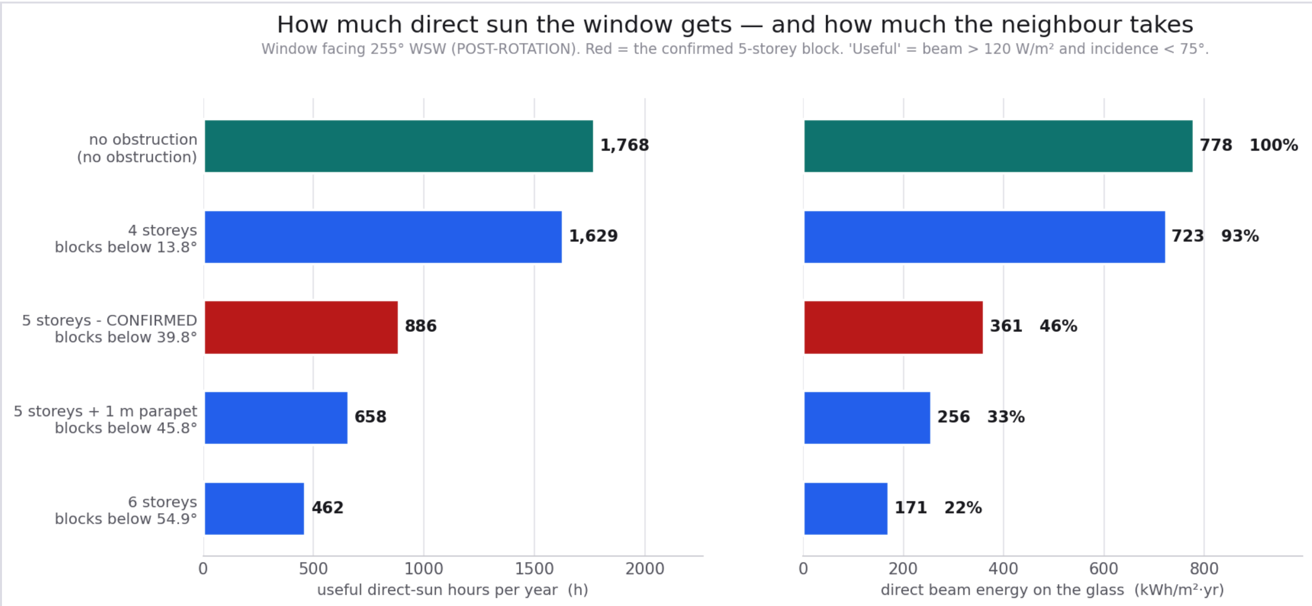
Correction to an earlier statement. This room was initially reported as brighter in the morning than the afternoon. That is wrong. At 21 March the as-built room reads 155 lx mean at 09:00 against 538 lx at 15:00. The afternoon is brighter, clearly.

What survives is the mechanism, stated properly. Normalised by the daylight actually available outside, the room delivers **3.7 lx per klx of exterior horizontal illuminance at 09:00 against 2.4 lx per klx at noon —** about 1.5× more efficient in the morning, because the east-facing wall opposite is sunlit then and works as a large beige reflector. But higher efficiency on a smaller supply does not beat direct afternoon sun. The room is *more efficient* at harvesting daylight in the morning and *absolutely brighter* in the afternoon.

Annual performance as built:

metric	value	meaning
$sDA_{300/50}\%$	**13%**	13% of the floor reaches 300 lx for half the occupied hours
Mean DA_{300}	16.1%	the average point is above 300 lx for a sixth of the year
UDI 300–3000 lx	15%	useful daylight for 15% of occupied hours
UDI below 100 lx	**61%**	**the room is effectively dark for three fifths of the working day**
$ASE_{1000,250}$	5%	little excessive direct sun by area
Mean illuminance, occupied hours	311 lx	flattered by the afternoon sun patch; the median is far lower

6. Direct sun access



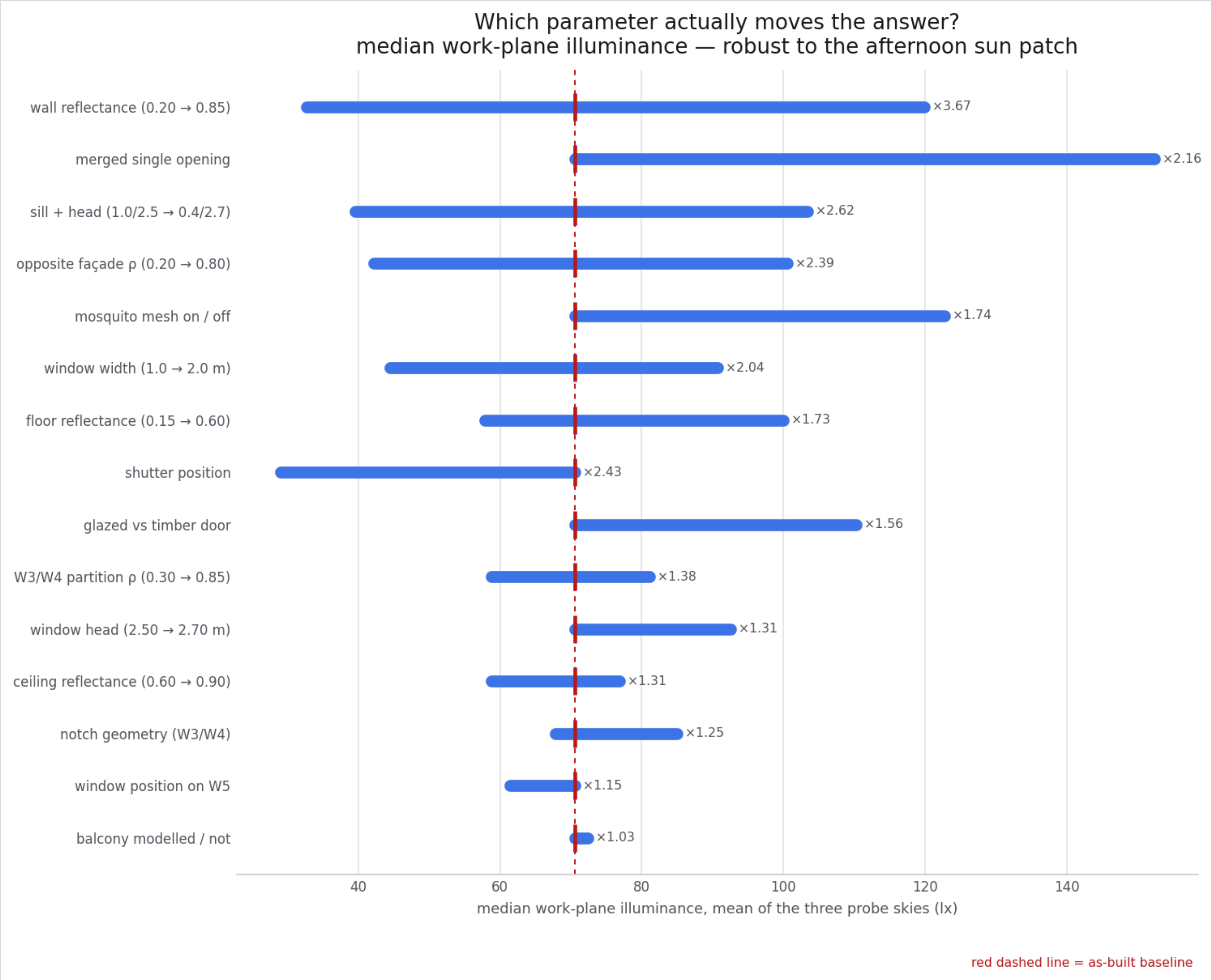
Direct-sun access against the height of the block opposite, after the 15° rotation.

block opposite	blocks below	useful sun hours/yr	beam on the glass	vs unobstructed
none	—	1 768	778 kWh/m²	100%
4 storeys	13.8°	1 629	723	93%
5 storeys — confirmed	**39.8°**	**886**	**361**	**46%**
5 storeys + 1 m parapet	45.8°	658	256	33%
6 storeys	54.9°	462	171	22%

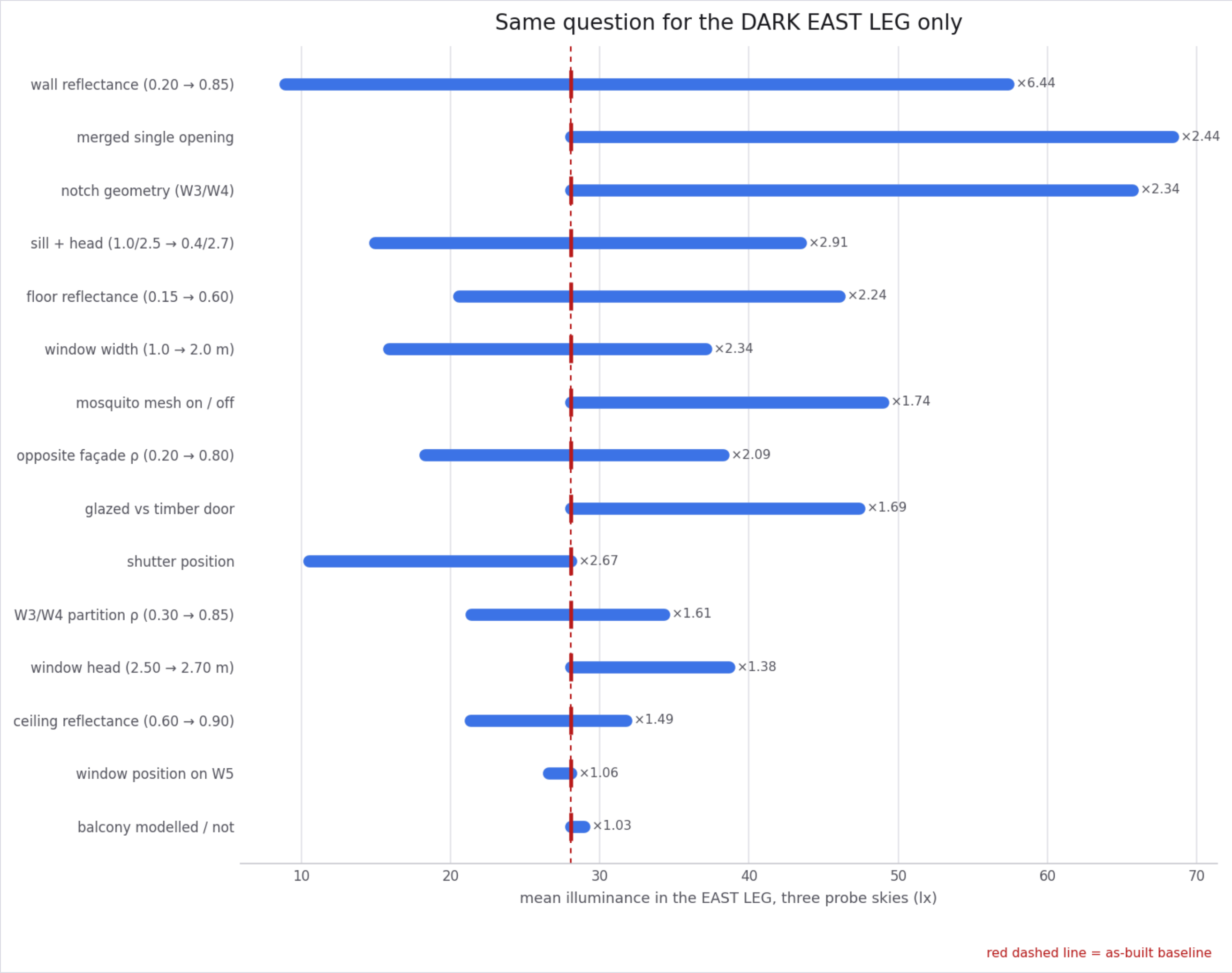
Your neighbour removes 54% of the direct beam this window would otherwise receive, and a single 1 m roof parapet would take that to 67%. In the confirmed case the glass sees about 3 hours of direct sun a day in June, against 5 unobstructed.

The 15° rotation toward south raises annual beam on the glass by 12% even before the obstruction is considered — the winter gain is real, and it is an all-year effect rather than a December one.

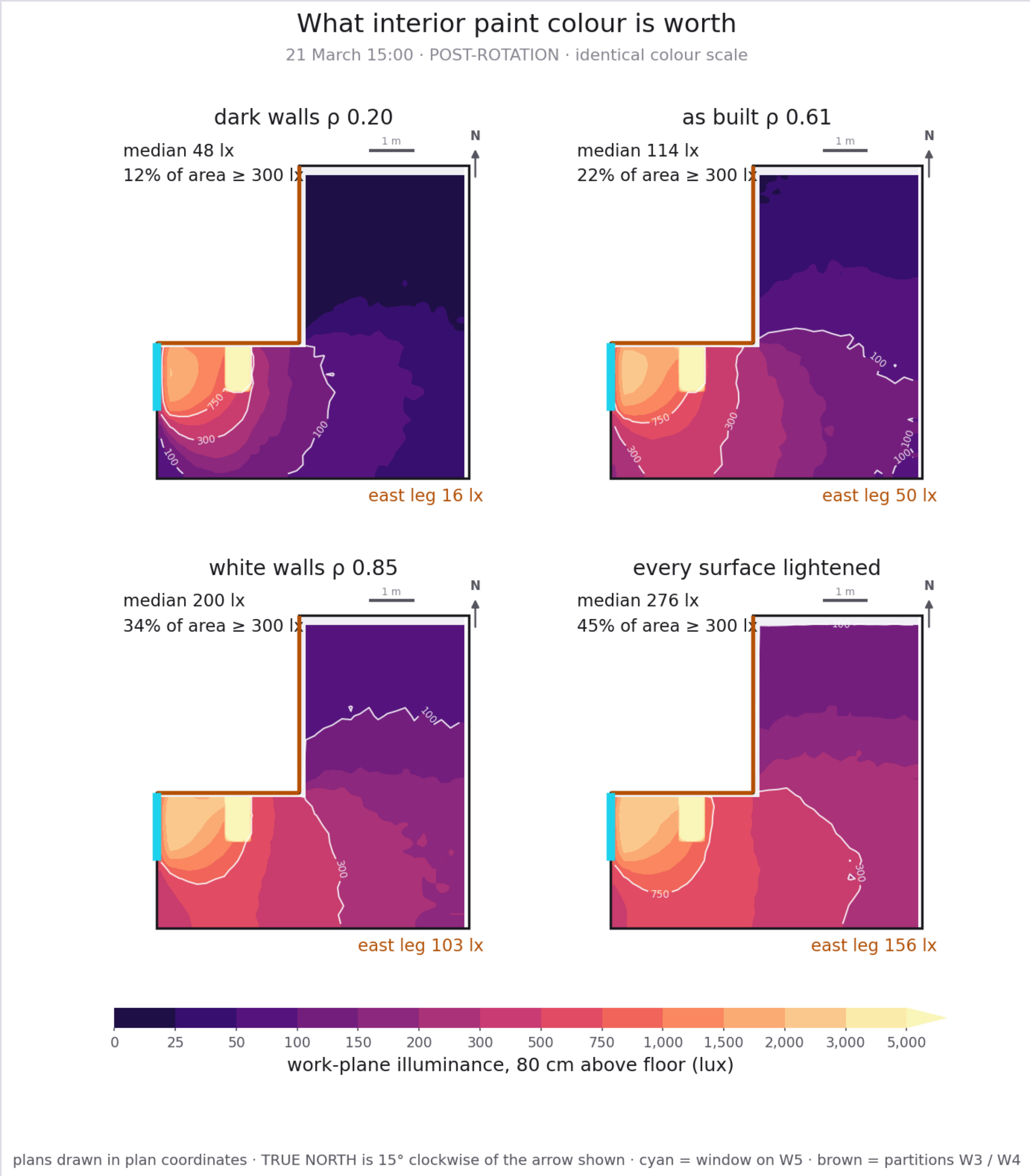
7. Which parameter dominates



Sensitivity of median work-plane illuminance to each parameter across its tested range.



The same question asked of the dark east leg alone.



What interior paint colour alone is worth, at one colour scale.

Reflectance dominates, and by a wider margin than the geometry does. Repainting the walls from their current 0.61 to 0.85 delivers **×1.70** in the room and **×2.05** in the east leg. Lightening every interior surface delivers **×2.21 and ×2.98** — which **exceeds** what the largest structurally possible opening on W5 achieves on its own (×2.16 and ×2.44).

The physical reason is in §1: with 50° of sky visible, the light has already bounced three or more times before it reaches the work plane, and each bounce multiplies by ρ.

Ceiling reflectance is comparatively marginal at ×1.31 because there is little light in the room for it to redistribute; the floor is worth more than expected at ×1.73, since a low sun angle puts much of the incoming light onto it first. Window position along W5 barely registers at ×1.15.

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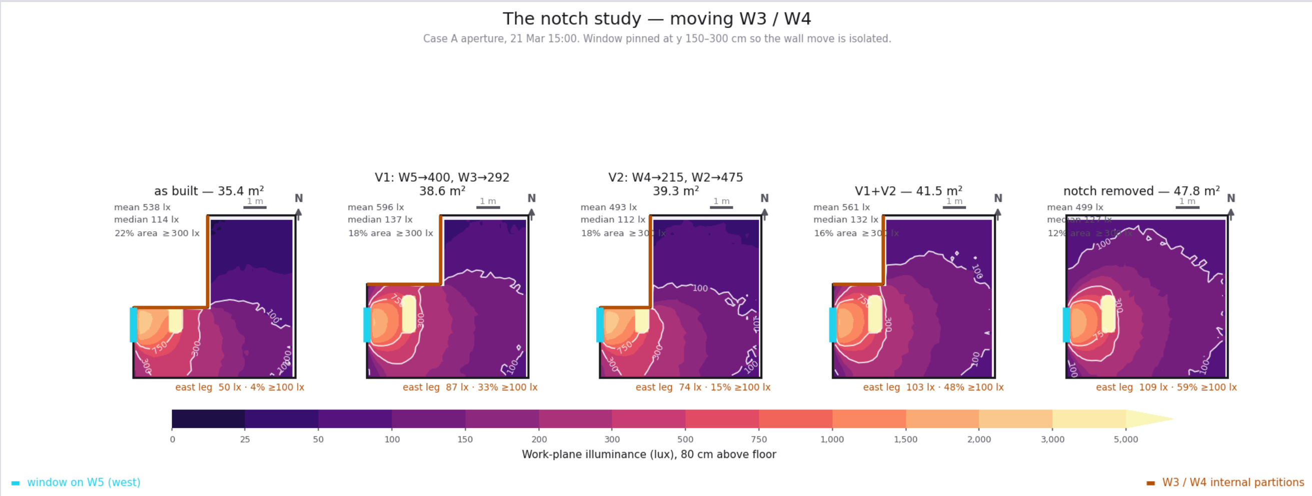
8. The notch study: moving W3 and W4



The notch variants against the as-built plan, window pinned so the wall move is isolated.

Both proposed variants close the polygon, verified independently: V1 gives W5 + W3 = 400 + 292 = 692 = W1 ✓ and W4 + W2 = 315 + 375 = 690 = W0 ✓; V2 gives 300 + 392 = 692 ✓ and 215 + 475 = 690 ✓. Areas: V1 = 38.55 m², V2 = 39.32 m², combined 41.47 m².

Tested on the as-built room, the notch looks not worth doing:

variant	area	room median	east leg DF
as built	35.40 m²	114 lx	0.047%
V1 — lengthen W5 to 400	38.55 m²	137 lx	0.081%
V2 — shorten W4 to 215	39.32 m²	**112 lx**	0.064%
V1 + V2	41.47 m²	132 lx	0.097%
notch removed entirely	47.75 m²	127 lx	0.114%

V2 on its own makes the room worse. It adds 3.92 m² in a deep narrow strip (x 215–315, y 300–692) — floor area where there is no light — diluting the median while barely widening the throat. **V1 adds 3.15 m² immediately north of the window, where the light already is**, and raises the median. Both add area; V1 adds it in the bright zone and V2 in the dark one.

But that conclusion does not survive being combined with a package

The notch was originally tested only against the dark, as-built room. Combined with an improved room it behaves differently, and the difference is large:

case	room DF	east-leg DF	east leg vs as built
as built	0.49%	0.047%	×1.0
Package B	1.49%	0.346%	×7.4
Package B + V1	1.43%	0.456%	×9.7
Package B + V1 + V2	1.35%	**0.505%**	**×10.7**
Package C	1.33%	0.342%	×7.3
Package C + V1	2.11%	0.718%	×15.3
Package C + V1 + V2	1.99%	**0.790%**	**×16.8**

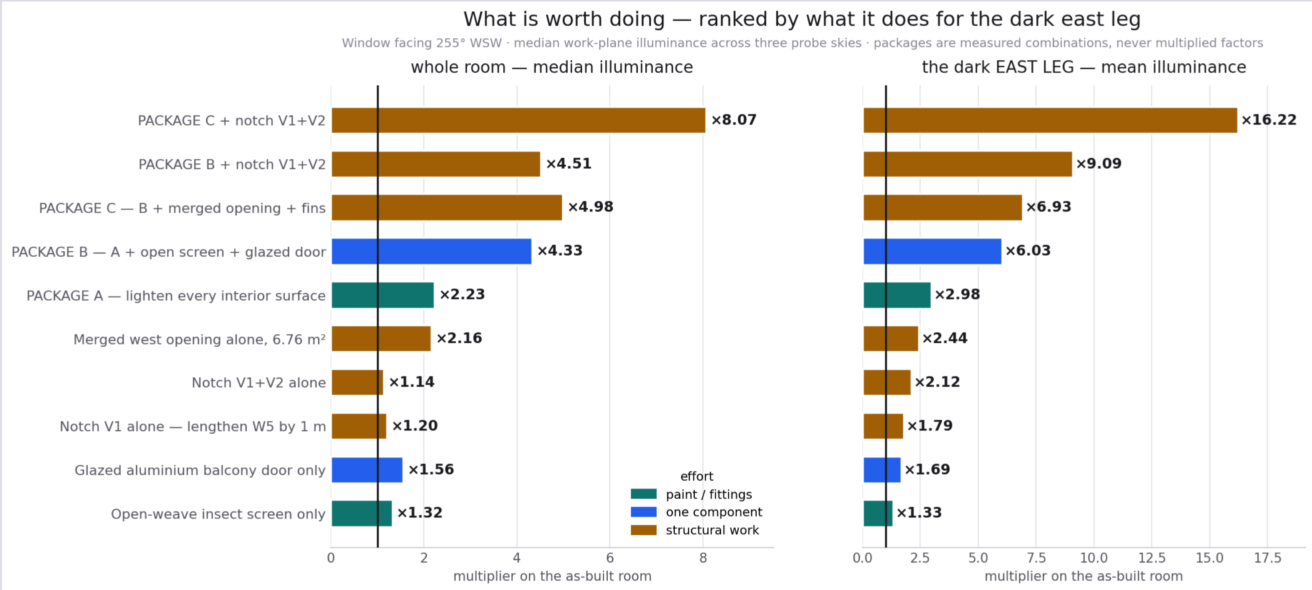
In ratio terms the notch is *less* effective on Package B than on the bare room (×1.46 against ×2.06), but in absolute terms it is three times more valuable there: it adds 0.159 percentage points of east-leg daylight factor to Package B against 0.050 on the as-built room. On Package C it is worth far more still — **×2.31, adding 0.448 percentage points.** Absolute level is what determines usability, so the honest reading is that the notch matters considerably more once the room is improved, not less.

One confound, separated. Package C's merged opening grows with W5, so lengthening that wall also buys 38% more glass. Holding the opening fixed at 6.76 m² separates the two effects. This sub-test was run on the *no-screen* variant of Package C, so its absolute values sit above the table before it — **read the ratios, not the levels**:

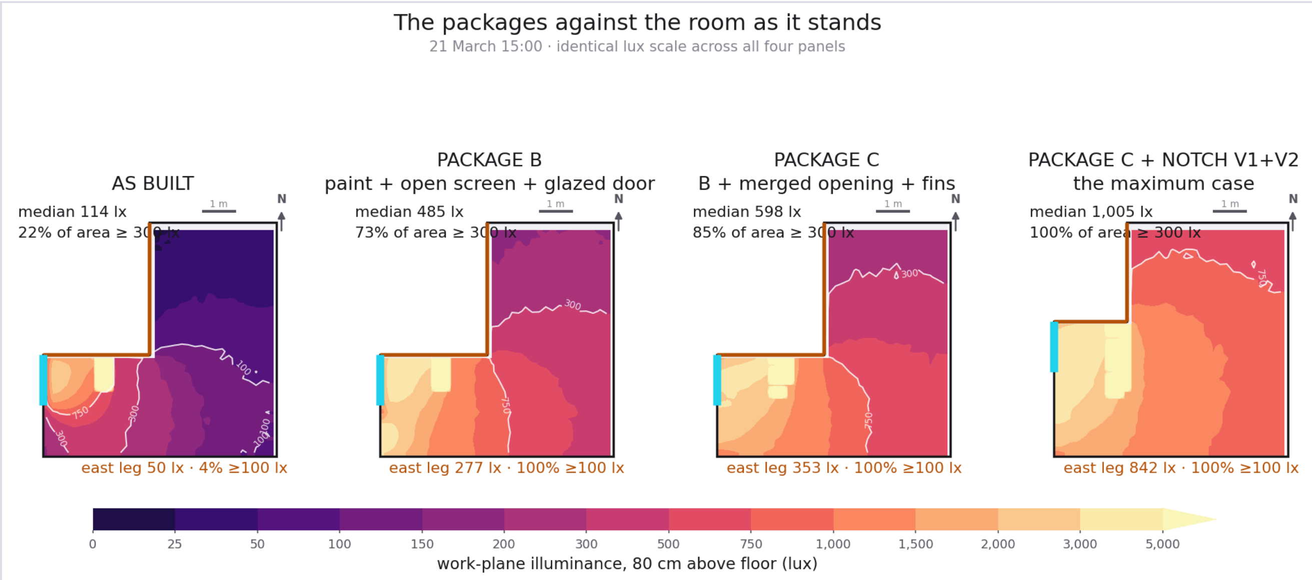
case (no-screen basis)	opening	east-leg DF
Package C*	6.76 m²	0.458%
Package C* + V1, **opening held constant**	6.76 m²	0.620%
Package C* + V1, opening allowed to grow	9.36 m²	0.968%
Package C* + V1 + V2, **opening held constant**	6.76 m²	0.679%
Package C* + V1 + V2, opening allowed to grow	9.36 m²	1.069%

So of the ×2.11 jump for V1, the partition move itself contributes ×1.35 and the longer opening it permits contributes a further ×1.56; for V1 + V2 the split is ×1.48 and ×1.57. Both parts are real, and the second is a genuine consequence of the first — you cannot have the longer opening without the longer wall. Roughly **half the benefit is the wider path to the east leg and half is the extra glass that the longer wall allows.**

9. Intervention packages



Ranked shortlist, coloured by the effort each intervention demands.



The packages against the room as it stands, at one colour scale.

Multipliers **do not multiply.** Every package below was simulated as a single model rather than assembled from individual factors, because daylight interventions are sub-additive: multiplying the three Package B interventions together predicts ×4.59, while the measured package is ×4.33 — the individual factors overstate a combination by about 6%.

package	contents	room	east leg	east-leg DF
A	lighten every interior surface	×2.23	×2.98	0.138%
B	A + open-weave screen + glazed balcony door	**×4.33**	**×6.03**	0.346%
C	B + merged 6.76 m² opening + vertical fins	**×4.98**	**×6.93**	0.342%
B + V1 + V2	B plus both partition moves	×4.51	×9.09	0.505%
C + V1 + V2	C plus both partition moves	**×8.07**	**×16.22**	**0.790%**

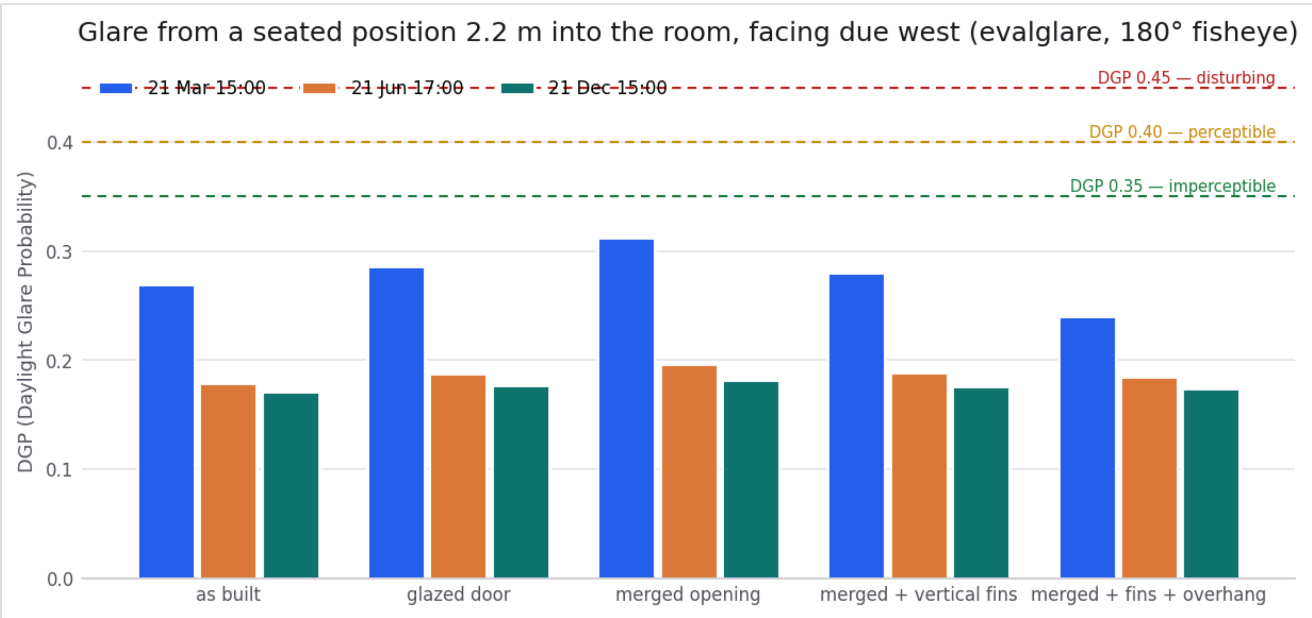
Every package uses the **realistic open-weave screen** (τ_mesh 0.78) throughout, so "Package B" and "Package C" mean one thing everywhere in this report. An earlier figure of ×5.31 for Package B assumed *no screen at all*, which is an upper bound rather than a product you can buy.

Annual metrics for the main packages:

case	$sDA_{300}/_{50}$%	$ASE_{1000,250}$	UDI 300–3000	UDI < 100 lx
as built	13%	5%	15%	**61%**
Package B	64%	9%	54%	13%
Package C	67%	9%	57%	12%

Package B takes the room from *dark for three fifths of the working day* to *dark for one eighth of it*. That is the single largest change available, and it requires no structural work.

10. Glare



Daylight Glare Probability by variant, position and hour.

An initial assessment from one seated position 2.2 m into the room found DGP ≤ 0.31 — comfortable. **That was not enough positions, and the conclusion was wrong.**

eye position	worst DGP	E_v at the eye	verdict
seated 2.2 m in, facing the window	0.312	2 292 lx	imperceptible
standing, 2.2 m in	0.309	2 325 lx	imperceptible
seated 2.6 m in, facing north-west	0.339	2 563 lx	imperceptible
seated 1.2 m from the window	**1.000**	**31 154 lx**	**intolerable**

Thirty-one thousand lux at the eye means the sun's disc is directly in the field of view. DGP saturates at 1.0. At 21 March 15:00 and 21 June 16:00, nobody can sit at that position facing that way.

Three things follow:

- **This is the room as built, not a consequence of any proposal.** The as-built window produces it. It is the same sun patch that makes the afternoon the brightest part of the day — **the peak-daylight hour and the peak-glare hour are the same hour.** That is the central design tension in this room.
- **It does not count against Package C.** As-built, merged, merged + fins and merged + overhang all reach DGP 1.000 at that position. A larger opening does not create the problem; it slightly widens the floor area and the hours over which it occurs.
- **The vertical fins do not solve it.** Four fins across a 2.6 m opening leave gaps the sun shines straight through. They reduce the count of intolerable probes from 2 to 1 — they narrow the exposure, they do not close it. What addresses it is operable internal shading on the afternoon hours, or fins at much closer spacing angled toward north.

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11. Solar gain

Transmitted solar energy, computed from total-solar daylight coefficients and validated to 97.5% against the EPW's own global horizontal irradiation.

case	glazed	transmitted	vs as built
as built	2.25 m²	597 kWh/yr	×1.00
glazed balcony door only	4.29 m²	1 184	×1.98
merged opening, no shading	6.76 m²	1 475	×2.47
merged + vertical fins	6.76 m²	**1 009**	**×1.69**
merged + fins + overhang	6.76 m²	772	×1.29
Package B (realistic screen)	4.29 m²	1 192	×2.00
Package C (realistic screen + fins)	6.76 m²	1 016	×1.70

Vertical fins are the right device for this façade, and the numbers show why: they cut incident radiation by 34% while costing only 19% of the daylight. They remove more heat than light. A horizontal overhang earns much less here because low west-south-west sun arrives from the side and passes underneath it.

Note that Package C — with a 6.76 m² opening — carries **less** solar gain than Package B with its 4.29 m², because the fins more than compensate for the extra glass. If a larger opening is built, the fins are not optional.

12. The neighbour's façade

This room lives on light bounced off a wall you do not own. It was modelled correctly as a **blank** surface — four flat polygons at ρ = 0.51, the paint reflectance for beige external render, with no window geometry and no area-weighted reduction anywhere. Had windows been assumed, every result in this report would have been pessimistic.

ρ of the wall opposite	room	east leg
0.20 — dark repaint	×0.60	×0.65
0.36 — soiled beige	×0.80	×0.83
0.51 — as modelled	×1.00	×1.00
0.63 — pale repaint	×1.17	×1.14
0.80 — white	×1.42	×1.36

If that wall is ever repainted a dark colour this room loses about 40% of its daylight, and there is no defence against it. If it were ever painted white, the room would gain about 40%. That swing is larger than most of the interventions available on your own side of the street — worth knowing, and worth a friendly word if the subject ever arises.

13. Recommendation

Do this, in this order

Step 1 — lighten every interior surface. Walls and both partitions to a bright matt near-white (ρ 0.80–0.85), ceiling to ρ ≈ 0.88, and a lighter floor finish when it is next replaced (ρ ≈ 0.50). **×2.23 in the room, ×2.98 in the east leg, for the price of paint.** This is the highest return per pound in the entire study and should be done regardless of what follows.

Step 2 — change the insect screen. The standard fibreglass mesh costs 44% of the light passing through it. An open-weave or retractable screen recovers a large part of that. Do **not** simply remove it — this is Damietta.

Step 3 — replace the timber balcony door with a glazed aluminium one. Same opening, one component, no structural work. It converts the second-largest area of W5 from an absorber into an aperture.

Those three are Package B: ×4.33 in the room and ×6.03 in the east leg, with no structural work at all. It takes the room from dark for 61% of the working day to dark for 13%. **This is the recommendation.**

If structural work is on the table

Package C — the merged 6.76 m² opening with vertical fins — is a genuine option, not a reluctant one. The privacy objection that would normally rule out a floor-to-head glazed wall facing a building five metres away does not apply here: that façade is blank and nobody can look in. What remains is oblique exposure from the street and the open ends of the gap, which is ordinary. And because the fins more than offset the extra glass, Package C carries *less* annual solar gain than Package B.

It buys about 15% more than Package B in both zones. Whether that justifies demolition, a new lintel and a new frame is a judgement about cost and disruption, not about daylight.

On moving the partitions — I revised this verdict

My provisional advice was that moving W3/W4 was not worth it. **Tested only against the as-built room that was true; combined with a package it is not.** Package C with both partition moves reaches **0.790% east-leg daylight factor against Package C alone at 0.342%** — a factor of 2.3 — it more than doubles the light in the zone that needs it most, and lifts the room as a whole to 1.99%, essentially at the 2% threshold.

So: **if you are already opening up W5 structurally, moving W3 and W4 at the same time is worth doing.** As a standalone intervention on the room as it stands, it is not.

The ceiling — stated plainly

Even with everything stacked, **the east leg reaches about 0.79% daylight factor against a 2% threshold.** The best no-structure package reaches 0.35%. That is between a sixth and two fifths of what a space needs to be considered daylit, and it is a structural consequence rather than a shortfall of effort: that zone has no line of sight to the only aperture the room possesses.

Two practical consequences:

1. **Put the daylight-dependent functions in the west leg** — desk, reading, anything requiring sustained visual work.
2. **Design proper electric lighting for the east leg** and treat it as an artificially lit zone from the outset. Good dimmable high-CRI fixtures on a separate circuit will serve better than any amount of white paint pretending the daylight problem has been solved.

And plan for afternoon glare regardless of which package is built. The room's brightest hour is also its most uncomfortable. Operable internal shading on the west aperture is not an optional refinement; it is required for the space to be usable on a March or June afternoon.

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14. What would change these answers

In rough order of how much they would move the result:

1. **A roof parapet on the block opposite.** Assumed absent. A 1 m parapet raises the obstruction from 39.8° to 45.8°, removes the March afternoon sun patch, and cuts direct beam on the glass from 46% to 33% of unobstructed. **This is the single assumption most worth confirming.**
2. **The neighbour repainting that façade.** A dark repaint costs about 40% of the room's daylight (§12).

3. **Whether W5 is frame infill or load-bearing.** The 6.76 m² structural ceiling on the merged opening depends on it. If W5 is load-bearing masonry, Package C shrinks substantially or becomes impossible.
4. **The balcony parapet — solid or railing?** Assumed solid. An open railing would return part of the 17% the balcony currently costs.
5. **Furniture and glazing maintenance.** Neither is modelled; together they would typically reduce every figure by 15–25%. The results here are the optimistic end of the range.
6. **Actual mesh transmittance.** Assumed 0.60 for the existing screen, 0.78 for a replacement. Measuring the real screen would firm up the second-largest no-structure intervention.