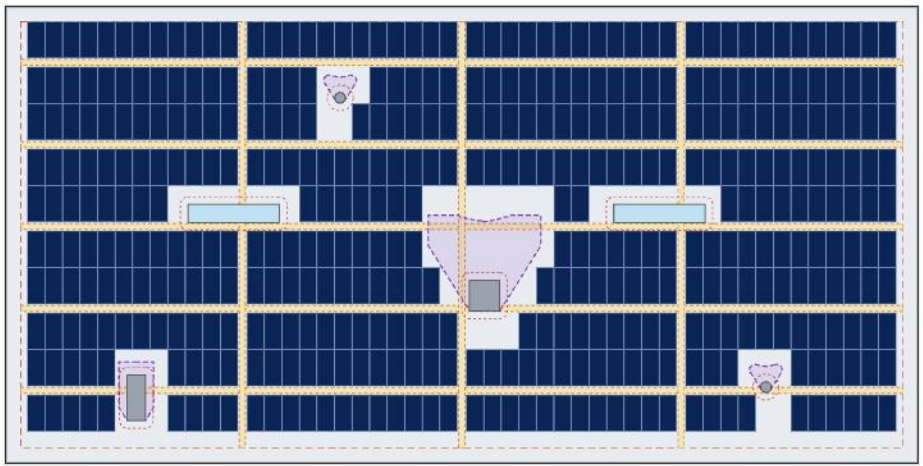
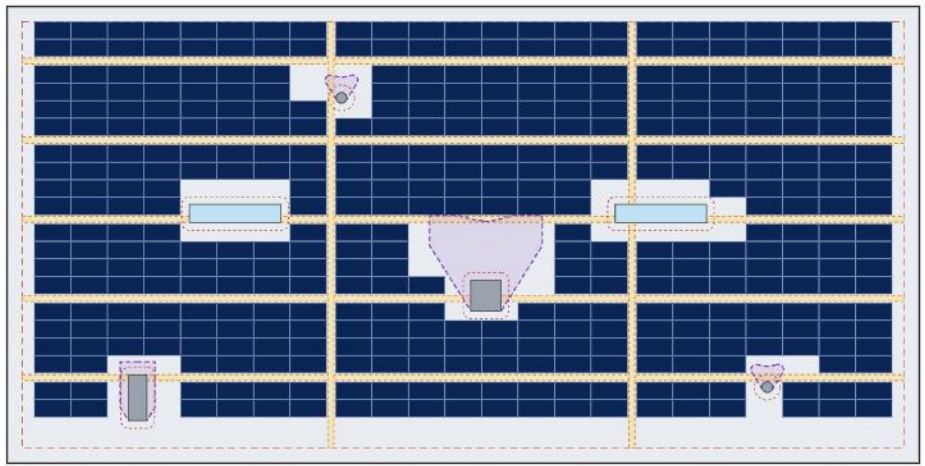
Sample A · Same roof, two module orientations

60 m × 30 m tin shed · flush mounted · every module reachable from a walkway · winter shadow kept clear

A1 · Portrait (1-2-2…-1)



A2 · Landscape (2-4-4…-2)



	A1 Portrait	A2 Landscape
Row pattern	1-2-2-2-…-1	2-4-4-4-…-2
Cross walkways	3 (blocks 12/12/12/12)	2 (blocks 8/8/7)
Modules (620 Wp)	428	408
Capacity	**265.4 kWp**	**253.0 kWp**
Year-1 generation	387 MWh	369 MWh
Strings	23 × 18 + 1 × 14	22 × 18 + 1 × 12
Positions kept out of winter shadow	16	16
Modules more than reach from a walkway	0	0

What this shows

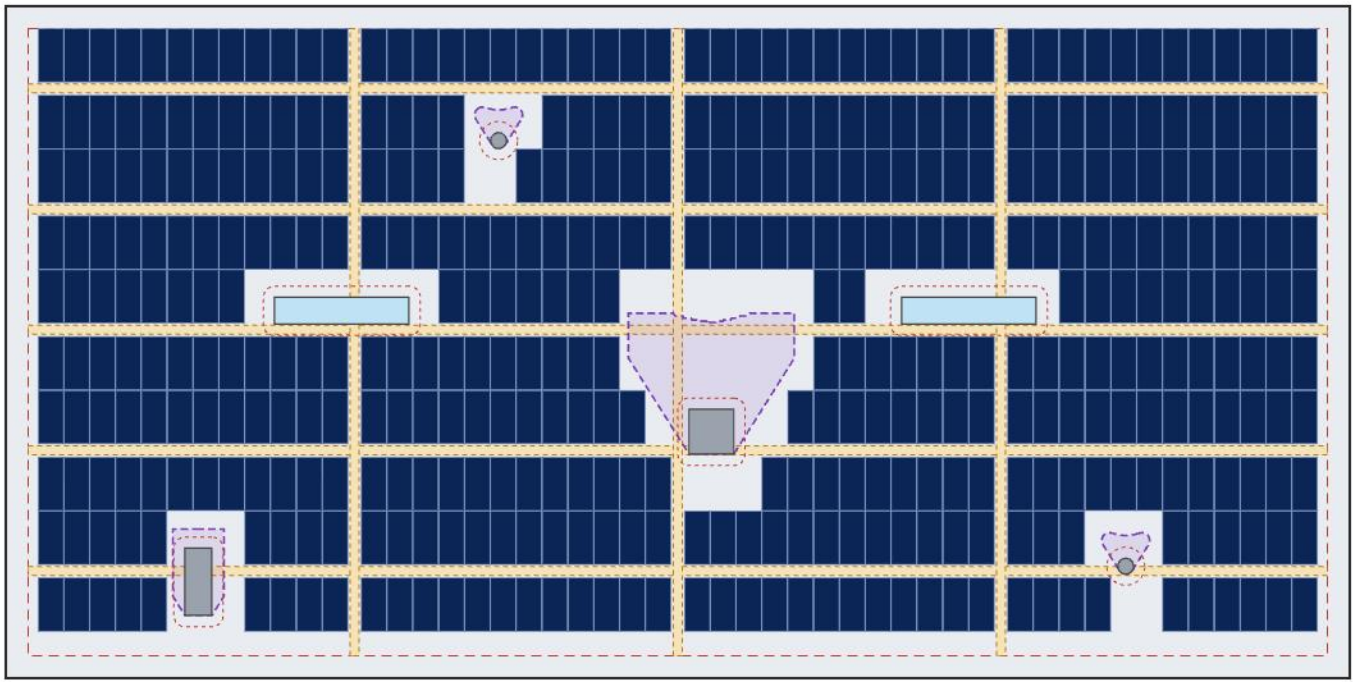
Orientation changes how many modules fit around the same walkways, obstacles and shadows. Here portrait fits 20 more modules (+12.4 kWp). On other roofs landscape can win; we check both before recommending one.

Purple dashed outline = obstacle shadow on 21 Dec, 10 am – 2 pm. It is identical in both layouts; the empty areas differ only because whole modules are removed if they touch it.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

Rooftop panel layout

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



DESIGNED CAPACITY

265.4 kWp

428 modules × 620 Wp · portrait · flush on tin shed

Every module reachable

1 row at each edge, then pairs of rows with a walkway after every pair, plus 3 cross walkways. Every module touches a walkway or the roof edge. No one steps on a panel to clean or service it.

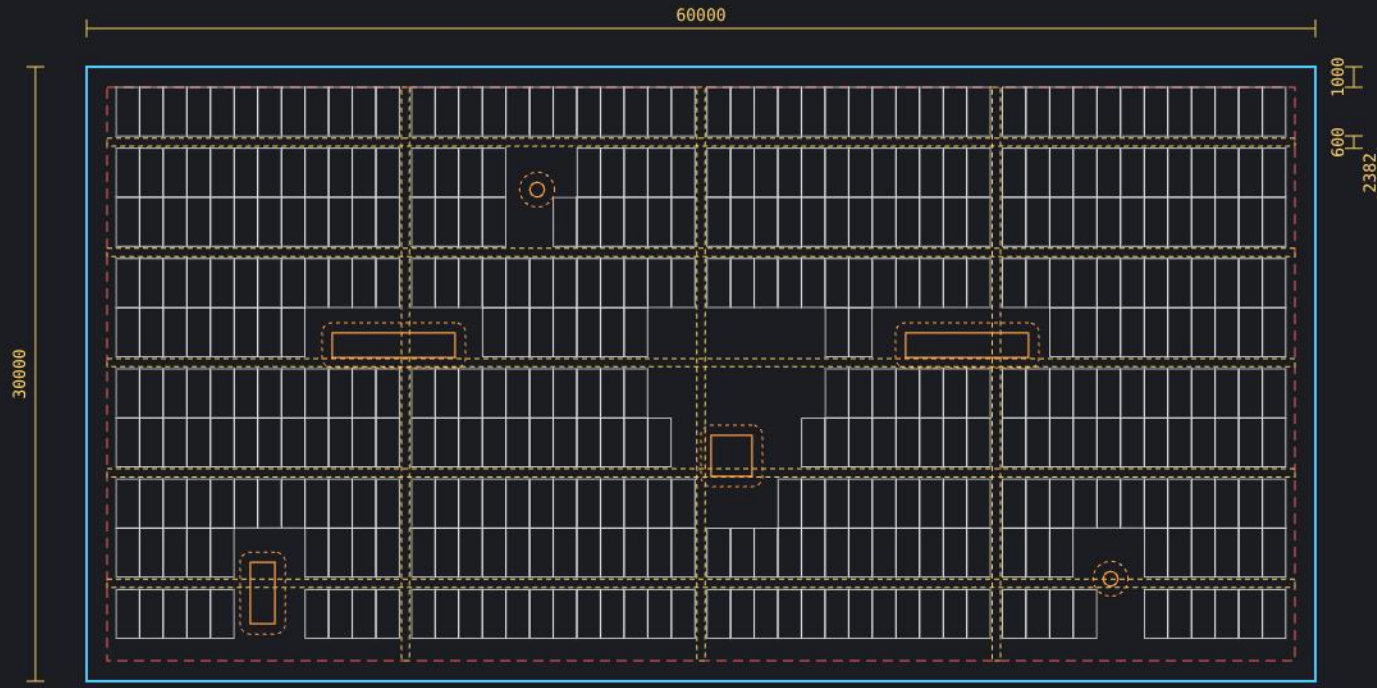
- Module 2382 × 1134 mm
- Walkway 0.4 m + 0.1 m clearance each side
- Fire-access setback 1.0 m from roof edge
- Skylight
- Water tank / duct
- Turbo ventilator
- Safe clearance 0.5 m around obstacles
- Obstacle shadow, 21 Dec 10 am – 2 pm

PROJECT	SHEET
Sample C&I rooftop (fictional)	A1-1 / 7
DESIGNED BY	TURNAROUND
Titan Solar Energy Providers	2 working days

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

Layout drawing (DWG)

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



ALL DIMENSIONS IN mm · LAYERS: PV_MODULES / WALKWAY / SETBACK / OBSTACLES / CLEARANCE

DRAWING NOTES

1. Roof 60.0 × 30.0 m, tin shed.
2. Fire-access setback 1.0 m all edges.
3. Walkway 400 mm + 100 mm clearance each side (600 mm clear gap).
4. Row pattern 1-2-2-2-…-1, portrait.
5. 3 cross walkways, blocks of 12/12/12/12.
6. 500 mm clearance around obstacles.
7. Delivered as DWG; opens in AutoCAD.

PROJECT Sample C&I rooftop (fictional)	SHEET A1-2 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

Table list & quantities

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp

Table	Row	Block	Mods	kWp
T01	R1	B1	12	7.44
T02	R2	B1	12	7.44
T03	R3	B1	12	7.44
T04	R4	B1	12	7.44
T05	R5	B1	8	4.96
T06	R6	B1	12	7.44
T07	R7	B1	12	7.44
T08	R8	B1	12	7.44
T09	R9	B1	5	3.10
T10	R9	B1	4	2.48
T11	R10	B1	5	3.10
T12	R10	B1	4	2.48
T13	R1	B2	12	7.44
T14	R2	B2	4	2.48
T15	R2	B2	5	3.10
T16	R3	B2	4	2.48
T17	R3	B2	6	3.72
T18	R4	B2	12	7.44
T19	R5	B2	7	4.34
T20	R6	B2	10	6.20
T21	R7	B2	11	6.82
T22	R8	B2	12	7.44
T23	R9	B2	12	7.44
T24	R10	B2	12	7.44
T25	R1	B3	12	7.44
T26	R2	B3	12	7.44
T27	R3	B3	12	7.44
T28	R4	B3	12	7.44
T29	R5	B3	2	1.24
T30	R6	B3	7	4.34
T31	R7	B3	8	4.96
T32	R8	B3	9	5.58
T33	R9	B3	12	7.44
T34	R10	B3	12	7.44
T35	R1	B4	12	7.44
T36	R2	B4	12	7.44
T37	R3	B4	12	7.44
T38	R4	B4	12	7.44
T39	R5	B4	10	6.20
T40	R6	B4	12	7.44
T41	R7	B4	12	7.44
T42	R8	B4	12	7.44
T43	R9	B4	3	1.86
T44	R9	B4	6	3.72
T45	R10	B4	4	2.48
T46	R10	B4	6	3.72
Total (46 tables)			**428**	**265.36**

Mounting quantities

Modules (620 Wp)	428 nos
Mounting rail (2 per table)	988 m
Tables of 12 modules	25 nos
Tables of 11 modules	1 nos
Tables of 10 modules	2 nos
Tables of 9 modules	1 nos
Tables of 8 modules	2 nos
Tables of 7 modules	2 nos
Tables of 6 modules	3 nos
Tables of 5 modules	3 nos
Tables of 4 modules	5 nos
Tables of 3 modules	1 nos
Tables of 2 modules	1 nos
End clamps	184 nos
Mid clamps	764 nos

Portrait: rails run east–west, so each table is a horizontal run of modules in one row. Quantities follow the layout exactly.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A1-3 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

DC string design

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



Inverter 1 · 125 kW · 12 strings · 133.9 kWp DC

S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12

Inverter 2 · 125 kW · 12 strings · 131.4 kWp DC

S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24

23 strings × 18 modules + 1 × 14. Each colour is one string; the numbered dot marks where it starts.

Electrical check (per string)

Modules per string	18 (S24: 14, on its own MPPT)
Voc at 3 °C (cold morning)	1,056 V < 1,100 V max ✓
Vmp at STC	828 V, inside MPPT range ✓
Vmp of short string S24	644 V, inside MPPT range ✓
DC/AC ratio	1.06

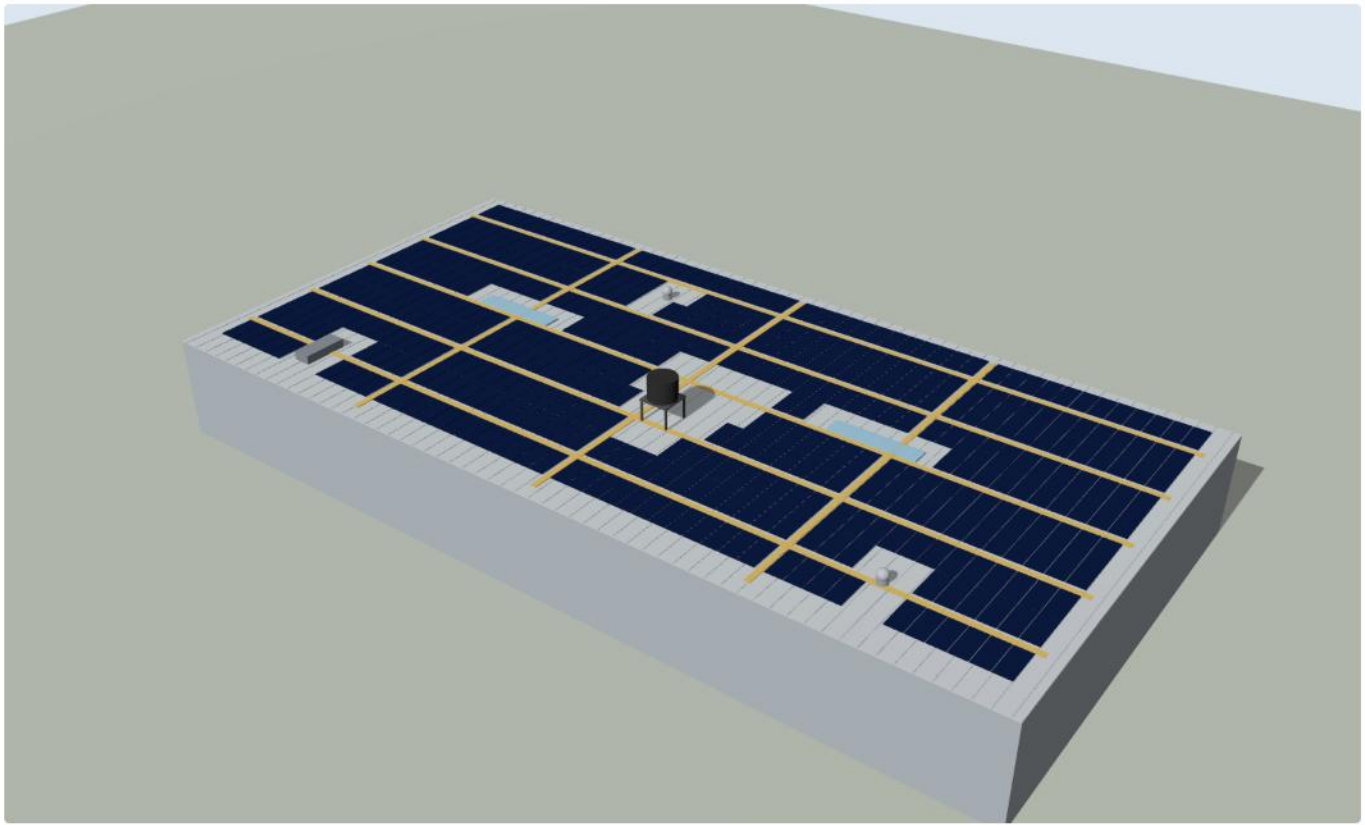
Typical 620 Wp TOPCon values: Voc 55.6 V, Vmp 46.0 V, Isc 14.2 A, Voc coefficient −0.25 %/°C.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A1-4 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

3D model

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



From 2D layout to 3D model

The 2D layout is converted to a 3D model of the roof with real obstacle heights:

- Water tank on stand · 3.0 m
- Turbo ventilators · 0.8 m
- Duct · 0.6 m
- Skylights · flush

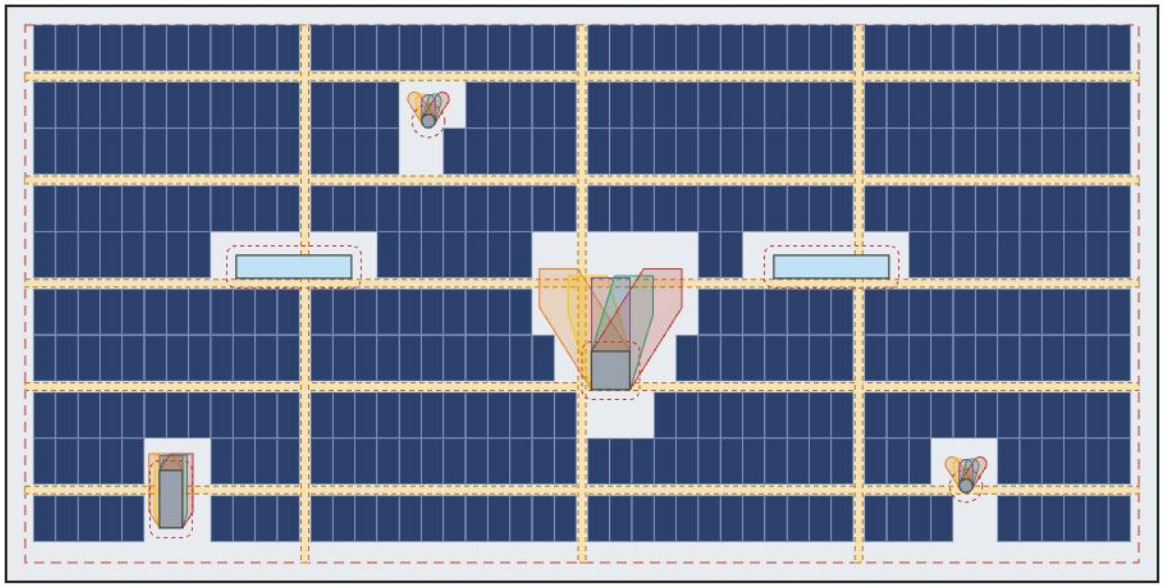
Sun position shown: 21 Dec, 12:00, Gurugram.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A1-5 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

Shadow analysis

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



Obstacle shadows on 21 Dec: 10:00 11:00 12:00 13:00 14:00

SHADOW CHECK

21 December · 10:00 – 14:00

Worst sun of the year (lowest angle). Panels are kept out of every obstacle shadow in this window. **16 module positions were left empty** because they fall in the water tank's winter shadow.

Solar time	Sun altitude	Azimuth	Tank shadow
10:00	30.6°	148°	5.1 m
11:00	36.1°	163°	4.1 m
12:00	38.1°	180°	3.8 m
13:00	36.1°	197°	4.1 m
14:00	30.6°	212°	5.1 m

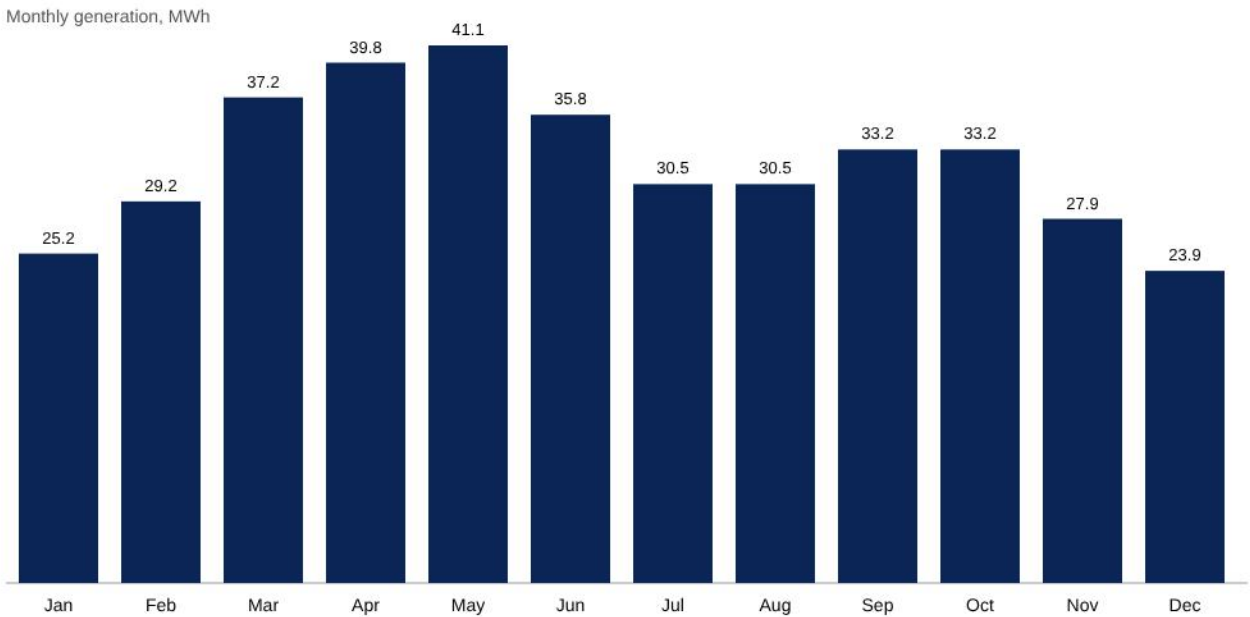
Latitude 28.46° N (Gurugram). Date and time window can be set to the customer's requirement. On RCC roofs with tilted rows, the same check sets row-to-row spacing.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A1-6 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

Generation estimate

Sample A1 · 60 m × 30 m tin-shed roof · portrait · 428 modules × 620 Wp · 265.4 kWp



YEAR-1 GENERATION

387 MWh

≈ 1,460 kWh per kWp per year

Assumptions

Location: Gurugram, Haryana

Flush on tin shed, −10° slope

Performance ratio 0.78

Layout kept clear of winter obstacle shadows

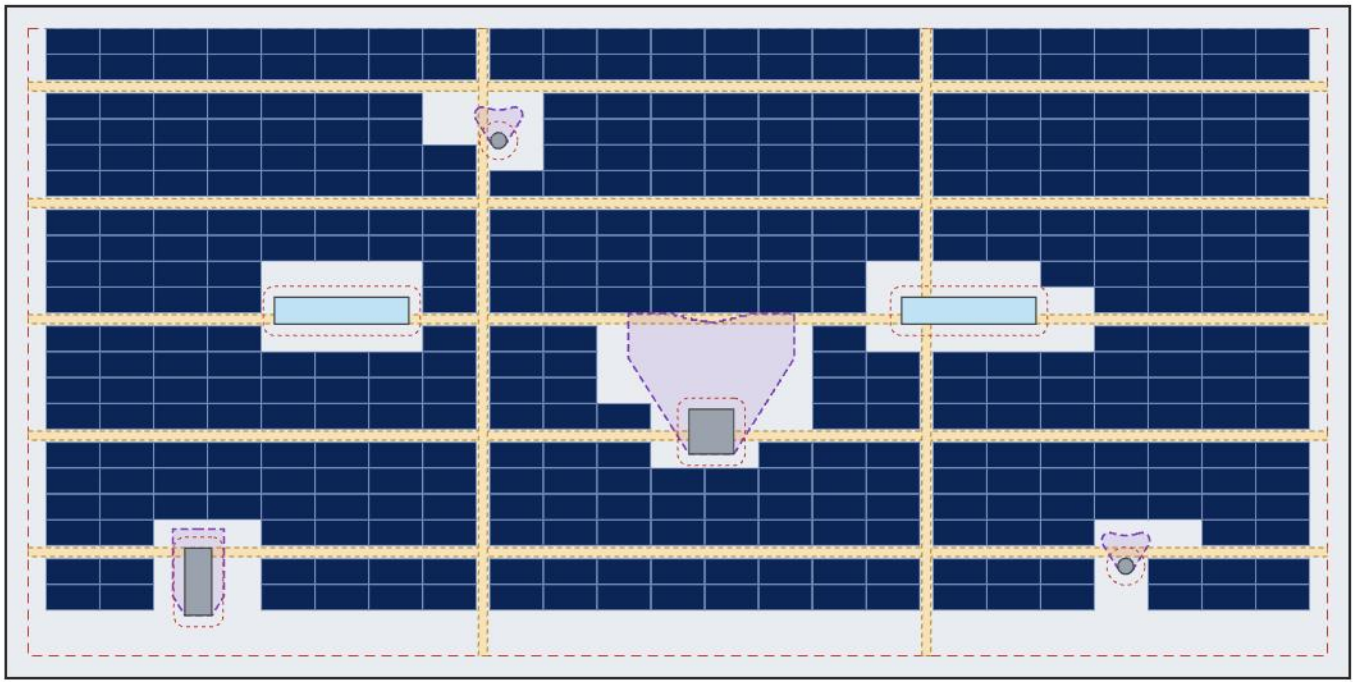
Year-1 value; degradation not applied

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A1-7 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

Rooftop panel layout

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



DESIGNED CAPACITY

253.0 kWp

408 modules × 620 Wp · landscape · flush on tin shed

Every module reachable

2 rows at each edge, then bands of 4 rows with a walkway after every band, plus 2 cross walkways. Every module is at most 1 module away from a walkway. No one steps on a panel to clean or service it.

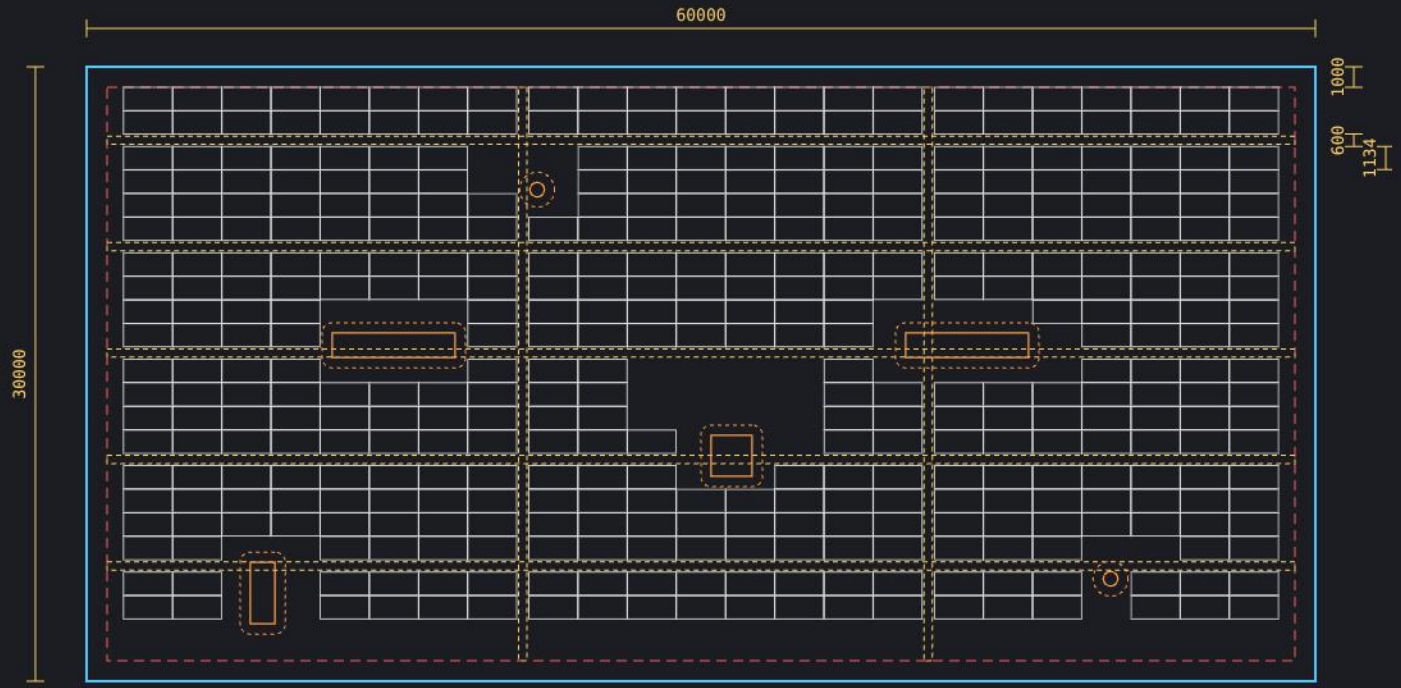
- Module 2382 × 1134 mm
- Walkway 0.4 m + 0.1 m clearance each side
- Fire-access setback 1.0 m from roof edge
- Skylight
- Water tank / duct
- Turbo ventilator
- Safe clearance 0.5 m around obstacles
- Obstacle shadow, 21 Dec 10 am – 2 pm

PROJECT	SHEET
Sample C&I rooftop (fictional)	A2-1 / 7
DESIGNED BY	TURNAROUND
Titan Solar Energy Providers	2 working days

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

Layout drawing (DWG)

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



ALL DIMENSIONS IN mm · LAYERS: PV_MODULES / WALKWAY / SETBACK / OBSTACLES / CLEARANCE

DRAWING NOTES

1. Roof 60.0 × 30.0 m, tin shed.
2. Fire-access setback 1.0 m all edges.
3. Walkway 400 mm + 100 mm clearance each side (600 mm clear gap).
4. Row pattern 2-4-4-4-….-2, landscape.
5. 2 cross walkways, blocks of 8/8/7.
6. 500 mm clearance around obstacles.
7. Delivered as DWG; opens in AutoCAD.

PROJECT Sample C&I rooftop (fictional)	SHEET A2-2 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

Table list & quantities

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp

Table	Column	Band	Mods	kWp
T01	C1	Band 1	2	1.24
T02	C2	Band 1	2	1.24
T03	C3	Band 1	2	1.24
T04	C4	Band 1	2	1.24
T05	C5	Band 1	2	1.24
T06	C6	Band 1	2	1.24
T07	C7	Band 1	2	1.24
T08	C8	Band 1	2	1.24
T09	C9	Band 1	2	1.24
T10	C10	Band 1	2	1.24
T11	C11	Band 1	2	1.24
T12	C12	Band 1	2	1.24
T13	C13	Band 1	2	1.24
T14	C14	Band 1	2	1.24
T15	C15	Band 1	2	1.24
T16	C16	Band 1	2	1.24
T17	C17	Band 1	2	1.24
T18	C18	Band 1	2	1.24
T19	C19	Band 1	2	1.24
T20	C20	Band 1	2	1.24
T21	C21	Band 1	2	1.24
T22	C22	Band 1	2	1.24
T23	C23	Band 1	2	1.24
T24	C1	Band 2	4	2.48
T25	C2	Band 2	4	2.48
T26	C3	Band 2	4	2.48
T27	C4	Band 2	4	2.48
T28	C5	Band 2	4	2.48
T29	C6	Band 2	4	2.48
T30	C7	Band 2	4	2.48
T31	C8	Band 2	2	1.24
T32	C9	Band 2	1	0.62
T33	C10	Band 2	4	2.48
T34	C11	Band 2	4	2.48
T35	C12	Band 2	4	2.48
T36	C13	Band 2	4	2.48
T37	C14	Band 2	4	2.48
T38	C15	Band 2	4	2.48
T39	C16	Band 2	4	2.48
T40	C17	Band 2	4	2.48
T41	C18	Band 2	4	2.48
T42	C19	Band 2	4	2.48
T43	C20	Band 2	4	2.48
T44	C21	Band 2	4	2.48
T45	C22	Band 2	4	2.48
T46	C23	Band 2	4	2.48
T47	C1	Band 3	4	2.48
T48	C2	Band 3	4	2.48
T49	C3	Band 3	4	2.48
T50	C4	Band 3	4	2.48
T51	C5	Band 3	2	1.24
T52	C6	Band 3	2	1.24
T53	C7	Band 3	2	1.24
T54	C8	Band 3	4	2.48
T55	C9	Band 3	4	2.48
T56	C10	Band 3	4	2.48
T57	C11	Band 3	4	2.48
T58	C12	Band 3	4	2.48
T59	C13	Band 3	4	2.48
T60	C14	Band 3	4	2.48
T61	C15	Band 3	4	2.48
T62	C16	Band 3	2	1.24
T63	C17	Band 3	2	1.24
T64	C18	Band 3	2	1.24
T65	C19	Band 3	3	1.86
T66	C20	Band 3	4	2.48
T67	C21	Band 3	4	2.48
T68	C22	Band 3	4	2.48
T69	C23	Band 3	4	2.48
T70	C1	Band 4	4	2.48
T71	C2	Band 4	4	2.48
T72	C3	Band 4	4	2.48
T73	C4	Band 4	4	2.48
T74	C5	Band 4	3	1.86
T75	C6	Band 4	3	1.86
T76	C7	Band 4	3	1.86
T77	C8	Band 4	4	2.48
T78	C9	Band 4	4	2.48
T79	C10	Band 4	4	2.48
T80	C11	Band 4	1	0.62
T81	C15	Band 4	4	2.48
T82	C16	Band 4	3	1.86
T83	C17	Band 4	3	1.86
T84	C18	Band 4	3	1.86
T85	C19	Band 4	3	1.86
T86	C20	Band 4	4	2.48
T87	C21	Band 4	4	2.48
T88	C22	Band 4	4	2.48
T89	C23	Band 4	4	2.48
T90	C1	Band 5	4	2.48
T91	C2	Band 5	4	2.48
T92	C3	Band 5	3	1.86
T93	C4	Band 5	3	1.86
T94	C5	Band 5	4	2.48
T95	C6	Band 5	4	2.48
T96	C7	Band 5	4	2.48
T97	C8	Band 5	4	2.48
T98	C9	Band 5	4	2.48
T99	C10	Band 5	4	2.48
T100	C11	Band 5	4	2.48
T101	C12	Band 5	3	1.86
T102	C13	Band 5	3	1.86
T103	C14	Band 5	4	2.48
T104	C15	Band 5	4	2.48
T105	C16	Band 5	4	2.48
T106	C17	Band 5	4	2.48
T107	C18	Band 5	4	2.48
T108	C19	Band 5	4	2.48
T109	C20	Band 5	3	1.86
T110	C21	Band 5	3	1.86
T111	C22	Band 5	4	2.48
T112	C23	Band 5	4	2.48
T113	C1	Band 6	2	1.24
T114	C2	Band 6	2	1.24
T115	C5	Band 6	2	1.24
T116	C6	Band 6	2	1.24
T117	C7	Band 6	2	1.24
T118	C8	Band 6	2	1.24
T119	C9	Band 6	2	1.24
T120	C10	Band 6	2	1.24
T121	C11	Band 6	2	1.24
T122	C12	Band 6	2	1.24
T123	C13	Band 6	2	1.24
T124	C14	Band 6	2	1.24
T125	C15	Band 6	2	1.24
T126	C16	Band 6	2	1.24
T127	C17	Band 6	2	1.24
T128	C18	Band 6	2	1.24
T129	C19	Band 6	2	1.24
T130	C21	Band 6	2	1.24
T131	C22	Band 6	2	1.24
T132	C23	Band 6	2	1.24
Total (132 tables)			**408**	**252.96**

Mounting quantities

Modules (620 Wp)	408 nos
Mounting rail (2 per table)	942 m
Tables of 4 modules	66 nos
Tables of 3 modules	14 nos
Tables of 2 modules	50 nos
Tables of 1 module	2 nos
End clamps	528 nos
Mid clamps	552 nos

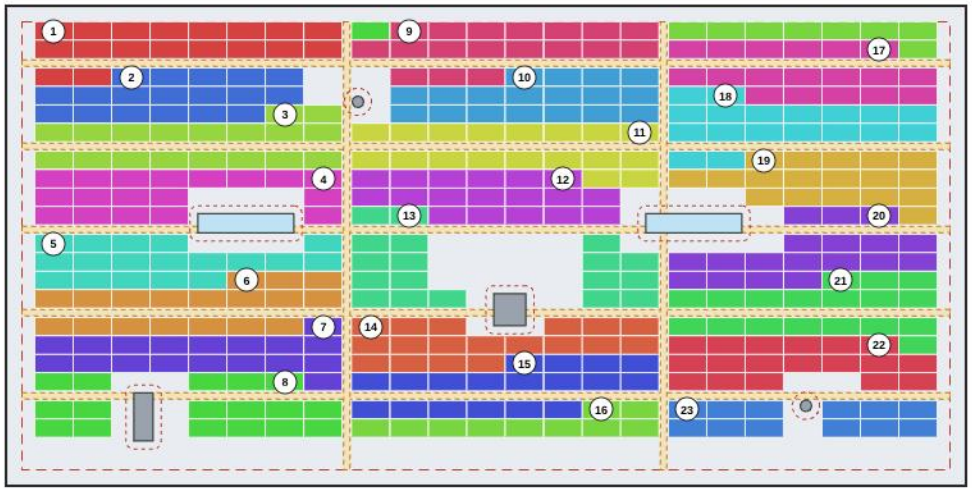
Landscape: rails run north–south, so each table is a vertical column of modules within one band. Quantities follow the layout exactly.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A2-3 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

DC string design

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



Inverter 1 · 125 kW · 12 strings · 133.9 kWp DC

S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12

Inverter 2 · 125 kW · 11 strings · 119.0 kWp DC

S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23

22 strings × 18 modules + 1 × 12. Each colour is one string; the numbered dot marks where it starts.

Electrical check (per string)

Modules per string	18 (S23: 12, on its own MPPT)
Voc at 3 °C (cold morning)	1,056 V < 1,100 V max ✓
Vmp at STC	828 V, inside MPPT range ✓
Vmp of short string S23	552 V, inside MPPT range ✓
DC/AC ratio	1.01

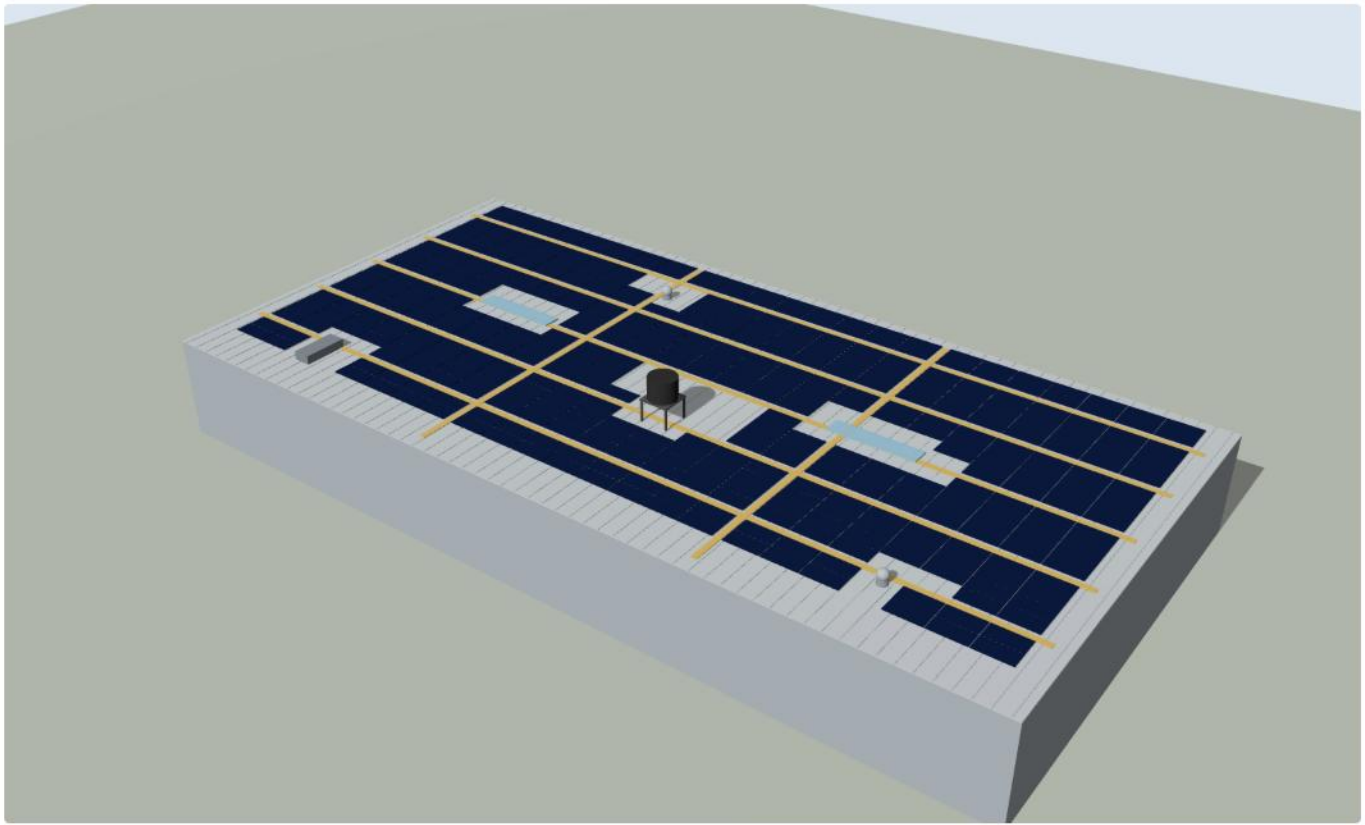
Typical 620 Wp TOPCon values: Voc 55.6 V, Vmp 46.0 V, Isc 14.2 A, Voc coefficient −0.25 %/°C.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A2-4 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

3D model

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



From 2D layout to 3D model

The 2D layout is converted to a 3D model of the roof with real obstacle heights:

- Water tank on stand · 3.0 m
- Turbo ventilators · 0.8 m
- Duct · 0.6 m
- Skylights · flush

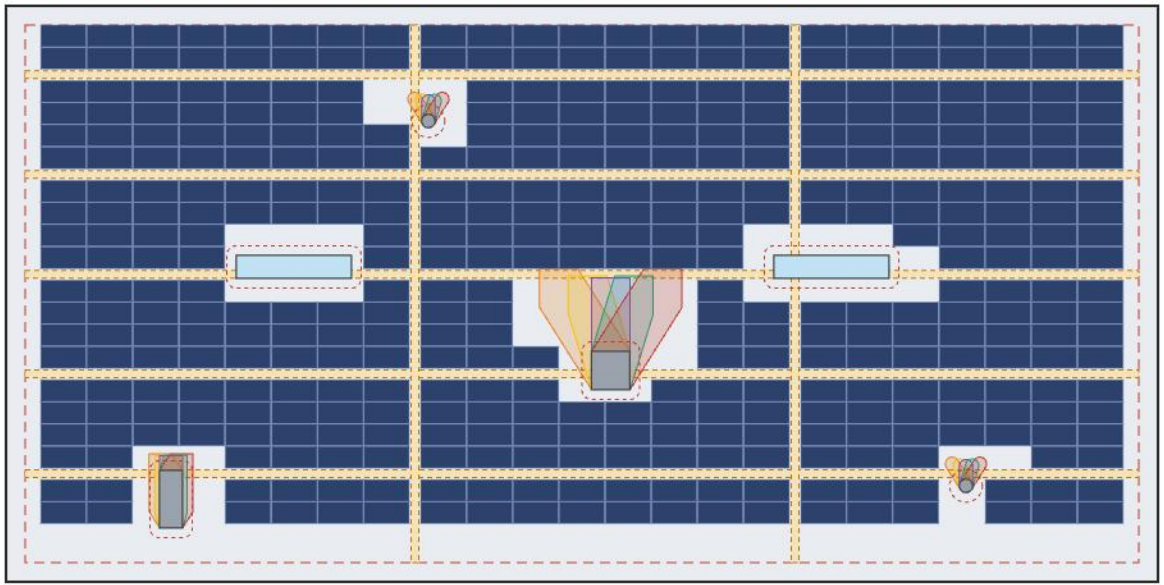
Sun position shown: 21 Dec, 12:00, Gurugram.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A2-5 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

Shadow analysis

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



Obstacle shadows on 21 Dec: 10:00 11:00 12:00 13:00 14:00

SHADOW CHECK

21 December · 10:00 – 14:00

Worst sun of the year (lowest angle). Panels are kept out of every obstacle shadow in this window. **16 module positions were left empty** because they fall in the water tank's winter shadow.

Solar time	Sun altitude	Azimuth	Tank shadow
10:00	30.6°	148°	5.1 m
11:00	36.1°	163°	4.1 m
12:00	38.1°	180°	3.8 m
13:00	36.1°	197°	4.1 m
14:00	30.6°	212°	5.1 m

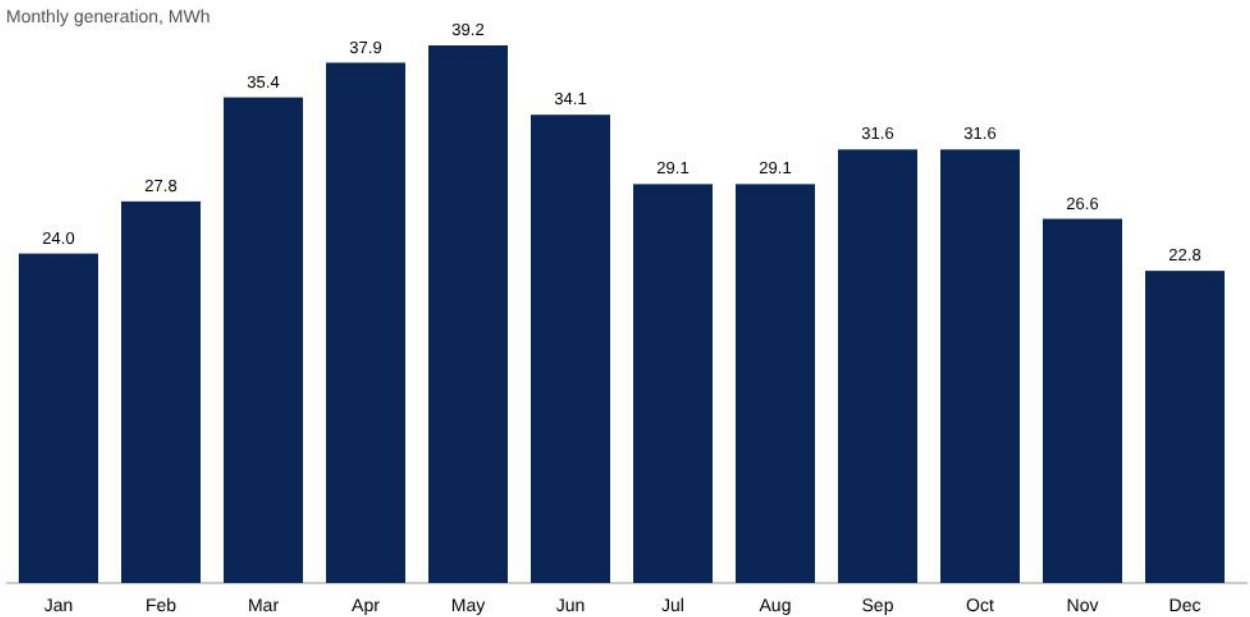
Latitude 28.46° N (Gurugram). Date and time window can be set to the customer's requirement. On RCC roofs with tilted rows, the same check sets row-to-row spacing.

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A2-6 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days

Generation estimate

Sample A2 · 60 m × 30 m tin-shed roof · landscape · 408 modules × 620 Wp · 253.0 kWp



YEAR-1 GENERATION

369 MWh

≈ 1,460 kWh per kWp per year

Assumptions

Location: Gurugram, Haryana

Flush on tin shed, −10° slope

Performance ratio 0.78

Layout kept clear of winter obstacle shadows

Year-1 value; degradation not applied

SAMPLE DESIGN PACK — FOR ILLUSTRATION ONLY

PROJECT Sample C&I rooftop (fictional)	SHEET A2-7 / 7
DESIGNED BY Titan Solar Energy Providers	TURNAROUND 2 working days