

Our ref: CRS 768,381
Your ref:

Highways England
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Bedford MK41 7LW

Email:

Direct Line:

16 January 2019

Dear

Freedom of Information Request A14 Orwell Bridge – aerodynamic study

Thank you for your email of 10 January requesting information about the aerodynamic study being carried out on the Orwell Bridge. We have now completed our search for information. I have extracted your requests and provide responses as follows:

1 – The total cost or estimated total cost of the aerodynamic study commissioned by Highways England to City, University of London for the Orwell Bridge in Suffolk, launched in October 2018

The total cost will be £25,581.30.

2 – How the aerodynamic study outlined in question 1 is being paid for – eg central government grant, Highways England budget

The study will be funded by Highways England. Highways England funding is received through HM Treasury.

3 – A brief outline of what the study is exploring (eg modelling of wind speeds, directions and thresholds which will prompt a closure of the Orwell Bridge)

The study is exploring the risk of cross-wind induced accidents in vehicles crossing the Orwell Bridge. Its aim is to assess the critical wind speed beyond which accidents are likely to occur for different types of vehicles crossing the bridge. Only cross-winds are being studied because they are critical to driving stability.

The influence of the following parameters on the risk of vehicle accidents in the Orwell Bridge will be considered:

- Influence of the wind and driving speeds.
- Influence of vehicle characteristics (exposed surface, loading, etc.)
- Influence of the position of vehicles across the width of the bridge deck.
- Influence of road surface irregularities.
- Influence of the aerodynamic response of the bridge deck.
- Influence of a driver's steering response.

The types of vehicle instabilities considered in this work include overturning, side-slipping and change of direction (yaw) accidents.

4 – A brief outline of what work will be carried out as part of this aerodynamic study (eg, computer modelling of wind speeds and directions, physical trials on the bridge of car use during high winds)

This is a numerical study based on the most advanced models of wind-vehicle-bridge interaction which could potentially be extended to experimental wind tunnel testing at a subsequent stage. The methodology of this project is as follows:

- a. Definition of the bridge by means of a detailed finite element model obtained from engineering drawings of the Orwell Bridge. Vibration modes are extracted from this model and used in the next steps.
- b. Definition of the wind velocity field in the Orwell Bridge by means of site-specific characteristics.
- c. Definition of surface irregularity of the road lanes of the Orwell Bridge.
- d. Definition of the aerodynamic coefficients of the deck using advanced computational fluid dynamic analysis.
- e. Dynamic analysis of the wind-vehicle-bridge interaction using a validated model.
- f. Vehicle accident analysis. The wheel-pavement reaction forces in the vehicles are used to study the risk of vehicle accidents.

By gradually increasing the wind and the vehicle speeds, and by repeating steps (e) and (f), critical wind curves can be obtained for the different cases outlined in 3 above. This will give us useful information about the risk of vehicle accidents and about the efficiency of the existing traffic protocols. Depending on the results, we may be able to determine alternative protocols.

5 – The number of people working on the aerodynamic study

Two

6 – The action plan for Highways England for once the aerodynamic study has been completed and publication plan once received – eg to be published on Highways England website on Sep 1 2019 etc

The outcomes of the study will determine the action plan. It would therefore be inappropriate to produce a detailed action plan at this stage. We intend to publish the study on our website once it has been finalised.

If you are unhappy with the way we have handled your request you may ask for an internal review. Our internal review process is available at:
<https://www.gov.uk/government/organisations/highways-england/about/complaints-procedure>

If you require a print copy, please phone the Information Line on 0300 123 5000; or email info@highwaysengland.co.uk. You should contact me if you wish to complain.

If you are not content with the outcome of the internal review, you have the right to apply directly to the Information Commissioner for a decision. The Information Commissioner can be contacted at:

Information Commissioner's Office
Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF

If you have any queries about this letter, please contact me. Please remember to quote reference number 768,381 in any future communications.

Yours sincerely

Business Management Team Leader
Operations (East)
Email: