Inspecting road accessories (road signs, lighting facilities, etc.)

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1. Introduction

Road signs, lighting facilities, and other column-shaped accessories installed on roadsides have been damaged in various ways including broken columns, fallen bolts or lamps, and so on. These may harm third parties such as passing pedestrians or vehicles, so it is vital that these problems are reliably found by inspections. Many defects are generated at places where they are difficult to see such as corrosion at invisible locations, underground for example (Photo 1), or loose bolts high on the structure or cracked welds, etc. In addition there are a huge number of these column-shaped accessories, so it is now necessary to introduce a rational easy inspection method which prevents overlooking of defects. The Bridge and Structures Division has, with the cooperation of the regional development bureaus, conducted research on the actual state of maintenance of these accessories and analyzed the results, to propose a draft of a periodical inspection manual for column-shaped accessories equipment.

Photo 1. Column Base Corrosion Covered by Paving

Photo 2. Match-mark

2. Outline of accessory inspection

The research results clearly show that among accessories with relatively simple structures, a severe accident such as collapse of the structure or a bolt falling to the ground or similar accident which threatens harm to third parties, can be limited to welds, joints, or specified members, and that corrosion or cracks of such specified parts can develop extremely rapidly in some installation conditions. On the other hand, a characteristic of column-shaped accessories is that it is possible to set patterns of typical structural details and forms of joints since many of them have the same or similar structures. Based on the above,an inspection manual has been proposed. This manual provides for general visual inspection and checking and recording of abnormalities at all specified locations which are known in advance as relatively weak points in every structure. In order to accurately detect whether or not there are corrosion or cracks which can deteriorate extremely rapidly, and to find any loose bolts or other problems, it is usually essential to closely inspect welds, bolts, etc. using a mobile lift or similar device. To reduce the labor requirements of inspections, bolted joints can also be inspected visually from a distance by placing match-marks, which are marks made on each bolt (Photo 2), so that any abnormality of the joint can be accurately identified. By clarifying the level of certainty which should be achieved by inspections in the inspection manual in this way, inspections by a method appropriate to conditions can be ensured. In addition, by taking care to minimize weak points in advance when setting or replacing structures, reliable and economical inspections, and the reduction of future maintenance cost can be counted on.

Methods of inspecting for corrosion of column foundations include non-destructive residual thickness inspections using the ultrasonic pulse reflection method and a safety evaluation method based on its results. To look for corrosion of invisible parts under the road surface, based on research on the actual state of maintenance, priority inspections in cases of such corrosion which can be visually confirmed near the boundary of the road surface and parts buried in asphalt pavement for more than 20 years since installation have been suggested.

3. Conclusions

The results of this research were reported to each regional development bureau by the National Highway and Risk Management Division of the MLIT as Inspection Manual for Accessories (Road Signs, Lighting Facilities, etc.) (Draft)" in December 2010. In the future, studies of the rationalization of maintenance, including analysis of inspection data which is collected will be conducted.