Oasis Bridge Condition and Major Refurbishment Works

1. Location and technical description of Bridge

Oasis Bridge (ECC Bridge No. 0556) is located in Chelmsford, Essex (OS Grid Reference TL 729 083) and carries the A138 Chelmer Road over B1137 Springfield Road. Its Gross Replacement Cost is £8.7m.

Oasis Bridge was originally constructed in 1970 and strengthened in 1995. It is a four span skew under-bridge. The deck has skew spans of 12.50m – 20.40m – 20.40m – 12.50m, with a skew angle of 38°14'. The original deck is 0.927m thick in-situ concrete with 0.533m diameter voids.

The 1995 strengthening comprised of the addition of 100mm and 200mm thick reinforced concrete topping slabs to the carriageway and footway sections respectively, acting compositely with the existing structure.

The superstructure comprises of a reinforced concrete voided deck slab supported on elastomeric bearings at the abutments and monolithic intermediate piers.

The abutments are supported by six discrete reinforced concrete columns on spread foundations that sit behind paved concrete revetments. The columns are parallelograms in section and are 2.374m by 0.609m in length and width respectively.

The three intermediate piers are each formed from 16 no. ten-sided reinforced concrete columns with an approximate 670mm diameter. The columns are pinned at the base and continuous at deck level with the superstructure.

The bridge parapet is an Aluminium P1 parapet installed in 1970 corresponding to a current N2 normal containment level parapet. The parapet is a modular system providing supporting posts 1.0m high and spaced at 3.60m centres. The system consists of 3 horizontal aluminium rail sections at different heights. The structural element supporting the bridge parapet comprises a reinforced concrete string course which is part of the reinforced concrete voided deck. The string course is approximately square in section with 457mm sides.

2. Evidence of condition issues, and proposed Major Refurbishment works

Oasis was subject to Principal Inspections in 2010 and 2018. Its current condition is 'fair'; its BCIav: 81.93 and BCIcrit: 55.48. The recommendations from the inspections include the following remedial works:

2.1 Bearing Replacement

Bearings are defective at both abutments but particularly at the north abutment. The Principal Inspection recommended bearing replacement due to poor condition.

2.2 Expansion Joint Replacement

Evidence of wide-spread expansion joint failure, especially at the northern end of the deck.

2.3 New Waterproofing

Evidence of failure of the waterproofing system. This was evident due to leachate migrating through the cracks in the soffits. Powdery patches were evident in many locations on the soffit.

2.4 Removal of Drainage Blockage

Water ingress is evident on both abutments, and the back of the bearing shelf drainage requires repair. Polystyrene foam filler requires reinstatement to ensure debris does not block the drainage.

2.5 Concrete Repairs

There is significant cracking and spalling in the abutment walls and cracking in the deck soffit that requires repair.

2.6 Installation of Vehicle Restraints (Safety Barriers)

The bridge parapet impact loading assessment found that the existing reinforced concrete string course is not adequate to resist the required demand.

An option appraisal was carried out to identify whether strengthening or protection measures would provide the most appropriate solution. Following this it has been recommended that protection measures are required; installation of inboard N2 safety barrier on the bridge central reserve and verges.

Assessment of the capacity of the existing bridge piers under collision loading has also been carried out. The assessment recommends protecting the piers with an appropriate vehicle restraint system.

Accordingly, installation of high containment safety barriers in front of intermediate piers has been recommended.

Recent detailed inspections of the vehicle restraints on the A138 over Oasis bridge have identified condition concerns, and these will also be included in the proposed refurbishment works.

2.7 Construction of bearing inspection access platforms and stairs

Due to the steep revetments, it has been recommended that in the interests of safety for inspection operatives, a new bearing inspection access platform with stairs is constructed.

3. Cost and Timing of refurbishment works

For costs and timing of bridge works please refer to 'Oasis Bridge Design and Works Programme 19-20.xls'.

Essex County Council was recently awarded £317.9m following an infrastructure housing bid to central government. £218m million is for the building of a new railway station at Beaulieu, as well as the implementation of a Chelmsford North-East bypass connecting the A12 with the A131, to unlock up to 10,500 new homes and create 2,500 jobs. Oasis bridge is a critical transport link to this project, providing access to the Beaulieu housing development as well as to the planned new railway station and bypass.

The proposed Oasis Bridge project is estimated to cost £7m (including the cycleway maintenance element). Bridge refurbishment works are currently in the design stage, but the cost would be extremely problematic to deliver from the annual Highways Maintenance Block Funding grant as it would likely require to be phased over several financial years. This much needed life enhancing refurbishment work will need to be completed in order to sustain transport links to Beaulieu, the City Centre and the A12, as well as to provide links to the proposed new railway station and planned Chelmsford North East Bypass. It will also need to be completed in time to avoid the anticipated disruption associated with this planned new infrastructure.