



Development and Construction of Non-Metal Bridge

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Abstract

The Non-Metal Bridge was developed to completely eliminate the use of steel members such as steel reinforcements and prestressing steel and it is expected to be able to reduce future maintenance costs. Aramid FRP rods were used as prestressing tendons to provide tensile force reinforcement. To eliminate the need for shear reinforcement, high strength fiber reinforced concrete with high shear strength was developed. That structure was conducted by wheel load running tests to verify the fatigue durability. After that, a half scale butterfly girder structure was built by using segmental method and tested to confirm that the structure of the joints between segments was sufficiently durable. Based on those results, the actual experimental bridge was built. This experimental bridge is part of a temporally road and its structural type is simple beam with 14 m of span length. The bridge was constructed by precast segmental method and has been used as a construction road since September of 2015.

Keywords: Non-Metal Bridge; High strength fiber reinforced concrete; Aramid FRP rod; Pilot bridge; Precast segmental method.

1 Introduction

Prestressed concrete bridges and other concrete structures are generally considered to be durable, but recently there have been reports of cases where factors such as salt dam-age and neutralization have corroded steel reinforcements or prestressing steel, causing concrete to spall as the corroded reinforcements expand, which has sometimes had an undesirable impact on third parties. Consequently, it is increasingly evident that concrete structures require appropriate maintenance and management, and can no longer be considered maintenance-free.

Worldwide, there are already large numbers of infrastructure assets, and the amount of capital stock is likely to keep on growing, particularly in developing countries working to put their infrastructure in place. Alongside this growth, the burden of maintenance will continue to increase, and the need to manage and maintain assets will keep growing. In Japan, the infrastructure constructed during the period of high economic growth is aging, and the costs of repair, reinforcement, and other maintenance or upgrades are already increasing. Annual maintenance and renewal costs alone are expected to surpass the current total annual