

CASE STUDY – AI Traffic Monitoring to inform design. Kier Transportation: A417 – November 2023

Introduction

Artificial Intelligence (AI) technology was used in traffic monitoring surveys, to inform the design of the Main Site Access for the A417 Scheme.

Through utilising AI enabled cameras to conduct advanced, instead of standard analogue or human-monitored count and classification surveys, the Traffic management team were able to identify 228 acts of unsafe driving, within a 28 day period. (examples below).

Using this information lead to a design change, whereby a Mini-roundabout was selected, instead of the previous preferred option of traffic lights.

This change was a direct result of the information provided through the AI monitoring, which was able to provide far more information than previous monitoring techniques, showing decision makers clear and effective evidence, which was used to ensure that all road users, both members of the travelling public, and project personnel will have the safest possible interface throughout the project.

This case study highlights the use of AI enabled technology in traffic monitoring as best practice, for consideration of any contractors needing to inform their decision making.

“Using this advancement in AI monitoring helped us to make far better-informed choices in the design stage, taking into account road user behaviour which was not available to us through standard monitoring. Any scheme using this system will help reduce risk significantly.”

Adam Cummins – A417 Traffic Management Manager.





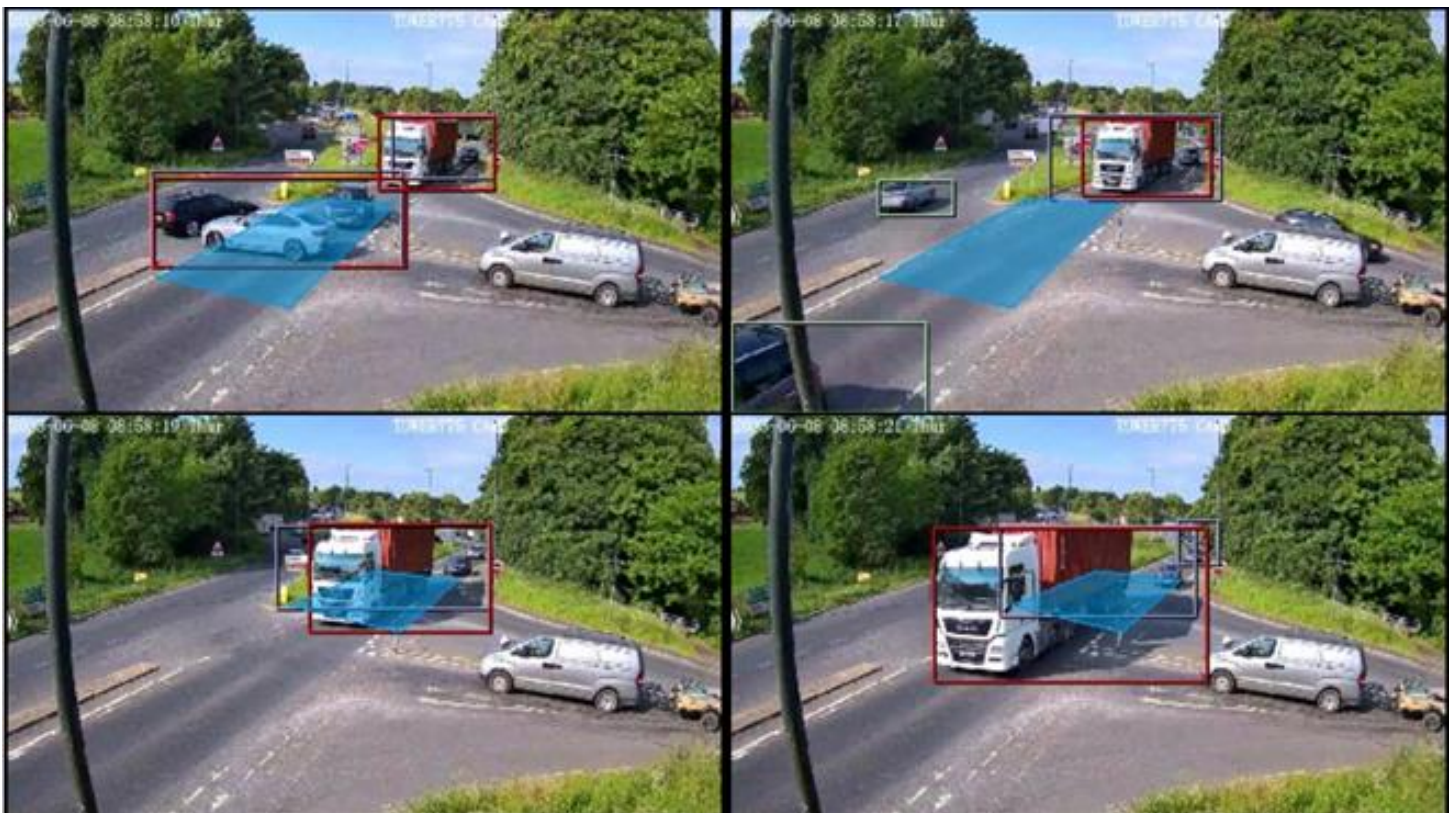
Overview

Due to significant concerns around the practicality and safety of the current Ullenwood Manor/A436 Junction arrangements, senior members of our Design, Health Safety & Wellbeing, Operations and Traffic Management Teams identified the need for design change.

The Junction sits on the opposite side of the road to what will soon be the A417 Schemes Main Site Entrance, and will therefore have significant interface with our works.

To inform the design change, the team deployed a cutting edge, Artificial Intelligence based 'Vehicle Incident Detection and Traffic Speed/Counting System', enabling the team to not only conduct standard traffic surveys (count, Classification etc) but also detect and report on any Unsafe Acts and Near Misses (Pictures, Below).

For example, The cameras AI systems were able to detect when vehicles crossing the A436 to join the westbound carriageway stopped foul of the eastbound carriageway or pulled out from the junction whilst a moving vehicle was present on the eastbound carriageway. Capturing this data provided clear, actionable evidence to influence traffic management and road user safety, during design.





Challenges

It was agreed that the most suitable location for the main project site access would be opposite the A436/Ullenwood Manor Junction, however Due to existing traffic flows in the area and historic data in the region of RTC's the project team wanted to prohibit right hand movements in and out of the site access for construction vehicles, to reduce the risk of driver error and reduce unsafe driving occurrences and near misses.

Due a number of anecdotal reports of unsafe driving at the junction, a more detailed survey was suggested, to ensure that driver behaviour could be accurately monitored, in addition to standard traffic count and classification, before any decision was made on the temporary layout design of the junction during the construction phase of the project.

Traffic data was collected between 2nd June and 29th June to obtain a better understanding of the number of vehicles which use the junction and the number of dangerous driving events and near misses, because of the current layout.



Action

One Solar-Powered CCTV tower fitted with a video analytics processor was deployed at the agreed count location for the duration of the count exercise. Analysis of the video was carried out on the tower, with data transmitted for processing and analysis.

The video analysis system detected when vehicles crossed a line within the scene in a specified direction and recorded the number of counts.

The system was live for a period of 28 Days, and monitored traffic count, classification and driver behaviour when using the junction.

At the end of the installation, a full detailed report was produced by the company who supplied and operated the technology, Clearway, which gave a comprehensive review of all the data required to make as informed decision as possible, which fed into the A417 Traffic Management Managers report for National Highways, on 'Main Stie Access Options'.



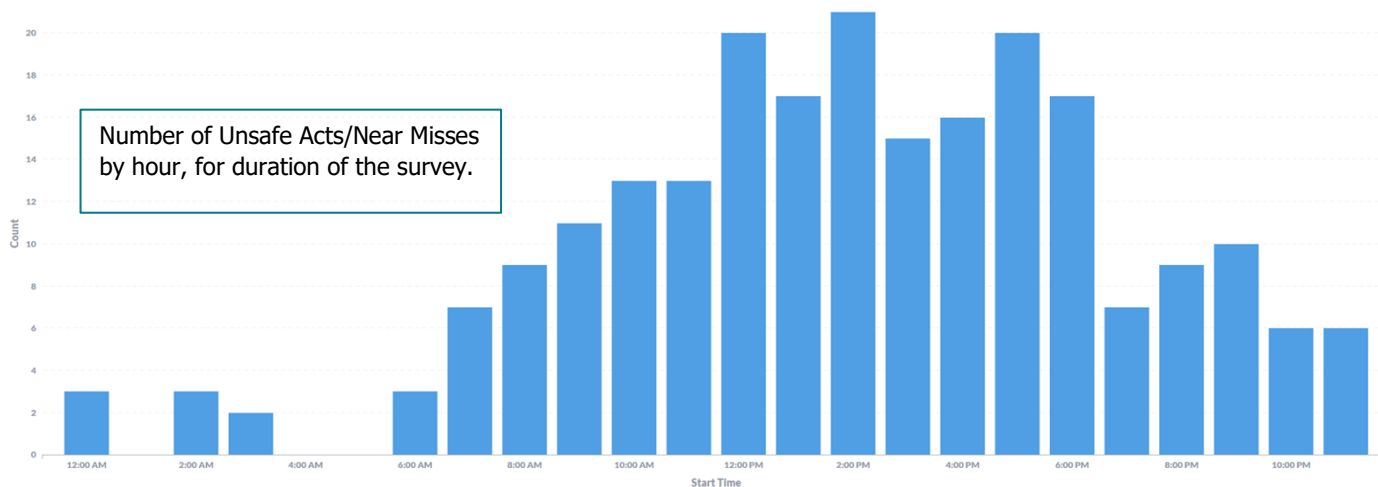


Above: Dangerous Driving (Near Miss) caught by AI, the system detects a vehicle pulling out in front of an HGV, and then stopping in the live lane, forcing another vehicle to stop.

★ Results

The Installation was successful in providing both a thorough Count/Classification survey, and also information around road user safety/unsafe driving, which would not have been previously available.

Over 228 Unsafe Acts/Near Misses were recorded during the deployment (between 2nd and 29th June) with the highest number occurring between 12pm and 2pm, followed by a second peak around 5pm, with surprisingly few during the morning Rush Hour.



By ensuring our teams have accurate data around current road use, we have been able to influence the junction redesign, which will significantly reduce the number of Unsafe Acts and Near misses, and therefore significantly reduce the likelihood of a serious accident.

What was originally designed to be a Traffic Light controlled junction, will now be a roundabout instead, as a result of this data.

A full Detailed report is available on request.



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