The Sesen-Aten Temple was inspired by Guastavino’s thin unreinforced masonry vaults, and Eladio Dieste’s doubly-curved concrete shell structures. Our design explores the ability of unreinforced masonry forms to perform passive thermoregulation in a desert climate.

**Passive Thermoregulation with Unreinforced Masonry**

**Dome Sizing**
- **Standard Load Case**
  - Dead Load + 30 psf live load
  - Clay Tiles: 125 pcf - 20%
  - Stabilized Earth: 100 pcf - 70%
  - Cement + Fly Ash: 135 pcf - 10%
- **Asymmetrical Load Case**
  - Dead load with only 50% of roof under 30 psf live load.

**Oculus Sizing**
- 10' effective depth created through feathering of structural fins.

**Passive Thermoregulation**

**Solar Chimney**

The masonry fins act as a solar chimney by absorbing solar radiation and heating the air around them, creating a convective updraft.

**Daylighting**

A central oculus, 20 feet in diameter, allows direct sunlight and precipitation into the building. Some light enters through the solar chimney.

**Ground-Exchange Air Intake**

This flow of hot air draws air up and out of the building, flushing it constantly. Air passes underground to cool before it enters the building.

**Wall Cross-Section Detail: Thermal Mass**

The walls of the dome are 24” thick near the base, providing sufficient thermal mass and thermal resistance to reduce temperature fluctuations between day and night.

**Tributary Area:**

- **Location:** Cairo, Egypt
- **Program:** Non-denominational spiritual space

**27 lbs CO₂ / sq. ft**

- **Diameter:** 160'
- **Height at apex:** 60'
- **Average wall thickness:** 20'
- **Total Square footage:** 20k sq ft
- **Maximum Force:** 42 kips
- **Design stress:** 1000 psi
- **Live load:** 30 psf
- **Total self-weight:** 3300 lbs
- **Total clay tiles:** 2600 lbs
- **Total stabilized earth:** 2000 lbs