



A state-of-the-art, flexible, easy-to-replace plug-type expansion joint for the Delaware Memorial Bridge

Forest Kovach, Gianni Moor

mageba North America Corp., New York, NY, USA

Dominik Ortmann

mageba Austria, Wels, Austria

Contact: dortmann@mageba-group.com

Abstract

The modern flexible plug expansion joint, which uses a special polyurethane material rather than the asphaltic material traditionally used, has been developed to offer an optimal small-movement expansion joint solution, in many cases, to bridge construction and maintenance engineers. Its long-term performance is vastly superior to that of the asphaltic plug joint – thanks, for example, to its great strength and elasticity (with the material allowing 650% elongation before failure), its resistance to both very low and very high temperatures, and the special advantages it offers when used to replace old joints in existing structures with minimum impact on traffic. The expansion joint is described, in terms of properties, benefits and installation, with reference to an ongoing project to replace the expansion joints of the Delaware Memorial Bridge.

Keywords: Expansion joint; Delaware Memorial Bridge; polyurethane; replacement.

1 Introduction

Typically being much less robust than the main structure, the expansion joints of any bridge are likely to need to be replaced several times during the bridge's service life. A very large part of the life-cycle costs relating to a bridge's expansion joints is due to these replacement works – particularly when considering indirect/consequential costs such as traffic disruption. Replacement of bridge expansion joints today still typically involves a significant amount of demolition and reconstruction of the bridge deck. For example, installation of the single gap joint shown in Figure 1 to replace an existing joint of any type would typically require breaking out and pouring of concrete. But this can be greatly reduced or even

avoided in many cases, by selection of the right expansion joint solution. For maintenance of the innumerable number of bridges around the world with low-movement expansion joints, installation-friendly expansion joint solutions are available that can minimise effort, costs and traffic disruption – primarily by minimising or avoiding the need to break out concrete of the main structure. This is demonstrated with reference to the Delaware Memorial Bridge (Figure 2), a twin suspension bridge connecting Delaware and New Jersey across the Delaware River in the USA, which is currently undergoing a renovation project that includes replacement of the numerous small-movement expansion joints on its approach structures.