CONFIGURATION CURTAIN MODELS OF THE PATTERN BASIS DEFORMATION IN ZONE PILLAR

Nenny[1*], [2*]Muh. Saleh Pallu , [3]M. Arsyad Thaha, [4]Farouk Maricar
[1] *Civil Enggineering, University of Muhammadiyah Makassar*
University of Muhammadiyah Makassar, Jl. Sultan Alauddin, 259 Makassar, Indonesia
*Email: nennykarim@yahoo.co.id
[2*] *Departemen of Civil Enggineering, University of Hasanuddin*
University of Hasanuddin Jl. Perintis Kemerdekaan, Km. 10,
Makassar, Indonesia
*Email: salehpallu@hotmail.com

Abstrak

Either the causes of damage to the bridge is scour the pillars that exceed the limits considered safe, so that the overall endangering the construction of the bridge. The purpose of this study was to determine the amount of scour that occurs with a different placement of the curtain and how the basic changes that occur as a result of the flow rate, after placing the blinds around the pillars of the bridge. This study used a cross-channel ground with a trapezium shape. The observations made are the flow velocity (v), water level (h), the flow rate (q), and the depth of scour (ds) around the curtain and the pillars of the bridge. The expected result is an overview and analysis of the flow and scour pattern that goes around the pillars, particularly with respect to the deformation of the base channel.

***Key words** : Configuration, deformation, curtain, pillar*

1. INTRODUCTION

The bridge is one of the critical infrastructure, maintaining the function and ability of the bridge to serve traffic flow into smooth locks the economy, and therefore the continuous examination of the condition of the bridge should be an integral part in the bridge management system. An examination of the condition of the bridge is meant to identify as early as possible the damage that occurs to the effective and efficient management can be carried out in accordance with the conditions of the damage.

Damage that occurs to the bridge can be caused by a load factors, environmentally and a natural disaster. The destructive force of water flow tend to be more terrible has now. One of the causes, upstream areas have been damaged, causing greater water flow. On the other hand, the riverbed is also degraded due to illegal to sand mining. This resulted in the swift stream a lot of infrastructure building either a bridge or a dam or dams sabo mangalami damage.

Scours the pillars are generally caused by a disturbance by pillars and streams and will be back by the effects of sedimentation. The impact of the construction of pillars in the river, water flowing will hit the pillar and move perpendicularly towards basic channels and the process agradasi and degradation.

The collapse of a bridge is mostly caused by the failure of a bridge pillar stability in function to transfer the load. The problems encountered in cross river bridge was under the bridge structure failure is one pillar in supporting a bridge. In some cases, this failure led to the collapse of the bridge.

Some cases are caused by bridge scour. Kandasamy and Menville (1998) in 1973 researching throughout the world have occurred 383 bridge damage, 25% are caused by the pillars of the bridge, 72% for the abutments. Link et. al., (2008) in the year 1960 to 1984, from 108 bridge damage that occurred, 29 of damage caused by scouring due to the abutment, 6 of the 10 bridge damage that occurred in New Zeland is caused also by the abutments, in addition to the 70% of the expenditure for bridge repair and maintenance of bridges are allocated for damage caused due to the abutment scour.Istiarto (2011) examine issues Srandakan bridge, Kulon Progo Yogyakarta bridge collapse caused by the failure of the bridge footing in the face of riverbed degradation. Riverbed down very quickly, fueled by seepage under groundsill safety bridge.

Supriya, 2006 examined the comparative effectiveness of treatment levels scours the cylindrical pillar between the curtain plate (physical model study of the flow of criticism), the observations, it appears that the use of blinds maximum scour depth around a pillar more than 40% and the result was 46.60%.

This study will continue with the usage model of a square curtain front side curved and more emphasis on the characteristics of the flow after passing through the curtain. It is expected that the results obtained are much better than previous studies, with consideration of the curtain models used effectively to reduce or mitigate scour around the pillar. For that will be studied using the model by using a silencer scours the front side curtain curved square shape, with the consideration that the placement of the building after the curtain with the type of building the pillars will be able to reduce scour around bridge pillars.

2. METHODOLOGY

Laboratory testing was conducted on the implementation of the River Engineering and Soil Mechanics Laboratory, University of Hasanuddin. Sampling of material taken as much as 5 m^3 of sand from the river Jeneberang Gowa, South Sulawesi, which is 30 miles from the laboratory.

The method used in this study is an experimental study and literature review. This type of testing that is done is the basic material testing and flow testing to determine the type of flow and discharge, using the model scour silencer.

2.1. Channel Model

The channel used is land channel sand material overlaid with a cross-sectional shape of a trapezium. The geometric shape of the channel is a straight channel with permanent walls, the channel base width 0.50 m, height 0.20 m and channel length 17 m channel experiments.

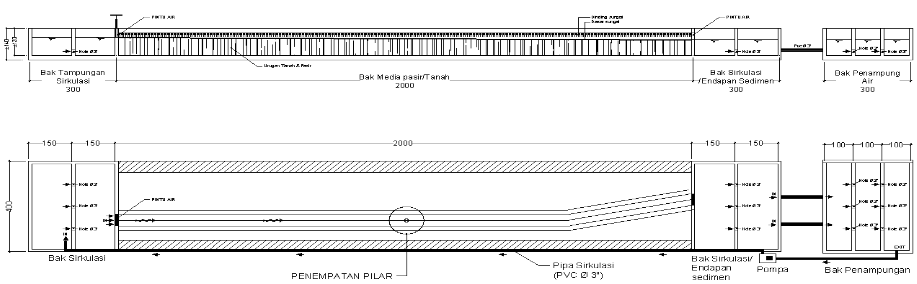

Fig. 1 Model Open Channel With Trapezoid Cross-Section

2.2. Pillar Model

Pillar models used in this study is made of concrete blocks formed by model. This study used a model of hexagonal pillars with a height of 40 cm and a width of 5 cm pillar. Model pillars placed in the middle of the channel model at a distance of 15 m from the upstream

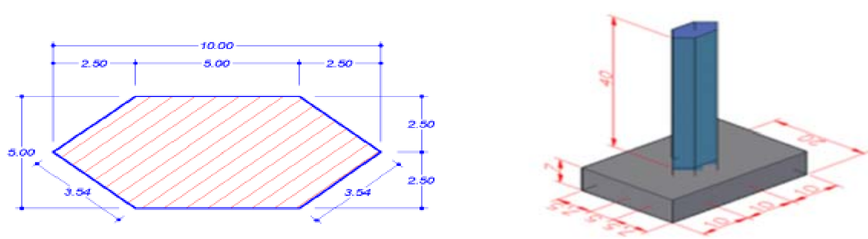

Fig. 2 The Pillar Model of hexagonal

2.3. Curtains Model

Curtain models used in this study are made of beams formed by model. This study used the curtain a square shape with a curved front side (rectanguler with wedge shaped curve) with a height of 40 cm and a width of 3 cm pillar. Model curtain was placed in front of the pillars of the bridge models with variations in the distance between the pillars and curtains.

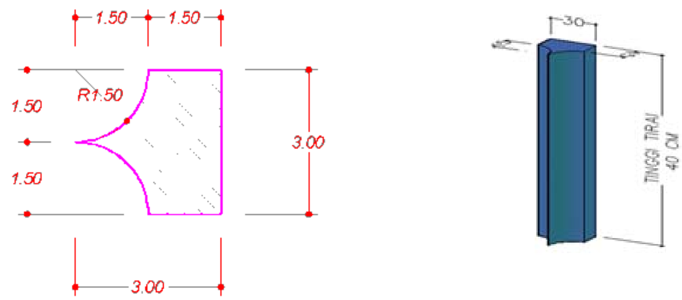

Fig. 3 Shape Curtains Rectanguler with Wedge Shape Curve (Rwwsc)

2.4. Research process

On the implementation of the planned research using the model and silencer scour hexagonal pillars with a square shape model variation curtains curved front side (rectanguler with wedge shaped curve) with different types of formations.

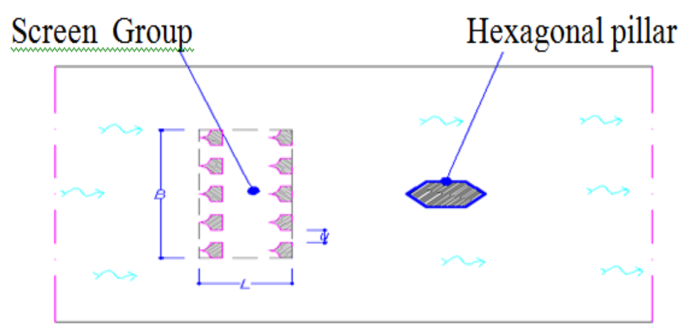

Fig. 4 Placement curtain models and pillars of the bridge

2.5. Steps Implementation Of The Research:

1. Model pillars placed in the middle of a land line with a distance of 6.0 m from the upstream, then arranged the placement of models in front of the pillar and damping material is spread sand in the average state.
2. Water is supplied from a small discharge to discharge specified so as to achieve a constant.
3. The observations made: the flow velocity (v), water level (h) made any attempt to time t1: 15 minutes, t2: 40 minutes, t3: 60 minutes.
4. Data collection scour contours around the zone was measured after running pillar finished, by minimizing flow slowly so scour around the pillar was not bothered by the change in discharge. This is done in order to obtain contour data that represents the scour. Elevation measured scour the area at the top of several parts, ie parallel to the flow direction and the transverse direction of flow.
5. Decision-length scour around the pillar zone was measured after running completed.

After the measurement of three-dimensional, flattened sand back for further running with other variations

3. RESULTS

The results are in getting from this study are :

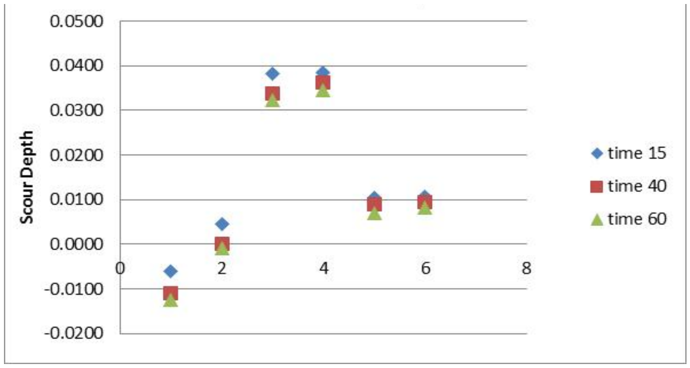

Fig. 5 Graph of time scouring the relationship into the type B1L1ξ1h

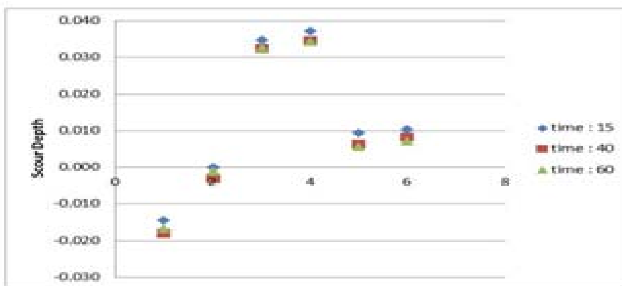

Fig. 6 Graph of time scouring the relationship into the type B2L1ξ1h

The depth of scour at t: 60 minutes to type B1L1ξ1h happen agradasi greatest at a distance of 8.0 m by 0.034 m and scours: 0.01 m, the flow velocity (v): 0.58 m / s. and for the type of B2L1ξ1h occur agradasi: 0,044 m and scour: 0,017 m, the flow velocity (v): 0.3 m / s. . From the two graphs are effective to reduce scour is B1L1ξ1h type (Figure 5.6)

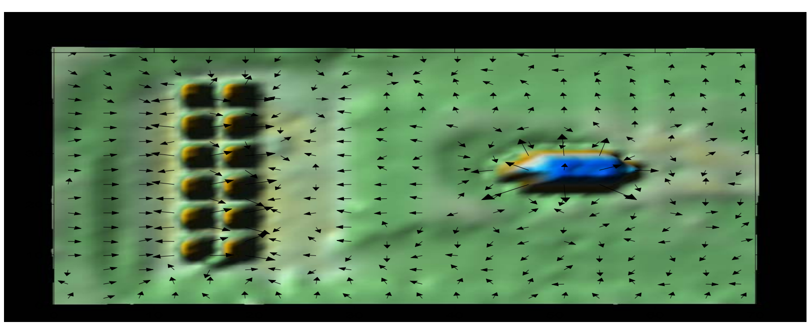

Fig. 7 The shape of the pattern of flow and deformation of the basic types B1L1ξ1h

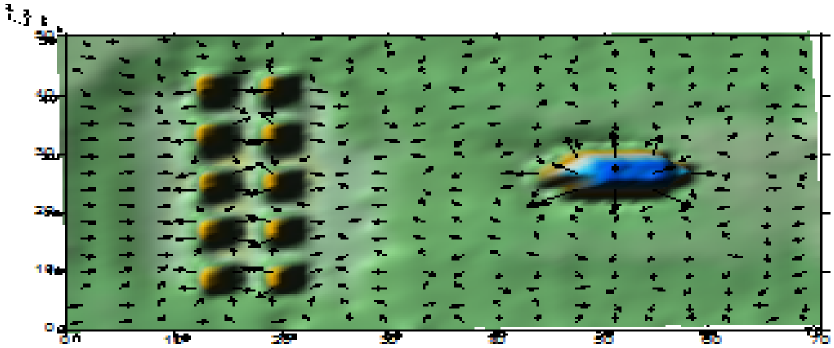

Fig. 8 The shape of the pattern of flow and deformation of the basic types of B2L1ξ1h

The pattern of flow and deformation occurring basis, it can be stated that with the curtains were placed in front of a pillar with a look at the pattern of movement of the flow can reduce / minimize scour at the pillar that has a tendency precipitates at a distance from the axis 40 and 60 pillar layout (Figure 7 and 8)

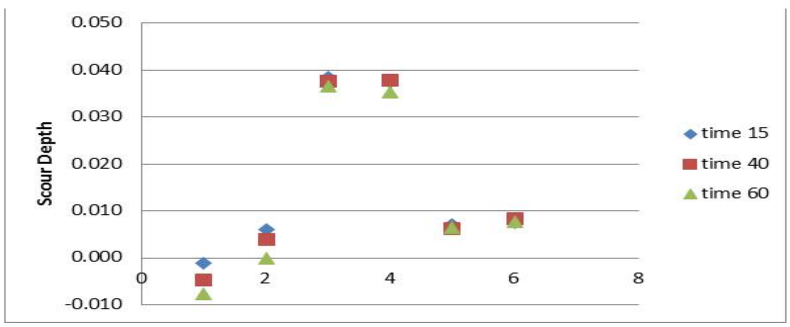

Fig. 9 Graph of time scouring the relationship into the type B1L2ξ2h

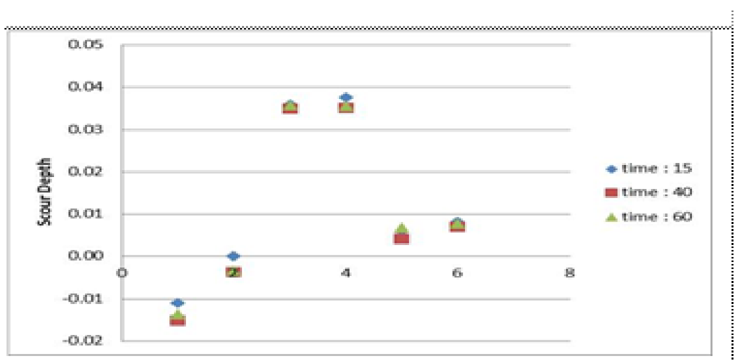

Fig.10 Graph of time scouring the relationship into the type B2L2ξ2h

The depth of scour at t: 60 minutes to type B1L2ξ1h happen agradasi greatest at a distance of 7.0 m by 0,036 m and scours: 0.01 m, the flow velocity (v): 0:18 m / s. and for the type of B2L2ξ2h occur agradasi: 0,035 m and scour: 0,013 m, the flow velocity (v): 0:30 m / sec .. From both graphs are effective to reduce scours are two types. (Figure 9 and 10)

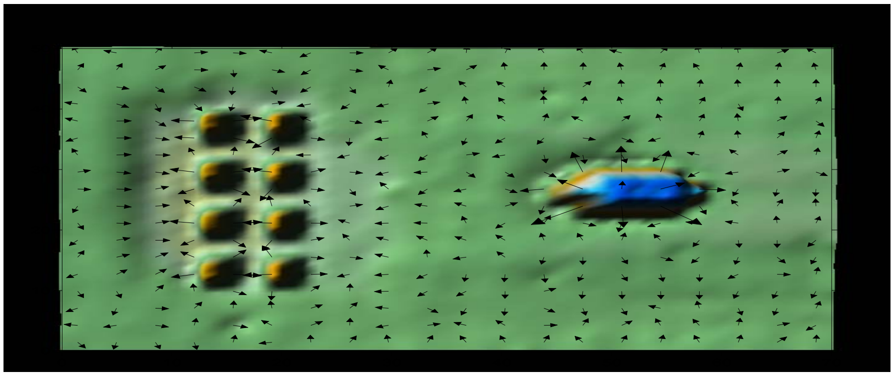

Fig. 11 The shape of the pattern of flow and deformation of the basic types of B1L1ξ1h

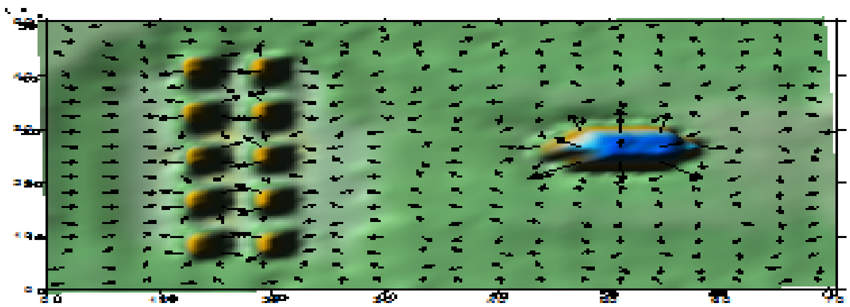

Fig. 12 The shape of the pattern of flow and deformation of the basic types of B2L2ξ2h

Figure 11.12, it can be stated that with the curtains were placed in front of a pillar with a look at movement patterns that flow occurs, which can reduce / minimize scour at the pillar that has a tendency to precipitate at a distance of axes 40 and 65 of the pillar layouts.

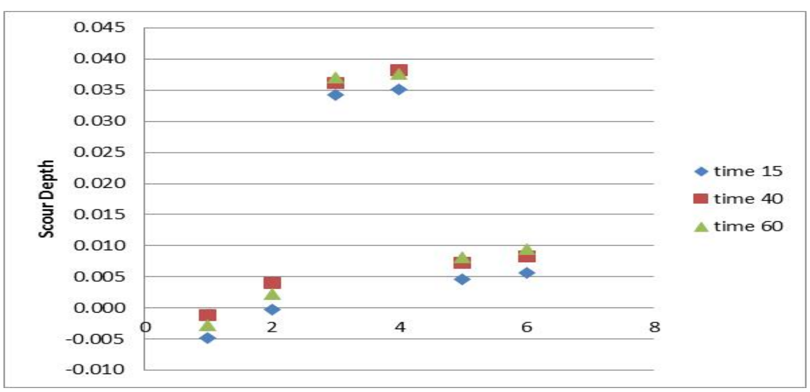

Fig 13. Graph scour versus time relationships into types B1L3ξ3h1

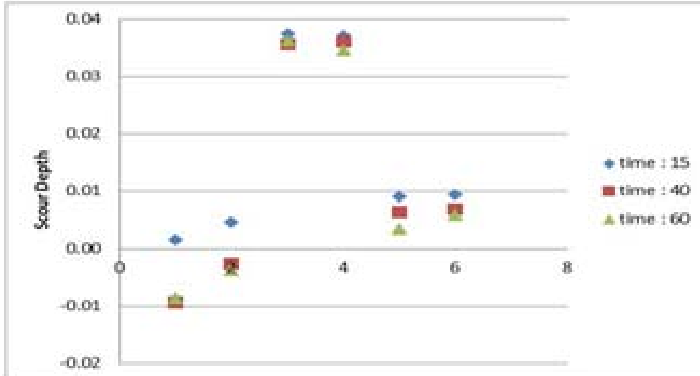

Fig. 14. Graph of time scouring the relationship into the type B2L3ξ3h1

In Figure 13.14 scour depth at t: 60 minutes to type B1L3ξ3h happen agradasi greatest at a distance of 8.0 m by 0,037 m and scours: 0.0028 m, the flow velocity of 0.28 m / s. and for the type of B2L3ξ3h occur agradasi: 0.034 m and scour: 0,008, the flow velocity (v): 0:24 m / s. From the two graphs are effective to reduce scour is the type B2L3ξ3h

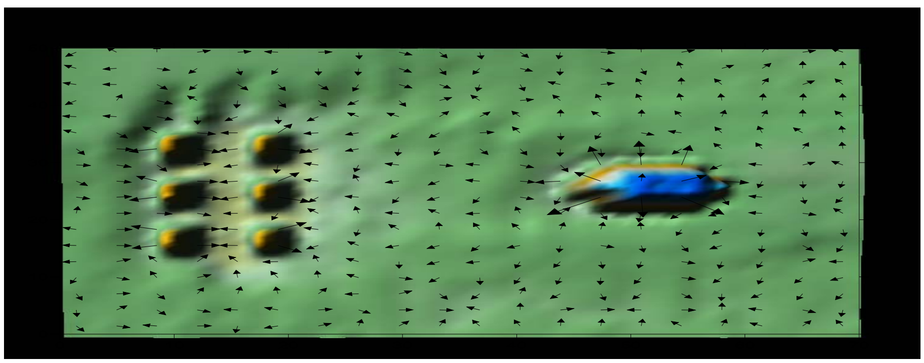

Fig.15 The shape of the pattern of flow and deformation of the type B1L1ξ1h

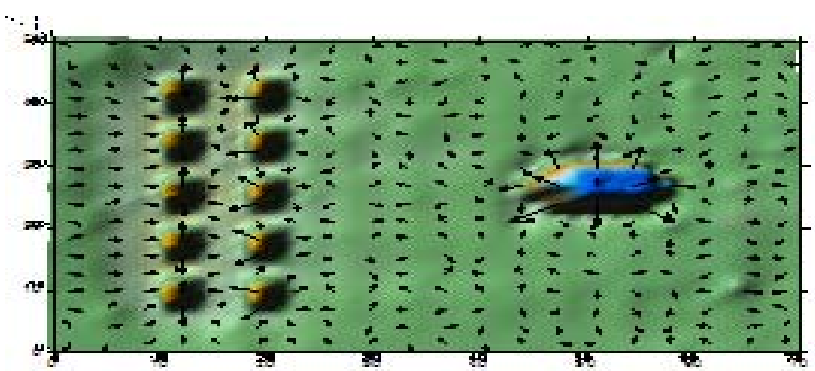

Fig. 16 The shape of the pattern of flow and deformation of the type B2L1ξ1h

From the figure above, it can be stated that with the curtains were placed in front of a pillar with a look at movement patterns of flow that occurs can reduce / minimize scour at the pillar that has a tendency to precipitate at a distance of axes 30 and 50 of the pillar layouts (Figure 15,16)

4. CONCLUSION

1. The process of greatest precipitation occurs at t = 60 at a distance of 0.18 m from the curtains to the height of 0,037 m of sediment and scour that occurs at 0.0028 m.
2. From the existing flow movement patterns have a tendency deposition occurs at a distance of axes 40 and 60 of the pillar layout.
3. The greater the smaller the distance between the occurrence of scour curtain, inversely if the greater distances

5. ACKNOWLEDGMENT

These studies were made with the help of the Directorate General of Higher Education, Ministry of Education, the financial support through Research Grant Doctorate research.

REFERENCES

Barbhuiya, Karim,A. and Subhasish. *Vortex Flow Field In A Scour Hole Around Abutments* International Journal of Sediment Research, Vol. 18, No. 4, 2003, pp. 310-325.

Dewandaru, Dimas, *Mewujudkan Konstruksi Jembatan Bentang Panjang yang Handal*, Majalah Litbang Pekerjaan Umum, Edisi April – Juni 2013

Ikhsan,C. *Analisis Susunan Tirai Optimal Sebagai Proteksi Pada Pilar Jembatan Dari Gerusan Lokal* Media Teknik Sipil/ Juli 2008/87

Istiarto, 2011. . *Problematika Jembatan di Sungai* **.** http://istiarto.staff. ugm. ac.id /index. php/2011/05/problematika-jembatan/

Julien Y. Pierre, River Menchanics, Cambridge University Press,2002.

Kandasamy,K.J,. Melville, W.B. *Maximum local scour depth at bridge piers and abutments* Journal of Hydraulic Research - J HYDRAUL RES , vol. 36, no. 2, pp. 183-198, 1998

Khwairakpam,P, Mazumdar,A. *Local Scour Around Hydraulic Structures* International Journal of Recent Trends in Engineering, Vol. 1, No. 6, May 2009

Kothyari,C.U., Raju, R.G.K. *Scour around spur dikes and bridge abutments Affouillement autour des digues en épi et des butées de pont,* Journal Of Hydraulic Research, Vol. 39, 2001, No. 4

Link,O. Pfleger,F. & Zanke, U. *Characteristics of developing scour-holes at a sand-embedded cylinder* Journal: International Journal Of Sediment Research - Int J Sediment Res , vol. 23, no. 3, pp. 258-266, 2008

Sucipto. *Pengaruh Kecepatan Aliran Terhadap Gerusan Lokal pada Pilar Jembatan dengan Perlindungan Groundsill*. Jurnal Teknik Sipil & Perenanaan, Nomor 1 Volume 13 – januari 2011, hal 51-60

Wyatt, J. C, Spiegelhalter, D, 2008, Field Trials of Medical Decision-Aids: Potential Problems and Solutions, *Proceeding of 15th Symposium on Computer Applications in Medical Care*, Washington, May 3.

Xavier Pi-Sunyer, F., Becker, C., Bouchard, R.A., Carleton, G. A., Colditz, W., Dietz, J., Foreyt, R. Garrison, S., Grundy, B. C., 1998, Clinical Guidlines on the identification, evaluation, and treatment of overweight and obesity in adults, *Journal of National Institutes of Health*, No.3, Vol.4, 123-130, :http://journals.lww.com/acsm-msse/Abstract/1998/11001/paper_treatment_of_obesity.pdf.

Yusoff, M, Rahman, S.,A., Mutalib, S., and Mohammed, A. , 2006, Diagnosing Application Development for Skin Disease Using Backpropagation Neural Network Technique, *Journal of Information Technology*, vol 18, hal 152-159.