



**Institute of Transportation,  
Ministry of Transportation  
and Communications,  
R.O.C.**

PRESS RELEASE on August 20, 2021

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Please release immediately

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## **Wave Attack Early Warning System for Hualien Coastal Highway**

### **Improve the Safety of Coastal Highway**

Following the completion of the "Wave Attack Early Warning System for Taitung Coastal Highway" in 2017, the Institute of Transportation(hereinafter referred to as the IOT), Ministry of Transportation and Communications cooperated with the National Sun Yat-sen University in 2020, used the hydrodynamic numerical models to simulate typhoon waves run-up scenarios, and integrated oceanographic observation data in the eastern Taiwan sea area to build the "Wave Attack Early Warning system for Hualien Coastal Highway" for the Hualien Taiwan Provincial Coastal Highway 11, to provide 24-hour early warning information of wave attack as the auxiliary reference for decision-making of wave attack and road closure.

Hualien Taiwan Provincial Highway 11 Fengbin Township "Man Can Conquer Nature" Highway Section (61k+250~63k+000) is vulnerable to be hit by swell during typhoon. The waves may carry sand and gravel and strike the pavement or revetment, causing public passing safety concerns or the roadbeds being washed away that resulted in interruption of traffic. The Directorate General of Highways needs to send personnel to station and watch the road section conditions during typhoon and implement early warning or emergency road closures. The current road closure operations use real-time observation information which lacks oceanographic forecast information and makes the early warning and response more difficult.

The IOT has studied and analyzed the oceanographic conditions and typhoon events in the Hualien sea area over the years and developed the technology that can calculate the typhoon waves run-up on coastal highways. Aiming at the "Man Can Conquer Nature" Highway

Section, numerical models are used for multi-variable scenario analysis. Established the typhoon wave run-up database based on the simulation results, researched and proposed the reference action indicators (light signals) in accordance with the wave attack disaster prevention standards of the Directorate General of Highways and established the "Wave Attack Early Warning system for Hualien Coastal Highway," the Early Warning System integrates the IOT 's (1) Port of Hualien wave and tide level oceanographic observation information, (2) Daily wave height and tide level forecast information provided by the Harbor Environment Information Website, (3) Wave run-up information, through the exclusive webpage of for the Highway Management Unit to display the warning light signals of 24 hours forecast for the highway section, the light signal is divided into 4 levels of Safe (Green), Early Warning (Yellow), Warning (Orange) and Closure (Red), so that the Highway Management Units and first-line personnel can inquire anytime and anywhere with computer or cellphone, to utilize this forecasted road closure auxiliary information in real time to early response, in order to improve the safety of highway users during the typhoon and reduce the risk of driving.

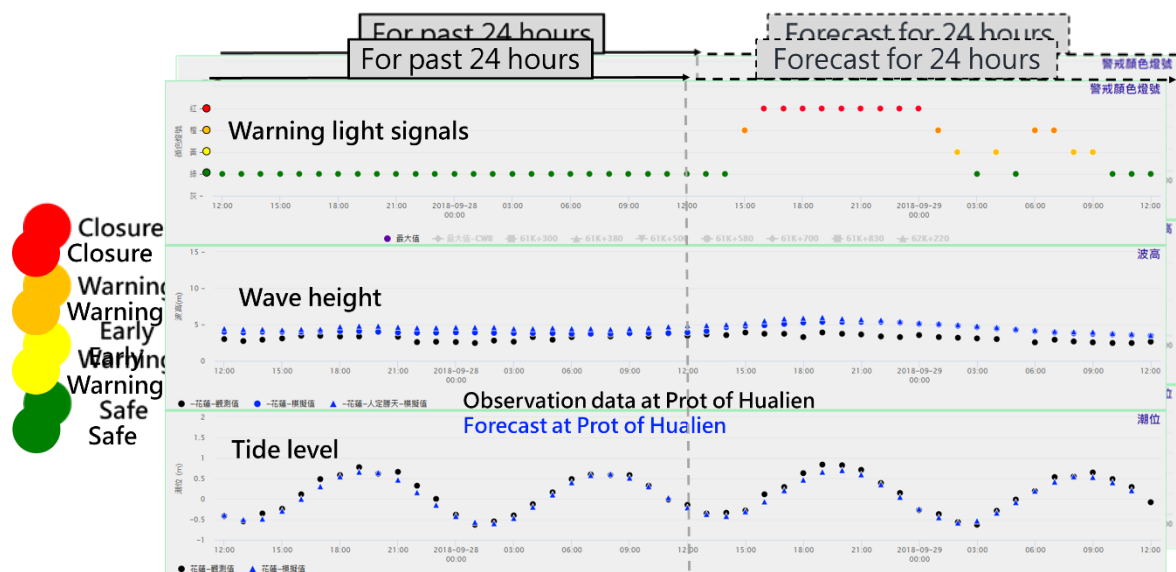
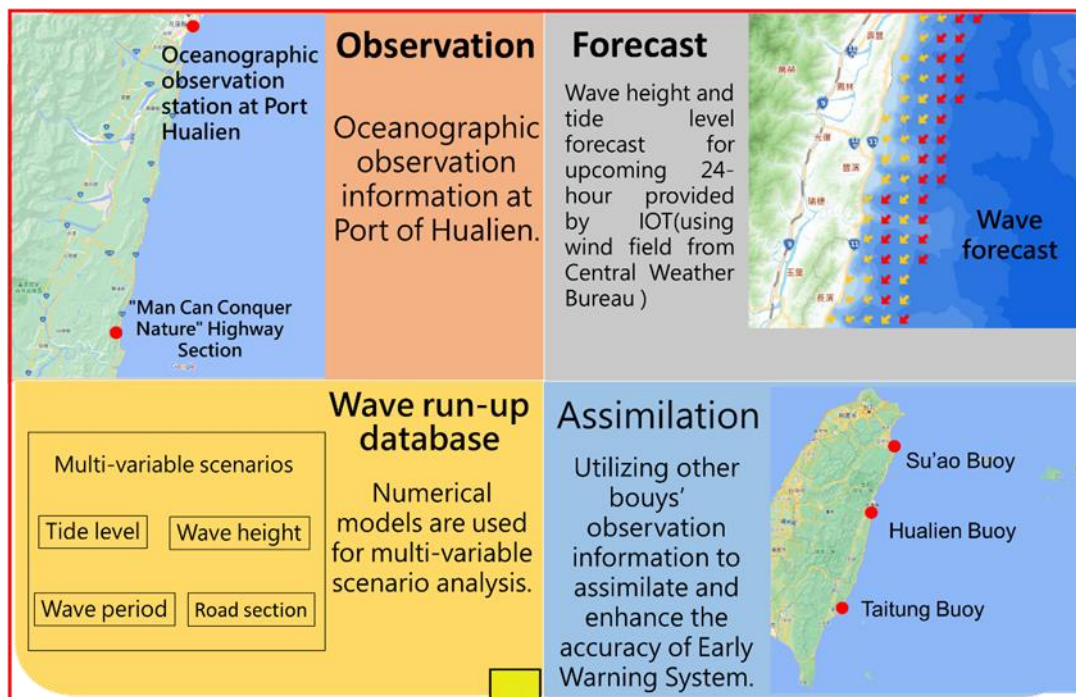


Figure 1 Screen and Light Signals of Wave attack Early warning system for Hualien coastal highway.



## Wave Attack Early Warning system for Hualien Coastal Highway

Figure 2 Cross-domain information integrated application and accuracy improvement