

# Bridge Architecture in Malaysia

H. Niroumand, M. F. M. Zain, and M. Jamil

**Abstract**— Bridges, symbols of superior progress, are a type of architectural construction that its importance is frequently raised to a level of emblematic significance. A review of the panorama of world architecture during the past decade reveals a great multiplicity of styles and trends, all of which provide an undeniable wealth of richness. In this paper is presented architectural aspects in Malaysian bridges. According to the configuration of frameworks, bridges may be described as arched, girdered, cable stayed or suspension. Refereeing to materials, Malaysian bridges are used natural stone, wood and steel as well as mass concrete, either reinforced or pre-stressed in the bridges construction that they are an important factor in architecture and aesthetic of bridges.

**Index Terms**—Bridge architecture, Malaysia, Penang bridge, Putrajaya bridges, sky bridge, materials, aesthetic.

## I. INTRODUCTION

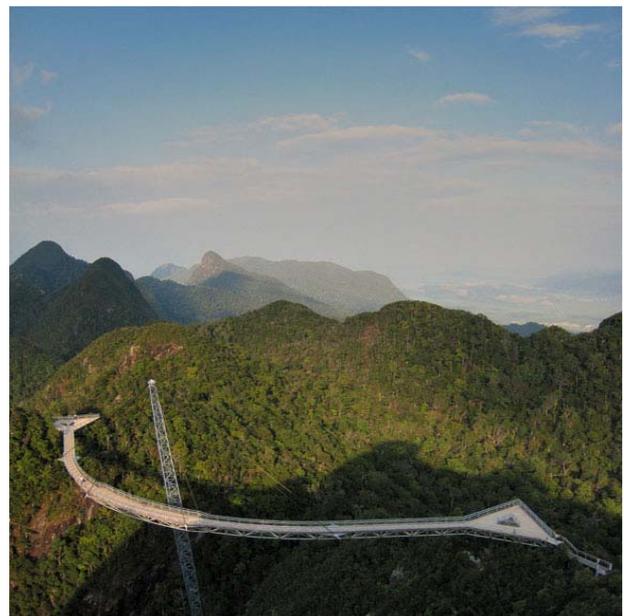
Bridge architecture is a subject for bridge architects, or bridge designers can be considered those professional who have been designing bridges with a specific concern for aesthetics for at least ten continuous years, or that have been involved at least one hundred projects over time or that have been involved in the actual construction of ten bridges. [2]. Malaysia is involves many bridges that their detail shows in Table I.

### A. Langkawi Sky Bridge

The Sky Bridge has been completed in 2005; it gleams in the sun and resembles a curved work of modern art modern art that's 700 meters (2,300 feet) above sea level and with glass sides that will scare the hell out of anyone harboring a fear of heights. The Langkawi sky-bridge is suspended at 700 meters above sea level and spans 125 across the mountains, offering magnificent views of the Andaman Sea and Thailand's Tarutao Island. It's set apart from other bridges by its curves that provide different perspectives of the landscapes. It is one of the most spectacular bridges in the world that delivers quite a pump of adrenaline. Fig.1 shows Langkawi Sky Bridge in Malaysia.

TABLE I: MALAYSIA BRIDGES

Name	Place	Design	Carries
Langkawi Sky Bridge	Langkawi	Cable	pedestrian
Penang Bridge	Penang	cable stayed box girder	Motor vehicles
Penang Second Bridge	Penang	cable stayed box girder	Motor vehicles
Seri Saujana Bridge	Putrajaya	cable stayed arch bridge	Pedestrian Motor vehicles
Seri Wawasan Bridge	Putrajaya	cable stayed	Pedestrian Motor vehicles
Seri Setia Bridge	Putrajaya	---	Pedestrian Motor vehicles
Seri Perdana Bridge	Putrajaya	box girder	Pedestrian Motor vehicles
Seri Gemilang Bridge	Putrajaya	---	Pedestrian Motor vehicles
Seri Bestari Bridge	Putrajaya	---	Pedestrian Motor vehicles
Seri Bakti Bridge	Putrajaya	---	Pedestrian Motor vehicles
Putra Bridge	Putrajaya	---	Pedestrian Motor vehicles
Sultan Salahuddin Abdul Aziz Shah Bridge	Selangor	box girder	Pedestrian Motor vehicles



Manuscript received April 13, 2012; revised May 8 2012.

H. Niroumand and M. Jamil are with Department of Architecture, National University of Malaysia (UKM), Malaysia (e-mail: niroumand@eng.ukm.my; hniroumand@ymail.com).

M. F. M. Zain is with Faculty of Built Environment and Engineering, National University of Malaysia (UKM), Malaysia.



Fig. 1. Langkavi Sky Bridge

### B. Penang Bridge

The Penang Bridge is a dual-carriageway toll bridge that connects Gelugor on the island of Penang and Seberang Prai on the mainland of Malaysia on the Malay Peninsula. The bridge is also linked to the North-South Expressway in Prai and Jelutong Expressway in Penang. It was officially opened to traffic on September 14, 1985. The total length of the bridge is 13.5 km, making it among the longest bridges in the world. Fig. 2 shows Penang Bridge.



Fig. 2. Penang Bridge

### C. Penang Second Bridge

The Penang Second Bridge is a new bridge under construction in Penang, Malaysia. It will connect Batu Kawan on the mainland Seberang Perai and Batu Maung on Penang Island. It will be the second bridge to link the island to the mainland after Penang Bridge. The total length of the bridge is 24 km and will become the longest bridge in Malaysia and Southeast Asia.

### D. Sultan Salahuddin Abdul Aziz Shah Bridge

The Sultan Salahuddin Abdul Aziz Shah Bridge or Jambatan Sultan Salahuddin Abdul Aziz Shah is a main bridge in Kuala Selangor in Malaysia that it is crossing of Selangor River. The bridge was officially opened on 1982 by the late Almarhum Sultan Salahuddin Abdul Aziz Shah of Selangor. Originally, the bridge was a two-lane bridge before being upgraded to 4-lane dual-carriageway Bridge.

### E. Putra Bridge

Putra Bridge is the main bridge in Putrajaya. It is analogous to Khaju Bridge in Esfahan, Iran. With a span of 435 metres, this bridge connects the Government Precinct to the Mixed Development Precinct and links Putra Square with the Boulevard. The upper level of the bridge forms part of the Boulevard. This huge three-deck bridge provides vehicle, monorail and pedestrian access. Besides providing the link between Precinct 1 and Precinct 2 on the Core Island, it has been designed to be a special feature of Putrajaya. The piers also accommodate fine dining restaurants within its main pillar supports. [3]. Fig. 3 shows Putra Bridge.



Fig. 3. Putra Bridge

### F. Seri Bakti Bridge

Seri Bakti Bridge is one of the main bridges in Putrajaya. Fig. 4 shows Seri Bakti Bridge.



Fig. 4. Seri Bakti Bridge

### G. Seri Bestari Bridge

Seri Bestari Bridge, also known as Jambatan Seri Bestari, is a large bridge in Putrajaya. The eastern end of the bridge starts in Precinct 16 and the western end starts near Wisma Putra on Core Island. The bridge has a total length of 152.6 meters with a main span of 60 meters. Fig. 5 shows Seri Bestari Bridge.



Fig. 5. Seri Bestari Bridge

#### H. Seri Gemilang Bridge

Seri Gemilang Bridge is a ceremonial bridge in Putrajaya. It connects Heritage Square with Putrajaya Convention Centre. The bridge has a main span 120 meters long, with a 60-meter span at each end, for a total length of 240 meters. There are six traffic lanes, each 3.5 meters wide. The deck level above the water is 36.75 meters at the center of the bridge. Fig. 6 shows Seri Gemilang Bridge.



Fig. 6. Seri Gemilang Bridge

#### I. Seri Perdana Bridge

Seri Perdana Bridge is a 370m long bridge which is built across the Putrajaya Lake in Putrajaya, Malaysia's federal administrative centre. It is based on royal Islamic architectural design. This bridge contains eight unique balconies / rest areas for visitors to enjoy the panoramic sights of the surrounding lake area. The bridge is made up of seven central spans of 75m and two end spans of 55m. Figure 7 shows Seri Perdana Bridge. There are two separate carriageways over two twin cell box girder. In the cross section, the overall width between extreme ends of two box girder is 23m. The foot path is flanked by railing and the road's median is lined by decorative street-lighting.



Fig. 7. Seri Perdana Bridge

#### J. Seri Saujana Bridge

The Seri Saujana Bridge is a main bridge in Putrajaya, the Malaysian federal administrative capital. The bridge's design is unique cable-stayed arch bridge. Seri Saujana connects the Core Island to the Precinct 7 on Lebuhraya Sentosa highway and is strategically located at the main entrance into the Core Island from the south via the upgraded and Kuala Lumpur-Putrajaya Expressway. Fig. 8 and Fig. 9 show Seri Saujana Bridge. It is a new concept of the cable-stayed arch bridge. The bridge is controlled by the principal design parameters to reflect a transparent, elegant and futuristic slender looking structure, with an overall single span of 300m and total width of 32m. There are dual three lane carriageways.



Fig. 8. Seri Saujana Bridge

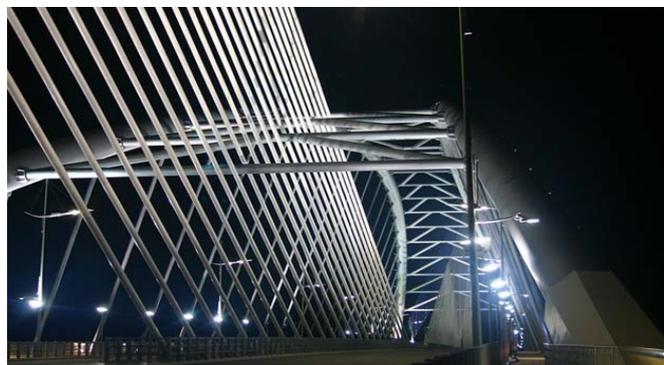


Fig. 9. Seri Saujana Bridge

#### K. Seri Setia Bridge

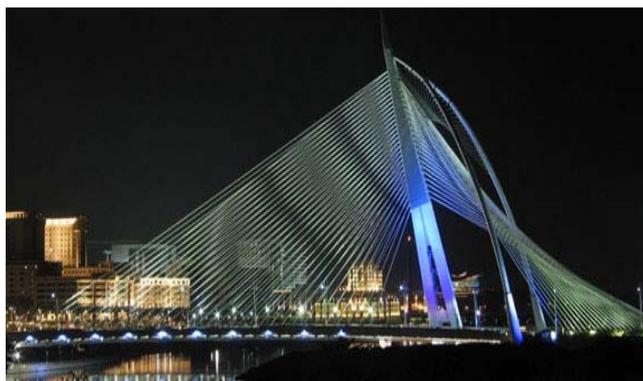
Seri Setia Bridge is a main bridge in Putrajaya. Fig. 10 shows Seri Setia Bridge.



Fig. 10. Seri Setia Bridge



Fig. 11. Seri Wawasan Bridge



### L. Seri Wawasan Bridge

The Seri Wawasan Bridge is one of the main bridges in Putrajaya, the Malaysian federal administrative capital. This futuristic cable-stayed bridge which has a sail ship appearance connects Precinct 2 on the Core Island to the residential area of Precinct 8. The concrete bridge is a combination of cable backstays and structural steel tie back. It is a dual three lane carriageways of 18.6m width each, comprising 3 x 3.5m width lanes, 0.5 m hard shoulder, and 0.5m marginal strip. The median is 4 m wide and walkway cum cycle track width is 5.1m giving a total width of 37.2m at the centre of the bridge. Fig. 11 shows Seri Wawasan Bridge. [1]

## II. CONCLUSION

The paper shows architectural and structural details of Malaysia bridges. The main part of Malaysian bridges designed with girder box and cable stayed. They used to pedestrian and motor vehicles advances. Malaysian bridges are involves of ancient until modern architecture in the world.

## REFERENCES

- [1] LLC, "Bridges in Malaysia: Penang Bridge, Penang Second Bridge, Malaysia-singapore Second Link, Batang Baram Bridge, General Books LLC", 2010, Malaysia, pp.70-84
- [2] Kassler, E. B., The architecture of bridges, Museum of Modern Art, 1949, pp.56-61
- [3] Weale, J. and et.al., "The Theory, practice, and architecture of bridges of stone, iron, timber, and wire", Architectural Library, 1843, pp.480-521

**H. Niroumand** is a PhD researcher in architectural design and geotechnical engineering in Iran and Malaysia. He is a PhD researcher and lecturer in universities. He was employed in different positions including scientific researcher in almost 150 papers and 28 books in both Persian and English languages.