



## Forth Estuary Transport Authority

### High Winds Update

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24 April 2009

#### 1 Purpose of Report

- 1.1 The purpose of this report is to provide an update to Members on progress of work carried out following the recommendations made to the Board in June 2008 by the FETA High Winds Working Group. The Working Group was set up following two incidents on the bridge, one on 31 January and the other on 12 March 2008. On both occasions, a heavy goods vehicle overturned in high winds causing widespread disruption.

#### 2 Background

- 2.1 In this report those vehicles which are most at risk from overturning during certain wind conditions are termed 'wind susceptible vehicles' rather than 'high sided vehicles'. The term 'high sided vehicles' can be misleading as motorbikes, cars towing caravans or trailers and cars with roof boxes are just some examples of vehicles which may be at risk but are not high sided. Indeed, there are high sided vehicles carrying heavy loads which have a significantly reduced risk of blowing over in certain conditions than say a small minibus towing an empty trailer.
- 2.2 FETA's Working Group was established following a meeting held on 29 February 2008 attended by the Chief Executive, Chief Engineer & Bridgemaster and the Operations Manager of FETA; the Chief Constable of Fife Constabulary and staff and an Assistant Chief Constable of Lothian and Borders Police. At that meeting it was agreed that the Working Group should be made up of personnel drawn from the following agencies to address the issues and try to provide solutions to the difficulties being experienced with traffic during high winds. These agencies were:

Forth Estuary Transport Authority  
Transport Scotland  
Fife Constabulary  
Lothian & Borders Police  
Central Scotland Police  
Fife and City of Edinburgh Councils

A brief for the Working Group was set out as follows:

- review current procedures for dealing with wind susceptible vehicles on Forth Road Bridge
- review the impact of high winds on the adjacent network
- review signing strategy during high winds
- review communications strategy during high winds
- consider prevention and enforcement strategies (emphasis on prevention/education with enforcement to deal with residual offenders); liaison with procurator fiscal to be included
- consult with key organisations within the haulage industry

It was recognised that the implementation of any of the Working Group's findings would involve different agencies and funding was likely to be an issue.

- 2.3 In addition to this work being carried out specifically at Forth Road Bridge, a national forum, the Scottish High Wind Strategy Group, has been set up by Transport Scotland to examine procedures on trunk road bridges identified as being at risk, as well as those used on Forth and Tay Road Bridges.
- 2.4 The management of traffic crossing Forth Road Bridge in strong winds is a matter of managing risk. A balance has to be reached between the strategic requirement to maximise the availability of the bridge to commercial traffic, and public transport in particular, with the safety of bridge users. It is also recognised that the ultimate responsibility for the safety of a vehicle lies with the driver.
- 2.5 Forth Road Bridge has operated since opening in 1964 with very few serious incidents or fatalities caused by high winds. The procedure for dealing with traffic and high winds has evolved over the years to reflect changes in risk management. The current procedures were introduced over 10 years ago and have been used with a good degree of success in this difficult task of maximising availability and managing risk.
- 2.6 However, efforts should continue to be concentrated on minimising the number of wind susceptible vehicles arriving at the bridgeheads because of the difficulties in diverting them once they have arrived.

### **3 Main Report**

- 3.1 The recommendations made in the June 2008 report are listed below along with the actions taken to date.
- 3.1.1 A study should be carried out to examine the feasibility of providing localised wind barriers on the bridge at the main towers.

The localised barriers would be provided in order to:

- Prevent sudden gust induced swerving of wind susceptible vehicles when passing by the towers.
- Reduce the likelihood of a loss of control/overturning event due to the above.
- Reduce the buffeting at the towers to no more than would be experienced in crossing the remainder of the unprotected span.
- Be used in conjunction with the other measures recommended by the High Wind Working Group.

The consulting engineers, Flint and Neill Limited, were appointed to carry out the study and have produced a first draft report. Their preliminary work has shown that the erection of localised wind barriers at the towers could provide significant localised shielding.

The design concept used by Flint and Neill is based on that used for the M48 Severn Bridge solution. That system was wind tunnel tested and proven by additional vehicle trials, and has now been in successful operation from nearly 20 years. It has reportedly reduced the risk of overturning at the towers to the same level as on the rest of the bridge.

Vertical slats are proposed to provide the shielding within the barriers which will allow greater transparency for drivers as they pass them, and is considered to provide a more aesthetically pleasing effect on the bridge when viewed from afar. The target level of shielding is set so that the lateral pulse that occurs at the tower would be less than the peak lateral buffeting force on normal crossing of the unshielded span. The wind barrier system will smooth the changes past the tower, and in particular the vanes act to prevent flow reversals (eddies) that could occur immediately behind the tower legs.

The barriers would be feathered down to achieve a lateral shielding effect in order to avoid sudden changes in sideways force being applied to passing vehicles. This is done by ramping down the height and increasing the porosity.

The panel arrangement proposed is for 4.3m high panels ramping back down to 1m either side of the tower over a 40m distance.

Initial discussions have taken place with both local authorities and Historic Scotland over the form of the localised shielding and a formal planning application will be made once the scheme is developed further.

The design loading on the barrier needs to be transmitted into the deck's lateral bearings and the next stage is for the assessment of these bearings to be made under various load combinations.

If loads are too great for the deck bearings, a more rigorous wind tunnel test may have to be carried out to refine the analysis and design.

A sum of £2 million has been included in the Capital Plan for this work. However, it should be noted that this estimate was made before the feasibility study was completed.

- 3.1.2 If acceptable to the Chief Constables of Fife and Lothian and Borders, a procedure to temporary transfer powers to allow FETA officers to stop and divert traffic during high winds and other incidents should be put in place.

The issue of temporarily transferring powers is now being taken forward by Transport Scotland's national forum, the Scottish High Wind Strategy Group. However, a memorandum of understanding has been signed by FETA and Lothian & Borders Police regarding roles and responsibilities and levels of assistance that will be provided during high winds. It is expected that a similar memorandum will be signed with Fife Constabulary in the near future.

- 3.1.3 Take forward a proposal to introduce a mandatory 30 mph speed limit on the approaches to the bridge during high winds or other emergency situations.

New variable speed limit signs are now in place on both approaches to the bridge.

- 3.1.4 Transport Scotland, City of Edinburgh Council and FETA have agreed to discuss the feasibility of providing VMS signing on the M9 Spur/A90 and these discussions should be progressed.

Transport Scotland had agreed to undertake some consultancy feasibility work to determine what network operation measures would be required and to determine more accurately what the likely costs would be. However, the Forth Replacement Crossing project now includes for the provision of an Intelligent Transport System from Halbeath across the new bridge to the M9.

- 3.1.5 Contact should be made with those drivers who have pulled into Welldean or the plaza area after ignoring advisory signing. This could be done by the Police or with the assistance of the Vehicle Operators Services Authority (VOSA). Fleet managers could also be contacted to engage them in a dialogue about the consequences of drivers ignoring signs.

In addition, vehicles which are clearly at risk and cross the bridge could be identified, perhaps using CCTV, and a name and shame campaign set up for repeat offenders.

Vehicles that ignore warning signs have been identified using CCTV and Fleet Managers have been contacted to discuss the issues. VOSA have agreed to mount a campaign during the next sustained period of high winds, although no suitable opportunity has yet arisen.

- 3.1.6 The Police and FETA should explore further the issue of prosecution of drivers with the Procurator Fiscal's office.

Discussions have taken place with the Procurator Fiscal through the offices of Fife Constabulary. It would appear that the Procurator Fiscal has indicated that they would almost certainly proceed with charges for non-compliant vehicles which overturned or caused an accident on the Bridge. However, failing to obey matrix signs and arriving at the bridgeheads was unlikely to be sufficient grounds for prosecution.

- 3.1.7 FETA's Operating Procedures during high winds currently allow pedestrians to access onto the footways in wind speeds gusting up to 65 mph. This should be reduced to restrict pedestrian access by the general public to 50 mph.

The FETA procedures have been amended accordingly.

- 3.1.8 Dialogue should continue between FETA and the Road Haulage Association and Freight Transport Association in order to promote driver education.

Dialogue is continuing.

- 3.1.9 A wind survey has been carried out by Vaisala Ltd on behalf of FETA to determine wind characteristics along the length of the bridge. This will assist in the location of the new weather station (with in built anemometer) being provided as part of the Dehumidification Works and the possible re-siting of the existing anemometer. One or both should be linked directly to the Met Office to improve modelling of local wind effects.

This work is still in progress and is being carried out to suit the dehumidification project programme.

- 3.1.10 FETA's e-mail service should be replaced with an SMS text-based alert service and a structured early notification system should be considered.

Work on a new alert service is at an advanced stage, with technical trials due to commence in April 2009. The service comprises SMS text alerts, automated voice messaging and new improved webcams. The system will allow users to tailor the information they receive to their own requirements.

- 3.1.11 Subscribers to the e-mail service should be offered the opportunity to subscribe to a quarterly email newsletter which will highlight planned works in the months ahead.

A newsletter is being developed as part of the new alert service.

- 3.1.12 The possibility of setting up a dedicated emergency update radio station for the Forth area should be revisited when the opportunity emerges.

Transport Scotland are investigating the possibility of an expansion of the UK Traffic Radio service to Scotland, initially looking at the central belt and covering the Forth corridor. This would provide a digital and internet based dedicated traffic radio service.

- 3.2 In addition to the recommendations listed above, Members should also note the following:

- 3.2.1 The toll plaza removal works were completed during summer 2008. The scheme provides for new roadside variable message signs around Echline junction and traffic light control as part of the new plaza layout. Also included was a holding area for wind susceptible vehicles.

- 3.2.2 The winter months of 2008-2009 have seen relatively light winds compared to last year, with fewer days of diversions and therefore fewer vehicles ignoring signs. However, there have been a number of occasions when restrictions due to high winds have had to be put in place. Although there is evidence that a minority of drivers are still ignoring signs and crossing the bridge, there have been no significant numbers of vehicles having to be stored then turned at either Welldean in the north or in the new holding area on the plaza.

- 3.2.2 Transport Scotland are replacing the overhead legacy VMS on the northbound carriageway, north of Newbridge junction. A mobile VMS is in operation. The new sign is programmed to be replaced in July 2009

- 3.2.3 City of Edinburgh Council have installed a roadside VMS on the A90, just east of the Barnton Junction, at Parkgrove Street and another at Balgreen on the Glasgow Road as part of their recently introduced Urban Traffic Management & Control system. Both of these signs can be employed to advise west bound drivers of restrictions at the bridge. The Forth Road Bridge Control Room now has direct contact with City of Edinburgh Council's control room for the purpose of requesting that signs are updated. However, discussions are still ongoing with both City of Edinburgh Council and Transport Scotland in respect of FETA's direct access to and use of the signs when required for bridge related messages. A further roadside VMS, operated by Transport Scotland, is sited immediately east of Maybury and can serve a similar purpose.

#### **4 Conclusion**

- 4.1 The FETA High Winds Working Group has been a successful forum, but was always seen as a short life working group. FETA will continue to take forward all the outstanding local issues. However, it is felt that the National Strategy Group is the best forum for taking forward the remaining national and strategic issues.

## **5 Recommendation**

- 5.1 Members note the progress made against the recommendations of the FETA High Winds Working Group
- 5.2 The FETA High Winds Working Group be wound up and the remaining strategic issues referred to the National Strategy Group. FETA will continue to address and take forward local issues in partnership with other agencies as required.
- 5.3 Those agencies that have contributed to the FETA High Winds Working Group to be formally notified of the decision that the group is being wound up and to be thanked for their contribution

**Barry R Colford**  
**Chief Engineer and Bridgemaster**

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## **Appendices**

**Contact/Tel:** Barry Colford / 0131 319 3092  
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### **Background Papers:**

Report of the FETA Working Group on High Winds, June 2008  
December 2008 Edition of the Transport Scotland Forth Replacement Crossing  
Newsletter  
Tower Wind Shielding Progress Report, Flint and Neill Limited, March 2009

