Malaysia Country Report 2010

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ABSTRACT: This paper reviews domestic activities in the wind engineering field in Malaysia in 2010. It includes activities from several agencies and organization in Malaysia. Furthermore this paper also highlights recent damage and injuries due to wind storm.

KEYWORDS: Basic Wind Speed, Wind Induced Disaster, Wind Storm

INTRODUCTION

Recently numbers of damage and injuries due to wind hazard in past few years had increase in Malaysia. The awareness among the respective people is also increase but however the numbers people involve wind engineering activities in Malaysia still fewer. Currently there are no by law association regarding Wind Engineering Society in Malaysia. However initiative had been done by forming a Wind Engineering Research Group who the members are voluntary participates from several agencies. This group is formally support at Faculty Civil Engineering & Earth Resources, Universiti Malaysia Pahang. Currently two others institution who had directly involved in this group are Disaster Research Nexus (DRN), Universiti Sains Malaysia, which is co-coordinated by Assoc Prof Dr Taksiah A. Majid and Institute of Geospatial, Science and Technology (INSTEG), University Technology Malaysia led by Prof Dr Mazlan Hashim.

The purpose of this group is organically cope with many problems related to wind-induced disasters and wind environmental impact. For the time being the aims of WERG are as follows:

1) To collect and analyze information of damage caused by strong winds.
2) To carry out positive awareness activities for citizens as well as for specialists, and to implement collaborative work with respective agencies.
3) To conduct research in related area in Wind Engineering field mainly due to the Malaysian surroundings.

RECENT DAMAGE DUE WIND STORM IN MALAYSIA

Most of possibility risk of wind hazard base on recent wind-induced damage to buildings and structures in Malaysia is due to thunderstorm. There are very little emphasizes of design building structure such as roof and cladding to minimize wind-induced damage to buildings. Several study had made by previous researchers in Malaysia. From the study made there are several factors are founded to contribute damage to building component. It can be conclude most of the failures cause by lack of the consideration due to wind effect during design stage.
Table 1 shows the recent damage due to windstorm in year 2010(Jan – Aug). It can be shown that most of the damage occurs in northern region on peninsular Malaysia. Furthermore it clearly stated most structure failure is roof and truss. The numbers of flying canopy due to wind are also become dangerous hazardous. The consequence of flying debris also now had been noted as most dangerous hazardous. Figure 1b-1d shows damage occurs at Malacca Night Market due to thunderstorm. In 13 august at Malacca the flying object from canopies had hit and kills 3 patrons of night markets.

Table 1: Damage due to Wind Storm in Malaysia (January – August 2010)

	Place	Region	Numbers of Affected	Structure Damage
27-Jan-2010	Sungai Petani, Kedah	Roof and truss	350 Houses	Roof and Truss
5-Apr-2010	Bukit Mertajam, Penang	Northern Peninsular	21 Houses	Roof and truss
5-Apr-2010	Mergong, Kedah	Northern Peninsular	13 Houses	Roof and truss
12-Apr2010	Baling, kedah	Northern Peninsular	200 Houses	Roof and truss
13-Apr-2010	Merbuk, Kedah	Northern Peninsular	150 Houses	Roof and truss
22-Apr-2010	Sg besi - Kg Malaysia	Middle Peninsular	18 Houses	Roof and truss
1-May-2010	Ulu Bernam, Selangor	Middle Peninsular	Secondary School	Roof and truss
31-May-2010	Parit buntar-Perak	Northern Peninsular	*	Roof and truss
11-Jun-2010	Batu Gajah-Perak	Northern Peninsular	30 houses	Roof and truss
13-Jun-2010	Temerloh, Pahang	Eastern Peninsular	9 houses and School	Roof and truss
7-July-2010	Beaufort, sabah	Eastern Borneo	50 houses	Porch, Roof
15-July-2010	Kuala Perlis, Perlis	Northern Peninsular	150 houses	Roof and truss
12-Aug-2010	Temerloh, Phang	Eastern Peninsular	20 houses Canopy Damage	Roof Night Market
13-Aug-2010	Malacca	Southern Peninsular	Canopy Damage 3 Kills 30 injured	Night Market (Flying Debris)
14-Aug-2010	Jerlun, Kedah	Northern Peninsular	1 Houses, Crop	Roof
14-Aug-2010	Petaling Jaya, Selangor	Middle Peninsular	*	Roof and truss
31-Aug-2010	Tanjung Malim	Middle Peninsular	Canopies Damage	Night Market

Figure 1a: Uplift canopy

Figure 1b: After Thunderstorm

Figure 1c: Injuries peoples

Figure 1d: Canopy Collapse

There are also many instances of partial lift off clay tiles fixed at eaves of roof and at ridge corner. From the investigation made damage to the tile roofs increase with the simplification of the substandard, i.e. decreasing the weight of roof tile, insufficient of nail fixed to the roof tile and the less of lay between the roof tiles.

Figure 2a: Uplift Roof Tile

Figure 2b: Damage Roof Tile

Figure 2c: Damage Due Flying Debris

Figure 2d: Flying Debris of Roof Tile

REVIEWING MS 1553:2002

Due to some historical reasons so there was many Foreign Standards used for Construction works in Malaysia. The most favourably code is CP 3 and BS 6399:2. The others code that also use are AS/NZS 1170.2 and ASCE.

In Malaysia, the current Wind Loading used for Building design is a part of Malaysian Standard, named MS 1553:2002 Wind Load for building Structure. This code is originated in 1998 when first Working Group on Wind Loading for Building Structure is set up and supervised by Technical committee on Structure Loading. The technical Committee on Structure loading which is supervised the development of this standard was managed by Construction Industry Development Board in its capacity as an authorized Standard Writing. During the development of the code, reference was made to AS/NZS 1170.2. Recently there are still many studies carry out to improve and update the code from time to time especially to improve the coefficient factor base on local climate and our widespread material that been used in Malaysia.

ACTIVITIES OF RESEARCH ON WIND-INDUCED DISASTER

a) Investigation of Different Basic Wind Speed in Countries Bordering Malaysia.

There are needs of revised basic wind speed in MS 1553:2002. Figure 2 shows a map of Malaysia. Malaysia is dividing in to part. At the moment in MS 1553:2002 the main wind force resisting system shall not be less than 0.65 kN/m^2 which is turn out from the value 32.5 m/s base on 3 second gust. While nears the seaside the code recommended wind speed at 33.5 m/s.

Figure 3 is map of South East Asia region Malaysia are divided into two parts. The country was separated by South China Sea. Malaysia is sharing the border with Thailand at the northern Peninsular Malaysia while adjacent to Singapore for the south. For Borneo island Malaysia are sharing the border with Indonesia at south and adjacent to Philippines in east of Sabah.

i. Comparison to Thailand Code Zone a

From the previous investigation due to recent damage it seems that the wind speed is mostly high compared to basic wind speed recommended. An investigation found that a triggering failure of steel truss structure of porch shown in figure 3 a- d reflecting a wind speed of 38 m/s [2]. Since this location is situated at northern region of peninsular Malaysia which is bordering to the Thailand Country in Zone 4a and Zone 4b. The Thailand code where referred

In Thailand code [4] the basic wind speed for the southern region which is classifies as zone 4a is 25 m/s base one-hour average speed at 10 m. If this wind speed converted to 3 second gust it will be equal to 37.5 m/s. This result is almost identical to wind speed identified to cause the failure to the structure. The Thailand code also recommended the typhoon factor equal to 1.2. Therefore from investigation of the failure and comparison of basic wind speed to the bordering country it shown basic wind speed in northern region in MS 1553:2002 given a low value compare to by right. Further than that the northern western region of peninsular should also considered the typhoon factor since the coastal area are also exposed to Indian Ocean.

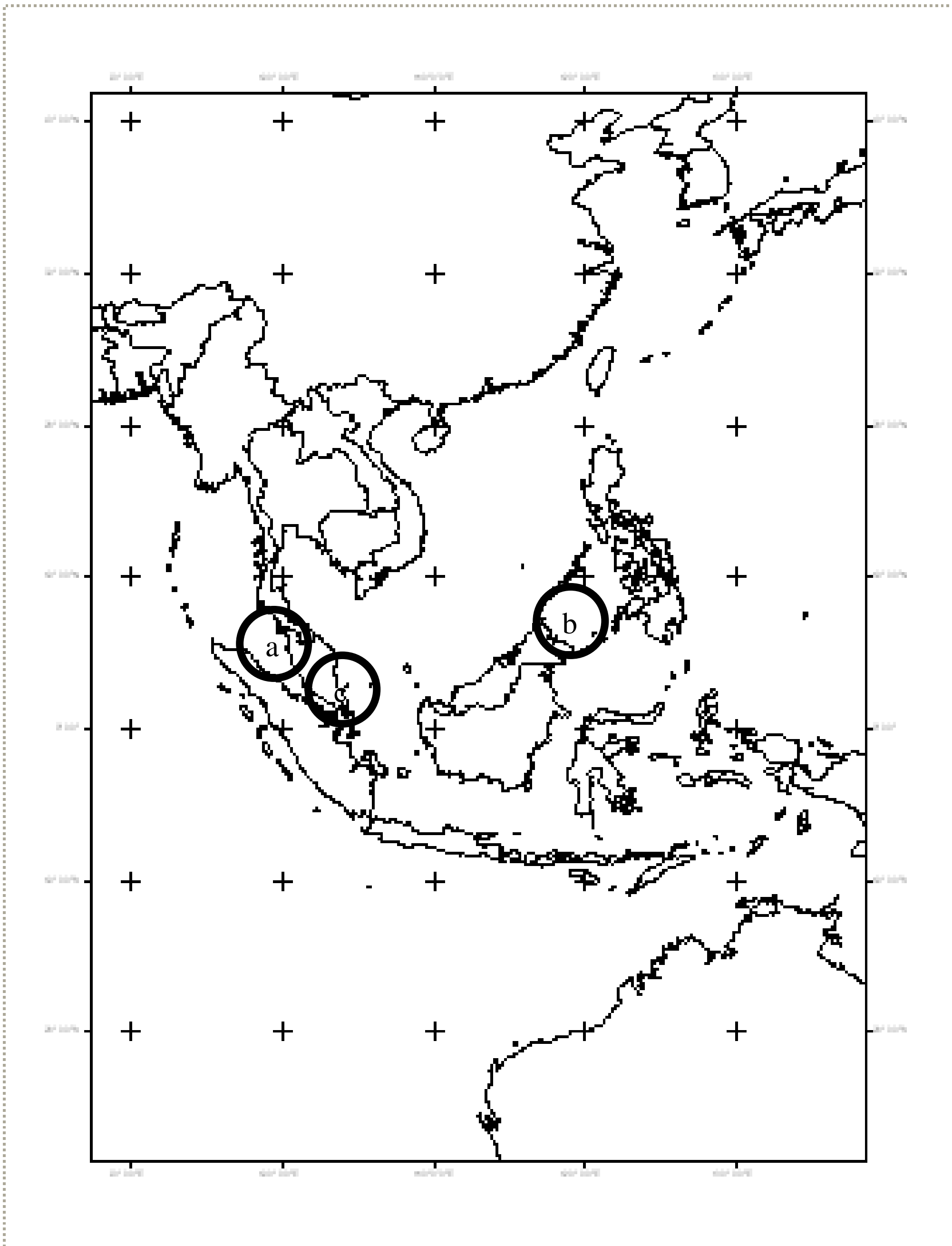

Figure 3 : South East Asia Regional Map

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Figure 3a. Collapse Porch

Figure 3b: Bending failure of Steel truss

Figure 3c: Ultimate Load Failure

Figure 3d: Bending failure

ii) Comparison to Singapore (zone b)

Even though the minimum basic winds speed in MS 1553:2002 state shall not be less than 32.5 m/s. From the calculation using data from meteorological station at Senai, Johor Bahru which is situated near to Singapore found that 29 m/s base on 3 second gust for 50 years return period. These values are most consistent with neighboring country Singapore. Refereeing to [3], basic wind speed for Singapore are proposed to equivalent to 10 minutes mean of 20 m/s. this value if converted to 3 second gust equal to 28 m/s.

iii) Comparison to Philippines code (zone c)

In Philippine code, basic wind speed is specified in NSCP. The corresponding basic wind speed adjacent to Malaysia is 125 kph which is equivalent to 35 m/s as shown in gigure 4. The basic wind speed recommended for the nearest town to Philippines is 33.5 m/s. This value seems to be identical. However, the historical records indicate that tropical cyclone may affect this region. In 1997, Typhoon Greg which developed in the South China Sea had crashed into on small logging town Keningau located at North East Borneo. It triggered heavy rains and floods that swelled rivers to overflowing, downed power lines and washed out road and communications links. . It also ripped 500 houses in nine villages along four rivers in the town were washed away down houses and thatched huts, raging for several hours on Christmas night before dissipating and moving to east as shown in figure 4. It is reported that Typhoon Greg has recorded wind speed reach up to 38 m/s.

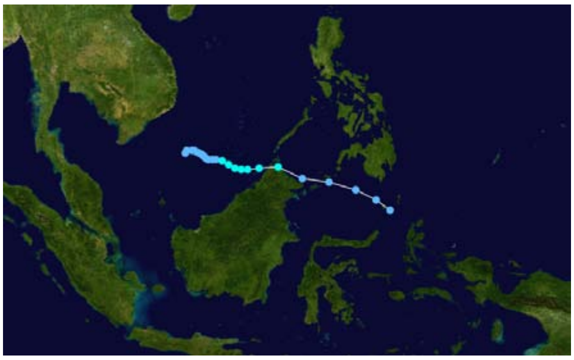

Figure 4 : Typhoon Greg Path 26 December 1996

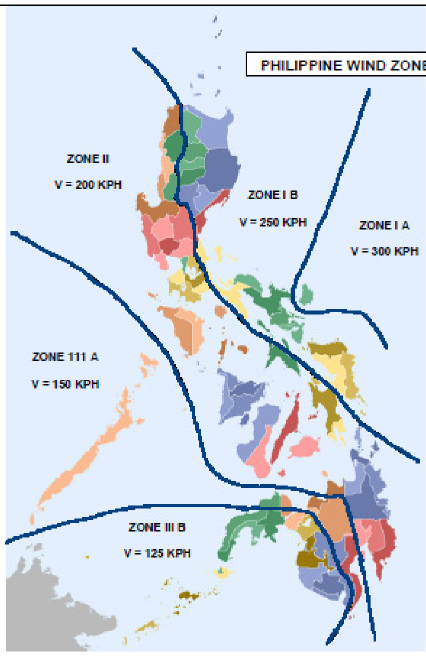

Figure 5 : Basic Wind Speed NSCP [1]

In evaluating the basic wind speed in MS 1553:2002 the most issue is limited meteorological data obtained especially at Borneo Island. This work should be emphasizes to get more consistent. Collaborating work with neighboring country by using raw meteorological data can increase the accuracy of the assessment basic wind speed especially in adjacent area.

b) Research and investigation on failure Roof Structure

The possibility risk of wind load damage to roof structure. Conventionally in Malaysia most of the roof design only considered wind load acting as a pressure load to the roof structure. However from the many research done it seem that wind also can cause suction load to the building structure. Most damage to roofs themselves is caused by local high suctions and large pressure fluctuations around the roof periphery and protruding portions. [ ]Tamura . In Malaysia the most of truss system used as roof structure is steel and wood. Steel truss structure is commonly used almost at urban area and considered as engineered building while wood frame truss always used at rural area which is almost are non-engineered building. Recently both of the structure system fails during the thunderstorm. Figure 6 a-e shows recent damage due to thunderstorm event. Currently study is conduct to examine whether the conventional method of design and current approach of construction in Malaysia is secure during the high wind speed.

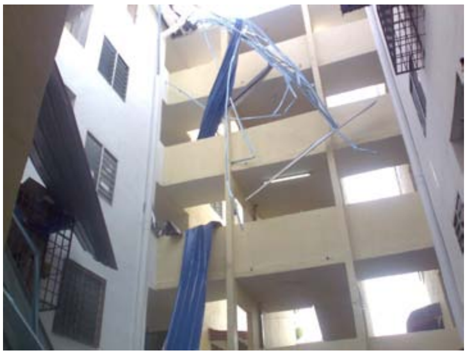
Figure 6a – Steel Truss failure


Figure 6b – Steel Truss failure


Figure 6c – Roof Sheet Failure


Figure 6d – Roof Damage


Figure 6e – Uplift Damage Roof


Figure 6f – Uplift Damage Roof Truss

c) Remote Sensing Approach in Wind Engineering

Remote Sensing systems are used to observe the earth's surface from different levels of platforms, such as satellites and aircraft, and make it possible to collect and analyze information about resources and environment across large areas. Remote sensors record electromagnetic energy reflected or emitted from the surface. This characteristic makes it possible to measure, map, and monitor these objects and features using satellite or aircraft-borne remote sensing systems. Satellite imagery offers a number of advantages over conventional techniques of collecting data. Therefore this technique can be use to collecting data for spatially distribution. Figure 7 shown the example of remote sensing technique in monitor intensity of rainfall.

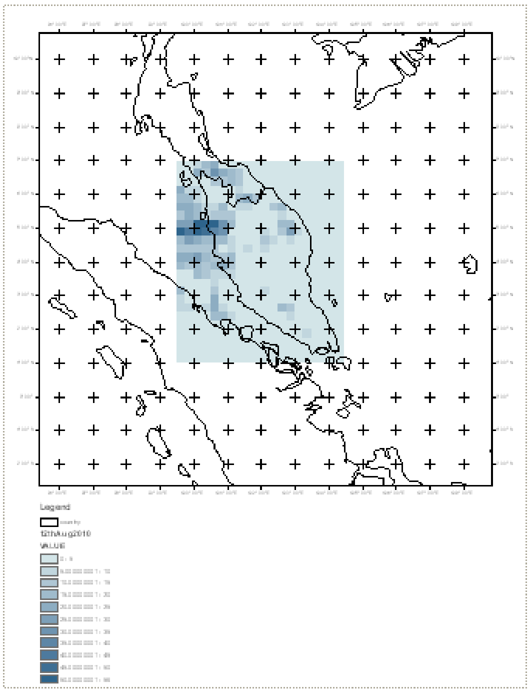

Figure 7a

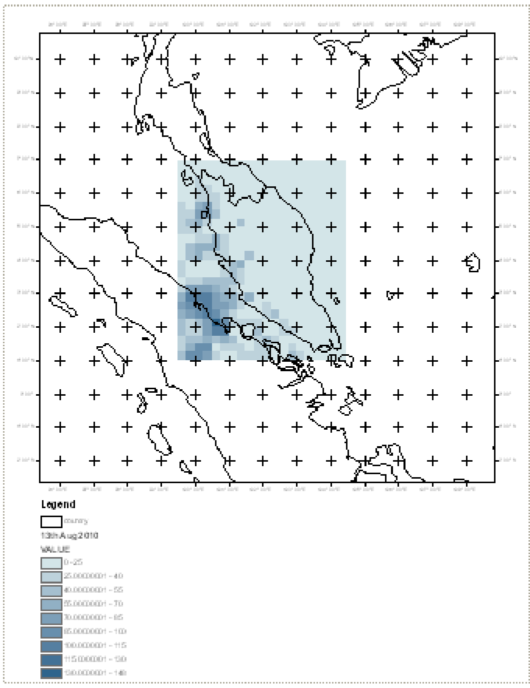

Figure 7b

CONCLUSION

Wind engineering is not sound noted in construction industry in Malaysia. Most of the building damage caused by strong wind mainly almost concentrated to small building or small structures, which almost non engineered building. However, recently there are several damage occurred to building structure which is not been design accordingly. Further study work should be carried out to gather more information for better understanding of wind characteristic in Malaysia.

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