

ANALYSIS OF ENERGY PERFORMANCES PATTERNS ON CONTEMPORARY ARCHITECTURE-A CASE STUDY OF PAKISTAN MONUMENT

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Abstract

Basic regionalism is an engineering method that rejects and tries to counter the place lessness and shortage of person of the Modern Architecture, basically its miles the amalgamation and blend of regionalism and innovation. This paper manages the simple regionalism discovered in Pakistan. It carries the subjective simply as quantitative exam of the cutting-edge engineering preserving in see the specific shape's characteristics simply as breaking down it via diverse programming projects. This research paper stresses the constructing shape of Pakistan Monument utilizing automatic advances and offers the deduction of quantitative effects utilizing one-of-a-kind automatic sensitive products. Presently the shape picked for that reason for current is Pakistan Monument located in Islamabad. The precept focal factor of the paper is to realize the relationship of the territorial but cutting-edge layout of Pakistan landmark with the surroundings of the town utilizing one-of-a-kind automatic instruments. The exam paper is set the research of the web page and picked building utilizing unique programming, for example, Formit Pro, Revit, Insight 360 and Ladybug. In addition, a complete association of rendered drawings has been created utilizing Photoshop for layout exam and scene research depending on the concept of regionalism.

1. LITERATURE REVIEW:

Pakistan is an area wherein there may be numerous compositional visitor spots. From landmarks which are covered at the countrywide coin's notes, to catacombs of conspicuous Pakistanis. The provincial fabric of Pakistan contains blocks mainly purple bricks, mortar, lime stones like marble a granite. Most of the systems make use of regionally reachable fabric so it could make the shape inner time with much less value ranges (Bhatti et al., 2024). So, regional substances are viably applied

even in inflicting the cutting-edge shape and this to may be focused via this exploration paper.

In view of the relative novelty (1966) of the capital metropolis of Islamabad, it highlights modern layout displayed below a floor breaking strategy. Notwithstanding present day capital systems, Islamabad is moreover domestic to the famous Shah Faisal Mosque that is large to such a quantity that the petition foyer can oblige 10000 people, whilst verandas and porticoes can preserve greater than twenty-4,000 admirers. It moreover has a patio

that has sufficient area for 40 thousand individuals. Islamabad likewise has a video games complex, craftsmanship displays, an exhibition corridor of feature records, and 4 colleges.

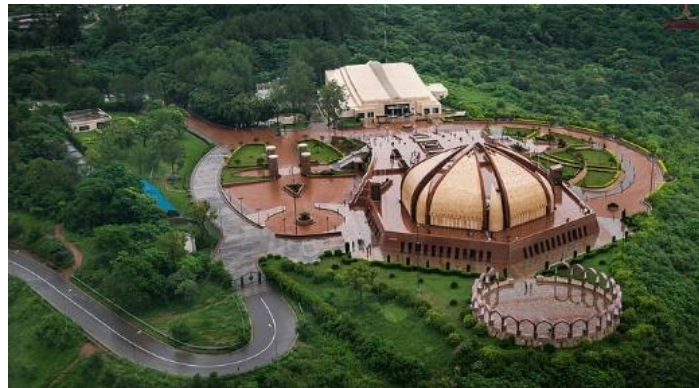
Different locations in and near Islamabad comprise Rawal Lake; the Rose and Jasmine Garden, the Murghzar Mini Zoo and Children`s Park; and the Shakarparian Hills, whose terraced lawn highlights views on exceptional slopes, Rawal Lake, and the city groups of Rawalpindi and Islamabad (Ahmed et al., 2024). The antiquated metropolis of Rawalpindi, at the outskirt of Islamabad, has a records that is going again 3,000 years. While several new modern systems had been introduced

to this metropolis, it has held pretty a piece of its recorded appearance and is amazing for its bazaars which have realistic enjoy in handiworks. Rawalpindi is domestic to Linquat Memorial Hall with alarge theater and library; Ayub National Park; and the Rawalpindi Golf Course, which changed into completed in 1926 but remains in standard use (Bhatti et al., 2024).The Pakistan Monument is a national landmark and legacy gallery situated on the western Shakarparian Hills in Islamabad, Pakistan.

Structural Engineer: Mushtaq & Bilal

Architect: Arif Masood

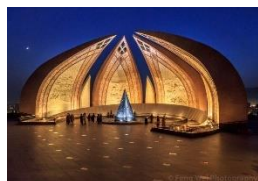
Total Cost: More than Rs.580 Million



Completed: March 23, 2007

Fig 1.1, 3D View of Pakistan Monument

The landmark was built to represent the solidarity of the Pakistani individuals. It is committed to the individuals of Pakistan who relinquished their "today" for a superior "tomorrow". The monument Islamabad is shaped like a blossoming flower. It is spread over an area of 28000 square meters. Its elevation makes the monument visible from across the Islamabad-Rawalpindi metropolitan area and is a popular tourist destination.



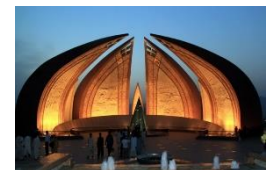
North elevation



West elevation



East elevation



South elevation

Fig 1.2, Elevations of monument

1.1. Structure And Materials:

Since the social individual of Pakistan relies upon on Mughal engineering typically and layout of Islamabad explicitly relies upon at the innovation so on this placing this shape is being deliberate remembering the Mughal compositional additives simply as modern constructing additives. Covering an absolute region of 2.eight hectares (6.nine sections of land), the plan of the landmark is mounted with inside the wealthy Mughal engineering of the Subcontinent whilst its passage is being following the cutting-edge layout.

Its petal shaped shape is gotten from the standard muqarnas of Mughal engineering. In it, the chronicled form of the muqarnas is being modernized. One of the important further to functions of travelling the Pakistan Monument is that one doesn't want to pay a weighty entirety or strain over taking excursion days paintings to peer the marvels of Pakistan. In the occasion that one offers near attention to the petals, Quaid-e-Azam's grave is seemed near Minar-e-Pakistan. His domestic in Ziarat stays above Baab-e-Khyber, and Faisal Masjid is reduce with Tarbela Dam. Directly near the Monument is the exhibition corridor of wax dolls that painting Pakistan's vast history. Furthermore, the Lok Virsa exhibition corridor, which expects to defend the nation's manner of existence, is moreover handiest a power away. Everything is there, perfectly reduce in (Ahmad et al., 2024). The resultant petal-molded shape stresses

the importance of unity and concord of the people of Pakistan. Instead of representing the 4 territories (as is erroneously watched), it speaks to the 4 particular societies of the people of Pakistan. The 4 big petals communicate to each one of the 4 societies, the Punjabi, the Balochi, the Sindhi and the Pakhtun. The 3 littler petals communicate to: the Minorities, Azad Kashmir and Gilgit Baltistan. Every one of the seven petals, but independent of 1 another, stand collectively as one to border the use of Pakistan. Standing collectively, they're making sure the super megacelebrity and the bow of the banner of Pakistan. The super megacelebrity of the banner with inside the landmark is dependent in sleek darkish stone with terrific stars, which communicate to the people who relinquished their existence for Pakistan.



Fig 1.3, Petals to the monument



Fig.1.4, Carving on petals

The moon sickle is produced using treated steel with helpful works of Quaid-e-Azam Mohammed Ali Jinnah and Allama Iqbal. The petals are worked of rock (anticipating in a suspended cantilever structure, among the biggest in Asia) and its

internal dividers are secured with fine art portraying the different tourist spots of the Pakistan, for example, Lahore Fort, Badshahi Mosque, Khyber Pass and Minar-e-Pakistan.

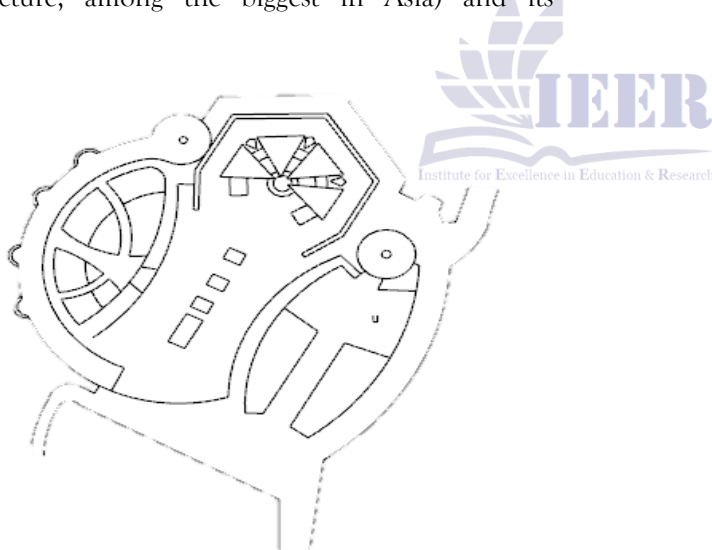


Fig 1.5, Plan of monument (Author)

The inward dividers of Pakistan Monument's stone petals are enlivened with wall paintings. These wall paintings are principally founded on Islamic Art. The improving group drove by Zarar Haider Babri and Kausar Jahan went through 119,000 hours of fine art.

The principal petal beginning from the correct side portrays the pictures of Shah Faisal Mosque, Malki Tombs, Rohtas Fort, Shahjahan Mosque and Gawadar. The subsequent petal highlights Quaid-e-

Azam Muhammad Ali Jinnah, Fatima Jinnah, Badshahi Mosque, Minar-e-Pakistan, Karakorum Highway, Shila Tunnel, and a group cheering at Muhammad Ali Jinnah's open appearance. The

third petal highlights includes the pictures of Allama Iqbal, the Tomb of Shah Rukn-e-Alam, Civilization of Indus Valley, Mahabat Khan Mosque, Indus River Delta and Lahore Fort. The fourth and last petal reflects Uch Sharif Tomb, Islamia College Peshawar, the Ziarat Residency, Shalamar Gardens, Sheesh Mehal, Lahore, the Khyber Pass and a polo coordinate.

On the off potential for success that one has in the exceptionally focus, they can see those notorious pictures of Allama Iqbal looking off into the separation, Quaid-e-Azam contacting his fingers to his temple, and Fatima Jinnah grinning delicately. One is hit over again with the acknowledgment that these regarded figures battled for our opportunity. They had a dream and our country is its result. Those pictures are blended with those of our present, regardless of whether they are of the laborers who made it or the individuals who visit it.

The Monument stands tall and glad since it speaks to everybody.

Other than the Peoples Monument, there is a historical center which portrays the history and recounts to the account of the making of Pakistan. These two structures are associated by an enormous piazza, known as the Freedom Plaza. In spite of the fact that the name of the modeler Arif Masoud—is recorded in stone in the principle Dedication Plaque situated toward the start of the primary square he has respected all development laborers by setting their hand impressions up and down the long dividers flanking this Freedom Plaza on both the sides. At the most remote end is a survey stage which gives a bird's-eye perspective on Islamabad City. The arrangement for a National Monument was first imagined in 2022 by President Pervez Musharraf helped by Uxi Mufti, child of Mumtaz Mufti.

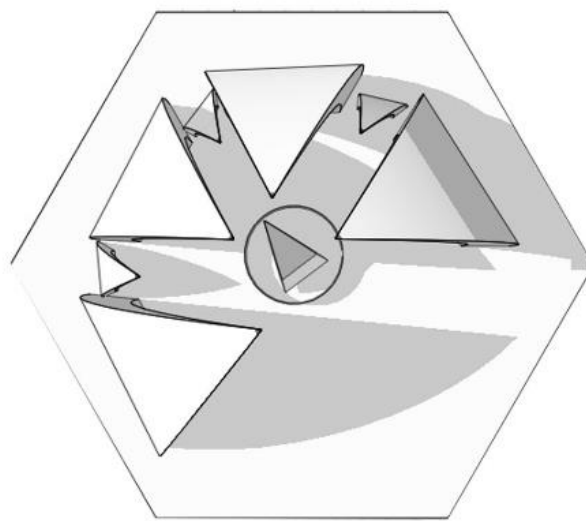


Fig 1.6, Plan of monument and surroundings (Author)

The Ministry of Culture changed into entrusted through President Musharraf to compose via Pakistan Council of Architects and Town Planners ; a country wide landmark shape competition structured close to connoting quality, cohesion and dedication of the people of Pakistan right into a image speak me to an self-reliant and loose country. From a mixture of 21 entries, three have been short-recorded. The final shape proposed through Arif Masood changed into chosen.

At the factor whilst you input on this historic middle you could manifestly have a look at that it's miles remote into numerous parts. You can find out the historic backdrop of Pakistan in a single phase even as destiny on the alternative part. The figures of Muslim saints and the political dissidents are on hand right here. The person room of Iqbal and Quaid are likewise gift. A library is also gift to inspire the visitors with the bygone generation recordings. Fatimah Jinnah likewise contributed a full-size activity with inside the war of opportunity.

Here you could find out her with the Quaid-e-Azam on numerous events. This the whole thing changed into prepared to train the adolescent and teenagers approximately our records and culture. No doubt this one changed into a fantastic venture which changed into completed superbly.

Gandhara Art, Buddha sculpture, Muhammad field Qasim, Mahmood Ghaznavi, conflict of opportunity, Gandhi, Tilak, Gokhale, Chandra Pal, Dadabhai Naoraji and infrequently any gradually exquisite pioneers and locations are brought right here via the figures. Maps of Pakistan are likewise constant right here for the visitors. Various factors diagnosed with the Pakistan are mentioned with inside the sound and video area. Old tune and antique pics of vocalists are likewise a bit of these videos.

The other basic piece of this structure is the Pakistan Monument Museum. It was the most centering piece of this arrangement. It incorporates the historical backdrop of the nation with the legacy, customs and likely arrangements. Distinctive timespans of the Pakistan was appeared in this historical center with the assistance of numerous figures. Every one of these things take you the past and you want to exist After the end of this challenge this fact changed into located that those figures are of low norm and don't satisfy the hints then this undertaking changed into given to the Lok Virsa organization. Under the control of Mr. Kamran Javed the organization of Lok Virsa completed this challenge so speedy adjacent the landmark is the Pakistan Monument Museum, which includes a wax historic middle delineating tremendous events prompting the Pakistan Movement. Moreover, the workplaces consists of a

reference library, numerous media document, accumulating hall along a 62-seat restriction theater called Panorama Hall. The complicated receives on ordinary were given 1500 voyagers for every day totaling at 0.fifty seven million visitors in 2015. From air the landmark seems as eleven though a famous person (focus) and a sickle moon (fashioned with the aid of using dividers framing the petals), those talk to the famous person and bow on Pakistan's banner. The established order stone changed into laid on 25 May 2004, completed in 2006 and delivered on 23 March 2007 with the aid of using President General Pervez Musharraf.

The aesthetically established engineering of Pakistan Monument is National Monument Islamabad of Pakistan. It offers facts approximately Pakistan's manner of lifestyles, legacy and records in a certainly considered one among a type manner. It enables us to recollect all of the penances our precursors made to perform the goal of an independent kingdom for us. Pakistan Monument Museum is moreover a cost traveling place. Therefore, the Monument has been meant to reflect the manner of lifestyles and human development of the kingdom and delineates the narrative of the Pakistan Movement, committed to the folks who relinquished themselves for humans with inside the future in that age and everything is occurring before you.

2. SITE ANALYSIS:

Temperature:

As telescopes and other instruments try to be in equilibrium according to the surrounding air and atmosphere as in fig 2.1.

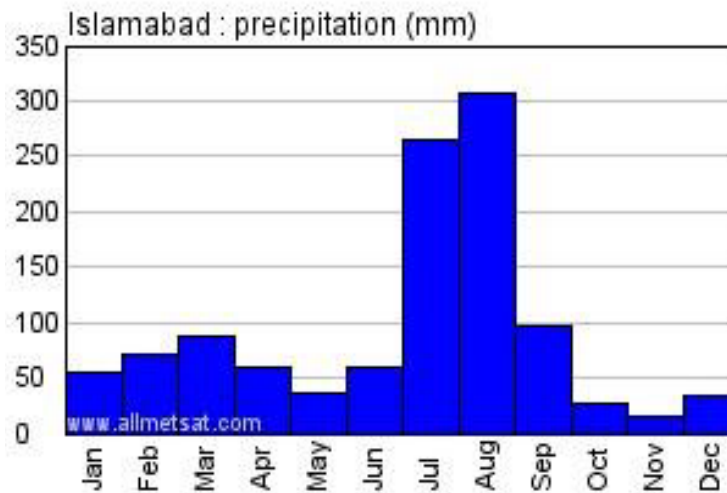


Fig 2.1(Author)

2.1. Relative humidity:

As much humidity leads to greater moisture content and hence condensations in optical parts

occur and also refrigeration in most instruments and electrical appliances, a column of perceptible water, etc as in fig 2.2.

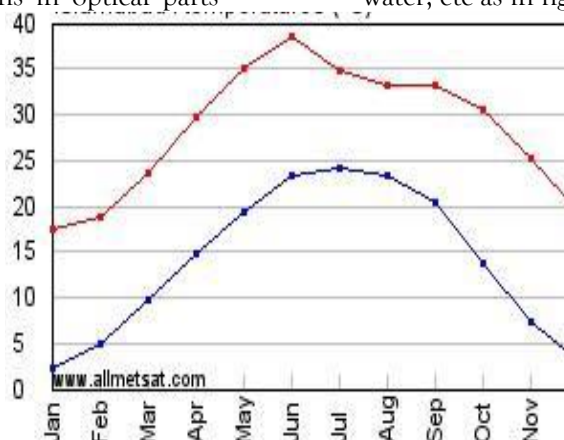


Fig 2.2, Humidity graph of Islamabad (Author)

2.2. Weather Suitability:

Islamabad has:

- Less humidity
- Less temperature
- Less rainfall

- Fewer wind pressures

2.3. Weather Analysis:

Weekly and monthly temperature analysis of the city of Islamabad is explained in fig 2.3.

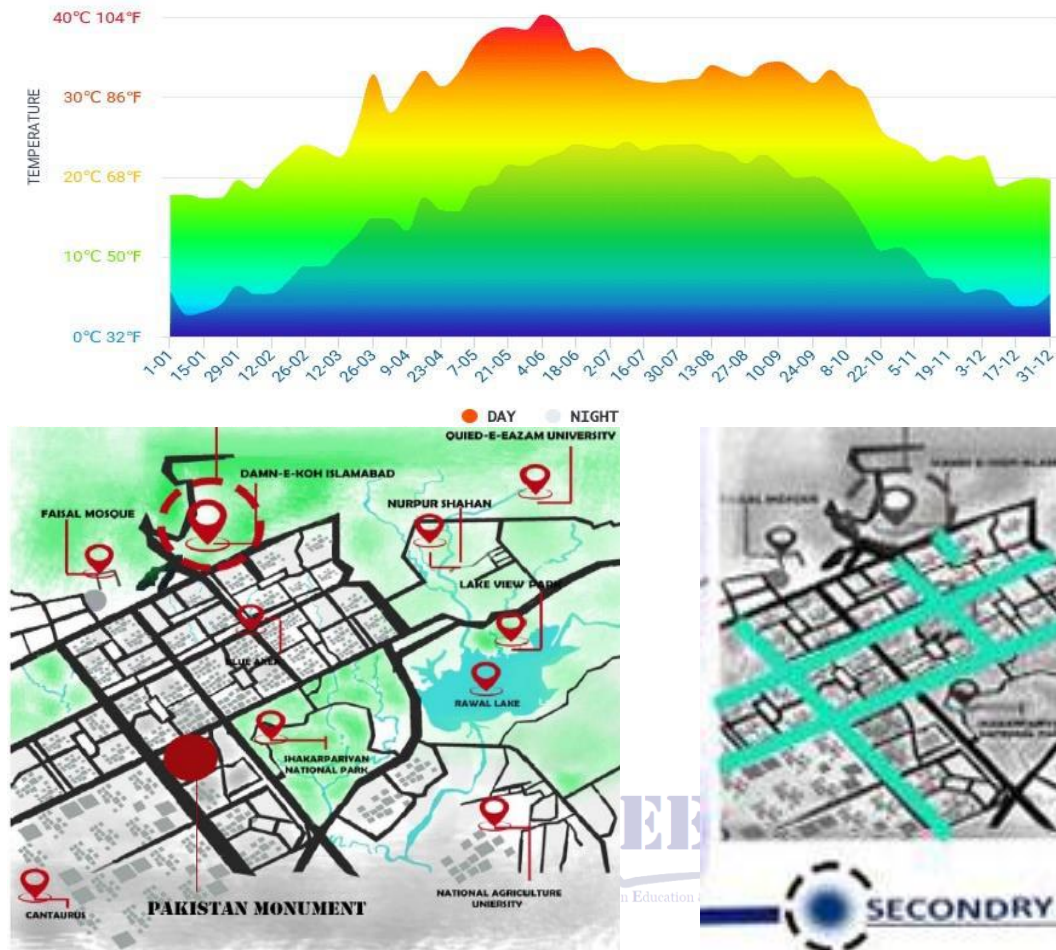


Fig 2.3, Weather variations (Author)

2.4. Analysis On Photoshop

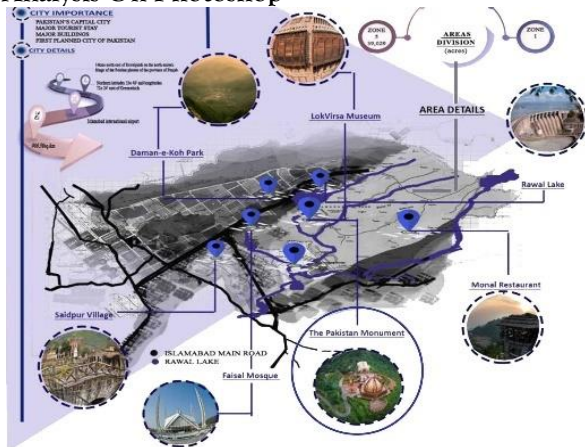


Fig 2.4(Author)



2.5. Roads analysis:

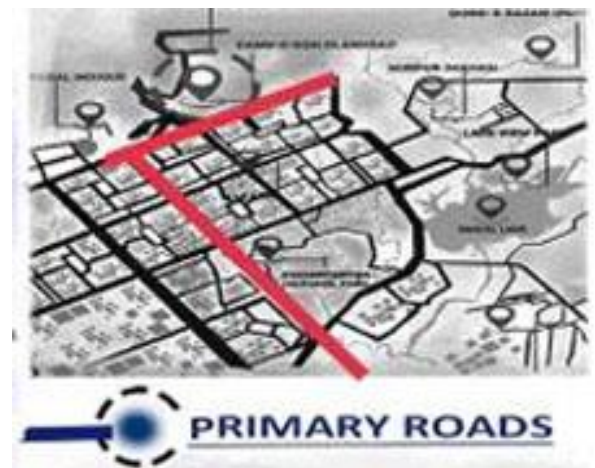


Fig 2.5(Author)

2.6. Core analysis of the site



Fig 2.6(Author)

2.7. Greenery Analysis:



Fig 2.7 (Author)

2.8. Figure ground relationship:



The figure ground reveals the relationship between built and un built spaces This is used to understand the spatial structure of sites Elevations, building mass, and floor plans can all be read through figure ground relationships to reveal the distribution of foreground and background spaces. Following are the drawings showing figure ground and parking relationship with the site.

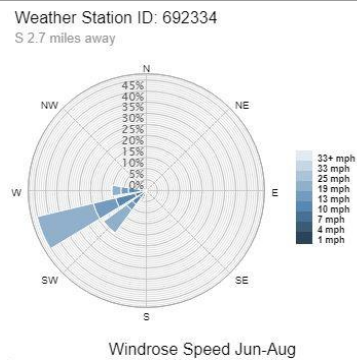


Fig 2.8 (Author)

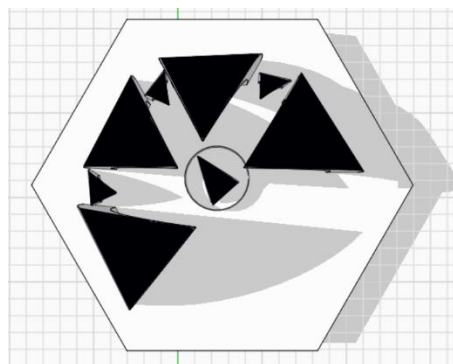


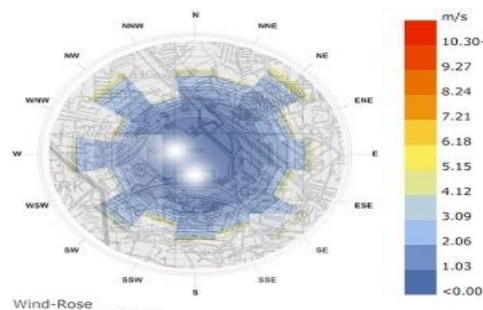
Fig 2.9 (Author)

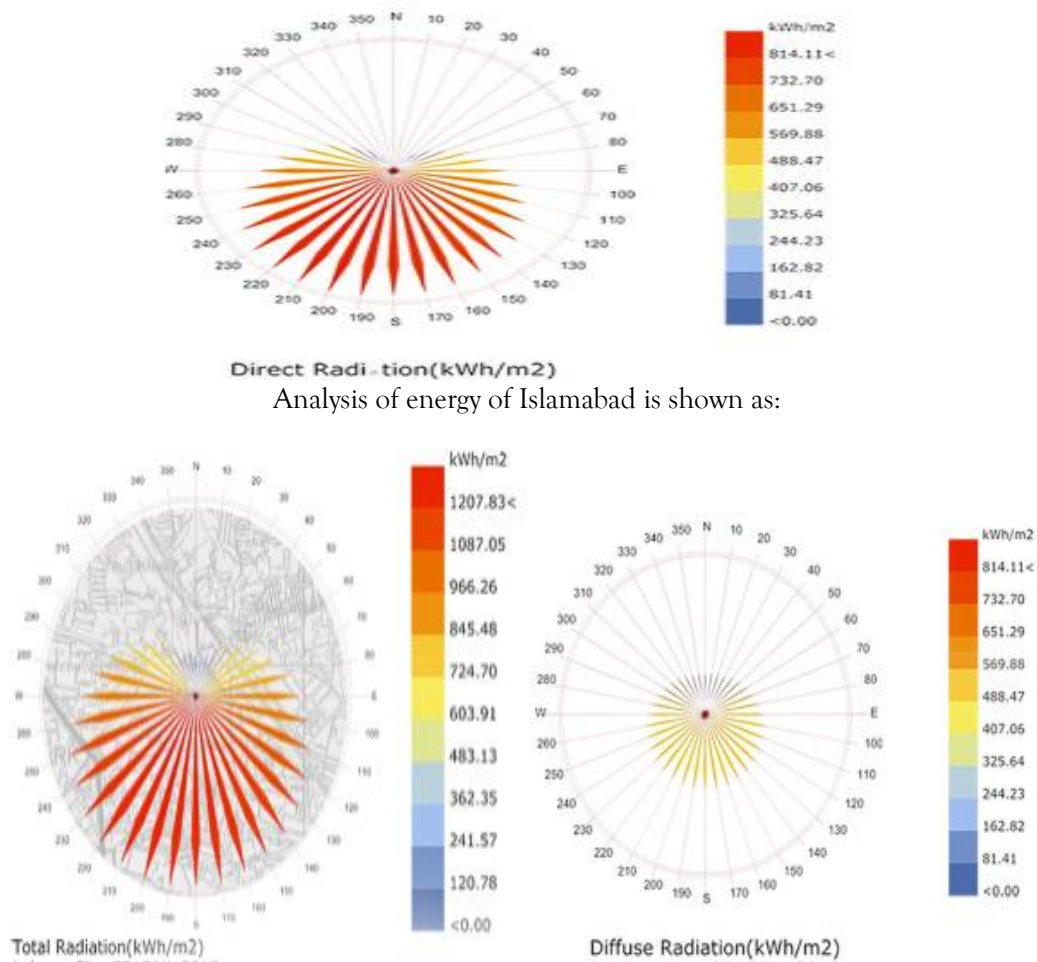
3. ENERGY ANALYSIS OF PAKISTAN MONUMENT:

Below are the sun path, energy and radiation analysis of the site and building model done on

3.1. Analysis By Ladybug:

Ladybug, Autodesk Formit and Insight 360 as well. It shows how the position of sun during different times of the year effects on the site and the amount of radiations and energy received by the building.





Analysis of energy of Islamabad is shown as:

Analysis of Pakistan Monument is done on ladybug as:

3.1.1. Solar Analysis:

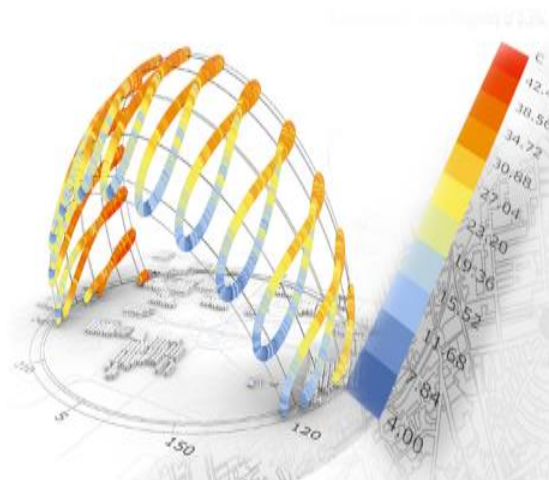


Fig 3.2, solar analysis of Pakistan Monument (Author)

3.1.2. Wind Analysis:

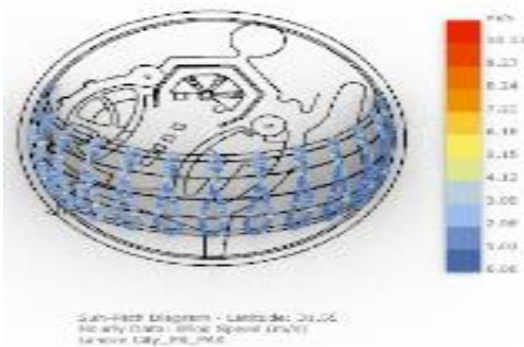
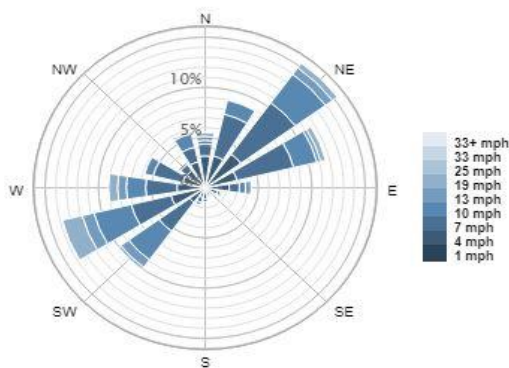


Fig 3.3, Wind analysis of Pakistan Monument (Author)

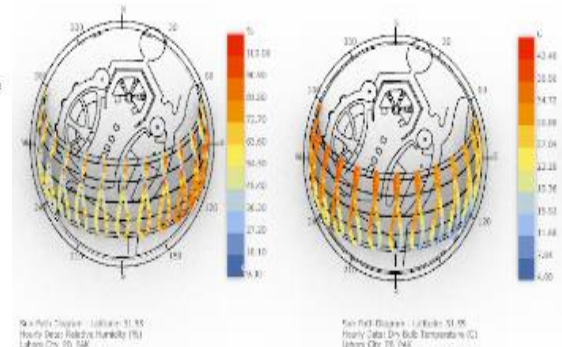
3.2. Analysis By Formit:

We were supposed to make a 3d model of selected building on Autodesk Formit and to generate its Insight (performing energy analysis in Revit).

Weather Station ID: 692334
S 2.7 miles away



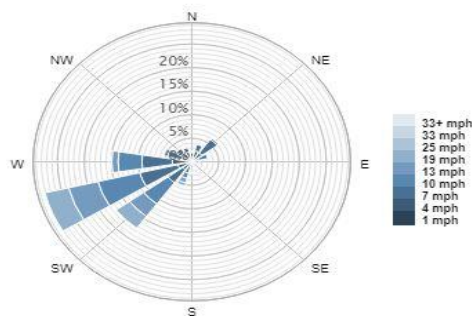
Windrose Speed Dec-Feb



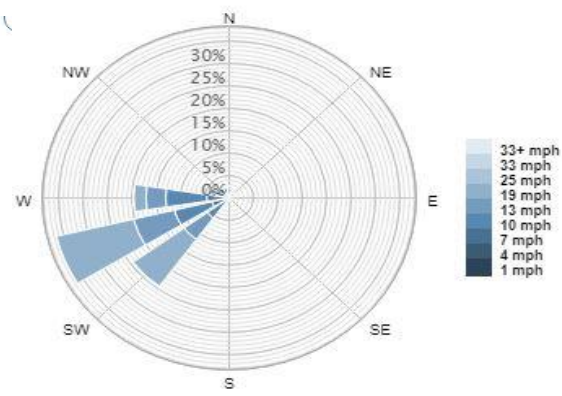
The weather analysis on formit is done as:

Weather Station ID: 692334
S 2.7 miles away

Weather Station ID: 692334
S 2.7 miles away



Windrose Speed Sep-Nov



Windrose Speed Mar-May

Fig 3.4, Weather analysis on formit(Author)

In order to generate Insight, we need to make our model on FormIt Pro or Revit.

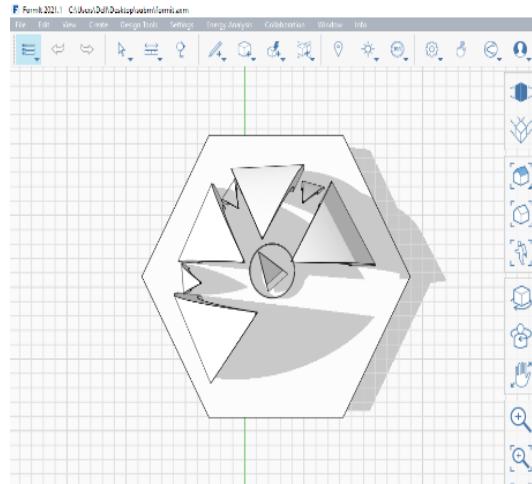


Fig 3.5, Plan view in formit(Author)



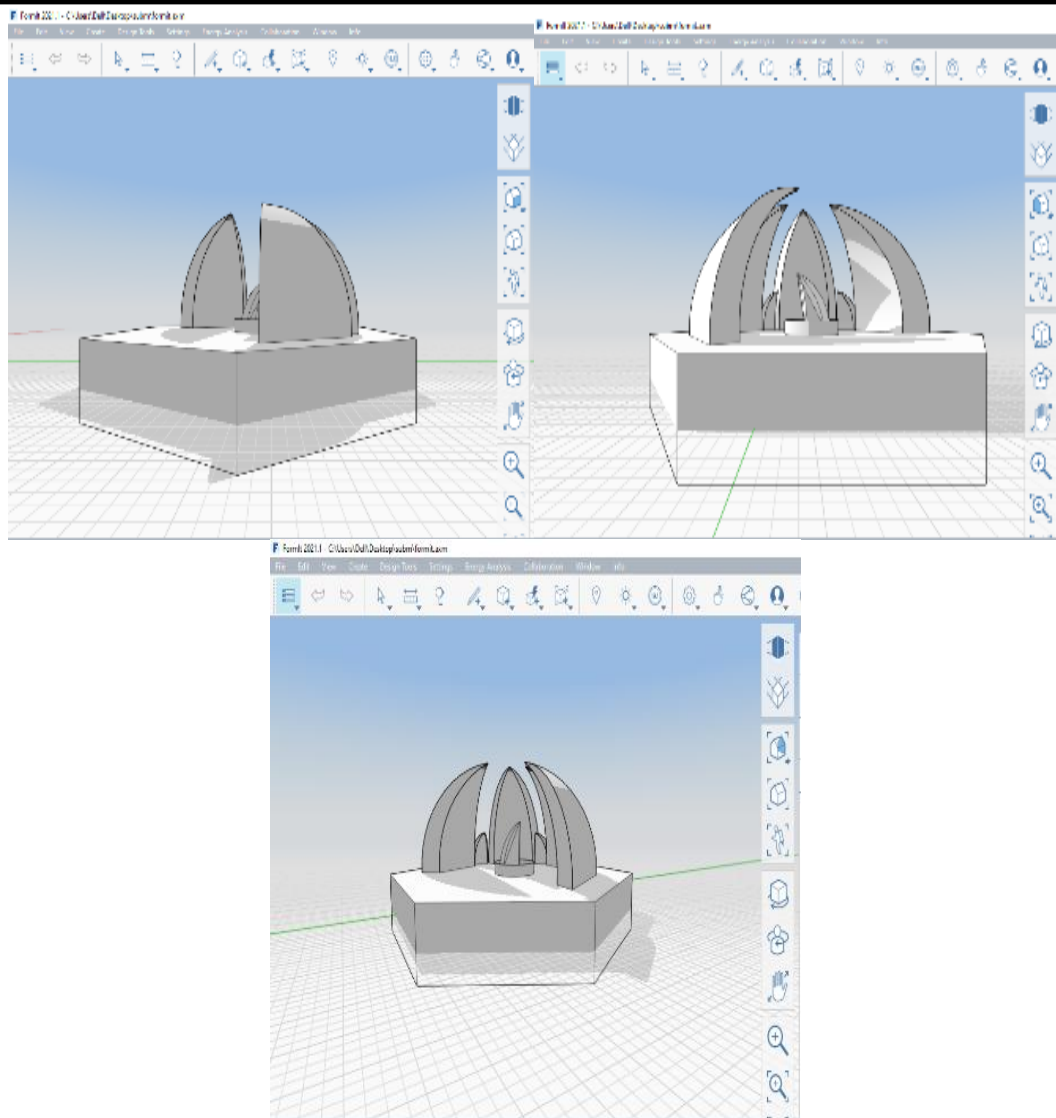


Fig 3.6, 3D view in formit(Author)

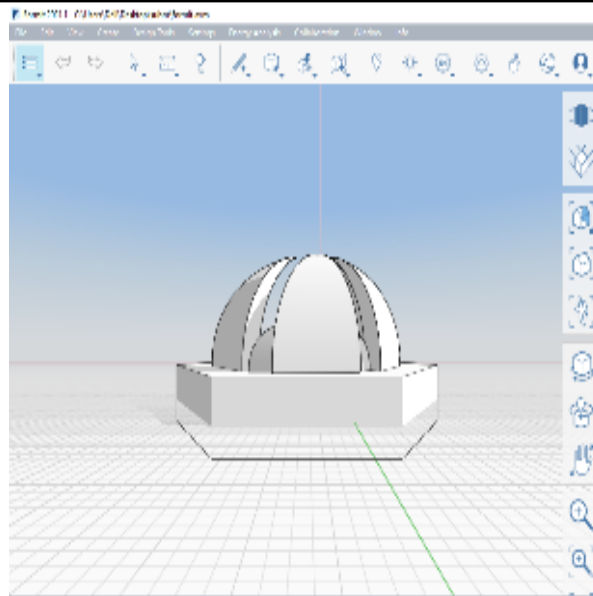
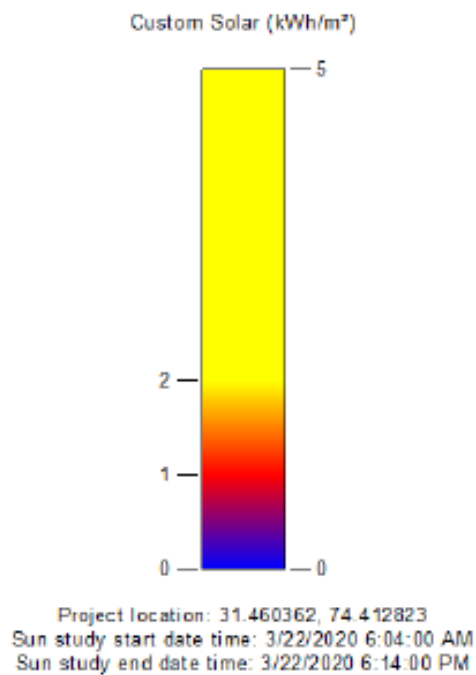


Fig 3.7, Elevations in formit(Author)

3.2.1. Energy Analysis On Model By Formit:



After making the model on formit it is being analyzed by sun's movement on the building as:

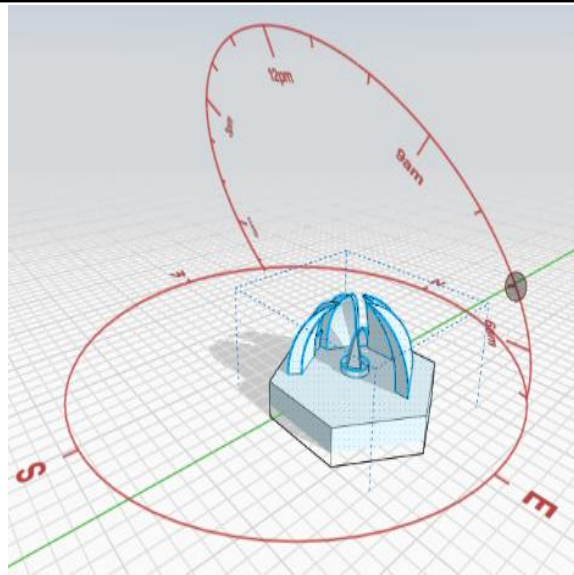
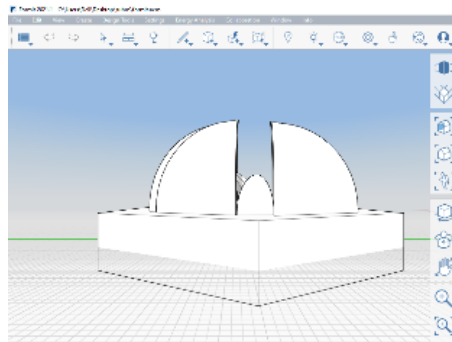
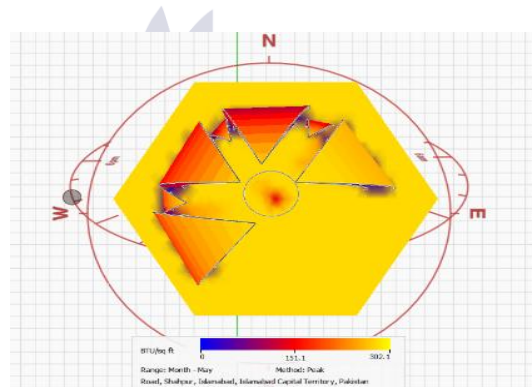


Fig 3.8, Analysis of Model (Author)

Analysis of the building model done on Formit shows the areas which receives maximum and minimum amount of radiations of the sun. It has three ranges as yellow color shows extreme radiations, intermediate radiations are shown by red color and blue radiations show less radiations.

In summer:



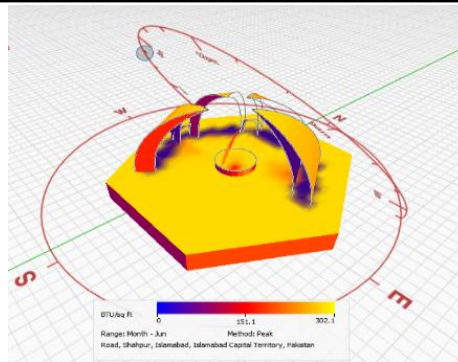


Fig 3.9, Maximum amount of radiations in June (Author)

In winter:

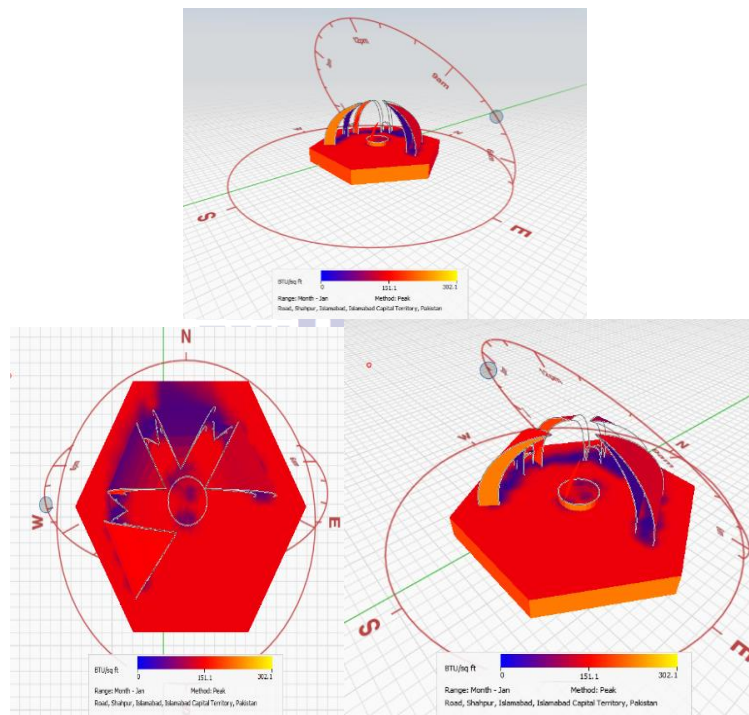


Fig 3.10, Minimum amount of radiations in January (Author)

3.3.ANALYSIS BY INSIGHT 360:

Energy Analysis of the building model done on Insight 360 shows the areas which receives max and

minimum radiations of the sun on average throughout the month.

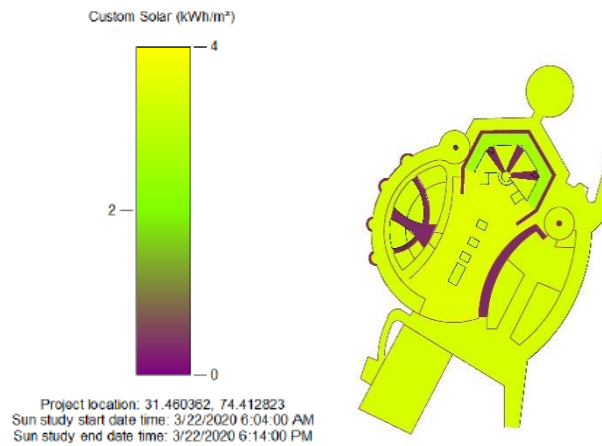
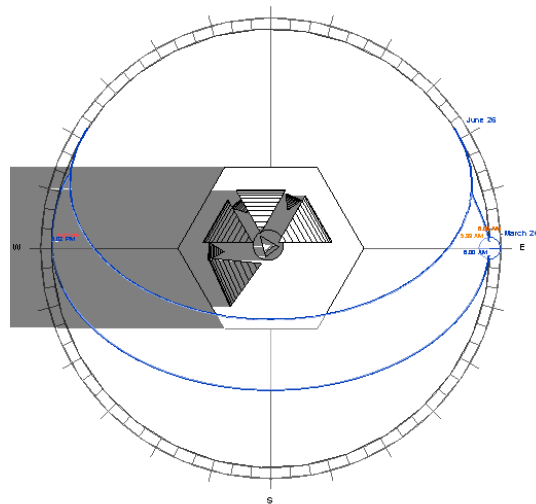
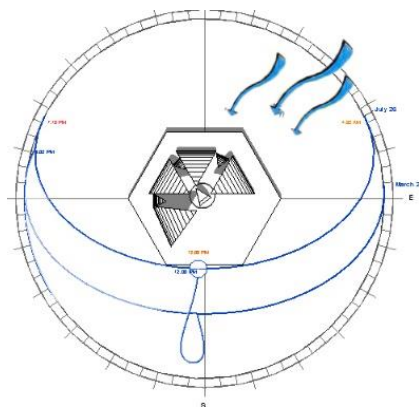


Fig 3.11, Analysis on Insight 360(Author)

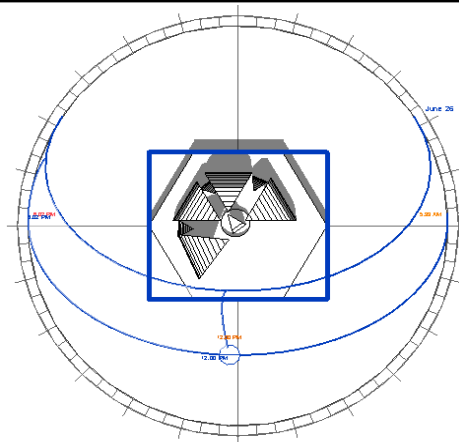
3.4.SHADOW ANALYSIS BY REVIT:



In summers:



At 6 am



At 12 pm

Fig 3.12, Summer Solstice Shadow Rangedata (Author)

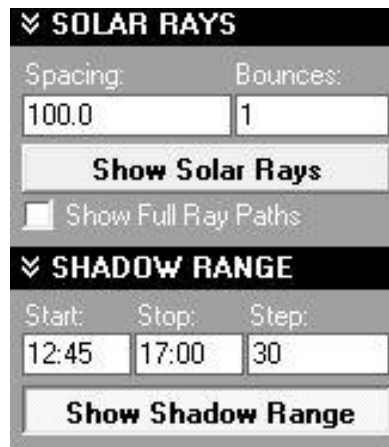
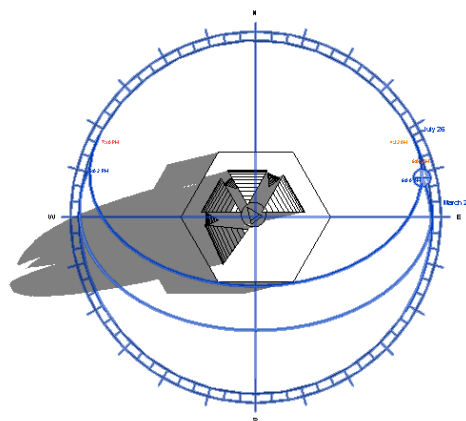


Fig 3.13, Source (Autodesk Ecotech) (Author)

Data Recorded from Autodesk Ecotech for above shadow range recorded and can be seen and observed.

In winters:



At 6 am

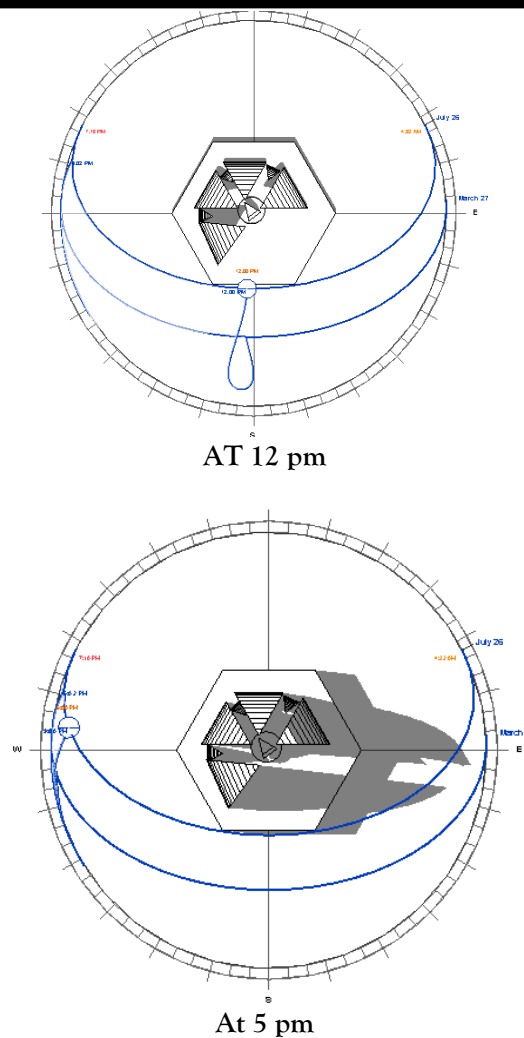


Fig 3.14, Winter Solstice Shadow Range (Author)

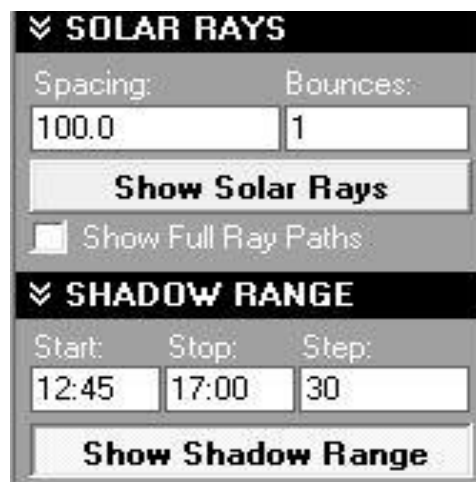
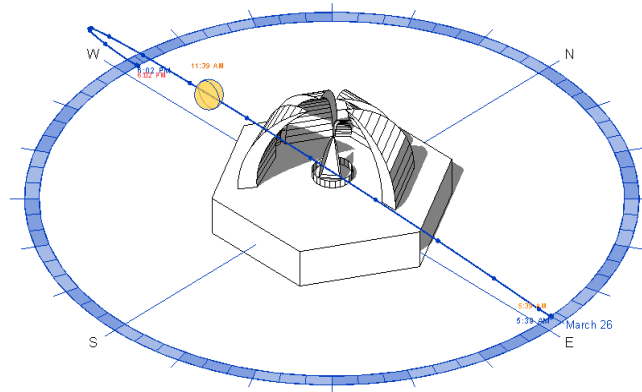


Fig 3.15, Source (Autodesk Ecotech) (Author)

Above is the dart chart for the winter

solstice and can be seen the steps and start and stop range of the shadows in

the image taken from Autodesk Ecotech Originally.



3.4.1. Energy Analysis on Revit:

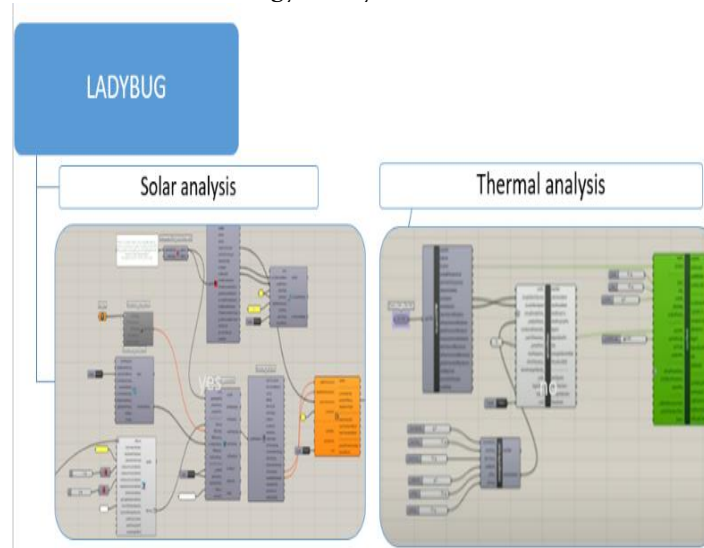


Fig 3.16, Energy analysis of monument by Revit (Author)

4. CONCLUSION:

- Thus, building and construction have been significant activities in human civilization. The journey from caves to building gigantic cities reflects the enormous interest and capacity of human beings in these areas.
- After independence, Pakistan emphasized on contemporary architecture based on somehow its cultural identity that makes the linkage between its architecture and culture. Today, along with technical knowledge the cultural and ethical dimensions of Muslim architecture need to be

explored to gain an insight and respond to the challenges in the contemporary Muslim world. Various characteristics of Muslim architecture have been highlighted in literature, which are still relevant to deal with the challenges of architecture.

- Adaptability is viewed as one of the important aspects of Muslim architecture. Muslims have learnt from other traditions but they have adapted them wisely by modifying and adding according to their cultural and contextual needs.

The rich Pakistan heritage in architecture can be a valuable source for Muslims to learn from in order to respond to the ethical/cultural issues of architecture. In this regard, conscious efforts are

needed at multiple levels such as the policy level, through education, media etc, to educate the people about the importance of the built environment in enhancing the quality of life.

- Thus, in the context of this building or any other important historical building we come to the point

that culture and architecture are side by side. These two terms are being linked as every Pakistani significant building has cultural that includes mostly the Mughal features as well as architectural that includes all styles in it.

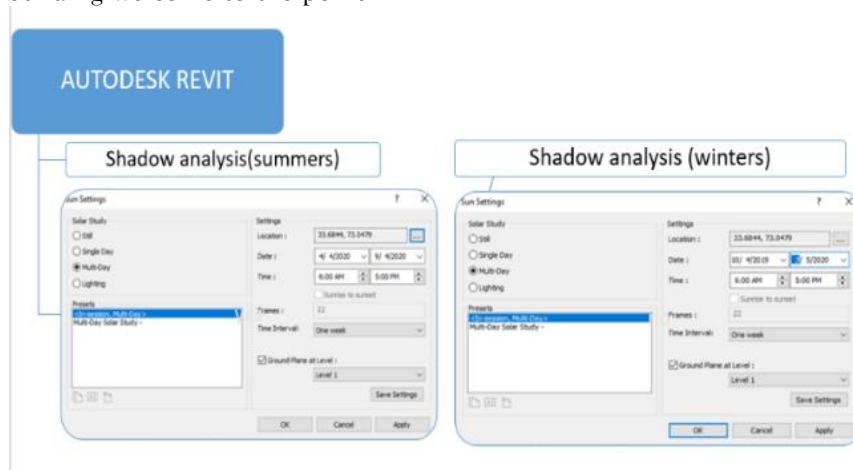
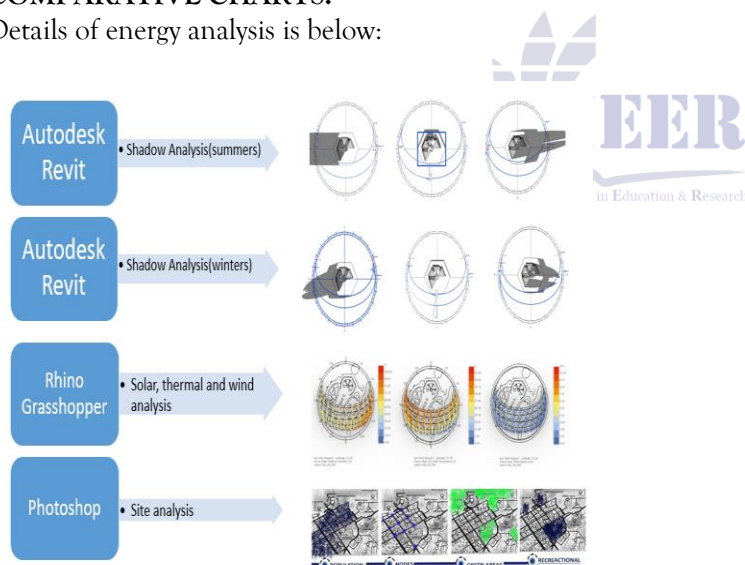


Fig 5.1, Analysis on different softwares (Author)

5. COMPARATIVE CHARTS:

Details of energy analysis is below:



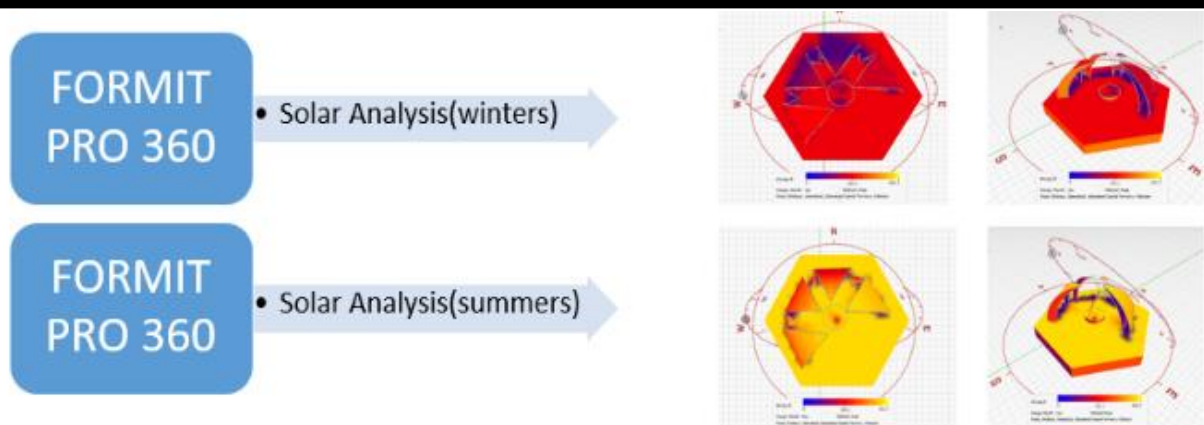


Fig 5.2, Method and details of analysis (Author)

6. RESULTS:

Software	Analysis	Results
Autodesk Revit	Shadow analysis(summers)	There is more shadow covering the whole structure.
Autodesk Revit	Shadow analysis(winters)	Less shadow than summers.
Ladybug Grasshopper	Solar analysis	There are more radiations on west side.
Ladybug Grasshopper	Thermal analysis	On east side there is most humidity.
Ladybug Grasshopper	Wind analysis	As south side is open, more wind is passing through it.
Formit Pro 360	Shadow analysis	Most of the area is covered with shadow because of its curved and tall structure.
Formit Pro 360	Solar analysis	More Radiations on west side.
Adobe Photoshop	Site analysis	Building is on north-east side.
Adobe Photoshop	Green areas	Many Green areas are there on north side.
Adobe Photoshop	Population	Very populated area.
Adobe Photoshop	Nodes	Many nodes nearby.

Fig 6.1, (Author)

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