

A Study on the Raising Method of Revetment Considering the Effect of Climate Change

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1. Background and purpose of the study

In April 2024, the Port and Harbor Bureau of the Ministry of Land, Infrastructure, Transport and Tourism revised the technical standard ⁽¹⁾ to set design values of tide levels and waves in consideration of the effects of climate change in the design of port facilities, and proposed two frameworks for adaptation measures: proactive adaptation and flexible adaptation. When considering adaptation measures, two types of future climate scenarios are mainly considered: the case using the average value of the 2°C rise scenario (medium scenario) and the case considering the upside risk (upper scenario).

In the previous literature ⁽²⁾, we described a method to design a cross section that satisfies the performance requirements for the medium scenario at the beginning of the design, considering the improvement for the upper scenario expected in the future. However, the merit to consider the upside risk has not been examined.

This study examines the impacts of redesigning a cross section that is originally designed assuming

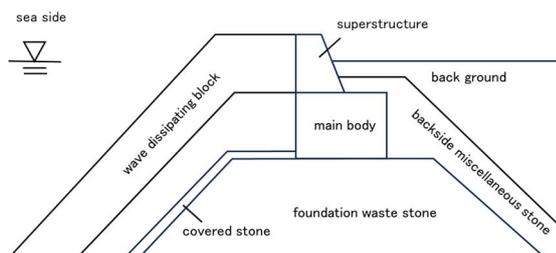


Fig.1 Existing cross section of the target wave-dissipating revetment

only the medium scenario, but for which the actual condition shifts to the upper scenario during the service period (rework scenario), with focus on the crown height of the existing wave-dissipating revetment (Fig.1)

2. Examination of countermeasure cross section with less hand return

Fig.2(left) shows the cross section to which the flexible adaptation was applied. At the start of service, the upgraded cross section was designed to satisfy the required performance (serviceability as overtopping flow) for the medium scenario. However, the cross section was redesigned so that additional construction would be feasible even if the action shifts to the upper scenario after service.

On the other hand, the red colored part in Fig.2 (right) is the cross section designed based on the crown height required for the medium scenario. The height difference between both scenarios is approximately 0.3 m, but an additional elevation of 0.5 m is required at least considering the minimum concrete placement thickness (0.5 m). Although this study case is just an example, it is considered to be one of the merits to carry out the design considering the upside risk.

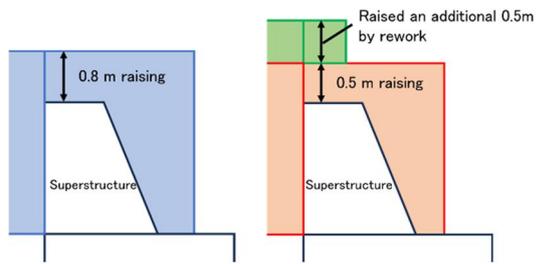


Fig.2 Raising from the main body to a rectangular shape

(Left: Flexible adaptation; Right: Rework scenario)

For more information:

- 1) Japan Port and Harbor Association: Technical standards for port and harbor facilities and their explanations
- 2) National Institute for Land and Infrastructure Management Material No. 1281

<https://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn1281.htm>