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21 April 2009

Mr. G. Weir
Whitchurch Bridge Company
Wells House
Eastfield Lane
Whitchurch-on-Thames
Reading
RG8 7EJ

My ref: MJBr/3.1.0.148 Your ref:

Please ask for: Martin Brain

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Dear Mr. Weir,

Whitchurch Bridge – Risk Assessment

I enclose for your information a copy of the Risk Assessment Table which has been updated recently.

This sets out the principal risks associated with the existing bridge, its form of construction and known defects, and its use by both vehicles and river traffic. The consequences of the listed events are documented in terms of the varying severity of the incident which might occur and the damage which would result. Measures which have already been taken to mitigate the risks are listed, together with additional measures which should be considered as part of the continuing management of the structure.

In particular, I would draw your attention to the section setting out the risks associated with the cracked river pier column heads and the need for the Special Inspections of those piers to be continued. Accordingly, I confirm that following on from my letter dated 26 March 2009 we are currently making arrangements for a further inspection and NDT testing to take place during May 2009.

If you have any queries, please contact me.

Yours sincerely,

Martin Brain
Principal Engineer – Bridges

Risk Assessment Table

EVENT	CONSEQUENCES	MITIGATION MEASURES
Use by overweight vehicles. Bridge Company evidence of vehicles up to 44t attempting to cross bridge.	- Damage and over-stress of transverse beams, particularly from closely spaced axle arrangements (ie vehicles ≥ 18t). - Buckling of main longitudinal girder, possibly leading to collapse in case of severe overloading.	7.5t Structural Weight Limit imposed 2003 (replacing previous 10t limit) + improved advance warning signs on approaches. Additional measures to be considered; - Overweight vehicle detectors and automatic barriers. - Width & height restrictions on approaches to exclude heavy vehicles. - Strengthen bridge to carry loading without damage.
Vehicle collision with main longitudinal girders. Girders perform dual function of both primary load bearing member and parapet provision (Eastern verge width of 0.2m severely sub-standard).	- Damage to lattice members reducing shear strength in minor collision. - Deformation of top flange reducing bending capacity in minor collision. - Large deformation of top flange causing collapse in major collision by heavy vehicle.	Existing speed humps on approaches reduce vehicle speeds and hence severity / probability of collision, but not permissible on bridge due to impact effects. Additional measures to be considered; - Increase clearance between carriageway and girder to reduce potential collisions, but reduced carriageway width would require alternate, single way traffic causing congestion. - Provision of separate safety barriers or parapets in front of girders, but would reduce footway / carriageway widths and therefore impracticable. - Reconstruct bridge with different structural form to isolate parapet / load bearing functions, or replace with stronger girders.
Boat collision with superstructure or river piers. Environment Agency records indicate typical 15,000 vessels/year through Whitchurch Lock.	- Minor local damage to main girders affecting durability or strength. - Minor damage to bracing between columns. - Minor local damage to column. - Displacement of the bridge superstructure from its position on a column. - Major damage causing loss of strength of a main girder. - Major damage causing displacement or buckling failure of a column under loads from the superstructure.	Upstream fenders replaced in 2005 + new downstream fenders installed at same time. Lightweight pleasure craft are unlikely to damage the bridge. However commercial vessels up to 150t have capability of causing significant damage – limited headroom forces largest vessels to pass close to central pier. Additional measures to be considered; - Intermediate fenders to close gaps between existing upstream/downstream fenders.

		- Strengthen bracing between pier columns. - Strengthen column/main girder connection. - Incorporate enhanced impact resistance as part of pier/superstructure reconstruction.
Cracks in river pier cast iron column heads. Historical since 1940's due to thermal movements.	- Shearing of top plate or column head casting, resulting in reduced capacity to support loads from main girder. - Failure of casting assembly leading to total loss of support and collapse of main girder.	Doubler plates and tie bars fitted to column heads in 1970's. However 2003 Principal Inspection and subsequent inspections indicate cracks are still "live". Additional measures to be considered; - Continue Special Inspections & NDT to monitor cracks. - Fit additional column head strengthening – tie bars etc. - Provide temporary support independent of existing columns. - Introduce bearings to allow for superstructure thermal movement. Remove castings for repair as part of reconstruction work. Reduce load on columns as part of reconstruction work.
Fire or explosion caused by dangerous goods on vehicles	- Deformation and reduction of strength of steel members due to temperature.	Extent of problem should be limited by the weight limit on the bridge. Measures to exclude overweight vehicles should also help reduce risk from dangerous goods.

March 2009