ANALYSIS OF JETTY PLATFORM DUE TO EARTHQUAKE AND STORM WAVE (BATAMSEA, INDONESIA)

Ridwan Abdul Rauf, Agus Priyanto

1,2 Civil Engineering Program, Faculty of Engineering – Sarjanawiyata Tamansiswa University
Jalan Kusumanegara 157, Yogyakarta 55165, Indonesia
E-mail: aguspri0858@gmail.com

Keywords: Jetty, finite element analysis, earthquake, storm wave.

ABSTRACT
Structural design of offshore is initiated with an evaluation of the structure condition of environmental loads, namely wave and ship impacts. Jetties are designed for the purpose of resisting these forces, on other hands, they must remain stable under other loads namely earthquake attack. Waves is the most critical loads on offshore structures. Other loading conditions such as storm wave and tsunami also include to be analyzed paper.

In this way, the analysis of jetty structure need software analysis SAP2000 which support the automatic wave and wind load distribution. Automatic wave load definition using API WSD2000 which automatically load pattern definition for structure load. For wave load using automatic API 4F 2013 provided by SAP2000.

Results of the analysis showed that maximum deformation and capacity ratio for jetty structure condition were 5mm dan 0.5 respectively.

INTRODUCTION
Secondary ports which are not as big in size, capacity and throughput volumes as the nation’s major ports contribute to the economic growth of the country by facilitating trade and providing a link between producers and consumers located in the areas an hinterlands served by the ports with their markets and suppliers. In this way, the secondary ports complement the role of the nation’s main seaports and support the distribution of goods and materials throughout the country. Therefore commonalities among them in terms of the issues and challenges they face, their aspirations to grow and their need for assistance from the Government to develop [1].

Structural design of offshore is initiated with an evaluation of the structure condition of environmental loads, namely wave and ship impacts. Jetties are designed for the purpose of resisting these forces, on other hands, they must remain stable under other loads namely earthquake attack. Waves is the most critical loads on offshore structures. Other loading conditions such as storm wave and tsunami also include to be analyzed paper.

The influence of soil and foundation conditions on the stability of jetty should not be underestimated. A small case of toe scour cause instability of jetty structure. It can produced structural damage and the extreme case, can result in structural failure. The settlement, consolidation and inadequate soil bearing capacity can be similarly severe. The potential for such difficulties should be identified in the initial phases of analysis so that remedial measures can be incorporated. In the foundation planning. Foundation design deserves at least as much attention as the structural design of the overlying mound. This topic is introduced in the second section.

This study will address the resilience of the jetty in accepting some of the forces acting on the structure in general, as well as provide an explanation regarding regulations, both taken from international standards are like; AS (Australian Standard), EN (European Norm) and API (American Petroleum Institute), and national standards such as PBI 1983 (Indonesian Loading
Regulation). Knowledge about the techniques wave obtained from the analysis method using software SAP 2000 version 14. All forms of data processing and analysis activities will be elaborated and can be easily understood by the reader using this software. Then the analysis are presented in a systematic manner, and use restrictions prescribed topical issues, so that the report can be useful as literary purposes.

**ANALYSIS METHOD**

In each study is an analysis either by using the help of software or manual, required load calculations that incorporate all aspects and possibilities burden will be accepted structure. The possibility that there is a load acting on structures which greatly affect the durability of the structure itself. This analysis based on this reference:

a. Shore Protection Manual 1984 is a module engineering science of offshore structure which is subject of a literature review on the loading plan analysis of jetty construction. Presenting the formula as well as a count of the ocean waves and breakwaters with useful technique for the analysis of the jetty because the structure is situated in the sea which the height of the waves can affect the durability of the building.

b. Fabrication Manual is a work plan and terms in a fabrication projects and explain the process of fabrication and construction activities to be performed and in accordance with step plan wake up, this module is obtained from the contractor Jetty Project Engineer, PT. PROFAB Indonesia, designed by Delta Marine Consultants.

c. High data waveform 2015 of the Meteorology and Geophysics Agency of Indonesia (BMKG) for the state of the wave on 27 September - 3 October 2015, that time is used as a benchmark in the analysis to determine some analysis plan imposition of the waves to be assumed for the load testers building resilience Jetty breasting dolphin.

**JETTY STRUCTURES**

Images of Jetty project as plan design drawings that will be used as the object being analyzed, explains the categories and dimensions of any construction material making up the building Jetty, information about the type of material used for construction materials, this image obtained from implementing building foreman as shown in figure 1.

![Figure 1. Loud out Jetty Breasting Dolphin](image)
Figure 2. Location of project

Figure 3. Three dimensional Construction design
Figure 4. Fabrication Details
ANALYSIS AND NUMERICAL RESULTS
The load capacity value based on the analysis is presented on Fig. 5.
Figure 5. Comparison between analysis and experimental results

Based on Fig. 4, it is shown that the results of the analysis of wave load in X and Y direction have similar results. The maximum deflection is in node 20, 21, 22, and 23 with the maximum deformation of 6 mm. While node 20, 21, 22, and 23 have maximum deformation of 5 mm respectively. The maximum deflection of the numerical result due to the combination of earthquake, wind load, and wave load. Jetty structure also checked using API-RP2A-WSD code, which automatically calculated by SAP2000. The maximum stress ratio is 0.5 for all load combinations.

SUMMARY

Based on the results of this research and data analysis, the following conclusions can be drawn:

1. The results of the analysis of wave load in X and Y direction have similar results. The maximum deflection is in node 20, 21, 22, and 23 with the maximum deformation of 6 mm. While node 20, 21, 22, and 23 have maximum deformation of 5 mm respectively.

2. The Jetty structure also checked using API-RP2A-WSD code, which automatically calculated by SAP2000. The maximum stress ratio is 0.5 for all load combinations.

REFERENCES.