Ovingham Bridge Blog – January-March 2015

6 March 2015

What's happening to the Reading Room slope?

With a vegetated slope such as this, when it rains it washes some of the top soil onto the road beneath. In turn this ends up being washed down onto the bridge. The old bridge had a small gap between the bridge deck and the land. To this end all the contaminated water washed onto the bearing shelf and down the front face of the masonry beneath.

Over time this builds up and can provide enough nutrients for weeds etc to grow on the bearing shelf and around the truss supports.

On the refurbished bridge this gap will no longer exist due to the addition of a movement joint. If topsoil continues to wash down the slope onto the road and in turn onto the joint, it will severely impair the bridge's movement. It will also reduce the lifespan of the joint.

So how does the addition of the honeycomb prevent the topsoil washing out?

Photo taken 20 February, showing the honeycomb installed on slope. The next stage is to fill the honeycomb cells with topsoil.

The honeycomb structure is normally used on river banks to prevent higher river levels eroding newly installed slopes. It is being used here to retain the topsoil, in broadly the same manner as it would on a river bank.

The honeycomb is anchored in a trench at the top and is pinned to the slope.

Because the slope is steep, it will not be replanted with grass seed. The plan is to replant it with ground cover plants which will only need minimal maintenance.

Will this work affect the Reading Rooms which sits on top of the slope?

The Council and the Reading Room owners have entered into an agreement to allow works to take place. There are some minor cracks to the rear of the Reading Rooms and these have been monitored since July 2014 to ensure the Reading Rooms are stable prior to the Council commencing work. The cracks are monitored weekly throughout the works to ensure the building is not moving. This is a precautionary measure to protect both the Council and the Reading Room owner's interests.

27 February 2015

Truss repairs part 2 of ?

Further to blog 18, some of the truss repairs have been installed on the bridge:-

New end stiffeners at the Ovingham abutment:-

Downstream Truss, Bay one, End Stiffner

Photo taken 19 February, refer to blog 17 which shows the stages prior to this. The end stiffeners were badly corroded and have been replaced. In order to prevent water ingress into the plies of metal beneath the stiffener plate, a capping plate will be added to the top of the stiffener.

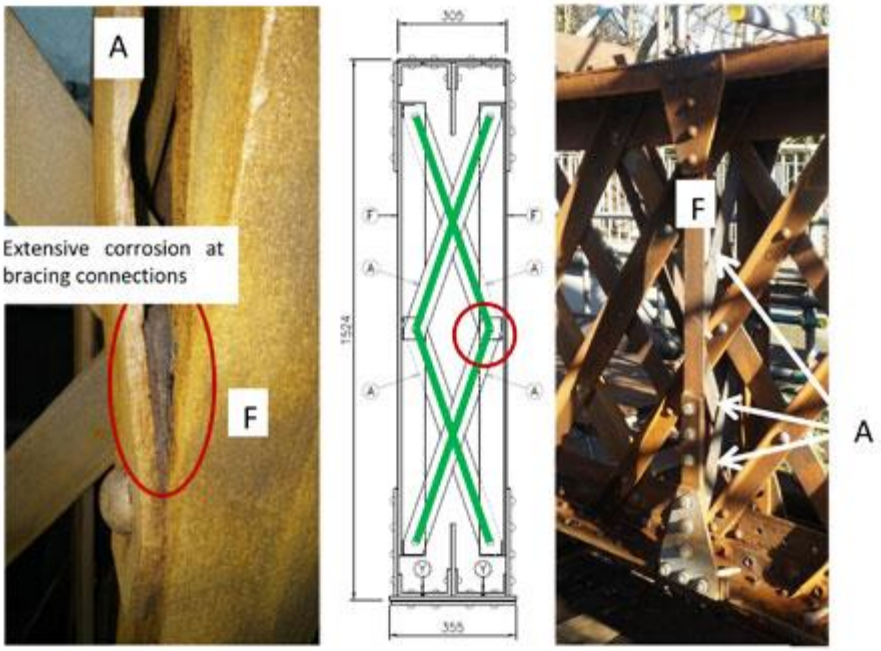
Downstream truss, nearest Ovingham abutment:-

Downstream Truss, Bay one. Ovingham abutment

Photo taken 20 February, showing the first bay behind the end stiffener shown above. This bay which is 2.286m (7’ 6”) long, is in a poor condition. The contractor has replaced some of the lattice web members. However further progress cannot be made until the repair to the bottom chord of the truss is finalised. The angle which connects the web plate (red line) to the bottom chord (horizontal plate and blue line) is badly corroded. Repairing this is complex because to repair the angle requires removing both lines of rivets. Removing the fixings changes the truss into a T section and their removal will weaken the structure.

The repair has to be done in short lengths, to maintain the truss’ strength. Once installed the repair has to be spliced together to ensure it is effective. The yellow lines show replacement angles to the lattice web.

U-frame stiffener bracing members:-



Typical U-Frame Stiffner Bracing Member

Photograph on the left shows the U frame bracing (labelled A) connection with the vertical angle (labelled F). Member F is a 3” x 3” angle, while member A is a 2.5” wide x 3/8” thick flat.

The drawing (centre) shows the U-frame stiffener detail. The green lines show the bracing member positions. They are fixed to either face of the angle.

The connection details (circled) are a water trap and this has led to significant corrosion of both the bracing element and the vertical angle. Approx 40% of the bracing members will be replaced in span 1, nearest Ovingham. By contrast only 20% of these members will be replaced in span 2.

Where corrosion of the angle is extensive, the angle will also be replaced. The photograph on the right shows a U-frame stiffener with three bracing members repaired. New members appear silver in contrast to the original brown members of the truss.

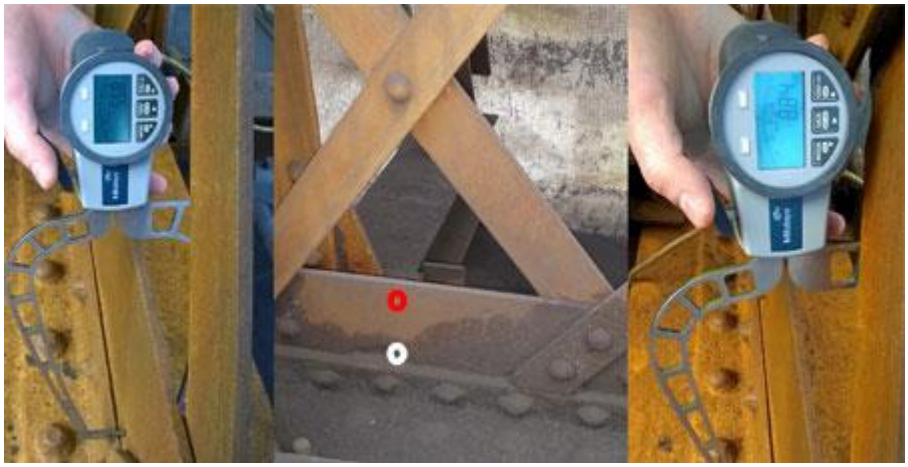
16 February 2015

Truss repairs – part 1 of ?

Further to blog 17, this describes some of the early findings from inspection and measurement of span 1 (nearest Ovingham). This span is in the worst condition because although the bridge is not gritted in winter, due to the width restrictors. Grit is still carried onto the span by cars dragging it from the main road through Ovingham. Due to the spans position, ie sheltered by trees, it has been exposed to

water and de-icing salts (grit) for the longest, without having the benefit of the drying effect of the wind.

Consequently the inside face of the truss, usually downstream, is in the worst condition.



This measurement was taken in span 1 (Ovingham), away from the worst corrosion. Refer to the central photograph for position. The plate is supposed to be 3/8” thick (10mm). At the top (red dot on central picture) where water has not sat it measures 9mm thick. It has lost 0.5mm per face in 130 years.

At the base of the plate (white dot on central picture) where the angles forms a water trap the measurement is 5.5mm. It has lost 2mm per face in 130 years. This will have to be repaired.

The black staining in the central photograph, is salt impregnation of the wrought iron. This has to be reduced to acceptable levels, in order to receive the paint system.

This photograph was taken 13 February 2015.

It demonstrates two things:

Firstly the extent of the web plate corrosion, as noted above.

Secondly, the edges of the lattice work have been ground off to a pencil edge radius, showing clean and shiny metal beneath. This is because the paint system can be damaged by sharp edges on the metal. Something the Victorians were not aware of at the time they built the bridge. Every edge on the bridge has to be ground down in this manner.

13 February 2015

Why has the tent come down?

Repairs to the bridge which were anticipated prior to its grit blasting, but could not be completed before due to the lead based paint, require the tent to come down. This is because the anticipated repairs are at the supports and their removal weakens the bridge. When the bridge is subject to wind loading the trusses are at risk of failing when the stiffeners have been removed.

Photograph taken 12 November 2014, Showing corroded end stiffener in place

Photograph taken 13 February, with end stiffener plate removed. Note the props are installed to ensure the truss is adequate to carry its own weight and the temporary bracing.

These repairs are carried out at the abutments (where the bridge meets the land). Similar repairs are required at every pier leg, as well as additional repairs. Hence the reason for all of the enclosure coming down.

The tent will be re-erected, after all repairs have been completed, on the existing scaffold framework in order to dry blast the steel (to remove surface rust) and apply the paint system.

6 January 2015

Grit blasting the trusses, inside the tent

Grit blasting of lead based paint requires an enclosure to contain the lead released into the atmosphere. Removing lead based paint in this manner is the industry standard.

The bridge enclosure has been divided into four sections, so blasting can take place in one while another section has the contaminated grit removed. Grit has to be removed daily to ensure the scaffold is not overloaded.

Grit blasting began on Wednesday 17 December with a test blast to ensure the work is to the required standard. No-one is allowed to enter the enclosure when blasting is underway. To enter the enclosure an hour after blasting has finished requires the Engineer/inspector to wear full body covering, (typically disposable suit) with eye protection, gloves and respirator mask.

Photograph taken 18 December 2014, after test blast

Photograph taken prior to grit blasting

Photograph taken 18 December 2014.

This was taken underneath the top chord, the blasters have found it difficult to remove the paint from the inside back face of the top part of the truss. Note the orange colour on the right of the photo.

This is the reason for doing a trial blast, it resolves any issues with blasting access to all parts of the bridge.