


Basuna Mosque

by [Waleed Arafa](#) / 2019-06-02 15:06:13 / International / 10263 / EN



New Construction

Energy & Hot Climates International Mention

GREEN SOLUTIONS AWARDS 2019

Primary energy need :

1 kWhpe/m².year

(Calculation method : Primary energy needs)

ENERGY CONSUMPTION

Economical building *Building*

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building Type : Other building
Construction Year : 2016
Delivery year : 2019
Address 1 - street : Downtown Basuna 1234 SOHAG, Other countries
Climate zone : [BWh] Subtropical dry arid

Net Floor Area : 472 m² Other
Construction/refurbishment cost : 300 000 €
Cost/m2 : 635.59 €/m²

General information

The Basuna Mosque won the Energy & Hot Climates Award of the 2019 Green Solutions Awards at the Egypt level and a mention for the international Energy & Hot Climates Award.

The Basuna Mosque is located in the hot & arid village of Basuna, Sohag, Egypt, over a site amidst a noisy, dusty and densely constructed area with encroaching residential buildings, a cemetery, cattle frequently moving back and forth on the road and a weekly makeshift small market right outside the main entrance of this place of worship posed a major challenge. The new building must offer peace and tranquility for its users and so a few requirements had to be met.

The solution depends on a cavity-wall with only one window, overlooking the calm cemetery, covered with a hybrid roof system; consisting of a concrete beam gridiron, cast in situ, forming a central square (6.0x6.0m) covered with a main dome, and 108 smaller square openings (0.82 x 0.82m) partially covered using pendentive-domes, complemented with fixed horizontal and operable vertical glass panels allowing fresh high-altitude northern breeze to filter into the mosque, indirect glare-less sunlight to naturally illuminate the interior, and rain-water to be collected and used for cleaning and watering plants.

The main dome was constructed using an Egyptian-made light block made of sand, lime and air, with a density of 0.5 ton/m³, thermal conductivity 0.136-0.132 W/m².°K, fire rating (relative to thickness) 4-7 hours, sound insulation (dB) 37-48. The remarkable lightness of the block decreased the building's own-weight, in turn decreasing the required dimensions of all reinforced concrete elements. Its dimensions (100x200x600 mm) were perfect for introducing an original aesthetic, serving the conceptual scheme of the mosque, through employing a special cutting list and a simple staggered tessellation. I had to devise a special steel compass to guarantee the meticulous spatial positioning of every single block regardless of a mason's skills and accuracy.

Pendentive-domes are a known structural element, traditionally used to facilitate the transition from square to octagonal plans to finally receive the circular plan of

a dome.

In the Basuna Mosque, this element was reimagined as an independent unit, with innovated functions; structurally as a roof system, environmentally as a wind-catcher and skylight, and aesthetically as an independent geometrical object, appreciated both from the interior and the exterior.

The entrance dome references the historical dome of the Cordoba Grand Mosque. It serves as a reminder of the rich potential of historical architecture in both the architectural discourse and construction innovations.

There are 4 entrances to the building, two of which could be made accessible for worshippers with special needs, once the roads and infra-structure of the village allows for free and independent movement of people with special needs.

The multi-use hall is designed to accommodate seasonal increases in the numbers of worshippers, of both genders, during Fridays and the Holy month of Ramadan, as well as serving an array of purposes all year round; temporary medical clinics, after-school and literacy tuition classes, etc...This brings back to mind the original all-inclusive function of the mosque, not only as a place for ritualistic worship but as a service center for both Muslims and non-Muslims alike.

Photo credit

Essam Arafa, Waleed Arafa, Tariq Al Murri

Stakeholders

Contractor

Name : Dar Arafa Architecture

Contact : Waleed Arafa info@dararafa.com, Cairo, Egypt

<http://www.dararafa.com>

Construction Manager

Name : Dar Arafa Architecture

Contact : Waleed Arafa info@dararafa.com, Cairo, Egypt

<http://www.dararafa.com>

Stakeholders

Function : Others

Hisham Negm + Ahmed alHadary Amr Haggag Waleed Samir + Bishoy Nagy

Engineering

Contracting method

Other methods

Energy

Energy consumption

Primary energy need : 1,00 kWhpe/m².year

Primary energy need for standard building : 1,00 kWhpe/m².year

Calculation method : Primary energy needs

Renewables & systems

Systems

Heating system :

- No heating system

Hot water system :

- Solar Thermal

Cooling system :

- No cooling system

Ventilation system :

- Natural ventilation

Renewable systems :

- Solar Thermal

Other information on HVAC :

Rain-water to be collected and used for cleaning and watering plants.

Environment

Urban environment

The Basuna Mosque is located in the hot & arid village of Basuna, Sohag, Egypt, over a site amidst a noisy, dusty and densely constructed area with encroaching residential buildings, a cemetery, cattle frequently moving back and forth on the road and a weekly makeshift small market right outside the main entrance of this place of worship posed a major challenge. The new building must offer peace and tranquillity for its users and so a few requirements had to be met.

Land plot area : 450,00 m²

Built-up area : 300,00 %

Green space : 150,00

Products

Product

DeltaBlock

Plena Egypt

Essam Samy +201272523375 +201228429253

<http://plenaegypt.com>

Product category : Structural work / Structure - Masonry - Facade

Light sand/lime block

This is an incredibly sustainable product with high performance in both acoustic and thermal insulation and fire resistance.



Costs

Construction and exploitation costs

Cost of studies : 10 000 €

Total cost of the building : 300 000 €

Health and comfort

Life Cycle Analysis

Eco-design material : All the materials were sourced to complement the environmentally sensitive approach governing the entire scheme.

The architects used local materials for the construction, including a building block made of sand and limestone. According to Dar Arafa, the block's lightness decreases the building's weight, which in turn reduces the required dimensions of all reinforced concrete elements.

Indoor Air quality

The decision to open the space mainly upwards, allowing the cavity walls to function as insulation, suggests a densely-populated village which is both hot and dusty, with residential buildings next to the monument, a cemetery, and small improvised weekly market just outside the main entrance, with livestock often

moving up and down the road.

Contest

Reasons for participating in the competition(s)

Creating a noise-free environment, naturally illuminated, and naturally ventilated, with very little need of mechanical means of air-conditioning and a very high thermal performance both in winter and summer.

The solution depends on a cavity-wall with only one window, overlooking the calm cemetery, covered with a hybrid roof system; consisting of a concrete beam gridiron, cast in situ, forming a central square (6.0x6.0m) covered with a main dome, and 108 smaller square openings (0.82 x 0.82m) partially covered using pendentive-domes, complemented with fixed horizontal and operable vertical glass panels allowing fresh high-altitude northern breeze to filter into the mosque, indirect glare-less sunlight to naturally illuminate the interior, and rain-water to be collected and used for cleaning and watering plants.

Decreasing the building's own-weight and hence its need for concrete reinforcement.

The main dome was constructed using an Egyptian-made light block made of sand, lime and air, with a density of 0.5 ton/m3, thermal conductivity 0.136-0.132 W/m2.°K, fire rating (relative to thickness) 4-7 hours, sound insulation (dB) 37-48. The remarkable lightness of the block decreased the building's own-weight, in turn decreasing the required dimensions of all reinforced concrete elements.

Social inclusivity & accessibility.

There are 4 entrances to the building, two of which could be made accessible for worshippers with special needs, once the roads and infra-structure of the village allows for free and independent movement of people with special needs. The multi-use hall is designed to accommodate seasonal increases in the numbers of worshippers, of both genders, during Fridays and the Holy month of Ramadan, as well as serving an array of purposes all year round; temporary medical clinics, after-school and literacy tuition classes, etc...This brings back to mind the original all-inclusive function of the mosque, not only as a place for ritualistic worship but as a service center for both Muslims and non-Muslims alike.

Building candidate in the category



Energy & Hot Climates



Users' Choice

