BINA MUSTADA-The Green City

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ABSTRACT: The World is under rapid Urbanization with the fast growing population and technologies are developing in an unsustainable way which can satisfy the present generation but not the future generation. Evolving people in the new era are interested to pursue a sustainable living. By focusing on the sustainable development Goals 6,7,9,11 and 12 (clean water and sanitation, affordable and clean energy, Decent work and Economic Growth, industry innovation and infrastructure, Sustainable Cities and Communities) BINA MUSTADA "The Green City" is to be constructed. It is constructed with low operating and overall maintenance cost having adequate natural lighting. The way by which the city will be constructed would reduce the cost of funds that government has allotted for the disaster recovery. Owning a house is a dream for many people and for people who don't have enough time or money this system will give a lot of benefit. Safety is ensured in the community as it is monitored completely. Resources are shared at the same time people live the way they wish. In the present analysis we have concluded that upto 80% of the total cost allocated for the disaster management by the government can be saved.

Keywords: Bina Mustada, Tunneling, IOT, Covid 19

1.INTRODUCTION

Since the 1990s, Russia's death rate has increased than its birth rate so The Russian Bureau Of Population have concluded that population density, as a rule, shouldn't exceed the 450 persons/hectare" and to be "not less than 40 persons/hectare". The chief architect and the head of the Council on development of city infrastructure from Barcelona, professor Jose Asebilyo Marin, considers that low population density is the main problem of the Russian cities: "It is necessary to remember that the cities with low density are inefficient both economically and ecologically. The high density and compactness of the cities are positive lines from the town-planning point of view "[2].High-rise construction reduces internal density and increases external at the same time. It promotes strengthening of individualization, autonomy of the person, estrangement from the outside world and society. The disturbing tendencies in behavior of people connected with growth of number of storey and population density in residential zones have been described in the Soviet researchers works in the 70-80th years itself. The prospect of architectural planning of a high-rise building is also for the removal of psychological and social tension of the population when they live in places like apartments. Most of the people living in the world's most congested cities are exposed pollution and uncontrollable spread of diseases (COVID-19) but a city with this kind of design approach avoids fast spreading of such diseases. Pragmatic solutions like BINA MUSTADA also saves agricultural grounds from building and reduces the energy consumption and emissions of carbon in the environment connected with pendular migration.

2.CAPACITY

We provide decagon shaped site area which are far affordable than normal site as we use the same space for four houses one above another so the amount is divided. It ensures the feel of own house with green and free out-space. The structure consist of G+11 floors with 10 ten houses in each floor. The capacity of the building comprises of 120 houses in total and will have an approximate population of around 600 people.

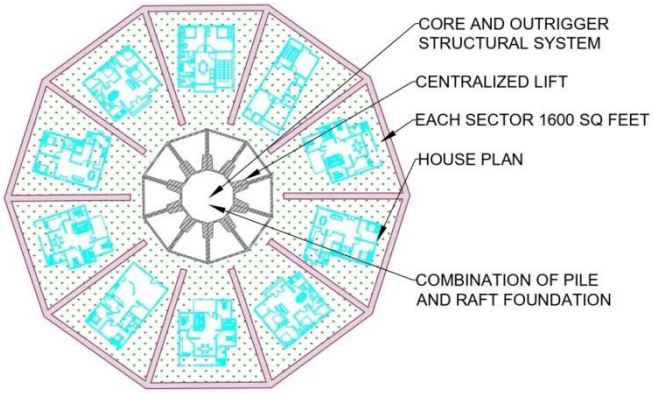

Fig.1.Decagonal site area of Ground Floor

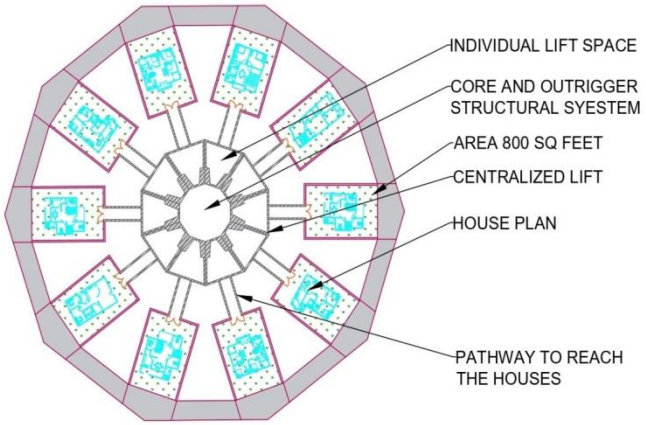

Fig.2.Decagonal site area of First Floor

3.SIGNIFICANCE OF THE DESIGN

For the people living in apartments experience the difficulty in using the common resources and fast spread of diseases. The site has been made decagonal shaped construction area which will split into 10 sectors each sector will consist of each house, which will ensures the handling of individual resources and social distancing. For the usage of natural resources solar workstation fixed in the roof of the houses, micro wind turbine and rain water harvesting pits are designed. And for the waste management separate disposing bins are fixed. For the disaster management like flood and drought, underground tunneling system is proposed. It means the tunnel inlet channel starts from the top of the dam continued by going under the tunnel reaching outside the city where a reservoir is constructed to store that water for usage in drought condition. And if in case the reservoir is over flow the tunnel continues to collect that over flow water and transfer the water to nearby river channel by underground tunneling.

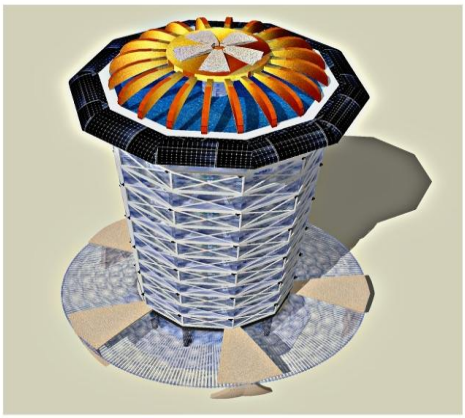

Fig.3.Exterior View

Fig.4.Front View

4.PROVISIONS

In order to prevent indoor heat gain the buildings are constructed with insulated hollow bricks. Roof gardening keeps the building cool in summer and the windows are to be designed according to cross ventilation. Only low-voc sealants are to be used for paints and adhesives. Some parts of the building are constructed with the recycled materials which are generated from the thermal power plant.[3]

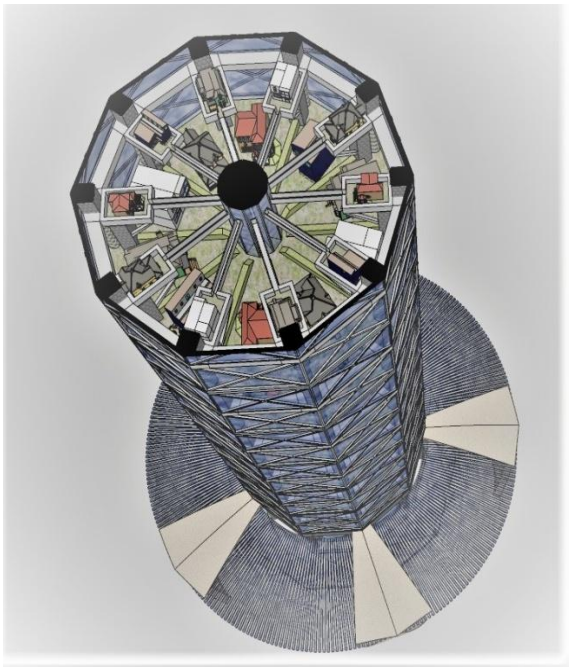

Fig.5.Sectional top view

Fig.6.Sectional front view

The project is planned and designed to meet standard energy efficiency with a low carbon foot print. The elevator which is specially designed for people to travel is fully automated and works faster having a large capacity to hold. Rainwater harvesting pits are constructed for collecting the water and e-bins are installed for disposing the waste generated by the people. The modernization in technology is taken in parallel to design the structure for maintaining hygienic and sophisticated environment. These kinds of structures have to dominate the future of construction to abate all the problems faced by normal people and the government at present.

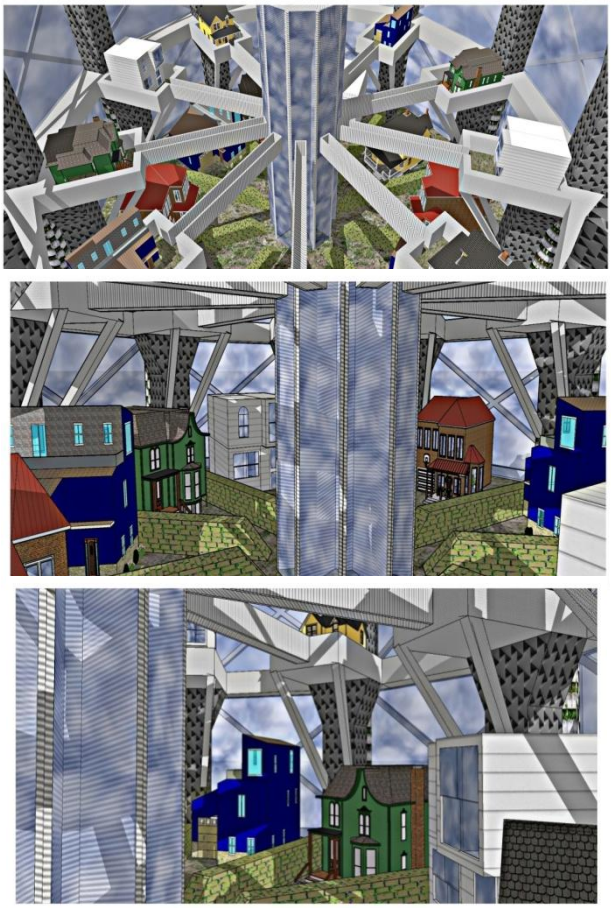

Fig.7.Interiors of Bina Mustada

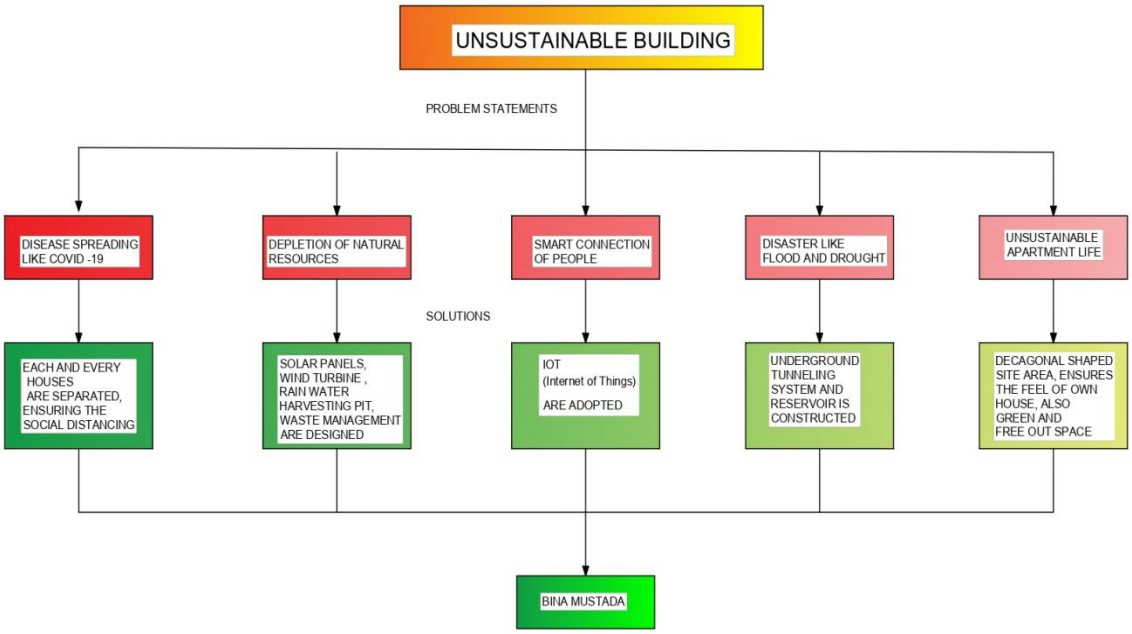

Fig.8. Flow Chart

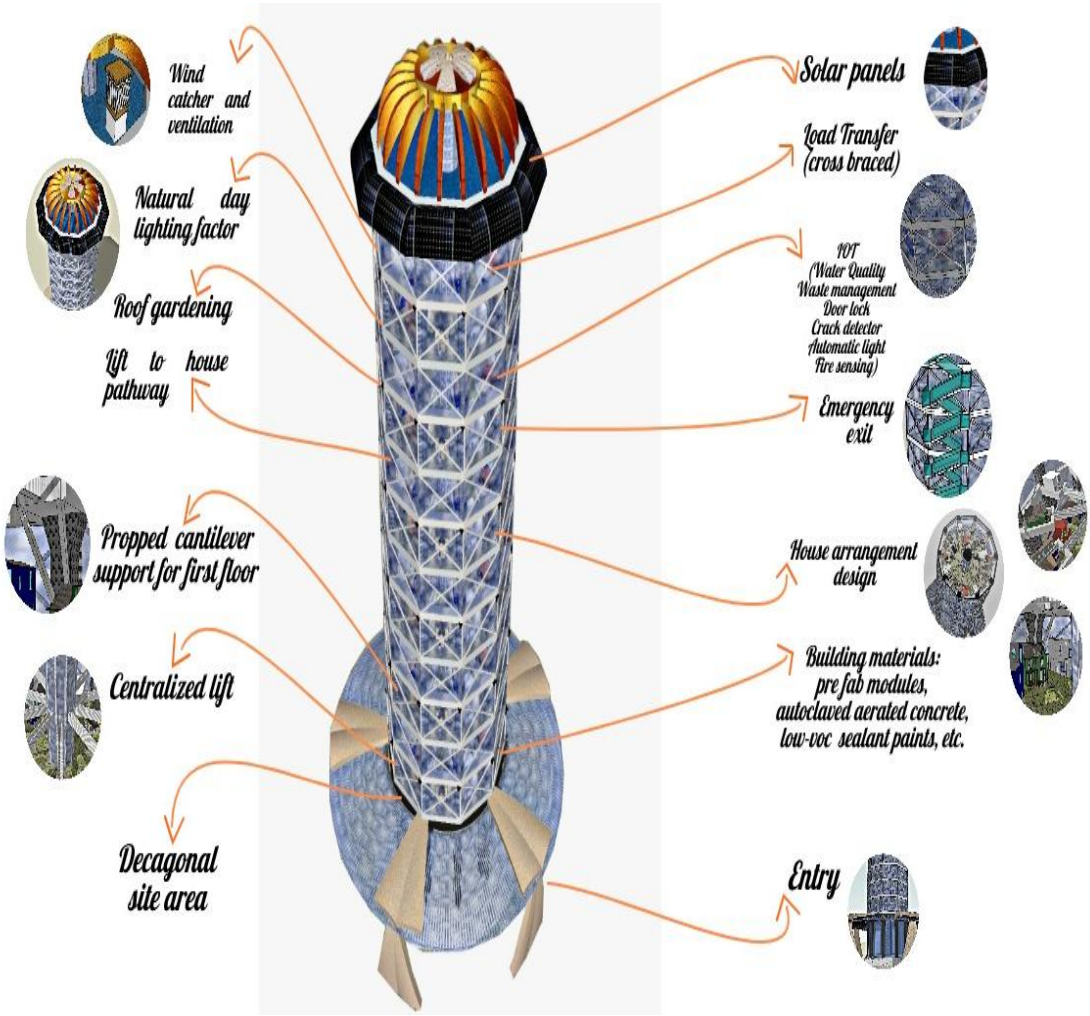

Fig.9.Provisions of Bina Mustada

5.**TUNNELING**

Today, droughts and floods pose a potent threat, which cannot be eradicated but has to be managed. Transfer of the surplus monsoon water to areas of water deficit is a potential possibility. Underground tunneling system is fixed in the dam and a channel connects the whole city to get rid of flood and drought. When the water level rises in the dam the water automatically enters the tunnel which is constructed 4 feet below the top of the dam. The water then travels through the underground pathway and reaches the reservoir. When the need comes into place during the scarcity water from the reservoir is redirected and used. In case the reservoir overflows the water will be diverted to the nearby river or any water body by the underground tunnel connecting the reservoir and the river.

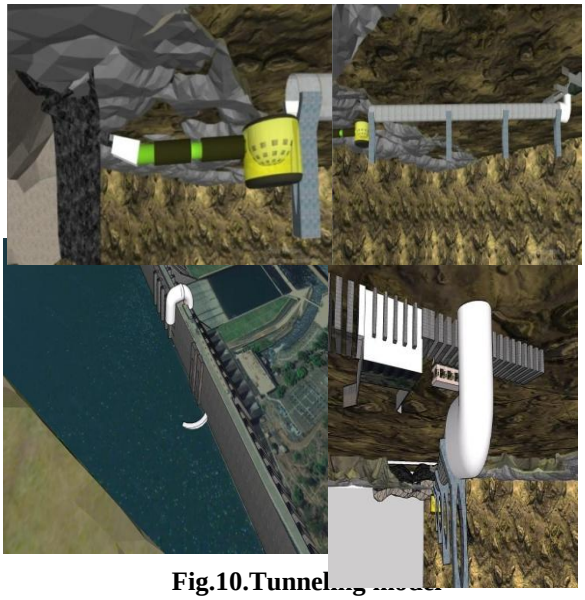

Fig.10.Tunnel

Fig.11.Features incorporated in tunneling

SOLAR ENERGY

Efficient management and usage of resources have been a very crucial part in our lives .The cost of electricity has been increasing at the rate of 6-9 % every year. Since net metering is the best bet to change this and make significant long term savings generating electricity through such renewable sources is a universal solution. During day time loads run directly from solar and any excess power generated is sent back to the grid using metered technology. A Bi-directional meter records the net import and export. An added advantage is that when the solar panels are registered with the government we get to receive payments for the extra electricity we produce apart from our usage. The solar panels are connected to a control panel and this wireless device can be used to monitor whether the system is working properly. Monocrystalline solar panels are categorized as the best solar panel as it has the highest efficiency. The companies currently making solar panels are sun powers, LG, Panasonic, Q cells, Canadian solar, etc. Cleaning of solar panels is not needed so there is no maintenance cost. Solar panels produce electricity from photons present in the natural day light, rather than from the sunlight itself so the panels need not be installed in direct sunlight. [6]

The estimated output of the power generation by the solar panel is given below:

LOCATON	OUTPUT(Avg. per day)
1 house consumes	5 KW-hr/day
Solar panel generate	1.5 KW-hr/day
Savings	45KW-hr /month
120 houses generate	65,760 KW-hr/year
Roof top panels generate	73,000 KW-hr/year
Total generated units	138760 KW-hr/year

Table.1.Power Generation

In addition solar water heaters will be installed in each building which has the capacity of 100LPD and solar street lights before the houses with on-grid and off-grid system. Most importantly, solar helps decrease the carbon foot print and in increasing areas, help to meet environmental requirements.

7.IOT (INTERNET OF THINGS)

7.1.Crack detector:

Usage of sensing skin will detect and alert when the cracks and other flaws in the structure get developed which are not visible to the naked eye to rectify it in the initial stages itself. It is integrated with array of sensors like FLEX sensors, VIBRATION sensor, etc…

7.2.Water quality monitoring:

Libelium offers a device containing the necessary sensors for the water quality monitoring. Among the twelve sensors in the device Turbidity sensor (detects the total dissolved solids),pH sensor(determines the acidity of water) and TOC sensor(Total Organic Carbon) are the main sensors for quality management. Water on reaching the building from the reservoir gets treated with necessary measures using activated charcoal and alum if the device detects it as poor quality.[5]

7.3.Waste management:

Idea proposed via this waste management system is to transfer the waste from the individual dustbins of the respective houses to the main garbage bin of the building. Ultrasonic fill level sensors are used to detect the level of waste and when main bin gets filled it alerts the municipality to collect it as a whole by sending notifications.

7.4.AIR QUALITY:

ELT sensors are fixed around the building for the residents to know the quality of the air in the building ensuring them a safe place to reside.

7.5.Automatic lighting:

PIR (Passive Infrared) sensor used to detect humans and photo electric sensors used to mention the distance enables the actuator to turn on the lighting when someone enters and automatically turns off in the absence of people which saves electrical energy.

7.6.Fire sensing and suppression:

Fire sprinklers are automatically triggered when it reaches the fire specific temperature which uses 6 times less water than normal hose and more efficient. Flame detector senses the fire and alerts the fire service station.[4]

7.7.Automatic security system:

PIR sensor detects the presence of a human and signals the CCD and CMOS image sensors which captures the image of the person and compares with the registered database. If it does not match, the residents are given access to allow them inside.

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8.CONCLUSION

People come to the big cities behind happy life, but get depressed as time passes due to the congested and hectic lifestyle. So designing a community this way with modernized architectural high rise building would combat it. The building has been designed on the idea of procuring the present needs and also not husband from what is for the future generations. Moreover we wanted it to energy efficient and generate its own needs to the maximum. IOTs play a very crucial role in elevating the idea of the structure making it automated and ease our lifestyle. Solar workstation and vertical axis micro wind turbine are fixed to generate electricity. The way by which the building is constructed will reduce the pollution in the area, reduces indoor heat gain and it is a fire resistant coating is given for the buildings which will be of great value in the future. And it is one of the alternate replacements for apartments where people enjoy handling individual resources and are free from fast spread of diseases like Covid at present. People experience extra day lighting factor and which reduces the consumption of electricity. Tunneling system designed in such a manner that it will get control floods and manage droughts. As the building is constructed under the norms of Sustainable Development Goals it will last for the future generations effectively.[1] On the whole, the BINA MUSTADA will provide a clean and green place for a peaceful and sustainable living.

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