

Glass and Its Relation in The Bridge Design at Tourist Villages in Egypt

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Abstract:

The glass was used for the first time on bridges in 1995 to give a complete and different start in the design of bridges which is to be highlighted as one of the most important aspects of tourism and the most important thing that characterizes the country where the bridge was established. Glass bridges are one of the most important modern architectural methods used in place of historical built bridges, first in the form of arches of stone or wood, then in the form of metal and reinforced concrete, with ordinary or compressed rebar.

Increasingly sophisticated bridging methods, and the nature of bridges have changed from purely functional objectives to fully designed structures that encompass technological and esthetic aspects, with the development of used materials which is having a major impact on bridge design in size and shape. With advances, technological development, the discovery of advanced technological and engineering technologies, new and rapid building materials based on scientific discoveries of building materials and techniques, the bridges of our modern times are changing with electronic technology and its revolution of modern information, technology and advanced systems now used in bridges, taking into account the environmental and technological factors.

The environment is having a major impact on design elements, necessitating a reconsideration of bridge designs using the maximum utility of the surrounding environment and utilizing their impact on design through architectural formation, which is the product of several factors that vary from time to time and from place to place depending on the environment, location or climate. Glass is an important element in the materials used in these bridges and therefore the aim of the search was to study the most important types of glass that can be used in the design and implementation of bridges in accordance with the surrounding environment, to give strength and security to this bridge while controlling the absorption and reflection of light rays.

Key Words:

Design- Bridges – Glass - Environment

Glass is an important material that is used in all areas whether architectural, industrial or artistic. Glass showed its strength in building bridges, as the desire for transparency increases, taking into account the environmental and technical factors. The environment had a major impact on design elements, which necessitated a review of bridge designs using the maximum utility of the surrounding environment and utilizing their impact on design by the environment, whether location or climate, to achieve human well-being and reduce environmental damage in terms of environmental, esthetic and utility compliance **Search problem:**

- Underutilization of glass in the design of bridges in Egyptian tourist villages emphasizes the unique features of Egyptian lounge and advanced technology.

Research objective:

- How to design glass bridges in Egyptian tourist villages? Relying on advanced technology in glass and architectural installations, and conduct a study of the most important types of glass that can be used in the design of bridges in proportion to the surrounding environment and give capacity and safety to this bridge, then give transparency and control the absorption and reflection of light rays.

To solve the problem of the research and reach the required target, the following has been studied:

1. Study the types of glass that are suitable for the design of bridges in the Egyptian environment.
2. Study engineering, technical and environmental considerations of the glass used in bridge design.
3. Design (Bridge or Glass Walkway) of a tourist village is suitable for use in the light of appropriate technical and technological results.

First: A study on the types of glass that are suitable for designing bridges in the Egyptian environment.

Float Glass:

Glass is produced by mixing different proportions of some of the following ingredients, silica sand, calcium carbonate, sodium carbonate, and mixed ingredients which are being mixed and pushed into the oven at an ambient temperature of approximately 1600 C, At 866 K when the glass cools down to room temperature.

Laminated Glass:

Laminated glass is made of two or more pieces of glass with one layer or multi-layers Polyvinyl butyral(PVB), Ionomer Sentry Glass(SGP), Ethylene Vinyl Acetate(EVA), Polyurethane (TPU), Poured resin (CIP) between them. Due to the strong cohesion of PVB, laminated glass becomes stable under high temperature and pressure.

Heat-Treated Glass:

Heat-treated glass is produced (Toughened glass- Heat strengthened glass) in the same way. Using the same equipment, the glass is heated up to approximately 650°C, then it is cooled down quickly and a pressure is generated on the surface of the glass, by controlling the cooling rate, that's how it is determined whether the glass is tempered or heat strengthened glass.

Wired Glass:

Used with metal mesh (iron or copper) between two glass panels at approximately 750°, it is then gradually cooled to achieve quality. This type is frequently used in roof coverage to achieve good lighting and is also used as protective cover in windows for its ability to resist fire.

Anti- Reflective glass:

This type of glass is a float glass that is covered with a special coating that reflects a small amount of light and can provide the highest transparency and visual clarity.

Curved Glass:

Curved glass gradually warms the level glass to reach a temperature slightly above the melting point, then it gives a convex shape in a special oven, and once the glass is shaped, it is cooled in a controlled manner to make sure that the final product is free of any internal stresses.

Self-cleaning glass:

This type is designed to self-clean, due to the finish coating which contains very small titanium dioxide crystals TiO_2 , and is best suited for use as a photo stimulus for several advantages including "incompletely, corrosion-resistant, requiring treatment and preparation.

Second: Studying engineering, technical and environmental considerations for designing glass bridges in Egypt:

The design and use of glass is an important building material of a special character, with glass acting as a filter cover to provide the required natural light, direct solar radiation shielding in summer to prevent the heating of spaces, and allowing it to warm during winter and increase light appearance.

Objectives related to the depletion of radiation:

To reduce heat penetration in summer:

Glass reduces heat inwards by:

- Prevent direct solar radiation from penetrating by different means of shadows.
- The radiation of glass to heat in the form of long waves that result in the temperature of the glass.
- Reduced conduction heat transfer by glass due to temperature difference.

Objectives and functions for non-radiation glass:

There are other functions and objectives that the glass must achieve alongside the radiological treatments:

Effect on architectural form:

- shape compatibility and no compromise on the esthetic value of the bridge.

The most important esthetics in bridging:

Concepts applied that deal with contemporary bridge designs in terms of the concept of formation: This concept has treated bridges with the concept of creativity in form, and has

adopted a consideration of creation which is one of the three aspects of the misconception of work (and function-form-creation).

Creation concept: Thomas Telford, a British engineer, and he was the first to be refer to as the originator, the personal expression of origin within the rules and regulations of efficiency and economy.

Technician Application:

The ability to design bridges as artistic expressions by art scientists, art histories, designers and engineers has made it clear that they can be designed as artistic expressions.

Foundations of bridge design:

1. At the visual level:

By taking into account the elements of the visual formation of the mass through (lines - shape - color - texture - proportions - scale) and their relationship to the elements of the visual formation of the surrounding space on the one hand and what should be between them in terms of equilibrium, homogeneity and complementarity.

2. At the functional level

This is achieved through the reflection of the function on the external and internal shape of the origin (spaces- passages- portals) such as the design of walkway displays that are suitable for the numbers used for them, especially at peak time, or taking into account the climatic and environmental aspects of the site and taking them into account when designing.

3. At the structural level

It is a good choice of construction system and building materials that are tailored to the design requirements of a voter and that fit in the exterior with the ocean, as well as providing security and safety factors for users.

4. Economically

This is by creating a balance between achieving an acceptable cost of origin and achieving the best solutions in achieving esthetic values, not achieving one at the expense of the other.

Third: Design (a bridge or a glass walkway) for a tourist village and apply the study to it under the appropriate technical and technological results:

We found that in Egypt, such bridges and walkways had already been built but in the city of Marsa Matrouh on Cleopatra Beach, That's why we think of a bridge like a resort which is an investment for attracting tourists in Ain El-Sokhna, the hot sulfurite has rocky beaches, with white sand then coral reef areas and colorful fish, it has been agreed with the village of Piasera with the hot eye to set up a beach walkway to help the tourists inside the village see the water and coral reefs from the bottom of this walkway.

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