

## **88-Blaengwrach River Bridge Partial Collapse of Central Pier - Options**

A large scour pool formed under the upstream end of the central pier during Storm Dennis but as the water levels have been so high, it was not visible. The foundation has failed and dropped into the scour pool causing the masonry pier to partially collapse diagonally upwards from midpoint along the footing.

The central pier has a reinforced concrete capping beam onto which the prestressed beams sit. This has a hairline vertical crack in it directly above the hinge point in the footing. The capping beam is acting as a cantilever at the moment, which it wasn't designed to do. There is a high risk that the capping beam will fail in the near future, causing the bridge deck to sag resulting in the total collapse of the bridge.

The structure is closed to pedestrians for the safety of the general public, as there is potential for the pier to further deteriorate which could lead to the partial collapse of the deck slab. The Bridge is the only pedestrian access from the villages of Blaengwrach & Cwmgrach to Glynneath where the school and medical centres are located.

There are 3 main options to the management of this structure:

### **Option 1 – Do nothing and keep the structure closed**

Pros This would appear to be the easiest.

Cons 1. There is no safe alternative pedestrian diversion. Pedestrians have 2 options, either use the shorter route of crossing the busy A465 Trunk Road at the roundabout which is illegal and highly dangerous or use a 1.5km diversion route along the Unity Mine Access Road, which is unlit. To use the access road we would need to enter into a legal agreement with the owners and provide lighting at a **cost of approx. £100K**. There is also a likelihood that the mine will reopen and the access road will be trafficked with Lorries rendering it unsafe for pedestrian use. To provide a footbridge over the A465 at the roundabout would require land purchase and **cost approx. £2.0M**.

2. The weakened central pier is not likely to withstand any further damage without it fully collapsing. It is noted that the River Neath during the winter months carries a large depth of fast flowing water, sometimes with large pieces of floating debris. Should the bridge collapse it would partially block the river leading to potential flooding concerns. This material couldn't be removed whilst the river is in high flow.

3. The BT cables, watermain & gas services feeding Blaengwrach & Cwmgrach pass through the bridge and should the bridge collapse these services would be severed. The statutory undertakers have already confirmed that they can't let this happen and are looking into diverting their equipment. Some of these diversion routes are lengthy and involve directional drilling under the A465. The undertakers have all confirmed that they would be looking to recover the costs associated with the diversions from NPTCBC under the New Roads and Street Works Act 1991. These costs are likely to be **approx. £700K** depending upon the final routes.

### **Option 2 – Partially demolish the bridge and keep for 10-30 years.**

Due to the form of construction it is possible to remove the beams and deck slab for the upstream 2/3rds of the bridge and leave the downstream 1/3rd of the bridge in place. **Approx. cost of £275K**.

Pros 1. The services are in the downstream 1/3rd of the bridge wouldn't need to be diverted. Although we would have to give assurances to the Statutory Undertakers that this option will provide long term support to their services, **which is difficult to achieve, given the age of the structure**.

2. The remaining width of bridge would be wide enough to accommodate pedestrians and only minor alterations would be needed to the public lighting.

- Cons
1. As the river bed has already been disturbed and a large scour pool has been formed it would be difficult and costly to prevent the remaining 1/3rd of the central pier from scouring out. If we chose to harden the invert a Sedimentologist's Report will be needed.
  2. Work will be needed to the upstream edge of the remaining 1/3rd to create a new cutwater. It will be technically difficult to structurally combine the new cutwater into the existing 70 year old masonry pier whose construction details are unknown.
  3. There will be ongoing maintenance liability to prevent scour to the pier.
  4. The existing bridge is 70 years old so its design life is only a further 20-30 years. After which it will have to be demolished and replaced, along with pedestrian & service diversions.
  5. The pedestrian diversion needs to be in place for the duration of the work, to protect the central pier and a new parapet will need to be installed along the upstream edge.

The structural integrity of the remaining structure will be difficult to guarantee in the medium term and it due to the age of the structure it is not a long term solution.

#### **Option 3 – Fully demolish & replace with new single span structure.**

Due to the form of construction it is possible to remove the beams and deck slab for the upstream 2/3rds of the bridge and temporarily leave the downstream 1/3rd of the bridge in place. A new single span steel truss footbridge can then be lifted into place, the services can then be diverted onto the new bridge and the downstream 1/3rd of the bridge can then be demolished. **Approx. cost of £710K.**

- Pros
1. The partial demolition work can be done as a matter of urgency to prevent the full collapse of the structure and then the new bridge can be installed in a couple of months' time. The remaining downstream 1/3rd of the bridge should ideally be demolished prior to the onset of the winter months.
  2. The new bridge would have a design life of 120 years, so can be used by future generations.
  3. The new bridge will have no central pier so there will be no ongoing scour maintenance liability.
  4. The proposed service diversions would be shorter and easier to manage. Approx £100-150K which has been allowed for in the £710K.
  5. There will be no need for Consents from Natural Resources Wales or a Sedimentologist's Report.

- Cons
- The pedestrian diversion needs to be in place for the duration of the work. Although with careful management pedestrians will be able to use the new footbridge when the downstream 1/3rd of the bridge is being demolished.

#### **Recommendation**

I can recommend that option 3 is the most viable and the cheapest option with the partial demolition of the existing structure to be carried out immediately.