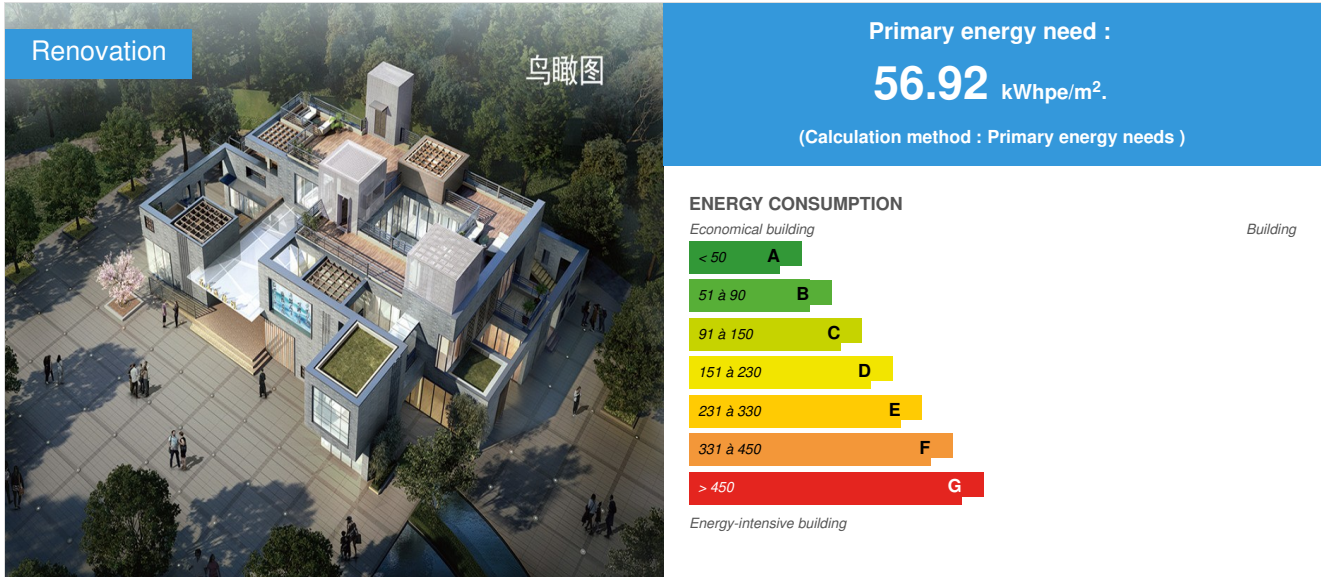


The Green Renovation Project of The Existing Building of Kunshan Civic Ethics Hall

by / 2021-03-24 07:08:24 / China / 2563 / CN



Building Type : Other building
Construction Year : 2018
Delivery year : 2019
Address 1 - street : 215399 ,
Climate zone : [Dfb] Humid Continental Mild Summer, Wet All Year

Net Floor Area : 672 m² Other
Construction/refurbishment cost : 4 656 400 ¥
Cost/m² : 6929.17 ¥/ m²

Certifications :



General informations

This building received a mention for the Sustainable Renovation Grand Prize of the Green Solutions Awards International 2020-21.

The Project, located in Siqi Park, Kunshan City, Jiangsu Province, functions as a civic morality museum and adopts frame structure. Built in 2004, the existing building originally functioned as a tea house, and was vacant before the refurbishment. Based on the refurbishment method similar to Chinese "acupuncture and moxibustion" therapy from a point to an area, the Project not only integrates the concept of green building to reinforce and transform the building, but also retains the small and exquisite Jiangnan style of the existing building. Specifically, the building envelope structure is reconstructed to the structure of energy-saving and interior thermal insulation, creating more than 65% overall building energy-saving rate. For HVAC system, the Variable Refrigerant Volume (VRV) system is adopted, in which the fresh air is supplied by the total heat exchanger that performs the air purification function of haze removal and PM2.5 filtration. The whole building adopts LED energy-saving lighting. The building is also equipped with photovoltaic power generation and solar street lights in order to make full use of

renewable energy. In addition, for the sustainable development of the building and its surrounding environment, Michelia trees planted in the existing building are retained according to local conditions, creating a compact and unique indoor landscape. The outdoor environment is green and beautiful, with 60.45% greening rate. The design concept of "Sponge City" is integrated into the transformation of the park around the building. Measures such as grassed swales, rainwater garden, permeable pavement and rainwater recycling pool are taken to effectively release the ponding at the plot and form a rainwater recycling system in the park for greening irrigation. At the same time, the building intelligent system is introduced to continuously enable the intelligent operation of "City Park" by means of equipment control, air quality monitoring and real-time display. After operation, indoor and outdoor environment monitoring data are displayed on large screen to effectively improve the quality of indoor and outdoor environment.

Data reliability

3rd part certified

Photo credit

Jiangsu Research Institute of Building Science Co., Ltd.
Jiangsu Jianke Identification Consulting Co., Ltd.
Kunshan City Construction Investment & Development Group Co., Ltd.

Stakeholders

Contractor

Name :
Contact : maojin@kscid.com
<http://www.kscid.com/>

Construction Manager

Name :
Contact : 13809065531
https://aiqicha.baidu.com/company_detail_48633107787224?rq=ef&pd=ee&from=ps

Stakeholders

Function : Thermal consultancy agency

jsjy_jlj@163.com
<http://www.jsjy.com/>
Responsible for the preparation of green refurbishment scheme, and green building label application and review, etc.

Contracting method

General Contractor

Owner approach of sustainability

Kunshan Civic Morality Museum is divided into six areas: Preface Hall, Morality Advocating Path, Virtue of Kunshan, Moral World, Walking with Morality, and One Heart with One Mind. Based on modern technologies such as sound, light and electricity, as well as various forms of representation such as texts and pictures, the museum is built into a new era civilization practice base integrating moral culture propaganda, apologue display, moral education experience and other functions. It is also an important carrier of deepening citizen moral education in Kunshan City.

The Project aims to build an "ingenious and exquisite" civic morality museum after completion. Through green refurbishment works, it will become a pilot demonstration project of green technology applications such as green refurbishment, Sponge City Park and intelligent building in Kunshan City and a visiting and exhibition experience center. At the same time, it will also be used as the practical education base of moral culture visit and exhibition, voluntary activities and "Red Tour" party member activities.

Compared with similar projects, the Project, based on the comfortable behavior characteristics of human, focuses on improving the comfortability of the reconstructed building, including lighting environment, acoustic features, thermal comfort conditions, air quality and health, physical and psychological health, as well as harmonious coexistence of building and natural environment. The physical technologies are applied to the building, so that it can achieve the goal of green building with comfortability, sustainable health, energy saving and environmental protection on the premise of meeting the space and function requirements of the museum.

Architectural description

(1) Green refurbishment

Based on the refurbishment method similar to Chinese "acupuncture and moxibustion" therapy from a point to an area, the Project not only integrates the concept of green building to reinforce and transform the building, but also retains the small and exquisite Jiangnan style of the existing building. Specifically, the building envelope structure is reconstructed to the structure of energy-saving and interior thermal insulation, creating more than 65% overall building energy-saving rate. For HVAC system, the VRV system is adopted, in which the fresh air is supplied by the total heat exchanger that performs the air purification function of haze removal and PM2.5 filtration. The whole building adopts LED energy-saving lighting. The building is also equipped with photovoltaic power generation and solar street lights in order to make full use of renewable energy. In addition, for the sustainable development of the building and its surrounding environment, Michelia trees planted in the existing building are retained according to local conditions, creating a compact and unique indoor landscape.

(2) Sponge City Park

The Project is located in Siqi Park, with beautiful and green environment and greening rate of 60.45%. The design concept of "Sponge City" is integrated into the transformation of the park. Measures such as grassed swales, rainwater garden, permeable pavement and rainwater recycling pool are taken to effectively release the ponding at the plot and form a rainwater recycling system in the park for greening irrigation.

(3) Intelligent building

The building intelligent system is introduced to continuously enable the intelligent operation of "City Park" by means of equipment control, air quality monitoring and real-time display. After operation, indoor and outdoor environment monitoring data are displayed on large screen to effectively improve the quality of indoor and outdoor environment.

Building users opinion

The Project is open to the public free of charge as a Civic Morality Museum. In the course of operation, visitors are regularly surveyed with questionnaires, including customer service level, sanitation, parking management, indoor thermal and humid environment of green building, noise environment, light environment, traffic convenience and property service level. According to the survey results, the overall satisfaction is more than 95%, and the property management company takes corresponding improvement measures timely.

Energy

Energy consumption

Primary energy need : 56,92 kWhpe/m².

Primary energy need for standard building : 71,58 kWhpe/m².

Calculation method : Primary energy needs

Final Energy : 34,22 kWhfe/m².

Breakdown for energy consumption :

HVAC: 4.54

General light socket: 1.66

General power equipment: 3.58

Other exhibition and display equipment: 24.44

Initial consumption : 149,00 kWhpe/m².

Envelope performance

Envelope U-Value : 0,71 W.m⁻².K⁻¹

More information :

Roof K: 0.4W/m2.k; exterior wall: 0.71W/m2.k; exterior window: 2.2W/m2.k

In the Project, the building envelope structure is reconstructed to the structure of energy-saving and interior thermal insulation. Specifically, the roof is reconstructed with 80mm extruded polystyrene board; the substrate of exterior wall and interior wall are built with 200mm-thick B06 aerated concrete blocks, and the interior thermal insulation material of the exterior wall uses 40mm-thick Type-II PNY inorganic insulation paste; aluminum alloy insulating glass (6Low-E+12A+6) is used for exterior window and glass curtain wall, and 6Low-E+12A+6+1.14PVB+6 glass is used for daylighting roof. According to the energy-saving calculation results, the overall energy-saving rate reaches 65% specified in the Design Standard for Energy Efficiency of Public Building (GB50189-2015).

Building Compactness Coefficient : 0,55

Indicator : GB/T 7106-2008

Air Tightness Value : 6,00

Real final energy consumption

Real final energy consumption/m2 : 34,22 kWhfe/m².

Year of the real energy consumption : 2 020

Renewables & systems

Systems

Heating system :

- Tape

Hot water system :

- No domestic hot water system

Cooling system :

- VRF Syst. (Variable refrigerant Volume)

Ventilation system :

- Natural ventilation
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 5,71

Smart Building

BMS :

The building intelligent system is introduced to continuously enable the intelligent operation of "City Park" by means of equipment control, air quality monitoring and real-time display. After operation, indoor and outdoor environment monitoring data are displayed on large screen to effectively improve the quality of indoor and outdoor environment.

Users' opinion on the Smart Building functions :

The user's satisfaction with the control system is more than 95%

Environment

GHG emissions

GHG in use : 34,82 KgCO₂/m²/

Methodology used :

Standard for Building Carbon Emission Calculation (GB/T 51366-2019)

GHG before use : 12,17 KgCO₂ /m²

Building lifetime : 50,00

, ie xx in use years : 0.35

GHG Cradle to Grave : 48,21 KgCO₂ /m²

Standard for Building Carbon Emission Calculation (GB/T 51366-2019)

Water management

Consumption from water network : 2 300,00 m³

Consumption of harvested rainwater : 300,00 m³

Water Self Sufficiency Index : 0.12

Water Consumption/m² : 3.42

Water Consumption/home : 82.14

Drinking water quality and control: the domestic water of the Project is directly supplied by the municipal pipe network. According to the municipal water quality monitoring report, the drinking water quality is better than the requirement of the current Standards for Drinking Water Quality (GB 5749). The total hardness (calculated by CaCO₃) and CFU of drinking water are less than 150mg/L and 10/100ml, respectively.

Non-traditional water quality and control: the non-traditional water source of the Project is the rainwater that has been recycled and processed up to the standard. According to the water quality test report, the water quality of landscape water body meets the requirements of Water Quality-Determination of Turbidity (GB/T 13200-1991) and Water Quality-Determination of Suspended Substance-Gravimetric Method (GB/T 11901-89).

Indoor Air quality

Indoor CO₂ test concentration (mg/m³): 819.12

Indoor formaldehyde test concentration (mg/m³): 0.04

Indoor TVOC test concentration (mg/m³): 0.25

Indoor benzene test concentration (mg/m3): 0.02

Indoor PM2.5 test concentration (µg /m3): 0.051

In the Project, the fresh air fan has the functions of air purification, haze removal and PM2.5 filtration. The outdoor air is distributed to the room after three layers of filtration, and the indoor dirty air is extracted out of the room. Each room is equipped with the air supply outlet and exhaust outlet via air ducts, so as to form a large-scale ventilation system. The system is effective for indoor formaldehyde and other organic volatiles, so as to make the air clean for a long time. The air quality monitoring system is also established. The field test results show that the indoor pollutant concentrations of formaldehyde, ammonia, TVOC, benzene and radon meet the requirements of Code for Indoor Environmental Pollution Control of Civil Building Engineering (GB 50325).

Comfort

Health & comfort :

(1) Health behavior

For the sustainable development of the building and its surrounding environment, Michelia trees planted in the existing building are retained according to local conditions, creating a compact and unique indoor landscape. This action not only protects the ecological environment, but also adds humanism to the ecological park. A children activity yard is built next to the building to provide parents and children with space for leisure activities and fitness exercises, so as to enhance their sense of happiness.

(2) Psychological guidance measures

In the Project, a leisure area is set on the roof of the building with tables, chairs and umbrellas to provide a warm leisure space for visitors to have a rest, talk and relax. Visitors who are tired can have a rest here for communication and heart-to-heart talk, so as to enhance the communication between relatives and friends and shorten the spiritual distance between people.

(3) Barrier free design

The barrier free ramp, barrier free elevator and barrier free toilet are provided on the first floor of the building.

Calculated indoor CO2 concentration :

819.12

Calculated thermal comfort : 18°C 46% 25°C 49% 95%

Acoustic comfort :

The Project, located in Siqi Park, Kunshan City, is far away from the traffic road and is not affected by traffic noise. The east and north sides of the Project are residential buildings with low noise level. The field test results show that the environmental noise of the site is better than the current international standard value of 5dB (A). Therefore, it can provide a quiet and comfortable environment for visitors.

Products

Product

VRV equipment

1468 6

<https://www.daikin-china.com.cn/>

Product category :

the integrated part load value (IPLV) is 7.4 or 7.2.

the air conditioning terminal can be controlled in different zones, so it is easy to use;



Photovoltaic power generation unit

BLDG#18,CO.PARK,NO.8HEYING ROAD,CHANGPINGDISTRICT,BEIJING,CHINA

<https://www.epsolarpv.com/>

Product category :

4950Wp installed capacity and sun roof type installation form

photovoltaic power generation for property use, effectively saving electricity



Air quality monitoring equipment

<https://www.brcon.com.cn/>

Product category :

monitoring indoor temperature, humidity, CO2 concentration, formaldehyde, dust and organic matter concentration.

the indoor air quality data is displayed on the intelligent monitoring platform in real time to provide fresh air for rooms;



Fresh air equipment

425

<http://www.gorzzir.com/>

Product category : HVAC /

heat recovery fresh air ventilator with the functions of air purification, haze removal and PM2.5 filtration.

the indoor air quality meets the requirements of GB 50325;



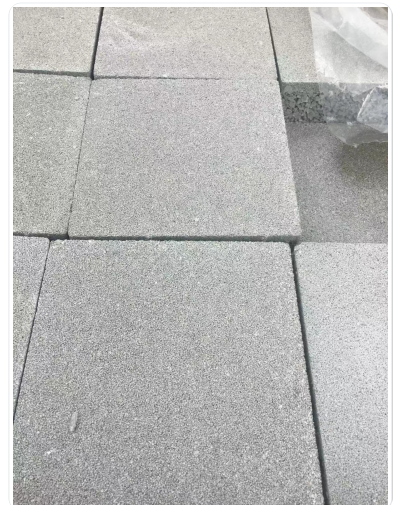
Permeable pavement material

2200 C

Product category :

the recycled aggregate of construction waste is used as the main raw material, which has the characteristics of high permeability (3cm/s), high strength (34.0), high flexural strength (cf3.3), good abrasive resistance (26mm), no radiation, alkali resistance and aesthetic appearance

it can well maintain the water permeability and air permeability of the ground, make the rainwater quickly penetrate into the ground, reduce the pressure of drainage and flood control, and avoid ponding.



Carbon fiber composite

1

<http://www.tjcarbon.com/index/about/index.html>

Product category :

high-strength grade II and tensile strength test value of 3417MPa.

with the resin high cohesive energy strength radical, this material has high elastic recovery rate, which ensures the structural reinforcement strength



Inorganic insulation paste

2268 50

<http://www.shfalary.com/>

Product category :

thermal conductivity test value of 0.060W/(m.k)

excellent thermal insulation performance; Level-A fireproof performance; long service life, with the same life as the building



Costs

Construction and exploitation costs

Renewable energy systems cost : 5 350,00 ¥

Cost of studies : 550 000 ¥

Total cost of the building : 4 656 400 ¥

Subsidies : 1 500 000 ¥

Energy bill

Forecasted energy bill/year : 17 300,00 ¥

Real energy cost/m² : 25.74

Real energy cost/none : 617.86

Urban environment

The Project is located in Siqi Park, Kunshan City, with smooth and convenient traffic. At the entrance of the park, the bus stop, motor vehicle parking spaces, bicycle parking spaces and urban shared bicycles are provided to facilitate the green travel of surrounding residents. The project site is surrounded by a commercial and residential complex integrating commerce, catering, office, residence and leisure, with complete living facilities. There are appropriate public open space and humanized streets.

Siqi Park, where the Project is located, is one of the pilot areas of Sponge City. By optimizing the park drainage system, adding permeable brick pavement, grassed swales, rainwater recycling pool, low elevation greenbelt and other facilities, Siqi Park is perfectly integrated with the surrounding park landscape, commercial supporting facilities and residence community. Efforts have been made to improve the overall landscape and create a green and beautiful environment.

Land plot area

Land plot area : 1 554,15 m²

Green space

Green space : 15 600,00

Parking spaces

In the Project, the layout of parking facilities at the entrance of the southeast side of the park is optimized. There are 14 free motor vehicle parking spaces and 18 automatic paid motor vehicle parking spaces added, without occupation of walking space and activity space in the park. At the same time, the park is provided with non-motor vehicle parking spaces and shared bicycle parking areas in the southwest of the park to facilitate green travel of surrounding citizens.

Building Environmental Quality

Building Environmental Quality

- indoor air quality and health
- acoustics
- energy efficiency
- renewable energies
- maintenance
- integration in the land

- mobility

CONTEST

Reasons for participating in the competition(s)

(1) Users benefits: the Project is open to the public free of charge as a Civic Morality Museum. The museum serves as the base that displays the achievements of civic morality construction in Kunshan and provides moral education for Kunshan citizens. It will promote the moral quality of Kunshan citizens in a deep and lasting way, guide the public to emulate the wise and good man, advocate morality and goodness, consciously become the disseminator and practitioner of socialist core values, and jointly build Kunshan into a "City of Morality" and "City of Civilization".

(2) Environmental benefits: through green refurbishment and comprehensive application of green building technologies, the Project sets a good example for buildings to reduce energy consumption and reduce the environmental impact, and effectively improve the indoor and outdoor operation environment. Therefore, it is of great promotional value.

(3) Economic benefits: the Project adopts various green building technologies, including the fresh air heat recovery unit, photovoltaic power generation unit, high-performance air conditioner, energy-saving lamps, high-performance envelope and rainwater recycling system, saving about 16,400 yuan annually.

(4) Social benefits: based on the design concept of "Inheriting Moral Culture and Integrating Green Development", Kunshan Civic Morality Museum is transformed by the refurbishment method similar to Chinese "acupuncture and moxibustion" therapy from a point to an area, including facade, indoor exhibition and outdoor greening. After completion, the Civic Morality Museum is "ingenious and exquisite", which has become a demonstration project of green technology applications such as green refurbishment, Sponge City Park and intelligent building in Kunshan, as well as a practical education base of moral culture visit and exhibition, voluntary activities and "Red Tour" party member activities.

