

# Scenario 1: Hot-Arid Climate Courtyard (Cairo, Egypt)

Total Courtyard Area: 500 – 1100 m<sup>2</sup>

Design Strategy: Prioritize shading, evapotranspiration, and thermal mass.

## Parameter Assignments:

- **out:permeable\_area:** (40.7%) — sand, gravel, and porous tiles
- **out:social\_area:** (11.1%) — shaded seating under pergolas
- **out:flower\_area:** (4.6%) — desert flowers and succulents
- **Out:calm\_area:** (11.1%) — fountain courtyard with stone benches
- **out:tree\_number:** 6 – 12 drought-resistant trees
- **out:UTCI\_degree\_trees:** 27.2°C

## Functional Uses:

- **Shaded Reading Nook:** Calm area under dense canopy (60 m<sup>2</sup>) accommodates up to 6 people.
- **Prayer or Meditation Zone:** Enclosed calm zone oriented away from noisy spaces.
- **Outdoor Classroom (Passive Cooling):** Social area fits 12 seated users under partial roof.
- **Desert Garden Trail:** Flower area serves as a linear experience path between calm and social zones.

## Why This Works:

- The high **permeable\_area** mitigates radiant heating.
- Trees lower UTCI by up to 4°C during peak hours, making reading and meditating viable during daytime.

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## Scenario 2: Hot-Humid Climate Courtyard (Jakarta, Indonesia)

Total Courtyard Area: 400 - 800 m<sup>2</sup>

Design Strategy: Promote airflow, use tall canopy trees, and integrate water features to reduce humidity.

### Parameter Assignments:

- **out:permeable\_area:** (22.2%) — stone pavers with grass joints
- **out:social\_area:** (29.6%) — bamboo deck with weather-resistant seating
- **out:flower\_area:** (9.9%) — native orchids and heliconia beds
- **out:calm\_area:** (19.8%) — water garden with shade trees
- **out:tree\_number:** 7 - 12 broadleaf tropical trees
- **out:UTCI\_degree\_trees:** 29.6°C

### Functional Uses:

- **Children's Nature Play Area:** Social zone includes organic wooden elements, stepping logs, and misting fans.
- **Book Club Terrace:** 5 benches under shade, with fans; suitable for small gatherings even on humid afternoons.
- **Meditation Pavilion:** Calm area has stone circle with water feature and insect-repelling flora (lemongrass, citronella).
- **Pollinator Garden Path:** Flower area supports butterflies and bees, with educational signage.

### Why This Works:

- Wide canopy trees reduce UTCI and trap humidity aloft.
  - Program diversity ensures both quiet retreats and vibrant social opportunities.
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## Scenario 3: Temperate Climate Courtyard (Paris, France)

Total Courtyard Area: 255 - 650 m<sup>2</sup>

Design Strategy: Use seasonal foliage, soft paving, and layered programs.

### Parameter Assignments:

- **out:permeable\_area:** (29.4%) — clay bricks and cobblestones
- **out:social\_area:** (23.5%) — circular plaza with café seating
- **out:flower\_area:** (19.6%) — perennial beds and roses
- **out:calm\_area:** (15.7%) — grassy knoll with benches
- **out:tree\_number:** 5 - 10 deciduous trees
- **out:UTCI\_degree\_trees:** 23.4°C

### Functional Uses:

- Outdoor Exhibition Area: Social area doubles as art display plaza or market popup zone.
- Shaded Reading Lawn: Calm zone under maple trees supports 4–5 hammocks or lounge chairs.
- Children's Garden Nook: Flower area features low planters and bird feeders.
- Seasonal Events Platform: Modular pergola can host music, readings, or community dinners.

### Why This Works:

- Deciduous trees allow winter sun and summer shade.
  - High usability throughout the year with dynamic courtyard zoning.
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## Scenario 4: Cold Climate Courtyard (Helsinki, Finland)

Total Courtyard Area: 300 - 800 m<sup>2</sup>

Design Strategy: Maximize winter sun access, use wind breaks, and provide thermal comfort through materials.

### Parameter Assignments:

- **out:permeable\_area:** (16.6%) — granite gravel walkways
- **out:social\_area:** (23.3%) — insulated wood seating with wind barriers
- **out:flower\_area:** (6.6%) — evergreen shrubs and winter berries
- **out:calm\_area:** (26.6%) — sunken firepit zone and thermal stone walls
- **out:tree\_number:** 4 - 8 cold-tolerant conifers
- **out:UTCI\_degree\_trees:** 19.1°C

### Functional Uses:

- Winter Gathering Circle: Calm area with heated seating around firepit, usable even in snow.
- Children's Snow Play Patch: Permeable zone doubles as snow pile zone for informal play.
- Sheltered Reading Bench: South-facing stone wall reflects sun to create a microclimate.
- Berry Walkway: Flower beds provide edible plant experience in warmer months.

### Why This Works:

- Calm areas double as thermal refuges.
  - Wind shielding enables usability up to -10°C with appropriate design.
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## Scenario 5: Mountain Climate Courtyard (Denver, USA)

Total Courtyard Area: 485 - 900 m<sup>2</sup>

Design Strategy: Balance snow melt, multi-season use, and strong solar orientation.

### Parameter Assignments:

- **out:permeable\_area:** (26.8%) — gravel and flagstone
- **out:social\_area:** (22.7%) — timber deck with retractable awning
- **out:flower\_area:** (12.3%) — alpine plant clusters
- **out:calm\_area:** (20.6%) — bench-lined sun court
- **out:tree\_number:** 6 - 10 pine and spruce mix
- **out:UTCI\_degree\_trees:** 22.7°C

### Functional Uses:

- Yoga & Movement Terrace: Calm area oriented toward sunrise for morning classes.
- Community Potluck Zone: Social area accommodates 3–4 movable picnic tables.
- Mountain Reading Pod: Small timber alcove with cushions and windbreak screen.
- Butterfly Rocks Trail: Raised stone planters in flower area host butterflies and textured paths for sensory experience.

### Why This Works:

- **Pine needles reduce snow compaction and increase winter usability.**
- **Area distribution suits year-round event and solo use.**