**Institute of Transportation,
Ministry of Transportation
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Developing Port Structure Maintenance and Management for Enhancing Port Maintenance and Management Performance

Sea transportation is the lifeline of Taiwan's export trade. As nearly 40 percent of major trade ports for sea transportation have been used for more than four decades, enhancing and maintaining the performance of port structures in major trade ports has thus become an urgent issue. The Institute of Transportation (IOT) thus helps the Taiwan International Ports Corporation, Ltd. (TIPC) to build a well-planned port structure maintenance and management (M&M) system to enhance operational facility safety, effective use of M&M funds, and pursue its sustainable development for port facilities. The IOT began to investigate and examine port structures, including wharves and breakwaters, of major trade ports in Taiwan since 2011. Currently, IOT is helping the TIPC develop the examination standards and annual tour inspection plans for individual port structures by type and by condition based on the basic data, structure life, and importance. Contents include basic tour inspections by visual inspection, non-destructive tests, underwater survey, geological survey and corrosion prevention of steel pipe piles. By doing so, IOT aims to optimize the establishment of the annual inspection plan and maintenance system.

According to the 2018 statistics of the TIPC, there are 285 wharves in total in domestic and international trade ports within its jurisdiction. The average life of wharves is about 38 years, and 106 (37.19%) of them have been used for over four decades. Some were even built during the Japanese colonial Taiwan era, suggesting that there are many old wharves in Taiwan. Therefore, the Control Yuan has requested the TIPC to establish a M&M mechanism to reduce the risk of port facility damage and maintain normal operations.

To enhance the M&M performance of port structures, in 2017, the IOT has reviewed, planned, and updated the functions of the M&M system built in 2013 of Hualien Port. To optimize port facility inspection and enhance inspection efficiency, the IOT developed an app and function expansion module in 2018. So far, the system has included functions including data review, test and assessment, real-time reporting, repair scheduling, and management of maintenance records. By standardizing inspection and assessment criteria and reasonable repair methods, the IOT enables effective facility operational safety and use of M&M funds, leaning

workforce without sacrificing normal operations, digitalization and systematization of operations and M&M efficiency enhancement. The scope of system application covers domestic and international trade ports within the jurisdiction of the TIPC and Kinmen and Matsu ports. In the future, the IOT will continue to perform a rolling review and revision of the M&M system and optimize the expansion functions and value-added services of the system. The outcomes can be used by the responsible units, including the Maritime Port Bureau and TIPC, in local inspections, safety assessment, and maintenance and repair.

The IOT has offered education and training activities with live, on-site operations to the Maritime Port Bureau and TIPC. The research outcomes have also won credits from users. The TIPC has requested all branches to set up a responsible unit and form an M&M promotion team to perform inspection and M&M of wharves and breakwaters based on the M&M system planned and established by the IOT.

M&M System Flowchart

M&M System Mobile App