

CASE STUDY AECOM | 1.1b) – Oct 23' - Dec 23'

A63 Castle St – Mytongate Bridge Pier to Deck Connection (Safety in Design)

Introduction

A63 Castle Street scheme is currently at PCF Stage 6 construction phase. The AECOM team work on site full time, and have a requirement to ensure that all the works constructed on site are in line with the works information, specification for highways works and safe for use once released to the public. The update A63 will have a new junction, including a bridge directly over the underpass to replace a large roundabout, this bridge is going to be an intergral concrete bridge, Mytongate Bridge.



Overview

AECOM were asked to complete an inspection of the steel reinforcement connection between the bridge pier and the bridge deck steel. L-Bars have been included within the Design to tie the pier into the deck steel, however, to install the beams these L-Bars were cut and then reconnected with couplers (See figure 1) after the beams were landed.

During the inspection it was identified that about 20% of the L-Bars could not be fully installed with the coupler method as per the Contractors plan. AECOM identified this as a significant issue and ensured that both an NCR & Defect were raised, and that the Designer was engaged to check what remedial works would be required to ensure the As Built per & deck connection would be sufficient and therefore safe for use by the public.

The Contractor engaged the Designer and the CAT3 checker, it was initially believed to have failed the CAT3 check, however, after numerous iterations of analysis, it was concluded that the as built design, with 20% of the L-Bars omitted, is ok and safe for construction and use by the public.

This failure in constructability and safety throughout the design phase was raised to both the Contractor and the Client to resolve the issue before any negative impact arose from the failure.



Challenges

- Ensuring all parties involved understood the potential safety hazard to the general public if the connection was not constructed in accordance with Design and Checks.
- Ensure that a change of design and remedial solution can be agreed between all parties (Contractor, Designer and Customer/Client).
- Ensuring any remedial works to be completed can be done in a safe and effective way.
- Ensuring that lessons were learnt due to this failure in Safety in Design (Constructability) is captured and shared with the wider team following completion of the bridge construction.





Action Taken

- AECOM raised the issue with the Contractor and Client.
- The Contractor then surveyed the As Built connection and send all detailed to the Designer to allow for a detailed analysis to be completed.
- AECOM working along side the client, made it clear to the Contractor that the new connection design would require a CAT3 check and revised Design & Check Certs to ensure it was build in accordance with specification and it would be deemed safe for use once completed.
- The Contractor followed the advice of AECOM and ensured that once the Designer had completed their analysis, concluding that missing 20% of the L-Bars would be OK, that a CAT3 check would be completed on this resolution.
- The CAT3 check initially concluded that this connection would fail under fatigue and be an unsafe connection for public use once opened to traffic. However, after a more detailed analysis it was concluded to be acceptable and safe.
- Following this conclusion, AECOM & NH made is very clear that the deck pour and completion of the structure could only take place if all the required contractual and safety documentation was in place. This included signatures from the Designer and CAT3 checkers.

Results

Following the above actions, the Contractor and Designer worked hard to gather all the required documentation that will provide both technical and safety assurance to the client.

These documents have now been produced and shared, and the deck pour has now been booked into to complete before the new year.

It is clear that there was a fundamental issue with the Design Constructability and Safety in Design. Lessons learnt will be shared following completion of the concrete deck pour as the outcome of this safety in design issue could have been very different.



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home
safe
and well

Images



Figure 1 – Example of couplers and L-Bar locations that could not be installed.

NCR 268

BM 30 Central Pier - Unconstructable

Part 1 Problem - Completed

PART 1 Problem

Edit 

Statement of Problem

The requirement of BM 30 from drawing HE514508-ARP-SBR-S0_JN_MB-DR-CB-170025 are impossible to place within the links at the top of the pre cast beams as details.

Apparent Cause (What caused the problem)

The bar marks clash with the lifting arrangements of the beams, subsequent couplers have been introduced to allow lifting to be completed. Either way the bars are not placeable in the T2 mat of the of the bridge deck. No clash detection has been undertaken at the design stage.

Cause Type	Design - Incorrect Detailing		
Discipline	EAC-Environmental Approvals & Consents		
Contractor	Arup	Team	BB Supplier

Completion Package

Series 1700 Structural Concrete Greenfile-HE514508-BAL-SGN-WHL_AL_SCHME-PM-ZM-000001

Figure 2 – NCR raised for missing L-Bars on Contractor Quality System