B976 LYDBROOK RAILWAY BRIDGE

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1 EXECUTIVE SUMMARY

On November 2016, Amey was appointed by Gloucestershire County Council (GCC) to carry out a feasibility study at Lydbrook Railway Bridge. The aim of this study is to identify the necessary works to refurbish the bridge and upgrade it as a footbridge as well as identify future maintenance costs of the structure. The installation of a brand new bridge has been considered too. The ultimate goal of this work is to not just provide a short term but a long term analysis of the cost to re-open Lydbrook Rail Bridge.

The proposed works to upgrading the bridge are based on structural judgement, awareness of material properties and behaviour of the structure components and connections, it is necessary to clarify that a detailed appraisal of the structure is outside the objective of this report and that a more detailed site investigation and models should be carried out to determine the real structural capacity of the bridge.

The bridge has been visited by Amey's engineers to attain an understanding of the structure and the site. However, neither inspections nor structural surveys have been carried out. The condition of the elements that form the structure is based on the Principal Inspection report carried out by XEIAD in March 2016.

The local planning authority (Forest of Dean), the River Wye A.O.N.B as well as environmental authorities Natural England and Environment Agency have been consulted to identify any protection entity or environmental figure that could affect the refurbishment works. The site has been identified as an Area of Outstanding Natural Beauty (AONB), Site of Special Scientific Interest (SSSI) and Special area of Conservation (SAC). The river Wye is a main river and a salmon fishing river. Although none of the indicated bodies could prevent the execution of the proposed works, Gloucestershire County Council must notify the above authorities and apply for the required permits.

The main results of the study have been summarized in table 1 below:

OPTION	COST
Make the bridge safe for track and river users leaving the existing transverse beams in place. See 6.2.	£217,600.00
Make the bridge safe for the users of the track and river removing the existing transverse beams. See 6.2.	£260,200.00
Demolition of the structure. See 6.3.	£608,890.00
Refurbish the deck with 37No fibre Reinforced Plastic decks spanning between the existing transverse beams. See 6.4.	£1,246,650.00
Demolition of the existing deck and installation of 8No Fibre Reinforced Plastic decks spanning between existing piers. See 6.5.	£1,339,700.00
Construction of new suspension bridge. See 6.6.	£767,500.00
Make the bridge safe (phase 1) and refurbish the bridge using 37No fibre Reinforced Plastic decks spanning between the existing transverse beams (phase 2). See 6.7.	£1,379,850.00
Installation of floating docks to operate ferry boat Cost to operate ferry boat a year	£200,000.00 £15,000.00

Table 1. Works options' cost

2 INTRODUCTION

Lydbrook bridge is a 19th century railway bridge made of eight simply supported wrought iron spans over the river Wye, in the Forest of Dean. The bridge was constructed circa 1875 as part of Ross & Monmouth Railway later absorbed by the Great Western Railway. After economic struggles, the line was finally closed in 1964. After this the bridge's deck was partially refurbished to accommodate a footway. Over the years several upgrading and maintenance works have been undertaken on the bridge. The decay of the wooden decking as well as the safety of the handrails have been recurrent problems since the bridge was opened for pedestrians.

In 2016, after finding significant defects on the bridge during a principal inspection, the bridge was closed to the public.

Although Lydbrook Railway Bridge is not a designated heritage asset as other similar bridges that span the river Wye, the bridge has an historical importance that must be considered.

The location of the bridge (as the Wye Valley) is classified as an **Area of Outstanding Natural Beauty (AONB), Site of Special Scientific Interest (SSSI) as well as Special Area of Conservation (SAC).**

Picture 1 Upstream view of Lydbrook Bridge

3 SITE DETAILS

3.1 SITE DESCRIPTION AND ACCESS

The bridge spans the river Wye approximately 1.5km northwest from Lydbrook in the Forest of Dean. At this location, the bridge forms the border between Gloucestershire and Herefordshire and the ownership of the bridge is shared between both Counties. In 1974 Gloucestershire County Council and Hereford and Worcester County Council came to a joint agreement for the maintenance of cross boundary bridges. In the case of Lydbrook Railway Bridge, inspections and maintenance was to be carried out by Gloucestershire County Council.

Although the bridge provides continuity to the Wye Valley long walk, just the Hereford and Worcester side of the bridge is declared as a Public right of Way. However, Gloucestershire County Council has received an application under Section 53 of the Wildlife & Countryside Act 1981 to formally add the route (on the Gloucestershire side) to the Definitive Map of Public Rights of Way as a public footpath. Initial assessment of the application suggests that there is likely to be sufficient evidence to show that public footpath rights have "come into being" (largely based on the amount of user evidence supporting the application, together with the fact that the path is already dedicated on the Herefordshire side), and as such it should be added to the Definitive Map of Public Rights of Way. Once the route is added, **Gloucestershire County Council will be legally obliged to provide a permanent path across the river**

As part of the Wye Valley long walk, the bridge is important to maintaining the continuity of the path. **A counter installed in the bridge recorded 21,091 pedestrians used between October 2014 and September 2015** this illustrates the importance of the bridge within the area.

At the south end, the bridge boundaries an abandoned factory (The Lydbrook Cable Works), the approaching embankment of the former rail track, and a track (approximately 3.5 wide) that passes under the structure next to the masonry abutment. This track runs from the Stowfield Road to a landing stage located approximately 50m west from the bridge.

The bridge is accessed from the track via approach steps made of timber boards backed with compacted granular material located at the east side of the southern abutment.

At the north, the bridge ends next to a path in a woodland without access for vehicles.

Picture 2. Path at north end

Picture 3. View from track

3.2 ENVIRONMENTAL CONSTRAINTS

Meetings have been held with Natural England, the Environmental Agency, the Local Authority (Forest of Dean) and Wye Valley AONB to determine the permits that would be required before undertaking any works on the bridge.

3.2.1 NATURAL ENGLAND AND ENVIRONMENT AGENCY

According to Natural England, the site falls within three statutory designations, the River Wye Site of Special Scientific Interest (SSSI), the River Wye Special Area of Conservation (SAC) and in a Park Wood SSSI on the northern bank. A number of permissions must be granted by Natural England which will depend on the final nature of the works. As the works would be within a main river, the Environment Agency must be consulted.

The sort of information to be considered from Natural England and the Environment Agency will depend on timings (in relation to bats and fish migrations), precautions to ensure works do not affect the river during operations and safety on site. Usually Natural England and the Environment Agency ask that the bridge is encapsulated during operations.

According to Natural England, **the area is particularly noted for its Lesser Horseshoe Bats** and consideration/appropriate licenses and mitigation must be considered.

Although the above aspects should not be a problem to undertake repairs works on the bridge or even constructing a new one, an early involvement with the relevant Environmental Agencies is recommended to help identify all environmental risks and permits to be granted.

3.2.2 WYE VALLEY AONB

As the site is in the Wye Valley AONB contacts with an officer from this body have been made and they have confirmed that **any new structure or refurbishment should enhance the natural beauty of the site.**

Back in 2008-2010, a new bridge was proposed over the Wye near Tintern. In this case a public consultation exercise identified an Underslung Truss design as the preferred option over a Cable Stayed bridge design. **The AONB Joint Advisory Committee (JAC) expressed some concerns about the Cable Stayed bridge** in relation to landscape impacts and a more rigid Underslung Truss structure was felt to have less impact.

If a new structure is built, it would be necessary to make the existing structure safe for the users of the right of navigation along the river and the path that crosses under the southern abutment.

The bridge is not a designated heritage asset so technically it is possible to demolish it. However as the bridge crosses a SAC/SSSI and a public navigation the practicalities of preventing any objects falling into the river would make these works expensive.

When dealing with historic structures (even if not Listed or Scheduled), unless a true restoration is intended, it is **better that new additions are clearly identifiable as new rather than trying to hide the modification with a mock-heritage imitation**. Therefore a modern refurbishment could be appropriate but it must still not conflict with the conservation and enhancement of the AONB.

4 STRUCTURE DESCRIPTION

4.1 INTRODUCTION

Lydbrook Railway Bridge was built circa 1875 as part of Ross & Monmouth Railway. The structure was in service as a railway bridge until 1964 when the line was closed. After that the deck was partially refurbished to accommodate a footway along its western side. However there are not records about the exact date when the footway was opened.

The bridge is a simply supported eight-span bridge with a total length of approximately 86.5 m. The approaching spans (4 along the southern side and 3 along the northern side) are 10m long with a central span of 16.5 m.

The superstructure is made of a pair of longitudinal built-up wrought iron girders which are simply supported on the piers. To support the deck, 32 transverse built-up wrought iron beams span between the longitudinal girders. A pair of longitudinal built-up wrought iron beams are riveted to the web of the transverse beams. Over these longitudinal beams lay a pair of large timber bulks which originally supported the single rail track.

The current deck footway, built once the railway line was closed, is made of timber planks that span between the transverse girders. The timber planks are bolted to the top flange of the transverse beams. At the western edge of the footway, there is a steel handrail, while at the eastern end the hand railing is made of wood.

The bridge is used as part of the Wye Valley Walk. However the deterioration of the timber walkaway has forced the closure of the bridge several times in the past and required maintenance works to be undertaken. Following a principal inspection of the bridge in March 2016 the structure was closed and remains so at the time of writing this report.

4.2 CONDITION AND DISCUSSION OF BRIDGE'S ELEMENTS

The appraisal of the different elements that form the bridge, is based on the Principal Inspection Report carried out by XEIAD in March 2016 as well as site visits carried out by Amey's Engineers in November and December 2016.

4.2.1 TIMBER WALKWAY AND HANDRAILS

The footway is located at the western edge of the deck. The walkway is made of timber planks which span between the transverse beams. The timber planks are placed on and bolted to the top flange of the transverse beams with a pair of bolts at each end. The planks are severely rotten and several planks are completely missing and replaced with plywood panels which make the use of this walkway by pedestrians unsafe.

Picture 4. Walkway and handrailings

The decay of the timber walkway has been a problem with significant impact on the maintenance cost of the footway since it was opened. The main maintenance works were carried out in 1992 where the timber planks were taken up and replaced. Even though the new planks were treated to improve its lifespan, the maintenance works on these elements has been continuous. The last main repair works on the walkway were carried out in 2009 where 43 No timber planks were replaced. The historical maintenance records of the structure make it clear that the environmental conditions of the site must be considered when refurbishing the bridge.

The western parapet is made of three tubular rails which pass through 100x100x12 steel posts. Between the two bottom rails there are mesh panels connected to the rails with kee-klamp panels clips. The posts, which form part of the former railway bridge handrails, are bolted to the timber planks and connected to the transverse beams with a gusset plate. In 1992 short steel angle sections were welded on to stiffen up the gusset plates. The steel angles are in fair condition but the gusset plates are badly corroded.

An appraisal of the handrails in 2002 determined that **the handrails do not comply with BS 7818:1995 Specification for pedestrian restraint system in metal, on three dimensional issues**, the clear height between the top and the middle horizontal rails, the height of the top rail above the footpath, and the mesh sizes in the panels between the middle and the bottom rails. This appraisal found that the parapet is structurally understrength in relation to the horizontal rails, the angle posts and the strength of the gusset plates.

The eastern parapet is made of timber posts fixed to the timber bulks that previously supported the rail track and two horizontal wooden rails. **The wood is severely rotten and the posts are loose**.

At the eastern edge of the bridge deck there is an unused steel handrail made of two tubular rails and vertical steel posts. This **handrail is completely corroded and its poor stability represents a risk for members of the public that use the river or the track that passes underneath the bridge**.

Based on the condition of the handrails it is suggested that **new pedestrian handrails complying with current standard should be installed.** If it is decided not to refurbish the bridge, at least **the eastern handrail should be removed to prevent its collapse onto the river or existing track.**

4.2.2 MAIN LONGITUDINAL GIRDERS

Although a chemical test has not been carried out to identify the material of the different elements, considering the time of construction (circa 1875, when the use of mild steel was not a common practice) and the appearance of the girders (rounded edges, delamination pattern on rusted areas as well as the absence of steel maker print on the plates), it is thought that the main girders (as well as the transverse girders and secondary longitudinal girders) are made of wrought iron.

The girders are built-up girders with plates riveted together. Although the girders are in a general fair condition the bottom flanges present delamination due to a severe corrosion as well as a marked distortion induced by rust jacking. The 2016 PI report indicates that slight distortion was noted at the majority of joints with missing rivets.

Although an accurate survey would be necessary to determinate the actual strain of the plates, based on the visual appearance of the plates, it is possible to deduce that they have already reached the yielding point. The distortion of the plates has induced a significant tension in the rivets. This has implications on the safety of the structure as the elements would have become more brittle, and therefore its capacity to deform before failure.

Picture 5 Detail of rust jacking on longitudinal girder

Considering the stress-strain uncertainty of the bottom flanges and stiffeners and the consequences that a failure of these elements could have, it is recommended that an accurate assessment of these elements is undertaken before re-opening the bridge to the public.

4.2.3 TRANSVERSE GIRDERS

As the main girders, the transverse girders are made up of wrought iron riveted angles and plates to form fish belly shape sections. The bottom flanges of the transverse girders are riveted to the top flanges of the main longitudinal girders. These connections are in a fair condition.

However, the top flanges of the transverse girders (where the timber planks are bolted) are badly corroded with a severe delamination and knife edging (2016 PI estimates a loss of section of 35% at the top flanges).

Picture 6 Detail of corrosion on top flange of transversal girder

Based on the dimension of the transverse beams, it may be said that the carrying capacity of these elements should be enough to carry the loads imposed by pedestrians once the top flanges are replaced.

4.2.4 SECONDARY LONGITUDINAL BEAMS

A pair of longitudinal wrought iron built-up girders span between the transverse girders under the wood bulks. These girders are in fair condition although some connections to the transverse girders are badly corroded. Although these element had importance when the structure was designed as a railway bridge (as they carried the load of the rail track), **as a footbridge, these elements are fairly redundant.**

Picture 7 Transversal and secondary girders

4.2.5 PIERS

As indicated in the introduction, Lydbrook Bridge is an eight span structure. The approaching spans are supported on a pair of cast iron piers whereas the central span (longer) is supported on a pair of caissons made of riveted wrought iron panels.

The cast iron columns are made of hollow circular sections connected with split sleeves bolted together. At the top, the columns are bolted to a cast-iron "table" which receive the main longitudinal girders. The head of the piers are braced with a transverse built up wrought iron beam. The taller piers (located into the water course) are transversely braced with a cross made of angle sections. The 2016 PI found some of the crosses broken. These elements played an important role to prevent buckling and improve the capacity of the piers under the heavy loads imposed by the trains. Although these elements are not structurally necessary if the bridge is used as a footbridge, they should be maintained as they could be used to support the crash deck at the same time increasing the stability of the bridge.

Picture 8 Cast Iron columns

The central span is supported on two pairs of caissons made of wrought iron plates. The caissons are filled with concrete up to the level of the longitudinal girder (the caissons are hollow above this level). At the interface between the hollow and the filled section, there is a ring which has broken. Considering the position of this ring (where the caissons are filled with concrete), it can be said that these elements are purely aesthetic.

Some paint loss and pitting has been identified at the water level of the caisson.

In general all the piers are in a sound condition so that they could be used to support a new deck without significant repair works.

Picture 9 Caissons at central span

4.2.6 PAINTING SYSTEM

The paint system is in a general poor condition on the longitudinal and transverse girders. On the cast-iron piers the painting is in a sound condition while in the central piers (caissons) the painting system should be replaced in the medium term.

As discussed in previous sections, the corrosion is probably the most important problem that should be addressed before re-opening the bridge. **Removing the rust and providing an adequate painting system is vital to re-opening the bridge and assure its integrity in the medium- long term**.

5 REMEDIAL MEASURES FOR BRIDGE ELEMENTS

5.1 TIMBER WALWAY AND HANDRAILS

As indicated in point 4.2.1 the poor condition of the existing handrails and their failure to meet the required standards make their replacement the only possible option to open the bridge. The new handrail must comply with BS 7818:1995 Specification for pedestrian restraint systems in metal.

5.2 MAIN LONGITUDINAL GIRDERS

To repair the rusting at the bottom flanges of the main longitudinal girders, a combination of flame cleaning, rivet removal and hammering could be used to get the rust out. However, it is possible that after removing the rust, a gap may appear between the plates. In this case, an inert filler material may be required to fill the gap. The replacement material may be recycled wrought iron or steel depending on the conservation requirements for the bridge.

The repair option described for the existing rusting may be possible if the distortion of the plates is not critical. Where the plates are badly distorted and delaminated, they may be removed (rivets drilled out) and replaced using hot set riveting so they can re-fixed.

5.3 TRANSVERSAL GIRDERS

Due to the poor condition of the top flanges it is vital to repair them before opening the bridge. The first option is to flame cut the top flanges and replace them with back to back bolted steel sections. After discussing with different contractor about this option, it has been agreed that it would be cheaper to replace the whole girder with a new steel girder as it would speed up the process.

5.4 SECONDARY LONGITUDINAL BEAMS

These beams present a sound condition. Therefore the works would be limited to repairing some connections and repainting them.

5.5 PIERS

As indicated in sections 4.2.5 the piers are structurally sound. In the short term they do not need any works. However in the long term they would need to be repainted.

5.6 PAINT SYSTEM

The paint system of the superstructure presents a poor condition (specially on the main and transverse girders) and should be repaired before opening the bridge to prevent further deterioration of the structure

At the time of construction of the structure, oil based paints were common practice; however, there is a good possibility that the paint system was also based on lead pigments, therefore, the nature of the system should be determined with a paint survey.

The surface preparation is vital to achieve a good performance of the new paint system. To remove years of grime, salts and contamination the surface should be first high pressure washed and then grit blasted. To prevent any blasting residue or paint falling into the river, the structure must be fully scaffolded and encapsulated.

To increase the lifespan of the paint system, and bearing in mind the high cost of scaffold and grit blasting the structure, a marine specification paint system is recommended. This system usually consists of a twin pack zinc rich primer, a zinc rich MIO intermediate coat (this can be 1 or 2 coats depending on the micron thickness required) and a twin pack polyurethane top coat to whatever RAL or BS finish colour.

6 WORKS OPTIONS

6.1 INTRODUCTION

In this section different alternatives for the bridge are studied. The alternatives have been discussed with the environment and planning authorities as well as with specialist contractors to point out the advantages and risks intrinsic to each option.

As will be developed through this section the alternatives considered are:

- Works required to make the bridge safe (for the users of the river and track)
- Works required to demolish the structure.
- Works required to refurbish the bridge maintaining the superstructure.
- Works required to replace the superstructure.
- Works required to build a new cable supported bridge.
- Works required to refurbish the bridge in two phases.

6.2 WORKS REQUIRED TO MAKE THE BRIDGE SAFE

The current condition of the bridge is not safe for the users of the river and the track that crosses under the southern abutment. The alternatives covered withing this section do not consider re-opening the bridge but the **minimum works that should be undertaken to make the bridge safe to the users of both river and track.**

As discussed in section 4 of this document, the parapet at the eastern end of the deck is in really poor condition. It has lost its anchorage points to the bridge deck; hence it should be removed to prevent it falling into the river. Although the western parapet is in better condition and its stability is not compromised at the moment, it doesn't meet the standard for a pedestrian restraint system. Therefore the best option is to remove the western handrails before its deterioration compromises its stability.

The timber handrails located at the eastern side of the walkway as well as the timber planks and timber bulks should be removed as they are badly rusted and they can fall into the river and path. The timber planks that form the walkway must be removed not just to prevent them falling into the river and track but to dissuade pedestrians using the bridge (even after installing steel fences at both ends of the bridge, they have been vandalised to enable access to the bridge).

Although the wrought iron girders have significant corrosion that will reduce the structural capacity of the bridge (especially the top flanges of the transverse girders) they are still safely carrying their self-weight. In the **short term the transverse girders may stay in place** (Option 6.2.1) **although consideration should be given to removing them in the medium term.**

Considering the safety of public as well as environmental constrains (the bridge is above a water course) it is necessary to remove the elements which due to their poor condition may fall into the water and track.

As the bridge spans over a watercourse, preventing any debris or liquid entering the river is a priority. A crash deck/scaffolding could be suspended from the main girders. The crash deck must be fire proof to allow flame cutting. The crash deck is an indispensable element in order to obtain a permit from the Environment Agency. This crash deck must to be perfectly sealed, and any other option would be rejected by the Environment Agency.

For the span 1 and span 2, a 50 tonne crane could be placed on the existing track to assist with the operations. However from span 3 to span 8 a temporary platform would need to be installed between the existing transverse beams. This platform would provide access for a mini crane to assist with the operations. However, due to the really poor condition of the top flanges of the transverse beams, it is likely that some strengthening works would be required on the transverse beams before installing the temporary platform.

Next to both ends of the bridge, there are trees which branches are growing over the structure. These trees should be trimmed or cut to prevent them falling and damaging the structure.

The main works to make the bridge safe are briefly described below:

- Vegetation clearance/ tree management at both ends of the bridge.
- Installation of scaffold/crash deck under the main longitudinal girders.
- Installation of temporary platform over the bridge
- Remove the existing handrails, timber walkway and timber bulks.
- Remove transverse beams (Option 6.2.2)
- Repair/strengthen the fencing at both sides of the bridge to prevent people entering the bridge

Refer to Annex A for programme and detail cost for this option.

Advantages of the method:

- The proposal represents the cheaper way to make the bridge safe in the short term.
- The works may be considered as an initial phase of a bigger demolition scheme to be completed in the future. See 6.7.
- The river channel would remain open all the time.
- Minimum use of public track during the works.

Disadvantages of the option:

- The bridge would remain closed.
- Short term solution as further demolition would be needed in the future.
- The remaining elements would need to be monitored to check their condition.

6.3 WORKS REQUIRED TO DEMOLISH THE STRUCTURE

In the long term, unless large sums are set aside to maintain it, the demolition of the structure will be necessary either if it is decided to build a new bridge or to keep the bridge closed to the public as its continuous deterioration will eventually make it unsafe.

The demolition of the structure is constrained by the location of the bridge (over a water course) which requires a number of measures are put in place to prevent objects falling into the river.

Discussions have been held with a specialist demolition contractor and the following method of work has been proposed:

- Installation of a cofferdam from the southern bank to the pier No 4. The cofferdam would be filled with rock to form a level platform to operate machines and cranes from. The access to this platform would be via a ramp excavated into the southern bank.
- A scaffold access/crash deck will need to be installed underneath the main girders, this will provide access for site operations to remove the handrails, timber planking, bulk timbers, and cross beams. This crash deck will prevent any debris entering the water course during dismantling works, and also keep the waterway navigable.
- The bridge walk way timber, handrails and cross girders would be removed with the scaffold /crash deck in place.
- Before removing the scaffold /crash deck lifting chains will need to be fixed to the beams.

- The scaffold access/crash deck will then be removed, and main beams craned down (1 span at a time). The cranes will operate from the cofferdam.

Refer to Annex A for programme and detail cost for this option.

Advantages of method:

- All works to be carried out from one side of the river.
- No additional land required, access track is suitable for plant and machinery.
- All debris to be contained with no debris entering the water course.
- River channel to remain open to the public (apart from during craning operations).

Disadvantages of the method:

- Cutting down of trees to access the river bank.
- Excavation of southern river bank to from a down ramp.
- Restriction of river flow.
- Heavy use of public track for site access.
- A new bridge would need to be installed to maintain the footpath.

6.4 WORKS REQUIRED TO REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE

This option would **maintain the piers and main longitudinal girders** while the existing walkway and handrails would need to be removed. **A new Fibre Reinforced Plastic (FRP) deck would be installed over new steel transverse beams**.

The main longitudinal beams would be repaired and repainted as indicated in sections 5.2. and 5.6 respectively.

The top flanges of the transverse girders are in a really poor condition. The works to repair the top flanges (cut and replace them with back to back steel angles) would be more difficult and expensive than to replace the entire girders with new steel beams. Therefore it is advised that the transverse girders are replaced.

The new deck would be made off 37 No FRP decks (2.35 m in length and 500 kg of weight) which would span between the new transverse beams. It would provide pedestrian and cyclist access with a width of 1.25m with new aluminium handrails to be installed. The width could be increased to 2.5m to carry light vehicles.

At the southern side of the bridge, the access will be improved and the vegetation cleared.

To provide access and allow all the operations, a scaffold /crash deck would need to be installed under the longitudinal beams and a temporary bridge will be installed to allow a mini crane to access along the structure to assist with the demolition of the transverse beams and installation of new beams and decks. The scaffold access/crash deck should be water tight and fire proof.

The main works to be undertaken are summarized below:

- Vegetation clearance/ tree management at both ends of the bridge.
- Installation of scaffolding/crash deck hung from the main longitudinal girders. This scaffold would provide access to operatives and allow operation to remove handrails, timber walkway, timber bulks and transverse girders.
- Installation of temporary bridge (platform) over existing transverse beams.
- Remove existing wrought iron transverse beams and replace them with new steel beams.
- Repair bottom flanges of main girders.
- High pressure washing and blast cleaning of main longitudinal girders.
- Repair bottom flanges of main girders. See section 5.2.
- Application of new marine paint system. See section 5.6.
- Installation of No 37 FRP decks.
- Installation of new aluminium handrails conforming to BS7818:1995
- Removal of scaffolding / crash deck
- Remove temporary bridge
- Improve south access.

Refer to Annex A for programme and detail cost for this option.

Advantages of the option:

- The structure would retain its original architecture.
- FRP deck has a really good performance in wet conditions with a design life of 50-60 years requiring minimal maintenance.
- If necessary FRP deck can be designed to carry light vehicles.

- The new decking would help to reduce the corrosion of the girders as the main reasons for the corrosion of the girders is water leaking through the timber planks.

Disadvantages of the option:

- A detailed survey would be required to determine the condition of each element specifically the splices of the longitudinal girders.
- The structure will need to be modelled to determine its carrying capacity and the necessary works to repair the wrought iron elements would be difficult and expensive.
- The maintenance of the paint system and wrought iron elements would represent an important ongoing cost during the life of the structure. (The guaranteed lifespan of the pain system is about 15 years).

6.5 WORKS REQUIRED TO REPLACE THE SUPERSTRUCTURE

This option is to **demolish the whole deck** (including main girders) and the **installation of eight simply supported FRP decks between the existing supports**. The new deck would provide adequate access for pedestrians and cyclists with a width of 1.25m. The width could be increased up to 2.5m to carry light vehicles.

The deck would be made off 7 No FRP units, 10 m in length and 2500kg in weight, which would span between the approaching piers and 1 FRP unit, 16.5m in length and 3400 kg in weight, at the central span.

New steel transverse beams would need to be installed at the top of the existing piers to receive the FRP decks.

A scaffold/crash deck would be required below the deck. The demolition of the first and second spans would be carried out with a mobile crane positioned at the track. The demolition of the spans over the river would be undertaken using a telescopic crane which would operate mounted on a modular pontoon. This pontoon system would be used to install the new FRP decks over the water course. The first two spans would be installed with a mobile crane from the track.

The main works to be undertaken are summarized below:

- Vegetation clearance/ tree management felling or coppicing at both ends of the bridge.
- Installation of scaffold/crash deck hung from the main longitudinal girders.
- Demolition of spans 1 and 2 using a mobile crane.
- Installation of modular pontoon system.

- Demolition of spans 3 to 8 using a crane mounted upon a pontoon system.
- Installation of new FRP decks.
- Installation of new aluminium handrails to standard.
- Demobilise pontoon.
- Removal of scaffold/ crash deck
- Improve south access.

Refer to Annex A for programme and detail cost for this option.

Advantages of the option:

- The new FRP deck would require minimal future maintenance during its working life (50-60 years)
- It would provide almost a new bridge (just the existing piers would be maintained) maintaining the structural type of the old bridge.
- If necessary, it would be possible to upgrade the design to enable access for light vehicles.

Disadvantages of the option:

- The construction process for installing the new deck will be a difficult operation.
- Temporary restriction of river flow during construction.
- The historic value of the structure would not be maintained as the original deck would be removed and replaced.
- The piers (specially the paint system) would require regular maintenance

6.6 WORKS REQUIRED TO BUILD A NEW CABLE SUPPORTED BRIDGE

This solution involves constructing a new bridge and leaving the existing as it is. In the long term, this option would require the demolition of the existing structure as its deterioration would eventually make it unstable and therefore unsafe for the user of the river and path. It should be noticed however as indicated in section 3.2, there is a precedence in the area when a public consultation exercise identified an Underslung Truss design as the preferred option over a Cable Stayed bridge design.

To build the foundation for the towers and anchorages a modular pontoon would be used to reach the northern bank of the river and to install the cables of the bridge. The deck would be made of a modular truss that can be installed without any temporary works once the cables are in place. All the elements of the bridge would be made of galvanised steel which eliminate the need of painting and therefore keep the future maintenance of the structure to a minimum.

The main advantages and disadvantages of this option are described below:

Advantages

- This option would provide a new structure which would reduce the requirement for future maintenance of the bridge making this a good option in the long term.

Disadvantages

- Aesthetically, a cable supported bridge would have an important impact in landscape terms.
- Upgrade the design to allow the access for light vehicles would mean a high increase in the cost of the bridge.

Refer to Annex A for programme and detail cost for this option.

6.7 WORKS REQUIRED TO REFURBISH THE BRIDGE IN TWO PHASES

It is possible that due to financial reasons the refurbishment of the bridge needs to be undertaken in two phases. It is important that at the end of each phase the structure is left in a safe condition and ready to complete the next phase.

As indicated in previous sections, the installation of a crash deck is necessary for all the options in order to obtain a permit from The Environment Agency. The installation of the crash deck represents an important percentage of the total cost of each option. Therefore, to make financially feasible the refurbishment of the bridge in two phases, the crash deck should be installed so it can be left in place during the whole process.

The Environment Agency has been consulted about the feasibility of leaving the crash deck in place for several years and they have confirmed that the crash deck may be left in place for a maximum of 3 years as long as that the crash deck is above the associated water level to a 100 year return period event.

Two specialist scaffold contractor have been consulted to determine the price to install and maintain a crash deck during a period of 3 years. Unfortunately it is difficult for them to estimate the cost for the crash deck without a detailed design. The cost to undertake the design would be about £4,000 to £5,000. To estimate the cost for the crash deck, it has been assumed that it will be purchased and inspected monthly when not in use. Once the works are completed the scaffold may be sold (not considered in the table below).

The main operations required to complete the works in two phases and the associated cost are summarized in the table below:

PHASE	COST
Pre-construction works	£66,000.00
Initial works Purchase and install crash deck (£200,000). Maintain it (£1,500 a month. Total cost assuming 3 years)	£254,000
Phase 1. Minimum works to make the bridge safe. See 6.2. Complete pre-construction document and design. Mobilise and demobilise site compound/equipment. Remove existing handrails, timber walkway and timber bulks. Strengthen the fencing at both sides of the bridge to prevent people entering the bridge.	£134,000.00
Phase 2. Refurbish the bridge maintaining the superstructure. See 6.4. Remove existing transverse beams. Paint longitudinal beams and piers. Installation of new Fibre Reinforced Plastic deck on top of existing longitudinal girders. Installation of new aluminium handrails.	£925,850.00
TOTAL	**£1,379,850.00**

Table 2. Operations and cost to complete the works in two phases

The main advantages and disadvantages of this option are described below:

Advantage

- The total cost can be split out in two financial years which makes it easier from a financial point of view.

Disadvantages

- The final cost to complete the works is higher than in one single phase.
- The bridge will be maintained closed for a longer period of time.
- The crash deck would need to be inspected/maintained by a competent person.

6.8 WORKS REQUIRED TO OPERATE A FERRY BOAT

Although a ferry boat may be an option to provide a way to cross the river, the water level of the river Wye at Lydbrook make it difficult to both construct a floating dock and to operate the ferry boat.

The water level's range at Lydbrook is a significant constraint to the crossing. According to the Environment Agency's records for the river Wye at Lydbrook (Station ID 2196), the normal range for the water level in average weather conditions is between 0.28m and 2.44m. It has been between these levels for at least 150 days in the past year. The usual range of the Wye at Lydbrook in more extreme weather conditions is between 0.42m and 4.00m. It has been between these levels for 90% of the time since monitoring began. The maximum water level was registered on 10th February 2014 when the water level reached 5.84m.

As the water level varies, a floating dock will need to be installed at the river banks. After discussing with a specialist subcontractor on floating docks, the variation of the water level increases the cost of the dock's construction and reduces its operation time as it is not always possible to accommodate the extreme water levels.

To accommodate the average water level (0.28m to 2.44m) it is necessary to install a long gangway which is mounted on rollers to accommodate the movements. A concrete plinth will be cast in situ to create a foundation/platform for the rollers.

Although the docks would not be operable with water levels above 2.5m, the docks need to be anchored to big piles to prevent the docks being damaged at high levels, this considerably increases the construction cost. Although the design and construction cost depends on many unknowns at this stage, after discussing with contractor it is reasonable to assume a **design/construction cost of £200,000.00.**

Although the draught of the boat will depend on the boat design, load etc, it is fair to assume that a minimum of 1m of water is necessary to allow the navigation, which means that the boat will not be operable when the water level is low (especially in summer). In addition the navigation will not be safe under the upper range of the extreme conditions as the speed of the water flow would compromise safety. Therefore, the ferry boat would be inoperable for a significant numbers of days a year.

The cost to operate the ferry boat has been estimated at £15,000.00 a year.

ANNEX A. COST ESTIMATE AND PROGRAMME FOR THE DISCUSSED OPTIONS

OPTION	6.2.1 Works required to make the bridge safe
DESCRIPTION	Remove existing parapets, walkway and timber bulks. Vegetation Clearance
COST	£217,600.00
COMPLETION TIME	8 weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1	Preparation of pre-construction works documents	1	item
B	**CONSTRUCTION WORKS**		
B.1	Temporary works design	1	Item
B.2	Mobilisation.	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	8	Weeks
B.5	Management.	8	Weeks
B.6	Transport & Travel.	8	Weeks
B.7	Preliminaries.	8	Weeks
B.8	Method related costs - Fixed/Temporary works - Scaffold access & safety netting.	1	Item
B.9	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	8	Week
B.10	Method related costs - Time related -Provision of mini crane & acess bridge.	4	Week
B.11	Span 1 & Span 2 - Remove the existing parapets, timber walkway and timber planks in span using mobile crane from vehicle track.	2	No
B.12	Spans 3, 4, 6, 7 & 8 - Remove the existing parapets, timber walkway and timber planks in span using mini crane & bridge system.	5	No
B.13	Spans 5 - Remove the existing parapets, timber walkway and timber planks.	1	No
B.14	Carry out general site reinstatements.	1	Item
B.15	Clear site and de-mobilise all labour, plant, and materials.	1	Item
Total BUDGET Estimate(excluding VAT)		**£217,600.00**	

CONTINGENCY	£40,000.00

Risk
Strenghtening work on existing transversal beams to allow temporary access over the bridge

OPTION	6.2.2. Works required to make the bridge safe (removing transverse girders)
DESCRIPTION	Remove existing parapets, transverse girders, walkway and timber bulks. Vegetation Clearance
COST	£260,200.00
COMPLETION TIME	10 Weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1	Preparation of pre-construction works documents	1	item
B	**CONSTRUCTION WORKS**		
B.1	Temporary works design	1	Item
B.2	Mobilisation.	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	10	Weeks
B.5	Management.	10	Weeks
B.6	Transport & Travel.	10	Weeks
B.7	Preliminaries.	10	Weeks
B.8	Method related costs - Fixed/Temporary works - Scaffold access & safety netting.	1	Item
B.9	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	10	Week
B.10	Method related costs - Time related -Provision of mini crane & acess bridge.	8	Week
B.11	Span 1 & Span 2 - Remove the existing parapets, timber walkway and timber planks in span using mobile crane from vehicle track.	2	No
B.12	Span 1 & span 2 - Remove the existing transversal girders	2	No
B.13	Spans 3, 4, 6, 7 & 8 - Remove the existing parapets, timber walkway and timber planks in span using mini crane & bridge system.	5	No
B.14	Spans 3, 4, 6, 7 & 8 - Remove the existing transversal girders	5	No
B.15	Spans 5 - Remove the existing parapets, timber walkway and timber planks.	1	No
B.16	Carry out general site reinstatements.	1	Item
B.17	Clear site and de-mobilise all labour, plant, and materials.	1	Item
Total BUDGET Estimate(excluding VAT)		**£260,200.00**	

CONTINGENCY	£50,000.00

Risk
Strenghtening work on existing transversal beams to allow temporary access over the bridge

OPTION	6.3. Works required to demolish the structure
DESCRIPTION	Demolition of the bridge
COST	£608,890.00
COMPLETION TIME	23Weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Preparation of tender documents	1	item
A.2	Preparation of permits	1	item
	CONSTRUCTION WORKS		
B	**MANAGEMENT, HEALTH AND SAFEY AND SET OUT SITE COMPOUND**		
B.1	Supervision and management	1	item
B.2	Site set-up	1	item
B.3	Maintenance of Welfare Facilities	23	weeks
B.4	Mobilitation	1	item
B.5	Premilinaries	23	weeks
C	**DEMOLITION OF BRIDGE DECK**		
C.1	Labour and Plant	1	item
C.2	Craneage	1	item
C.3	Crash Deck/Scaffold	1	item
D	**COFFER DAM**		
D.1	Labour and Plant	1	item
D.2	Supply & Install Sheet Piles	1	item
D.3	Stone fill	1	item
D.4	Design	1	item
D.5	Remouve coffer dam	1	item
E	**DEMOLITION OF BRIDGE COLUMNS**		
E.1	Labour and Plant	1	item
D	**DEMOLITION OF BRIDGE COLUMNS**		
D.1	Carry out general site reinstatements.	1	Item
D.2	Clear site and de-mobilitation.	1	Item
	Credit on recovered scrap metal		
	Total BUDGET Estimate(excluding VAT)		**£608,890.00**

CONTINGENCY	£152,222.50

RISKS
External Design Check CAT III
Analysis for any waste removal
Removal of contaminated ground or material

OPTION	6.4. Works required to refurbish the bridge maintaining the superstructure
DESCRIPTION	Installatin of 37No FRP decks over main girders.
COST	£1,246,650.00
COMPLETION TIME	34 Weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Detailed condition and painting survey	1	item
A.2	Structural assessment, detailed design and permits	1	item
A.3.	Preparation of tender documents	1	item
B	**CONSTRUCTION WORKS**		
B.1	Temporary works design	1	Item
B.2	Mobilisation.	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	34	Weeks
B.5	Supervision/Management.	34	Weeks
B.6	Transport & Travel.	34	Weeks
B.7	Preliminaries.	34	Weeks
B.8	Method related costs - Fixed/Temporary works - Scaffold access & safety netting.	1	Item
B.9	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	34	Week
B.10	Method related costs - Time related -Provision of mini crane & acess bridge.	15	Week
B.11	Span 1 & Span 2 - Remove the existing parapets, timber walkway and timber planks in span using mobile crane from vehicle track.	2	No
B.12	Span 1 & span 2 - Remove the existing transversal girders and replace them with new to receive new FRP deck	2	No
B.13	Span 1 & 2 Install new aluminium parapets using mobile crane from vehicle track.	2	No
B.14	Spans 3, 4, 6, 7 & 8 - Remove the existing parapets, timber walkway and timber planks in span using mini crane & bridge system.	5	No
B.15	Spans 3, 4, 6, 7 & 8 - Remove the existing transversal girders and replace them with new to receive new FRP deck	5	No
B.16	Spans 3, 4, 6, 7 & 8 - Install new aluminium parapets using mini crane & bridge system.	5	No
B.17	Spans 5 - Remove the existing parapets, timber walkway and timber planks.	1	No
B.18	Spans 5 - Remove the existing transversal girders and replace them with new to receive new FRP deck	1	No
B.19	Spans 5 - Install new aluminium parapets.	1	No
B.20	Repair the bottom flanges of the main girders	1	Item
B.21	Preparation & Painting longitudinal girders and piers.	1	Items
B.22	Design and delivery of FRP decks	1	Item
B.23	Purchase Aluminium Parapets	1	Item
B.24	Tree surgeon and improve southern access	1	Item
B.25	Carry out general site reinstatements.	1	Item
B.26	Clear site and de-mobilise all labour, plant, and materials.	1	Item
Total BUDGET Estimate(excluding VAT)			**£1,246,650.00**

CONTINGENCY	£249,330.00

RISKS
External Design Checks
Further environmental permits
More accurate design to determine capacity of elements and connections

OPTION	6.5. Works required to replace the superstructure
DESCRIPTION	Demolish existing deck and replace it with 8No FRP decks
COST	£1,339,700.00
COMPLETION TIME	35 Weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Pier survey	1	item
A.2	Piers assessment, detailed design and permits	1	item
A.3.	Preparation of tender documents	1	item
B	**CONSTRUCTION WORKS**		
B.1	Temporary works design	1	Item
B.2	Mobilisation including floating plant	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	35	Weeks
B.5	Supervision/Management.	35	Weeks
B.6	Transport & Travel.	35	Weeks
B.7	Preliminaries.	35	Weeks
B.8	Method related costs - Fixed/Temporary works - Scaffold access & safety netting.	1	Item
B.9	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	35	Week
B.10	Method related costs - Time related - Maintenance of floating plant	35	Week
B.11	Span 1 & Span 2 - Remove the existing parapets, timber walkway and timber planks in span using mobile crane from vehicle track.	2	No
B.12	Span 1 & span 2 - Remove the whole decking and girders including main longitudinal beams using mobile crane from vehicle track. .	2	No
B.13	Spans 3, 4, 6, 7 & 8 - Remove the existing parapets, timber walkway and timber planks in span using the floating barge.	5	No
B.14	Spans 3, 4, 6, 7 & 8 - Remove the whole decking and girders including main longitudinal beams using the floating barge.	5	No
B.15	Spans 3, 4, 6, 7 & 8 - Install transversal beams between piers to receive new decks.	5	No
B.16	Spans 3, 4, 6, 7 & 8 - Install Fibre Reinforced Plastic decks spanning between the transversal beams.	5	No
B.17	Spans 3, 4, 6, 7 & 8 - Install new aluminium parapets.	1	No
B.18	Spans 5 - Remove the existing parapets, timber walkway and timber planks.	1	No
B.19	Spans 5 -Remove the whole decking and girders including main longitudinal beams using the floating barge.	1	No
B.20	Spans 5 - Install transversal beams between piers to receive new decks.	1	No
B.21	Span 5 - Install Fibre Reinforced Plastic decks spanning between the transversal beams.	1	No
B.22	Spans 5 - Install new aluminium parapets.	1	No
B.23	Span 1 & 2 - Install transversal beams between piers to receive new decks using mobile crane from vehicle track.	2	No
B.24	Span 1 & 2 - Install Fibre Reinforced Plastic decks spanning between the transversal beams.using mobile crane from vehicle track.	2	No
B.25	Preparation and paint piers	1	No
B.26	Span 1 & 2 - Install new aluminium parapets.	2	No
B.27	Carry out general site reinstatements.	1	Item
B.28	Clear site and de-mobilise all labour, plant, including floating plant	1	Item
B.29	Design and manufacture FRP decks	1	Item
B.30	Purchase Aluminium Parapets	1	Item
B.31	Tree surgeon and improve southern access	1	Item
Total BUDGET Estimate(excluding VAT)			**£1,339,700.00**

CONTINGENCY	£267,940.00

RISKS
External Design Check CAT III
Analysis for any waste removal
Removal of contaminated ground or material
Further detailed design

OPTION	6.6. Works required to build a new cable supported bridge
DESCRIPTION	Suspension bridge
COST	£767,500.00
COMPLETION TIME	17 weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Topo survey	1	item
A.2	Geo. Survey and Foundation design	1	item
A.3.	Preparation of permits	1	item
A.3.	Preparation of tender documents	1	item
B	**CONSTRUCTION WORKS**		
B.2	Mobilisation including floating plant	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	17	Weeks
B.5	Supervision/Management.	17	Weeks
B.6	Transport & Travel.	14	Weeks
B.7	Preliminaries.	17	Weeks
B.8	Site clearance and stablish suitable acces	1	Item
B.9	Completion of foundation and achorage points	2	item
B.10	Installation of towers	2	Item
B.11	Installation of cables	1	No
B.12	Installation of truss deck	1	No
B.13	Clear site and de-mobilise all labour, plant,	1	Item
B.14	Design and manufactgure bridge	1	Item
Total BUDGET Estimate(excluding VAT)		**£767,500.00**	

CONTINGENCY	£250,000.00

RISKS
External Design Check CAT III
Analysis for any waste removal
Removal of contaminated ground or material
Detailed design
Further permits

OPTION	6.7. Works required to refurbish the bridge in two phases
DESCRIPTION	Make the bridge safe. Installatin of 37No FRP decks over main girders.
COST	£1,379,850.00
COMPLETION TIME	6 weeks (phase 1) and 28weeks (phase 2)

Item No.	Item Description	Qty	Unit
	PHASE 1		
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Detailed condition and painting survey	1	item
A.2	Structural assessment, detailed design and permits	1	item
A.3.	Preparation of tender documents	1	item
	INITIAL WORKS. INSTALLATION/MAINTENANCE OF CRASH DECK		
B.1	Purchase and install crash deck	1	Item
B.2	Supervision/Maintenance crash deck	36	weeks
	PHASE 1 MAKE THE BRIDGE SAFE		
B.2	Mobilisation.	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	6	Weeks
B.5	Management.	6	Weeks
B.6	Transport & Travel.	6	Weeks
B.7	Preliminaries.	6	Weeks
B.9	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	6	Week
B.10	Method related costs - Time related -Provision of mini crane & acess bridge.	6	Week
B.11	Span 1 & Span 2 - Remove the existing parapets, timber walkway and timber planks in span using mobile crane from vehicle track.	2	No
B.12	Spans 3, 4, 6, 7 & 8 - Remove the existing parapets, timber walkway and timber planks in span using mini crane & bridge system.	5	No
B.13	Spans 5 - Remove the existing parapets, timber walkway and timber planks.	1	No
B.14	Carry out general site reinstatements.	1	Item
B.15	Clear site and de-mobilise all labour, plant, and materials.	1	Item
	PHASE 2. REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE		
B.2	Mobilisation.	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	28	Weeks
B.5	Supervision/Management.	28	Weeks
B.6	Transport & Travel.	28	Weeks
B.7	Preliminaries.	28	Weeks
20	Method related costs - Time related - Provision of safety boat & scaffold inspections etc	28	Week
B.10	Method related costs - Time related -Provision of mini crane & acess bridge.	12	Week
B.12	Span 1 & span 2 - Remove the existing transversal girders and replace them with new to receive new FRP deck	2	No
B.13	Span 1 & 2 Install new aluminium parapets using mobile crane from vehicle track.	2	No
B.15	Spans 3, 4, 6, 7 & 8 - Remove the existing transversal girders and replace them with new to receive new FRP deck	5	No
B.16	Spans 3, 4, 6, 7 & 8 - Install new aluminium parapets using mini crane & bridge system.	5	No
B.18	Spans 5 - Remove the existing transversal girders and replace them with new to receive new FRP deck	1	No
B.19	Spans 5 - Install new aluminium parapets.	1	No
B.20	Repair the bottom flanges of the main girders	1	Item
B.21	Preparation & Painting longitudinal girders and piers.	1	Items
B.22	Design and delivery of FRP decks	1	Item
B.23	Purchase Aluminium Parapets	1	Item
B.24	Tree surgeon and improve southern access	1	Item
B.25	Carry out general site reinstatements.	1	Item
B.26	Clear site and de-mobilise all labour, plant, and materials.	1	Item
	Total BUDGET Estimate(excluding VAT)		**£1,379,850.00**

CONTINGENCY	£137,985.00

Risk
Strenghtening work on existing transversal beams to allow temporary access over the bridge
Further repair works on longitudinal girders

OPTION	6.8. Works required to build two floating docks
DESCRIPTION	Floating docks
COST	£175,600.00
COMPLETION TIME	8 weeks

Item No.	Item Description	Qty	Unit
A	**PRE-CONSTRUCTION WORKS**		
A.1.	Topo survey	1	item
A.2	Geo. Survey and Foundation design	1	item
A.3.	Preparation of permits	1	item
A.3.	Preparation of tender documents	1	item
A.4.	Design	1	item
			Sub-Total
B	**CONSTRUCTION WORKS**		
B.2	Mobilisation	1	Item
B.3	Site set up - Welfare facilities.	1	Item
B.4	Maintenance of welfare facilities.	8	Weeks
B.5	Supervision/Management.	8	Weeks
B.6	Transport & Travel.	8	Weeks
B.7	Preliminaries.	8	Weeks
B.8	Site clearance and stablish suitable acces	1	Item
B.9	Completion of piles	1	item
	Completion of concrete plinths	2	item
B.10	Docks installation	1	Item
B.11	Purchase docks and gangway	1	No
	Sub-Total		
Total BUDGET Estimate(excluding VAT)			**£175,600.00**

CONTINGENCY	£35,120.00

RISKS
Further geotechnical investigation
Analysis for any waste removal
Removal of contaminated ground or material
Further environmental permits

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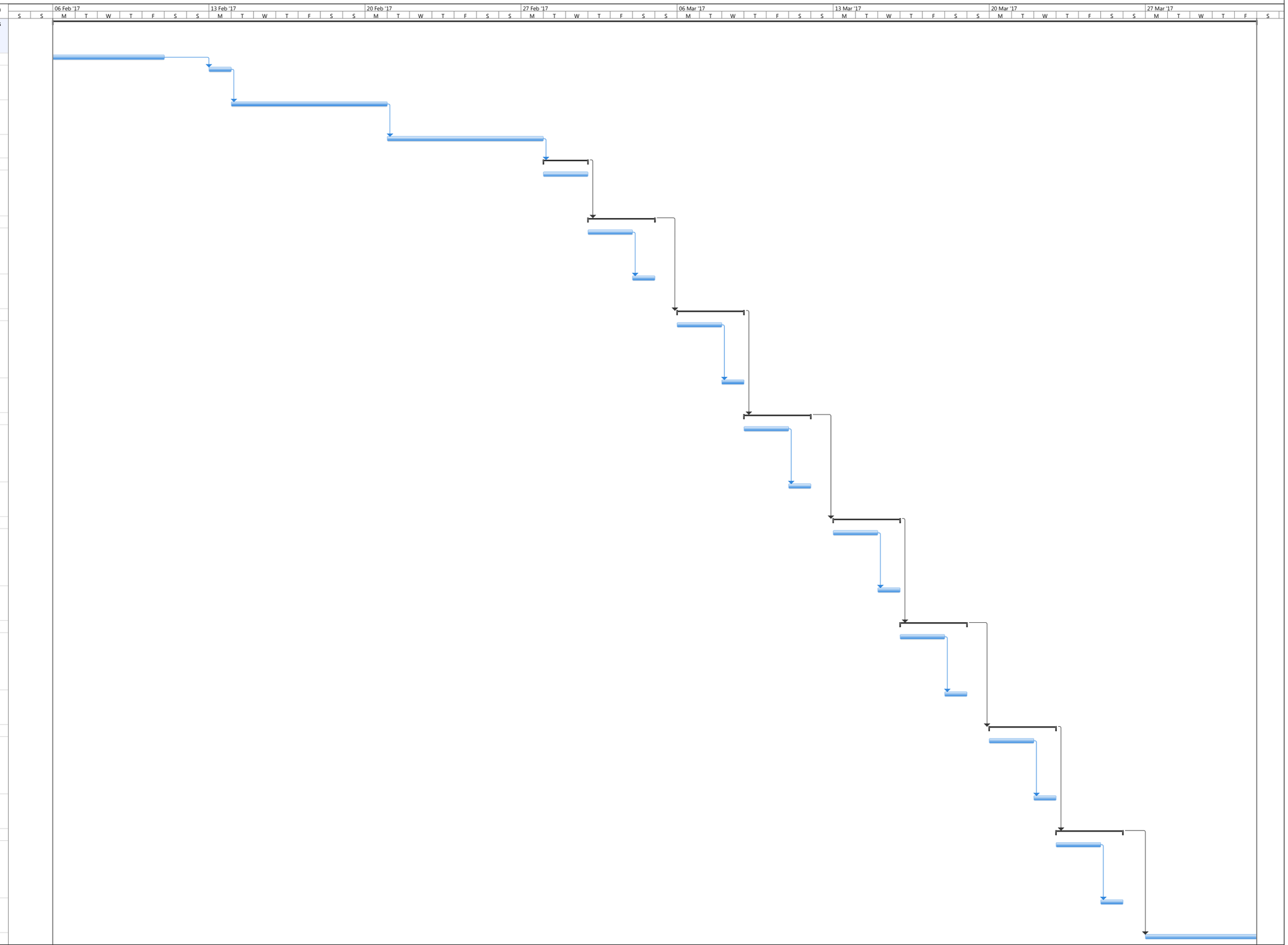
LYDBROOK BRIDGE - OPTION 6.2.1. WORKS REQUIRED TO MAKE THE BRIDGE SAFE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.2.1. Works required to make the bridge safe**	**44 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways along both upside and downside parapets.	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**2 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	**Span 2**	**3 days**
9	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
10	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
11	**Span 3**	**3 days**
12	Remove the existing parapets, timber walkway and timber planks in span 3 using the mini crane with access along the new temporary bridge deck.	2 days
13	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
14	**Span 4**	**3 days**
15	Remove the existing parapets, timber walkway and timber planks in span 4 using the mini crane with access along the new temporary bridge deck.	2 days
16	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
17	**Span 5**	**3 days**
18	Remove the existing parapets, timber walkway and timber planks in span 5 using the mini crane with access along the new temporary bridge deck.	2 days
19	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
20	**Span 6**	**3 days**
21	Remove the existing parapets, timber walkway and timber planks in span 6 using the mini crane with access along the new temporary bridge deck.	2 days
22	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
23	**Span 7**	**3 days**
24	Remove the existing parapets, timber walkway and timber planks in span 7 using the mini crane with access along the new temporary bridge deck.	2 days
25	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
26	**Span 8**	**3 days**
27	Remove the existing parapets, timber walkway and timber planks in span 8 using the mini crane with access along the new temporary bridge deck.	2 days
28	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
29	Demobilise and Clear Site.	5 days



Project: Lydbrook Bridge - Option A
Date: Thu 25/05/17

Task | Milestone | Project Summary | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | External Tasks | Deadline | Manual Progress
Split | Summary | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | External Milestone | Progress

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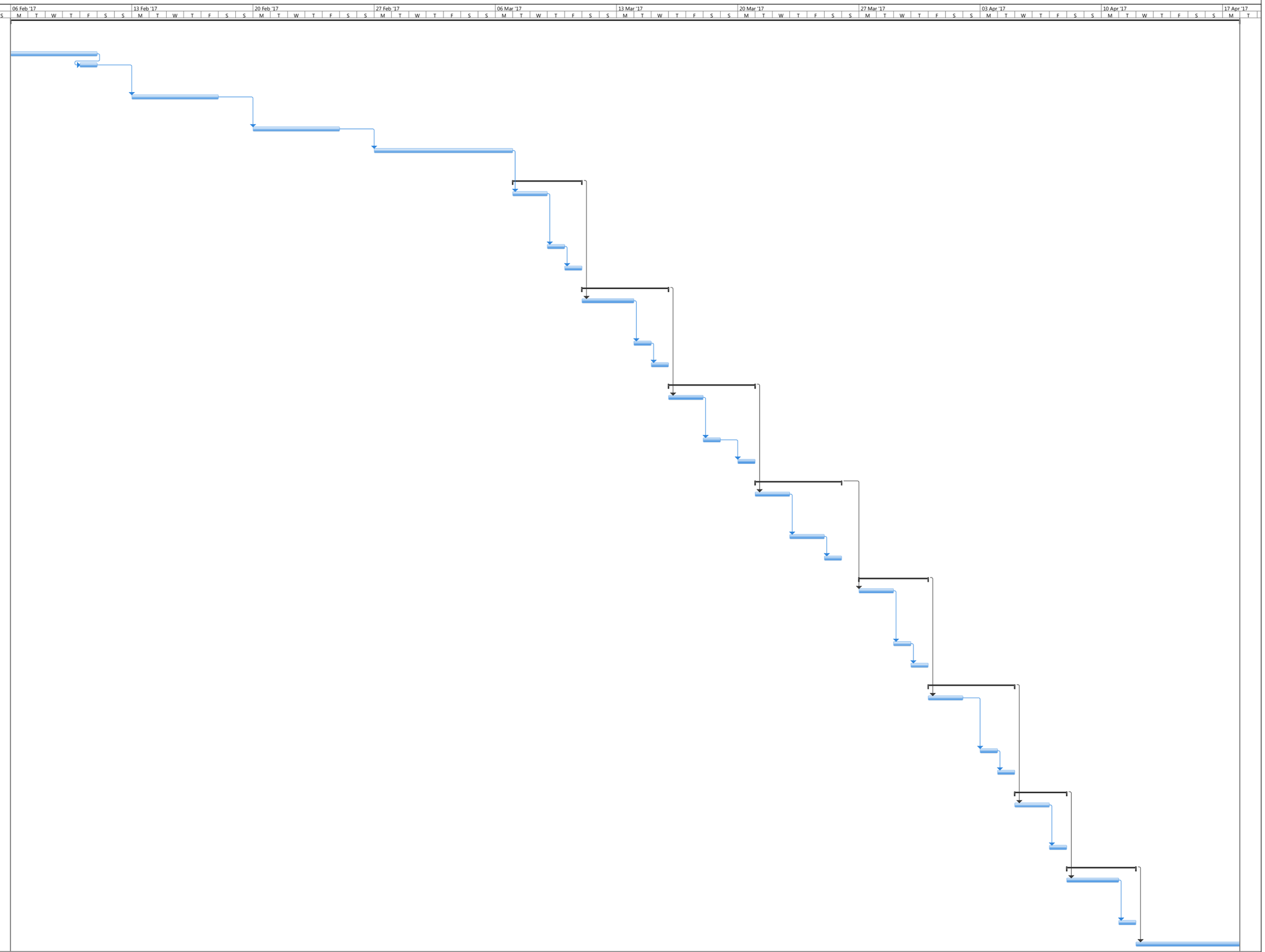
LYDBROOK BRIDGE - OPTION 6.2.2. WORKS REQUIRED TO MAKE THE BRIDGE SAFE (REMOVING TRANSVERSE GIRDERS)
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option.6.2.2. Works required to make the bridge safe (removing transverse girders)**	**58 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways along both upside and downside parapets.	5 days
5	Install safety netting system between all spans.	5 days
6	Install temporary bridge system along the bridge to enable access for mini crane	7 days
7	**Span 8**	**4 days**
8	Remove the existing parapets, timber walkway and timber planks in span 8 using the mini crane with access along the new temporary bridge deck.	2 days
9	Remove the old transversal girders.span 8	1 day
10	Remove temporary bridge from span 7	1 day
11	**Span 7**	**4 days**
12	Remove the existing parapets, timber walkway and timber planks in span 7 using the mini crane with access along the new temporary bridge deck.	2 days
13	Remove the old transversal girders. Span 7	1 day
14	Remove temporary bridge from span 6	1 day
15	**Span 6**	**4 days**
16	Remove the existing parapets, timber walkway and timber planks in span 6 using the mini crane with access along the new temporary bridge deck.	2 days
17	Remove the old transversal girders. Span 6	1 day
18	Remove temporary bridge from span 5	1 day
19	**Span 5**	**5 days**
20	Remove the existing parapets, timber walkway and timber planks in span 5 using the mini crane with access along the new temporary bridge deck.	2 days
21	Remove the old transversal girders. Span 5	2 days
22	Remove temporary bridge from span 4	1 day
23	**Span 4**	**4 days**
24	Remove the existing parapets, timber walkway and timber planks in span 4 using the mini crane with access along the new temporary bridge deck.	2 days
25	Remove the old transversal girders. Span 4	1 day
26	Remove temporary bridge from span 3	1 day
27	**Span 3**	**4 days**
28	Remove the existing parapets, timber walkway and timber planks in span 3 using the mini crane with access along the new temporary bridge deck.	2 days
29	Remove the old transversal girders. Span 3	1 day
30	Remove temporary bridge from span 1 and 2	1 day
31	**Span 2**	**3 days**
32	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
33	Remove the old transversal girders.	1 day
34	**Span 1**	**3 days**
35	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
36	Remove the old transversal girders.	1 day
37	Demobilise and Clear Site.	5 days

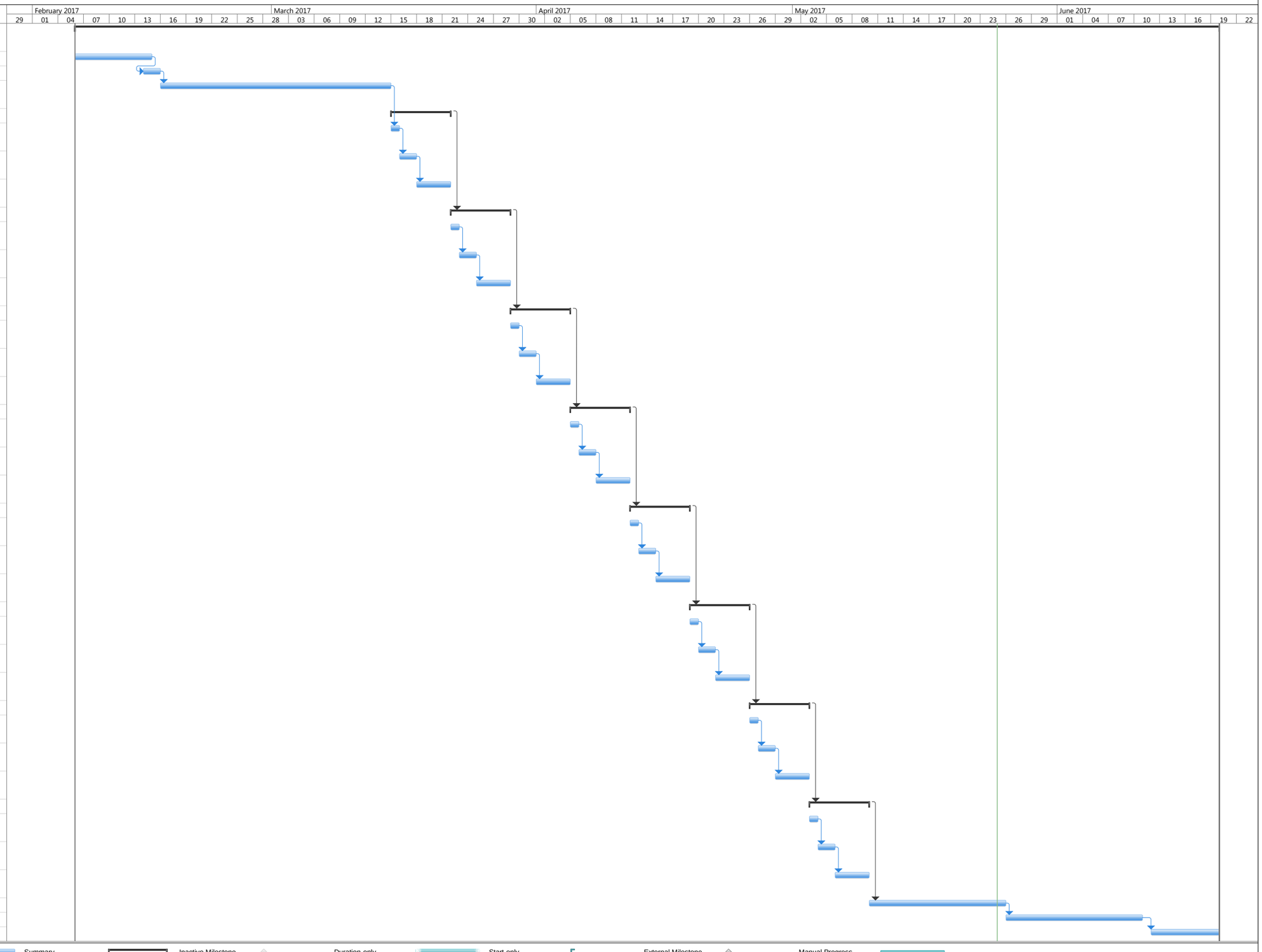


Project: Lydbrook Bridge - Option A.1
Date: Thu 25/05/17

Task | Milestone | Project Summary | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | External Tasks | Deadline | Manual Progress
Split | Summary | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | External Milestone | Progress

LYDBROOK BRIDGE - OPTION 6.3. WORKS REQUIRED TO DEMOLISH THE STRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge -6.3. Works required to demolish the structure**	**112 days**
2	Mobilisation including site set up.	7 days
3	Cut back trees at coffer dam area	2 days
4	Form coffer dam, sheet piling and rock armour	21 days
5	**Demolition Span 1**	**6 days**
6	Installation of scaffold access/crash deck	1 day
7	Remove transversal beams, walk way and parapets	2 days
8	Remove scaffold/crash deck and crane down main girders	3 days
9	**Demolition Span 2**	**6 days**
10	Installation of scaffold access/crash deck	1 day
11	Remove transversal beams, walk way and parapets	2 days
12	Remove scaffold/crash deck and crane down main girders	3 days
13	**Demolition Span 3**	**6 days**
14	Installation of scaffold access/crash deck	1 day
15	Remove transversal beams, walk way and parapets	2 days
16	Remove scaffold/crash deck and crane down main girders	3 days
17	**Demolition Span 4**	**6 days**
18	Installation of scaffold access/crash deck	1 day
19	Remove transversal beams, walk way and parapets	2 days
20	Remove scaffold/crash deck and crane down main girders	3 days
21	**Demolition Span 5**	**6 days**
22	Installation of scaffold access/crash deck	1 day
23	Remove transversal beams, walk way and parapets	2 days
24	Remove scaffold/crash deck and crane down main girders	3 days
25	**Demolition Span 6**	**6 days**
26	Installation of scaffold access/crash deck	1 day
27	Remove transversal beams, walk way and parapets	2 days
28	Remove scaffold/crash deck and crane down main girders	3 days
29	**Demolition Span 7**	**6 days**
30	Installation of scaffold access/crash deck	1 day
31	Remove transversal beams, walk way and parapets	2 days
32	Remove scaffold/crash deck and crane down main girders	3 days
33	**Demolition Span 8**	**6 days**
34	Installation of scaffold access/crash deck	1 day
35	Remove transversal beams, walk way and parapets	2 days
36	Remove scaffold/crash deck and crane down main girders	3 days
37	Remove Columns	14 days
38	Remove coffer dam	14 days
39	Demobilise and Clear Site	7 days



Project: Lydbrook Bridge - Option A
Date: Thu 25/05/17

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

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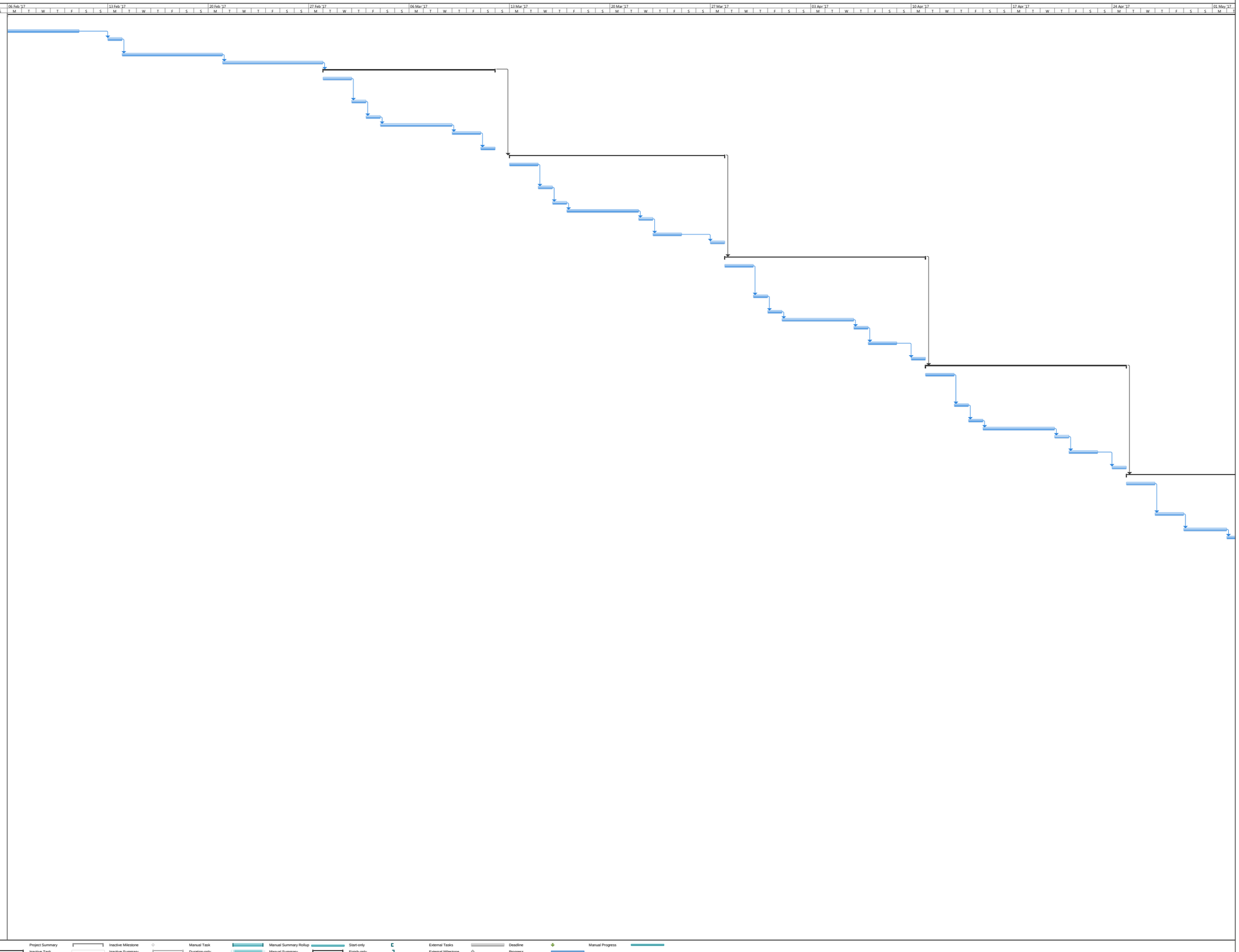
LYDBROOK BRIDGE - OPTION 6.4. WORKS REQUIRED TO REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.4. Works required to refurbish the bridge maintaining the superstructure**	**182 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**11 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	Install new transversal beams to receive new FRP deck.	1 day
9	Remove the old redundant transversal girders.	1 day
10	Repair the bottom flanges of the main girders.	4 days
11	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
12	Install new aluminium parapets.	1 day
13	**Span 2**	**13 days**
14	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
15	Install new transversal beams to receive new FRP deck.	1 day
16	Remove the old redundant transversal girders.	1 day
17	Repair the bottom flanges of the main girders.	4 days
18	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	1 day
19	Install new aluminium parapets.	2 days
20	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
21	**Span 3**	**12 days**
22	Remove the existing parapets, timber walkway and timber planks in span 3 using the mini crane with access along the new temporary bridge deck.	2 days
23	Install new transversal beams to receive new FRP deck.	1 day
24	Remove the old redundant transversal girders.	1 day
25	Repair the bottom flanges of the main girders.	4 days
26	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
27	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
28	Install new aluminium parapets.	1 day
29	**Span 4**	**12 days**
30	Remove the existing parapets, timber walkway and timber planks in span 4 using the mini crane with access along the new temporary bridge deck.	2 days
31	Install new transversal beams to receive new FRP deck.	1 day
32	Remove the old redundant transversal girders.	1 day
33	Repair the bottom flanges of the main girders.	4 days
34	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
35	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
36	Install new aluminium parapets.	1 day
37	**Span 5**	**16 days**
38	Remove the existing parapets, timber walkway and timber planks in span 5 using the mini crane with access along the new temporary bridge deck.	2 days
39	Install new transversal beams to receive new FRP deck.	2 days
40	Remove the old redundant transversal girders.	2 days
41	Repair the bottom flanges of the main girders.	6 days
42	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
43	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
44	Install new aluminium parapets.	1 day
45	**Span 6**	**12 days**
46	Remove the existing parapets, timber walkway and timber planks in span 6 using the mini crane with access along the new temporary bridge deck.	2 days
47	Install new transversal beams to receive new FRP deck.	1 day
48	Remove the old redundant transversal girders.	1 day
49	Repair the bottom flanges of the main girders.	4 days
50	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
51	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
52	Install new aluminium parapets.	1 day
53	**Span 7**	**12 days**
54	Remove the existing parapets, timber walkway and timber planks in span 7 using the mini crane with access along the new temporary bridge deck.	2 days
55	Install new transversal beams to receive new FRP deck.	1 day
56	Remove the old redundant transversal girders.	1 day
57	Repair the bottom flanges of the main girders.	4 days
58	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
59	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
60	Install new aluminium parapets.	1 day
61	**Span 8**	**17 days**
62	Remove the existing parapets, timber walkway and timber planks in span 8 using the mini crane with access along the new temporary bridge deck.	2 days
63	Install new transversal beams to receive new FRP deck.	1 day
64	Remove the old redundant transversal girders.	1 day
65	Repair the bottom flanges of the main girders.	4 days
66	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
67	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
68	Install new aluminium parapets.	1 day
69	Remove temporary bridge system from span 8 to 1.	5 days
70	Painting works	56 days
71	Demobilise and Clear Site.	5 days



Project: Lydbrook Bridge - Option A.1
Date: Thu 25/05/17

Task | Milestone | Project Summary | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | External Tasks | Deadline | Manual Progress
Split | Summary | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | External Milestone | Progress

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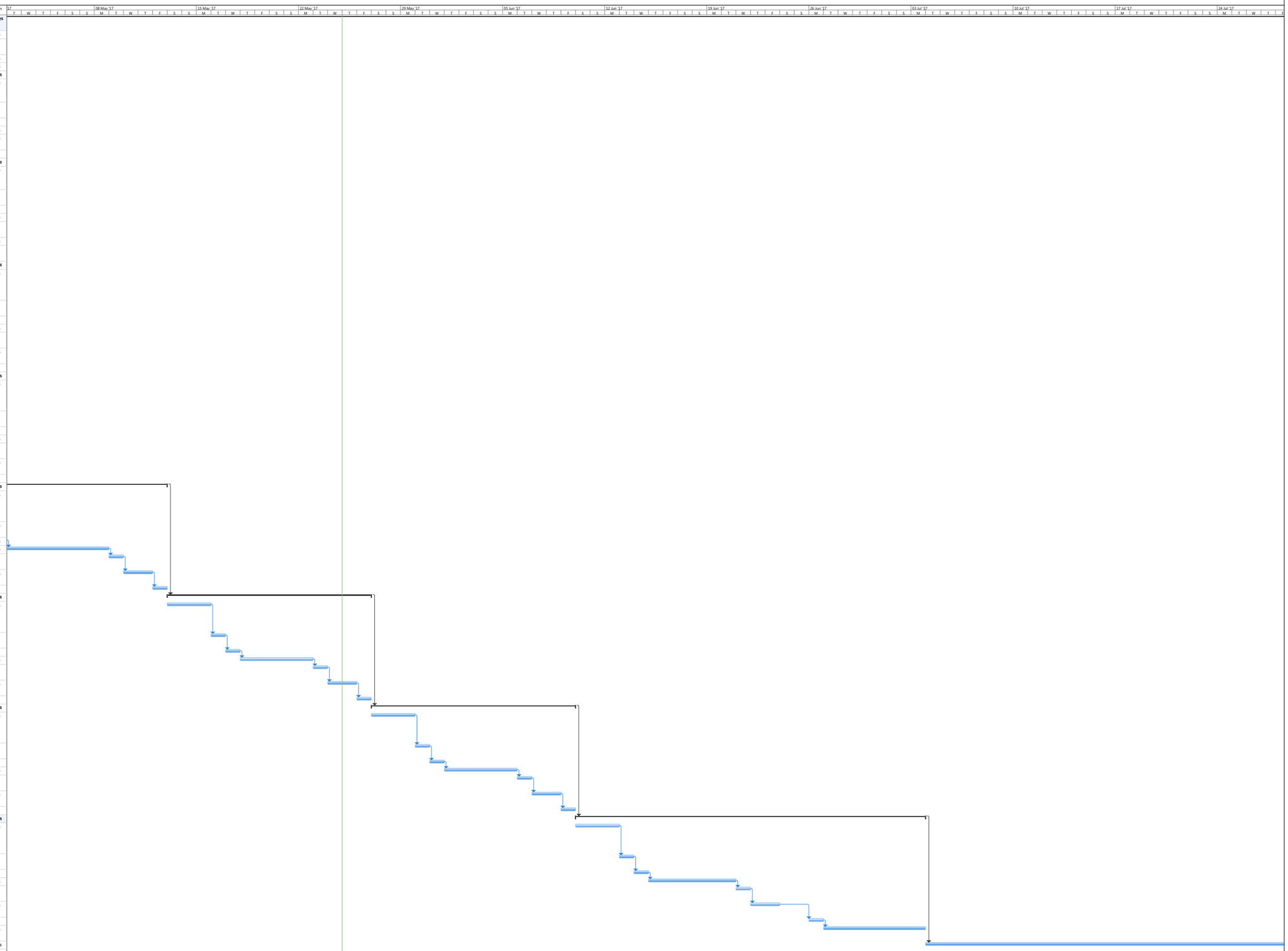
LYDBROOK BRIDGE - OPTION 6.4. WORKS REQUIRED TO REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.4. Works required to refurbish the bridge maintaining the superstructure**	**182 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**11 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	Install new transversal beams to receive new FRP deck.	1 day
9	Remove the old redundant transversal girders.	1 day
10	Repair the bottom flanges of the main girders.	4 days
11	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
12	Install new aluminium parapets.	1 day
13	**Span 2**	**13 days**
14	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
15	Install new transversal beams to receive new FRP deck.	1 day
16	Remove the old redundant transversal girders.	1 day
17	Repair the bottom flanges of the main girders.	4 days
18	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	1 day
19	Install new aluminium parapets.	2 days
20	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
21	**Span 3**	**12 days**
22	Remove the existing parapets, timber walkway and timber planks in span 3 using the mini crane with access along the new temporary bridge deck.	2 days
23	Install new transversal beams to receive new FRP deck.	1 day
24	Remove the old redundant transversal girders.	1 day
25	Repair the bottom flanges of the main girders.	4 days
26	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
27	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
28	Install new aluminium parapets.	1 day
29	**Span 4**	**12 days**
30	Remove the existing parapets, timber walkway and timber planks in span 4 using the mini crane with access along the new temporary bridge deck.	2 days
31	Install new transversal beams to receive new FRP deck.	1 day
32	Remove the old redundant transversal girders.	1 day
33	Repair the bottom flanges of the main girders.	4 days
34	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
35	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
36	Install new aluminium parapets.	1 day
37	**Span 5**	**16 days**
38	Remove the existing parapets, timber walkway and timber planks in span 5 using the mini crane with access along the new temporary bridge deck.	2 days
39	Install new transversal beams to receive new FRP deck.	2 days
40	Remove the old redundant transversal girders.	2 days
41	Repair the bottom flanges of the main girders.	6 days
42	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
43	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
44	Install new aluminium parapets.	1 day
45	**Span 6**	**12 days**
46	Remove the existing parapets, timber walkway and timber planks in span 6 using the mini crane with access along the new temporary bridge deck.	2 days
47	Install new transversal beams to receive new FRP deck.	1 day
48	Remove the old redundant transversal girders.	1 day
49	Repair the bottom flanges of the main girders.	4 days
50	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
51	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
52	Install new aluminium parapets.	1 day
53	**Span 7**	**12 days**
54	Remove the existing parapets, timber walkway and timber planks in span 7 using the mini crane with access along the new temporary bridge deck.	2 days
55	Install new transversal beams to receive new FRP deck.	1 day
56	Remove the old redundant transversal girders.	1 day
57	Repair the bottom flanges of the main girders.	4 days
58	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
59	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
60	Install new aluminium parapets.	1 day
61	**Span 8**	**17 days**
62	Remove the existing parapets, timber walkway and timber planks in span 8 using the mini crane with access along the new temporary bridge deck.	2 days
63	Install new transversal beams to receive new FRP deck.	1 day
64	Remove the old redundant transversal girders.	1 day
65	Repair the bottom flanges of the main girders.	4 days
66	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
67	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
68	Install new aluminium parapets.	1 day
69	Remove temporary bridge system from span 8 to 1.	5 days
70	Painting works	56 days
71	Demobilise and Clear Site.	5 days



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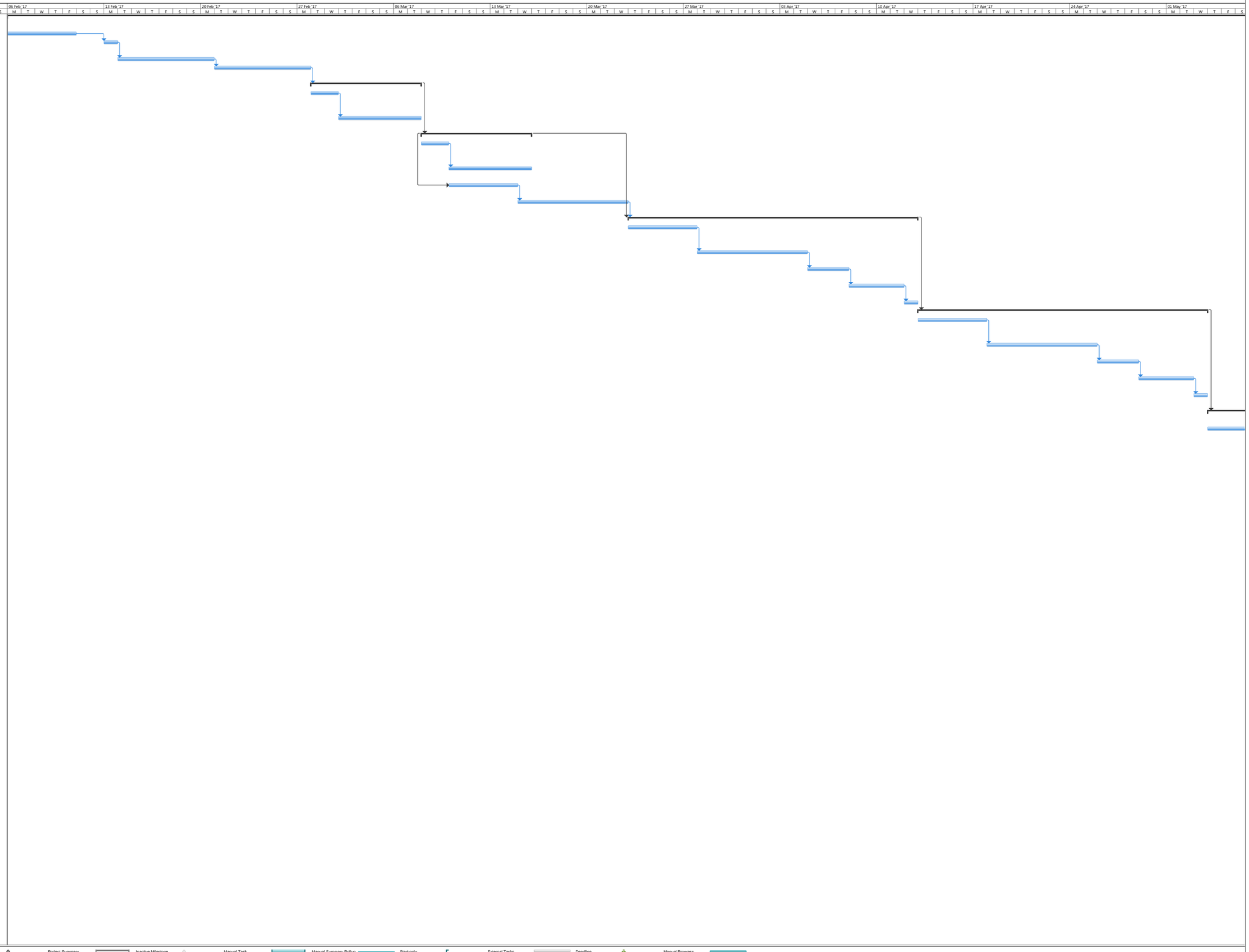
LYDBROOK BRIDGE - OPTION 6.5. WORKS REQUIRED TO REPLACE THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 5.5. Works required to replace the superstructure**	**192 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**7 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	Remove the whole decking and girders including main longitudinal beams.	5 days
9	**Span 2**	**7 days**
10	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
11	Remove the whole decking and girders including main longitudinal beams.	5 days
12	Establish suitable access ramp into the river on the downstream end of bridge.	4 days
13	Mobilise and set up the modular pontoon system on downstream end of bridge.	7 days
14	**Span 3**	**18 days**
15	Remove the existing parapets, timber walkway and timber planks in span 3 using the telescopic crane mounted on the barge.	4 days
16	Remove the whole decking and girders including main longitudinal beams.	7 days
17	Install transversal beams between piers to receive new decks.	3 days
18	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
19	Install new aluminium parapets.	1 day
20	**Span 4**	**18 days**
21	Remove the existing parapets, timber walkway and timber planks in span 4 using the telescopic crane mounted on the barge.	4 days
22	Remove the whole decking and girders including main longitudinal beams.	7 days
23	Install transversal beams between piers to receive new decks.	3 days
24	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
25	Install new aluminium parapets.	1 day
26	**Span 5**	**18 days**
27	Remove the existing parapets, timber walkway and timber planks in span 5 using the telescopic crane mounted on the barge.	4 days
28	Remove the whole decking and girders including main longitudinal beams.	7 days
29	Install transversal beams between piers to receive new decks.	3 days
30	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
31	Install new aluminium parapets.	1 day
32	**Span 6**	**17 days**
33	Remove the existing parapets, timber walkway and timber planks in span 6 using the telescopic crane mounted on the barge.	4 days
34	Remove the whole decking and girders including main longitudinal beams.	7 days
35	Install transversal beams between piers to receive new decks.	2 days
36	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
37	Install new aluminium parapets.	1 day
38	**Span 7**	**18 days**
39	Remove the existing parapets, timber walkway and timber planks in span 7 using the telescopic crane mounted on the barge.	4 days
40	Remove the whole decking and girders including main longitudinal beams.	7 days
41	Install transversal beams between piers to receive new decks.	3 days
42	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
43	Install new aluminium parapets.	1 day
44	**Span 8**	**18 days**
45	Remove the existing parapets, timber walkway and timber planks in span 8 using the telescopic crane mounted on the barge.	4 days
46	Remove the whole decking and girders including main longitudinal beams.	7 days
47	Install transversal beams between piers to receive new decks.	3 days
48	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
49	Install new aluminium parapets.	1 day
50	Demobilise floating plant including reinstatement of slipway ramp on DS end	6 days
51	**Span 1 and 2 reconstruction**	**35 days**
52	Install transversal beams between piers to receive new decks.	4 days
53	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	5 days
54	Install new aluminium parapets..	1 day
55	Paint Piers	25 days
56	Genaral Site Reinstatements, Demobilise and Clear Site.	8 days



Project: Lydbrook Bridge - Option B
Date: Thu 25/05/17

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

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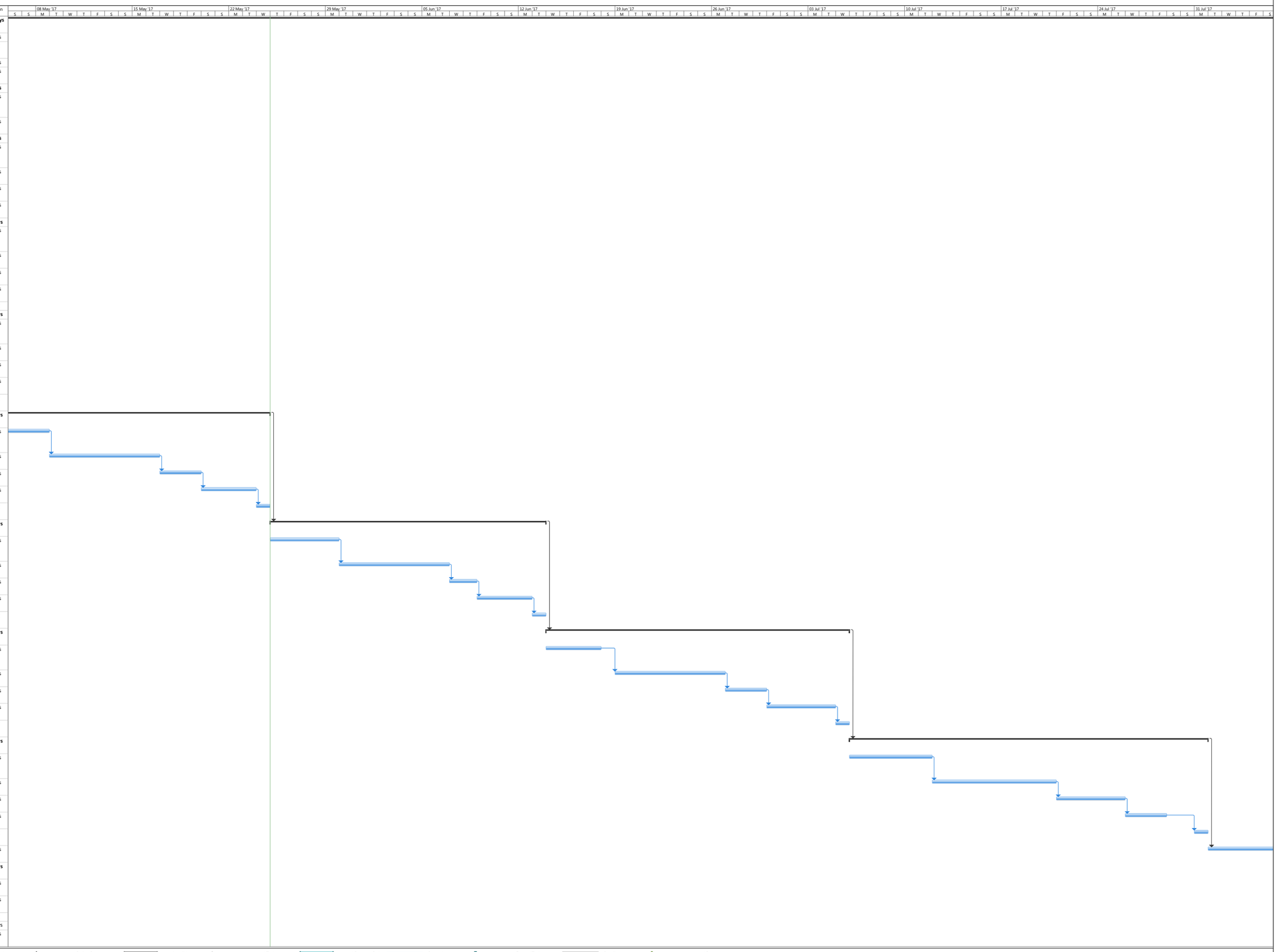
LYDBROOK BRIDGE - OPTION 6.5. WORKS REQUIRED TO REPLACE THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 5.5. Works required to replace the superstructure**	**192 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**7 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	Remove the whole decking and girders including main longitudinal beams.	5 days
9	**Span 2**	**7 days**
10	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
11	Remove the whole decking and girders including main longitudinal beams.	5 days
12	Establish suitable access ramp into the river on the downstream end of bridge.	4 days
13	Mobilise and set up the modular pontoon system on downstream end of bridge.	7 days
14	**Span 3**	**18 days**
15	Remove the existing parapets, timber walkway and timber planks in span 3 using the telescopic crane mounted on the barge.	4 days
16	Remove the whole decking and girders including main longitudinal beams.	7 days
17	Install transversal beams between piers to receive new decks.	3 days
18	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
19	Install new aluminium parapets.	1 day
20	**Span 4**	**18 days**
21	Remove the existing parapets, timber walkway and timber planks in span 4 using the telescopic crane mounted on the barge.	4 days
22	Remove the whole decking and girders including main longitudinal beams.	7 days
23	Install transversal beams between piers to receive new decks.	3 days
24	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
25	Install new aluminium parapets.	1 day
26	**Span 5**	**18 days**
27	Remove the existing parapets, timber walkway and timber planks in span 5 using the telescopic crane mounted on the barge.	4 days
28	Remove the whole decking and girders including main longitudinal beams.	7 days
29	Install transversal beams between piers to receive new decks.	3 days
30	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
31	Install new aluminium parapets.	1 day
32	**Span 6**	**17 days**
33	Remove the existing parapets, timber walkway and timber planks in span 6 using the telescopic crane mounted on the barge.	4 days
34	Remove the whole decking and girders including main longitudinal beams.	7 days
35	Install transversal beams between piers to receive new decks.	2 days
36	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
37	Install new aluminium parapets.	1 day
38	**Span 7**	**18 days**
39	Remove the existing parapets, timber walkway and timber planks in span 7 using the telescopic crane mounted on the barge.	4 days
40	Remove the whole decking and girders including main longitudinal beams.	7 days
41	Install transversal beams between piers to receive new decks.	3 days
42	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
43	Install new aluminium parapets.	1 day
44	**Span 8**	**18 days**
45	Remove the existing parapets, timber walkway and timber planks in span 8 using the telescopic crane mounted on the barge.	4 days
46	Remove the whole decking and girders including main longitudinal beams.	7 days
47	Install transversal beams between piers to receive new decks.	3 days
48	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
49	Install new aluminium parapets.	1 day
50	Demobilise floating plant including reinstatement of slipway ramp on DS end	6 days
51	**Span 1 and 2 reconstruction**	**35 days**
52	Install transversal beams between piers to receive new decks.	4 days
53	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	5 days
54	Install new aluminium parapets..	1 day
55	Paint Piers	25 days
56	Genaral Site Reinstatements, Demobilise and Clear Site.	8 days



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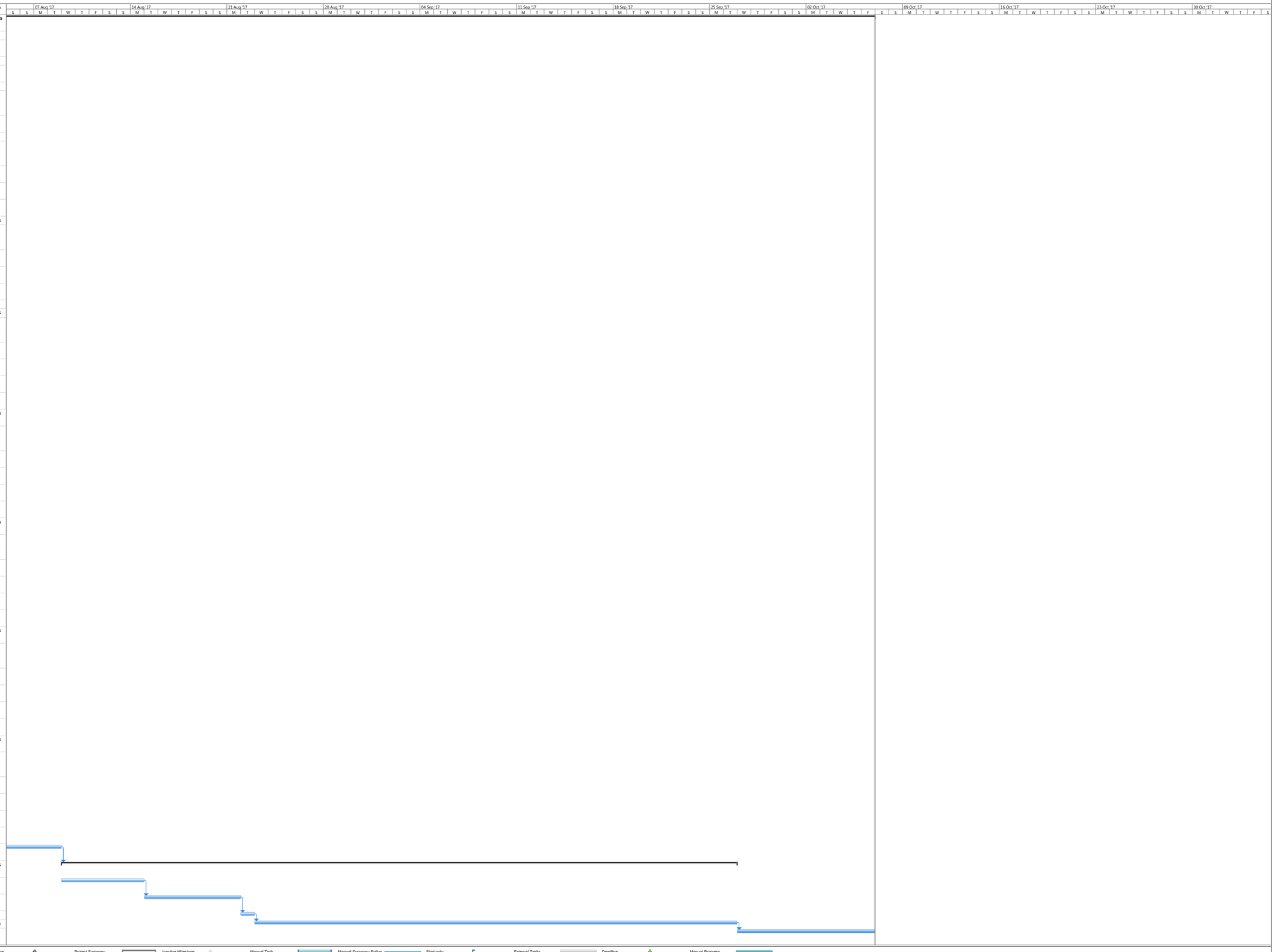
LYDBROOK BRIDGE - OPTION 6.5. WORKS REQUIRED TO REPLACE THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 5.5. Works required to replace the superstructure**	**192 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	Install scaffold access walkways	5 days
5	Install safety netting system between all spans.	5 days
6	**Span 1**	**7 days**
7	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
8	Remove the whole decking and girders including main longitudinal beams.	5 days
9	**Span 2**	**7 days**
10	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
11	Remove the whole decking and girders including main longitudinal beams.	5 days
12	Establish suitable access ramp into the river on the downstream end of bridge.	4 days
13	Mobilise and set up the modular pontoon system on downstream end of bridge.	7 days
14	**Span 3**	**18 days**
15	Remove the existing parapets, timber walkway and timber planks in span 3 using the telescopic crane mounted on the barge.	4 days
16	Remove the whole decking and girders including main longitudinal beams.	7 days
17	Install transversal beams between piers to receive new decks.	3 days
18	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
19	Install new aluminium parapets.	1 day
20	**Span 4**	**18 days**
21	Remove the existing parapets, timber walkway and timber planks in span 4 using the telescopic crane mounted on the barge.	4 days
22	Remove the whole decking and girders including main longitudinal beams.	7 days
23	Install transversal beams between piers to receive new decks.	3 days
24	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
25	Install new aluminium parapets.	1 day
26	**Span 5**	**18 days**
27	Remove the existing parapets, timber walkway and timber planks in span 5 using the telescopic crane mounted on the barge.	4 days
28	Remove the whole decking and girders including main longitudinal beams.	7 days
29	Install transversal beams between piers to receive new decks.	3 days
30	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
31	Install new aluminium parapets.	1 day
32	**Span 6**	**17 days**
33	Remove the existing parapets, timber walkway and timber planks in span 6 using the telescopic crane mounted on the barge.	4 days
34	Remove the whole decking and girders including main longitudinal beams.	7 days
35	Install transversal beams between piers to receive new decks.	2 days
36	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
37	Install new aluminium parapets.	1 day
38	**Span 7**	**18 days**
39	Remove the existing parapets, timber walkway and timber planks in span 7 using the telescopic crane mounted on the barge.	4 days
40	Remove the whole decking and girders including main longitudinal beams.	7 days
41	Install transversal beams between piers to receive new decks.	3 days
42	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
43	Install new aluminium parapets.	1 day
44	**Span 8**	**18 days**
45	Remove the existing parapets, timber walkway and timber planks in span 8 using the telescopic crane mounted on the barge.	4 days
46	Remove the whole decking and girders including main longitudinal beams.	7 days
47	Install transversal beams between piers to receive new decks.	3 days
48	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	3 days
49	Install new aluminium parapets.	1 day
50	Demobilise floating plant including reinstatement of slipway ramp on DS end	6 days
51	**Span 1 and 2 reconstruction**	**35 days**
52	Install transversal beams between piers to receive new decks.	4 days
53	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	5 days
54	Install new aluminium parapets..	1 day
55	Paint Piers	25 days
56	Genaral Site Reinstatements, Demobilise and Clear Site.	8 days

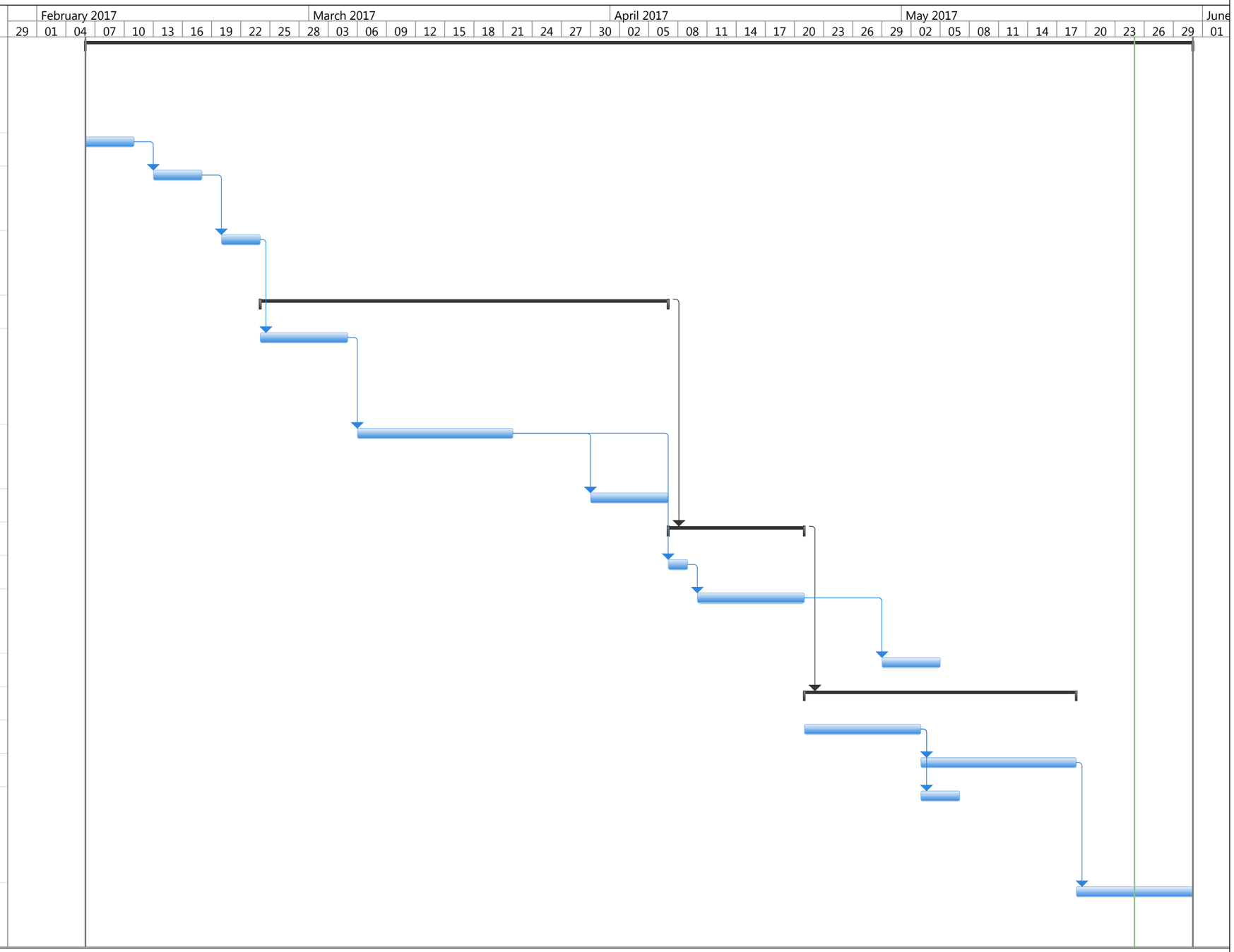


Project: Lydbrook Bridge - Option B
Date: Thu 25/05/17

Task · Split · Milestone · Summary · Project Summary · Inactive Task · Inactive Milestone · Inactive Summary · Manual Task · Duration-only · Manual Summary Rollup · Manual Summary · Start-only · Finish-only · External Tasks · External Milestone · Deadline · Progress · Manual Progress

LYDBROOK BRIDGE - OPTION 6.6. WORKS REQUIERD TO BUILD A NEW SUSPENSION BRIDGE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.6.Works required to built a new suspension bridge**	**95 days**
2	Mobilisation including site set up.	5 days
3	Establish suitable access ramp into the river	5 days
4	Mobilise and set up modular pontoon system	4 days
5	**Foundation. North side**	**35 days**
6	Site clearance. Establish suitable access to northern bank	7 days
7	Foundation and Anchorage blocks	14 days
8	Installation of tower	7 days
9	**Foundation Southern bank**	**12 days**
10	Site clearance	2 days
11	Foundation and anchorage blocks. South	10 days
12	Installation of tower	5 days
13	**Installation of modular bridge**	**24 days**
14	Cables and vertical lines	10 days
15	Modular deck and parapets	14 days
16	Demobilise floating plant including reinstatement of slipway ramp on DS end	4 days
17	Genaral Site Reinstatements, Demobilise and Clear Site.	10 days

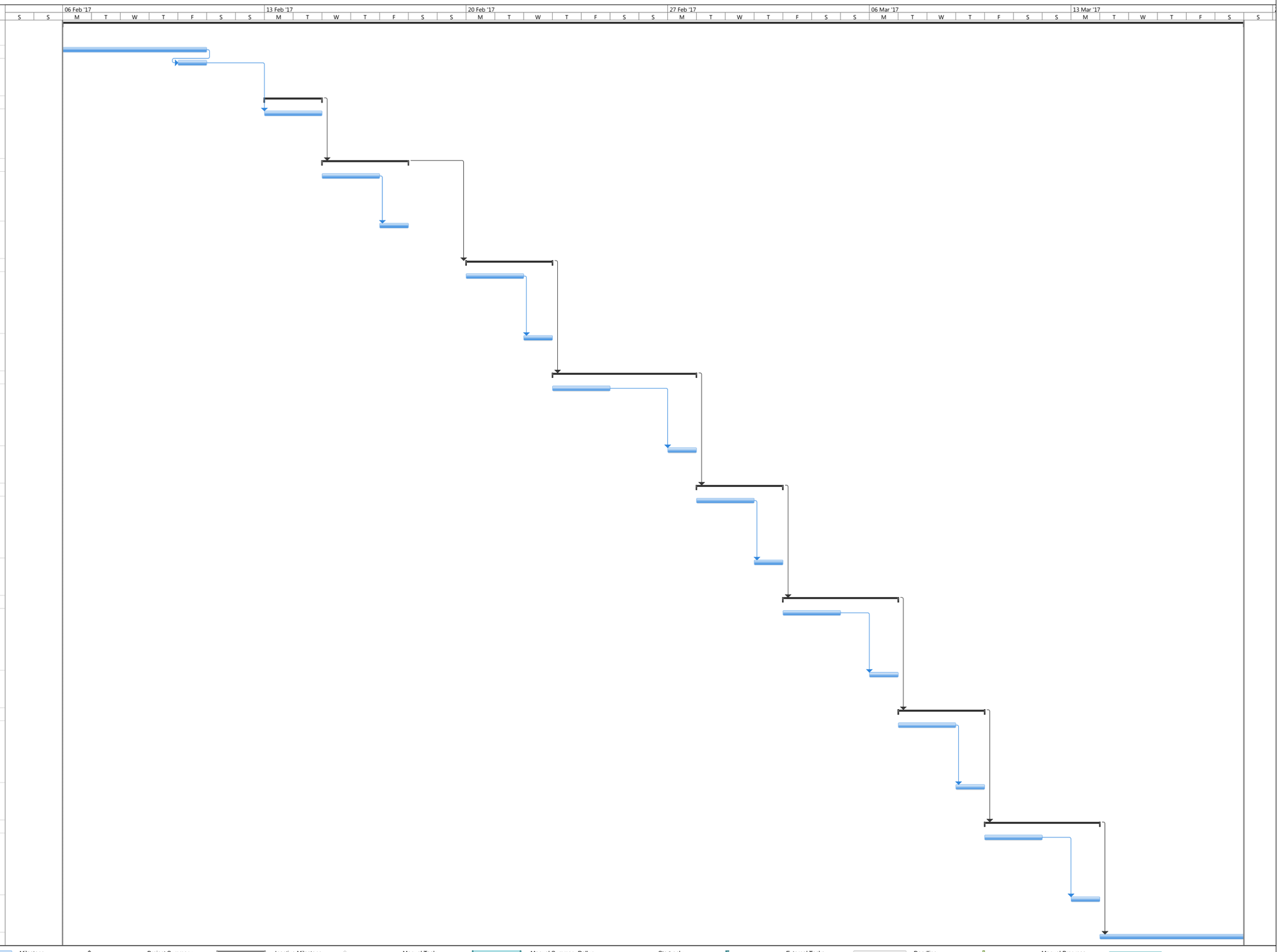


Project: Lydbrook Bridge - Option B
Date: Thu 25/05/17

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

LYDBROOK BRIDGE - OPTION 6.7. PHASE 1. WORKS REQUIRED TO MAKE THE BRIDGE SAFE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.7. Phase 1. MAKE THE BRIDGE SAFE**	**33 days**
2	Mobilisation including site set up.	5 days
3	Reduce level of vehicle track between Low mileage abutment and pier No 1.	1 day
4	**Span 1**	**2 days**
5	Remove the existing parapets, timber walkway and timber planks in span 1 using mobile crane from vehicle track.	2 days
6	**Span 2**	**3 days**
7	Remove the existing parapets, timber walkway and timber planks in span 2 using mobile crane from vehicle track.	2 days
8	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
9	**Span 3**	**3 days**
10	Remove the existing parapets, timber walkway and timber planks in span 3 using the mini crane with access along the new temporary bridge deck.	2 days
11	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
12	**Span 4**	**3 days**
13	Remove the existing parapets, timber walkway and timber planks in span 4 using the mini crane with access along the new temporary bridge deck.	2 days
14	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
15	**Span 5**	**3 days**
16	Remove the existing parapets, timber walkway and timber planks in span 5 using the mini crane with access along the new temporary bridge deck.	2 days
17	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
18	**Span 6**	**3 days**
19	Remove the existing parapets, timber walkway and timber planks in span 6 using the mini crane with access along the new temporary bridge deck.	2 days
20	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
21	**Span 7**	**3 days**
22	Remove the existing parapets, timber walkway and timber planks in span 7 using the mini crane with access along the new temporary bridge deck.	2 days
23	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
24	**Span 8**	**3 days**
25	Remove the existing parapets, timber walkway and timber planks in span 8 using the mini crane with access along the new temporary bridge deck.	2 days
26	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
27	Demobilise and Clear Site.	5 days



Project: Lydbrook Bridge - Option A
Date: Thu 25/05/17

Task | Milestone | Project Summary | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | External Tasks | Deadline | Manual Progress
Split | Summary | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | External Milestone | Progress

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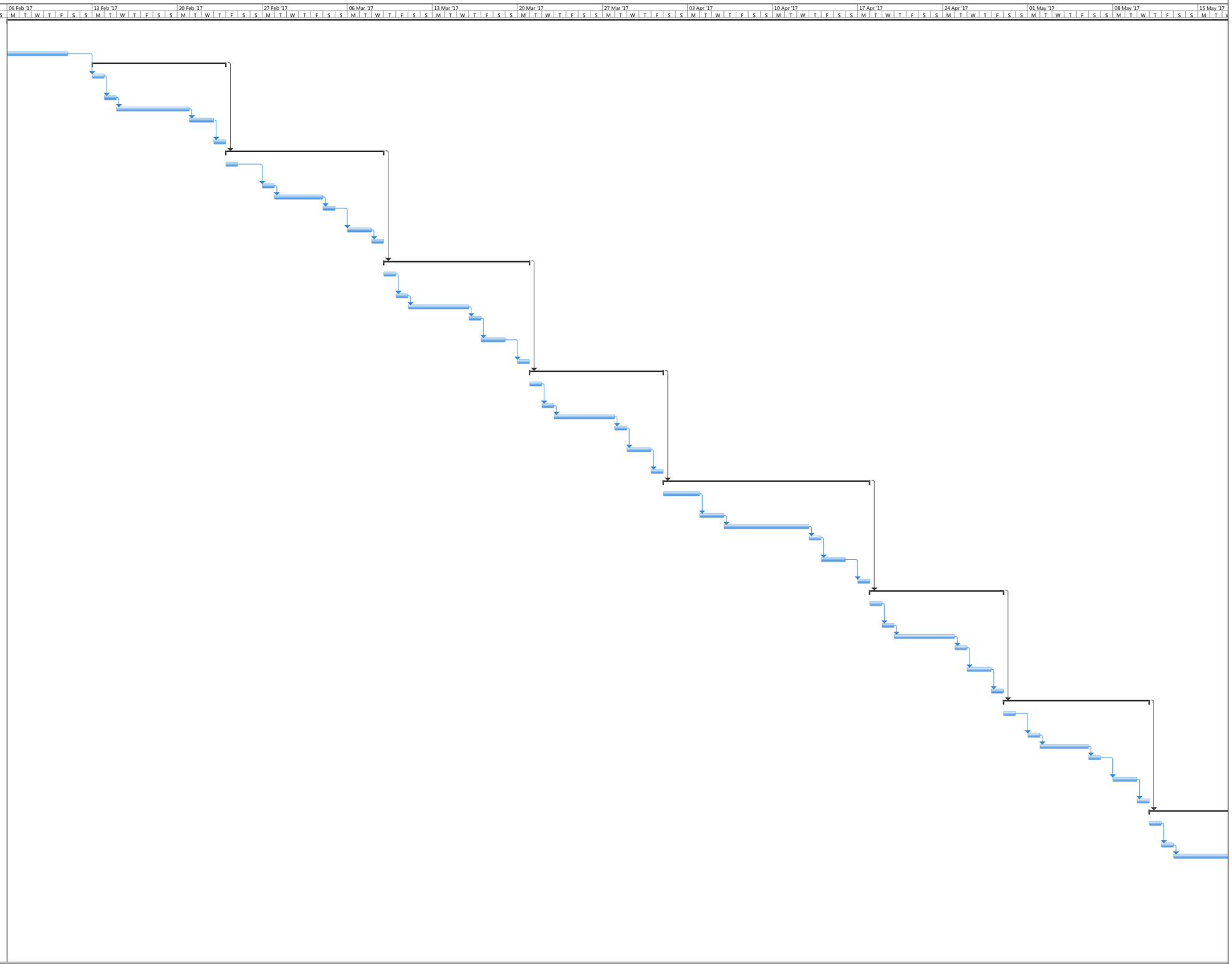
LYDBROOK BRIDGE - OPTION 6.4. PHASE 2 WORKS REQUIRED TO REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.4. Phase2. Works required to refurbish the bridge maintaining the superstructure**	**154 days**
2	Mobilisation including site set up.	5 days
3	**Span 1**	**9 days**
4	Install new transversal beams to receive new FRP deck using mobile crane from vehicle track	1 day
5	Remove the old redundant transversal girders.	1 day
6	Repair the bottom flanges of the main girders.	4 days
7	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
8	Install new aluminium parapets.	1 day
9	**Span 2**	**10 days**
10	Install new transversal beams to receive new FRP deck usinb mobile crane from vehicle track	1 day
11	Remove the old redundant transversal girders.	1 day
12	Repair the bottom flanges of the main girders.	4 days
13	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	1 day
14	Install new aluminium parapets.	2 days
15	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
16	**Span 3**	**10 days**
17	Install new transversal beams to receive new FRP deck.	1 day
18	Remove the old redundant transversal girders.	1 day
19	Repair the bottom flanges of the main girders.	4 days
20	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
21	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
22	Install new aluminium parapets.	1 day
23	**Span 4**	**10 days**
24	Install new transversal beams to receive new FRP deck.	1 day
25	Remove the old redundant transversal girders.	1 day
26	Repair the bottom flanges of the main girders.	4 days
27	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
28	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
29	Install new aluminium parapets.	1 day
30	**Span 5**	**14 days**
31	Install new transversal beams to receive new FRP deck.	2 days
32	Remove the old redundant transversal girders.	2 days
33	Repair the bottom flanges of the main girders.	6 days
34	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
35	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
36	Install new aluminium parapets.	1 day
37	**Span 6**	**10 days**
38	Install new transversal beams to receive new FRP deck.	1 day
39	Remove the old redundant transversal girders.	1 day
40	Repair the bottom flanges of the main girders.	4 days
41	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
42	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
43	Install new aluminium parapets.	1 day
44	**Span 7**	**10 days**
45	Install new transversal beams to receive new FRP deck.	1 day
46	Remove the old redundant transversal girders.	1 day
47	Repair the bottom flanges of the main girders.	4 days
48	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
49	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
50	Install new aluminium parapets.	1 day
51	**Span 8**	**15 days**
52	Install new transversal beams to receive new FRP deck.	1 day
53	Remove the old redundant transversal girders.	1 day
54	Repair the bottom flanges of the main girders.	4 days
55	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
56	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
57	Install new aluminium parapets.	1 day
58	Remove temporary bridge system from span 8 to 1.	5 days
59	Painting works	56 days
60	Demobilise and Clear Site.	5 days



Project: Lydbrook Bridge - Option A.1
Date: Thu 25/05/17

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

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LYDBROOK BRIDGE - OPTION 6.4. PHASE 2 WORKS REQUIRED TO REFURBISH THE BRIDGE MAINTAINING THE SUPERSTRUCTURE
OUTLINE PROGRAMME OF WORKS

ID	Task Name	Duration
1	**Lydbrook Bridge - Option 6.4. Phase2. Works required to refurbish the bridge maintaining the superstructure**	**154 days**
2	Mobilisation including site set up.	5 days
3	**Span 1**	**9 days**
4	Install new transversal beams to receive new FRP deck using mobile crane from vehicle track	1 day
5	Remove the old redundant transversal girders.	1 day
6	Repair the bottom flanges of the main girders.	4 days
7	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
8	Install new aluminium parapets.	1 day
9	**Span 2**	**10 days**
10	Install new transversal beams to receive new FRP deck usinb mobile crane from vehicle track	1 day
11	Remove the old redundant transversal girders.	1 day
12	Repair the bottom flanges of the main girders.	4 days
13	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	1 day
14	Install new aluminium parapets.	2 days
15	Install a temporary bridge system to enable access for a mini crane over spans 1 & 2.	1 day
16	**Span 3**	**10 days**
17	Install new transversal beams to receive new FRP deck.	1 day
18	Remove the old redundant transversal girders.	1 day
19	Repair the bottom flanges of the main girders.	4 days
20	Extend the temporary bridge system to enable access for a mini crane over span 3.	1 day
21	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
22	Install new aluminium parapets.	1 day
23	**Span 4**	**10 days**
24	Install new transversal beams to receive new FRP deck.	1 day
25	Remove the old redundant transversal girders.	1 day
26	Repair the bottom flanges of the main girders.	4 days
27	Extend the temporary bridge system to enable access for a mini crane over span 4.	1 day
28	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
29	Install new aluminium parapets.	1 day
30	**Span 5**	**14 days**
31	Install new transversal beams to receive new FRP deck.	2 days
32	Remove the old redundant transversal girders.	2 days
33	Repair the bottom flanges of the main girders.	6 days
34	Extend the temporary bridge system to enable access for a mini crane over span 5.	1 day
35	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
36	Install new aluminium parapets.	1 day
37	**Span 6**	**10 days**
38	Install new transversal beams to receive new FRP deck.	1 day
39	Remove the old redundant transversal girders.	1 day
40	Repair the bottom flanges of the main girders.	4 days
41	Extend the temporary bridge system to enable access for a mini crane over span 6.	1 day
42	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
43	Install new aluminium parapets.	1 day
44	**Span 7**	**10 days**
45	Install new transversal beams to receive new FRP deck.	1 day
46	Remove the old redundant transversal girders.	1 day
47	Repair the bottom flanges of the main girders.	4 days
48	Extend the temporary bridge system to enable access for a mini crane over span 7.	1 day
49	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
50	Install new aluminium parapets.	1 day
51	**Span 8**	**15 days**
52	Install new transversal beams to receive new FRP deck.	1 day
53	Remove the old redundant transversal girders.	1 day
54	Repair the bottom flanges of the main girders.	4 days
55	Extend the temporary bridge system to enable access for a mini crane over span 8.	1 day
56	Install Fibre Reinforced Plastic decks spanning between the transversal beams.	2 days
57	Install new aluminium parapets.	1 day
58	Remove temporary bridge system from span 8 to 1.	5 days
59	Painting works	56 days
60	Demobilise and Clear Site.	5 days

ANNEX B. DRAWINGS

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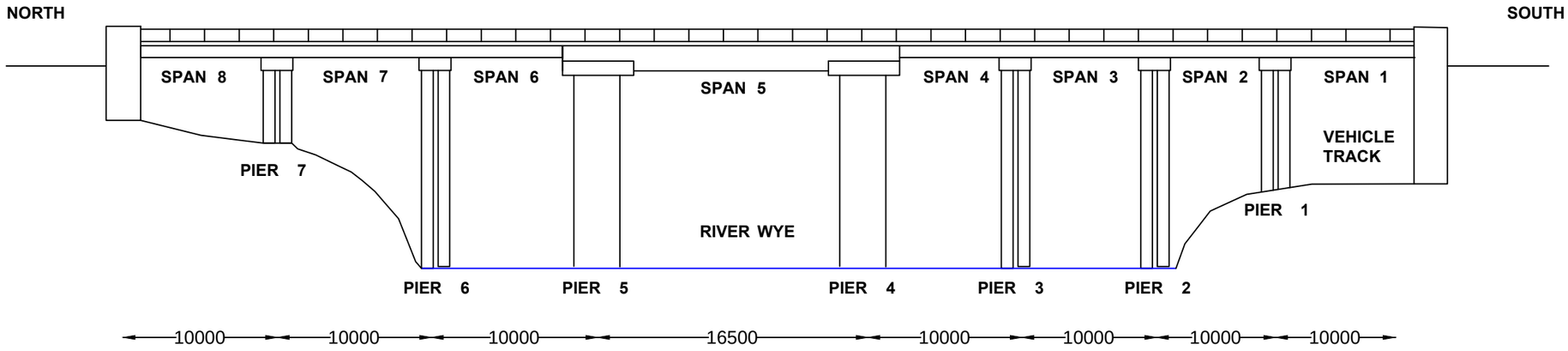
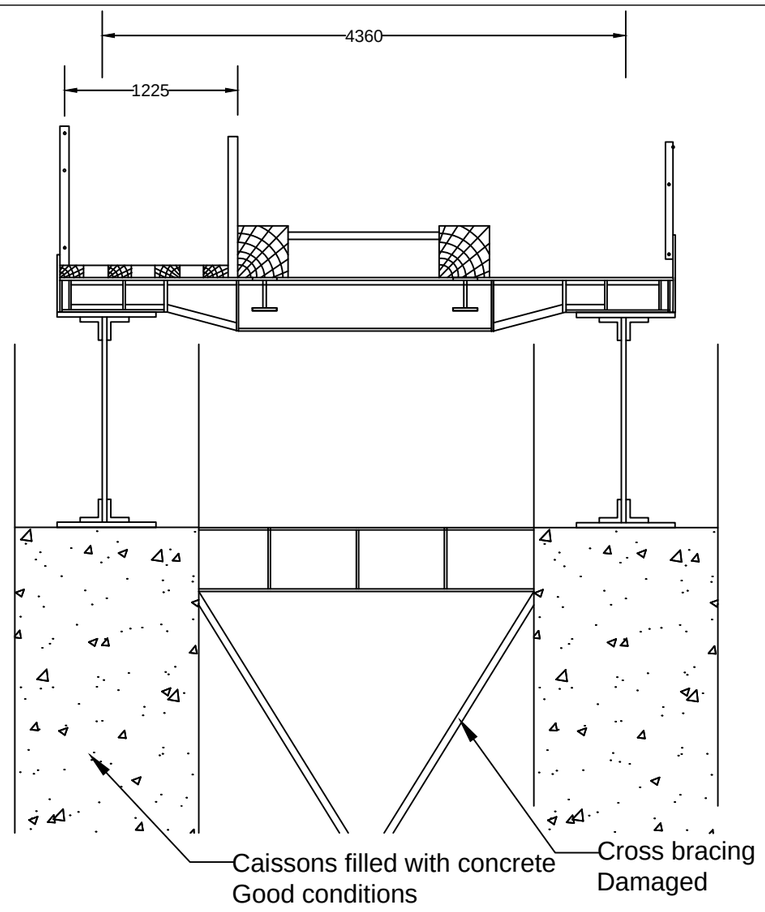
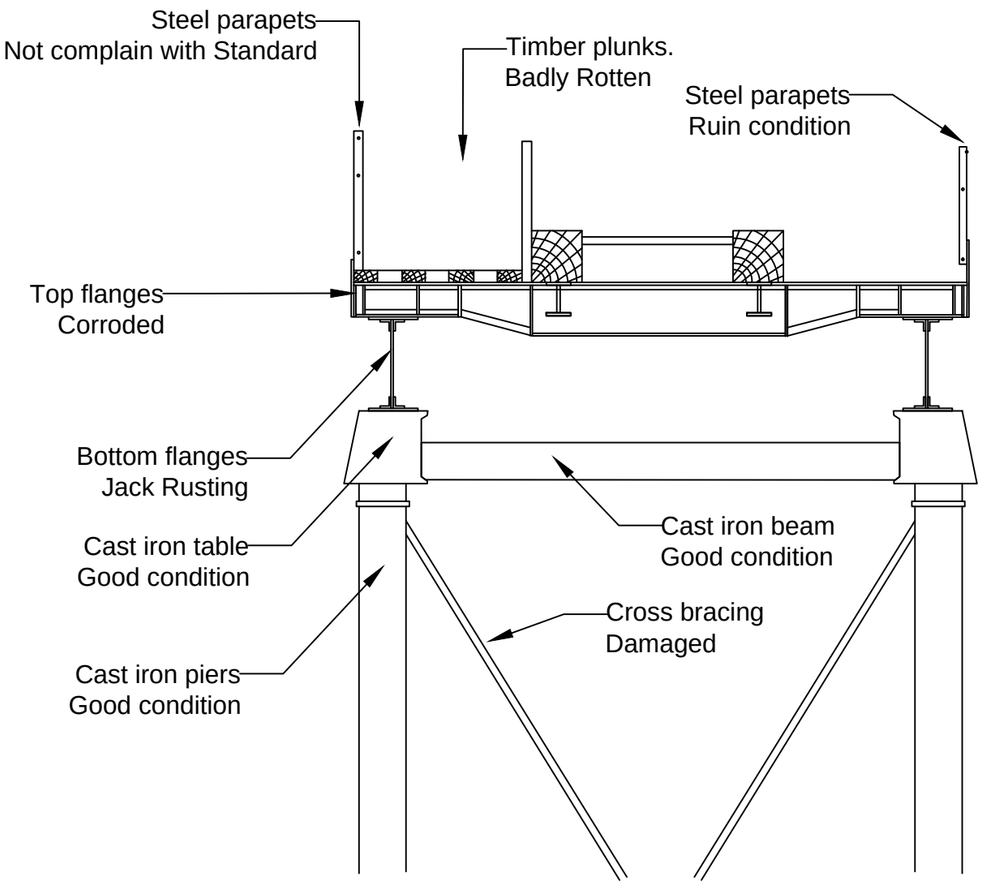


ELEVATION. NOT SCALE



CROSS SECTION PIERS 4 AND 5
SCALE 1:50



CROSS SECTION PIERS 1 TO 3 AND 6 TO 8
SCALE 1:50

Rev	Revision details	Chkd	Appd	Date

Drawn: JLM		Preliminary	
Design: JLM		For comment	
Chkd: -		For tender	
Appd: -		For construction	
Date: FEBRUARY 17		As constructed	
		For Information	X

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Client
Gloucestershire COUNTY COUNCIL

Project Name
LYDBROOK BRIDGE

Drawing Title
Existing G.A.

Original Drg Size : A3	Dimensions : -
Scale : AS SHOWN	Copyright © Amey

Drawing No	Rev
COGL43045784. 01	A

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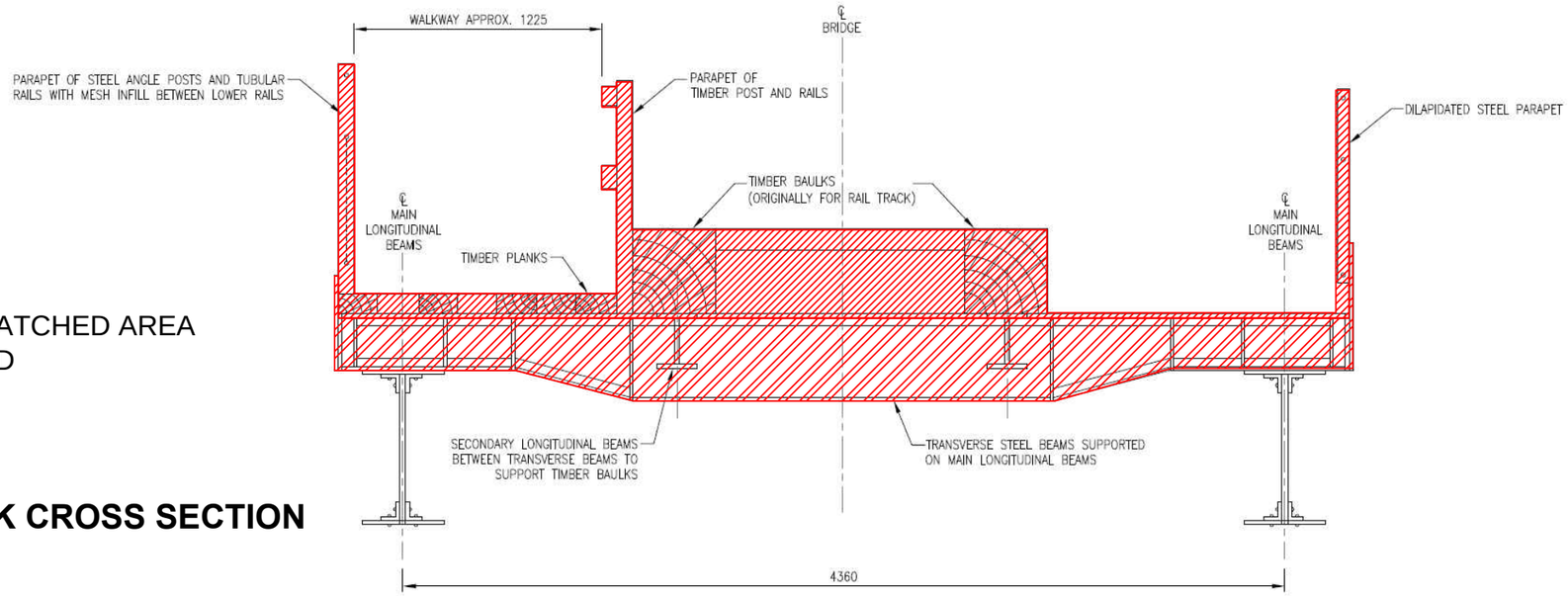


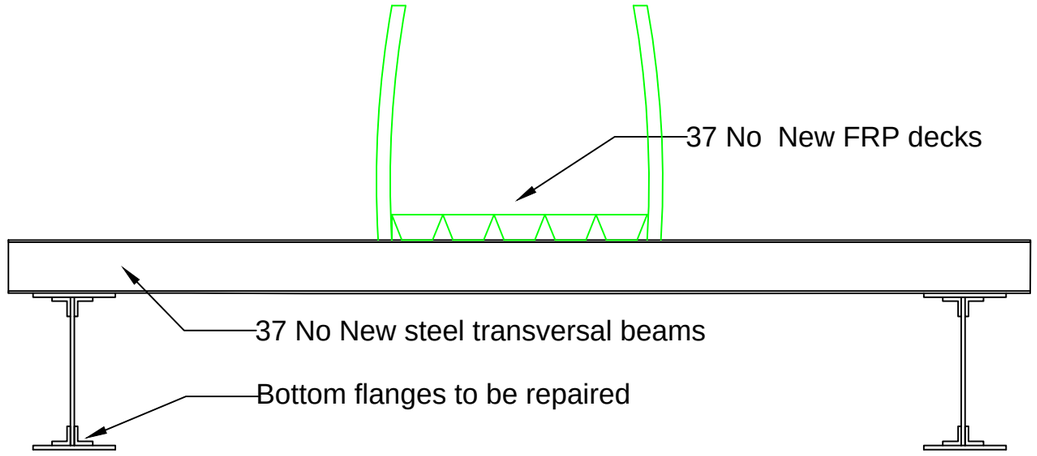
ELEMENTS IN HATCHED AREA TO BE REMOVED

EXISTING DECK CROSS SECTION

NOTES

WORKS TO BE UNDERTAKEN:

1. REMOVE EXISTING WOODEN PLUNKS, BULKS AND STEEL PARAPETS
2. REMOVE 37No. TRANSVERSAL BEAMS AND REPLACE THEM WITH NEW STEEL BEAMS
3. INSTALL 37 FRP DECKS SIMPLY SUPPORTED BETWEEN THE NEW TRANSVERSAL BEAMS.
4. REPAIR BOTTOM FLANGES OF MAIN GIRDERS.
5. PAINT MAIN GIRDERS.



Installation of 37 No FRP decks simply supported between the new transversal beams
Decks details:
Span: 2.335m
Walkway Width: 1225mm
Weight: 500 kg
Depth: 0.1m
Aluminum Parapets: 1.15m high

NEW DECK CROSS SECTION

RESOURCE. LIFESPAN WEBSITE

Rev	Revision details	Chkd	Appd	Date

Drawn: JLM		Preliminary	
Design: JLM		For comment	
Chkd: -		For tender	
Appd: -		For construction	
Date: FEBRUARY 17		As constructed	
		For Information	X

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Client
Gloucestershire COUNTY COUNCIL

Project Name
LYDBROOK BRIDGE

Drawing Title
Option 5.4. Refurbish the bridge with 37No FRP decks

Original Drg Size : A3	Dimensions : -
Scale : NOT SCALE	Copyright © Amey

Drawing No	Rev
COGL43045784.D02	A

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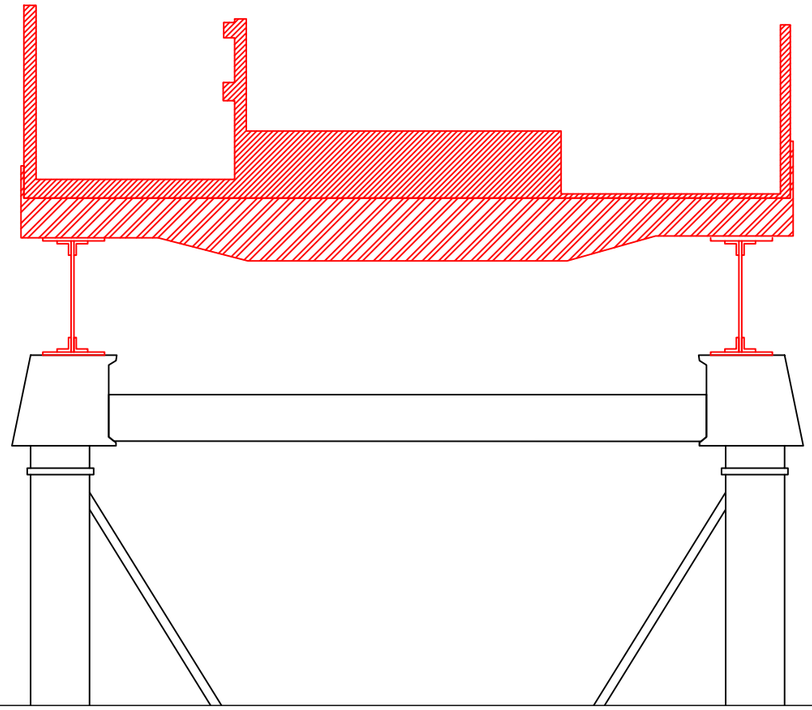
EXISTING DECK CROSS SECTION

REMOVE THE WHOLE EXISTING DECKING INCLUDING MAIN LONGITUDINAL BEAMS

TRANSVERSAL BEAMS BETWEEN PIERS TO REMAIN.



NOTES

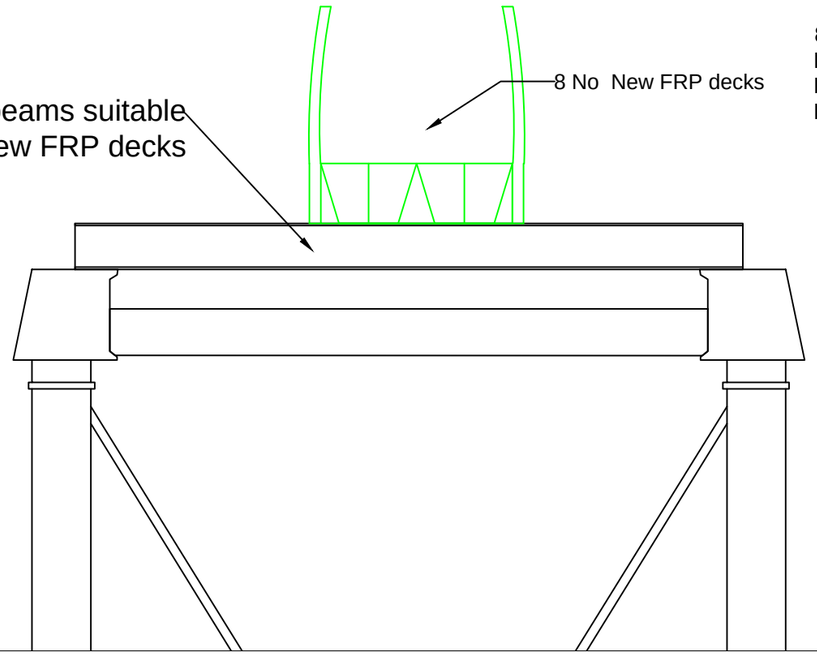
WORKS TO BE UNDERTAKEN:

1. REMOVE PARAPETS, TIMBER PLUNKS AND BULKS.
2. REMOVE 37No TRANSVERSAL BEAMS.
3. REMOVE MAIN LONGITUDINAL BEAMS.
4. INSTALL TRANSVERSAL BEAMS SPANNING BETWEEN PIERS TO RECEIVE NEW DECKS.
5. INSTALL NEW FRP DECKS SPANNING BETWEEN PIERS.

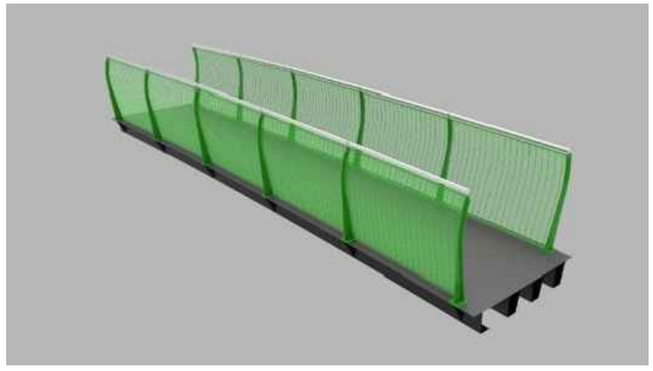
NEW DECK CROSS SECTION

New transversal beams suitable to carry out new FRP decks

8 No New FRP decks



8 No NEW FRP DECKS
Remove transversal beams: Weight 500kg. Length:5m Depth: 425mm
New decks (10m span): Weight: 2100 Kg. Width: 1250mm Depth: 300mm
New deck middle span (16.5m span): Weight: 3400 kg. Width: 1250mm Depth: 300mm



RESOURCE. LIFESPAN WEBSITE

Rev	Revision details	Chkd	Appd	Date

Drawn: JLM		Preliminary	
Design: JLM		For comment	
Chkd: -		For tender	
Appd: -		For construction	
Date: FEBRUARY 17		As constructed	
		For Information	X

amey
www.amey.co.uk

Client
Gloucestershire COUNTY COUNCIL

Project Name
LYDBROOK BRIDGE

Drawing Title
Option 5.4. Refurbish the bridge with 8No FRP decks.

Original Drg Size : A3	Dimensions : -
Scale : NOT SCALE	Copyright © Amey

Drawing No	Rev
COGL43045784.D03	A

ANNEX C. PHOTOGRAPHS

Picture 10 Eastern Elevation

Picture 11 View under deck

Picture 12. Northern Abutment

Picture 13. Vehicle Track at southern end

Picture 14. Walk way

Picture 15. Deck

Picture 16. Main girder

Picture 17. Jack rusting in main girders

Picture 18. Main girder bottom flange

Picture 19. Transverse beam. Top flange

Picture 20. Pier 2

Picture 22. Pier 7

Picture 23. Caisson

Picture 24. Main girders and caisson

Picture 25. Railing at eastern side

Picture 26. Access to bridge

ANNEX D. CONTRACTORS CONSULTED

CONTRACTOR	CONTACT DETAILS	AREA OF SUPPORT
Kaymac Marine & Civil Engineering	**Address:** Osprey Business Park, Byng Street, Landore, Swansea, SA1 2NR **Contact:** Jeff Lippiett **Tel:** 01792 301818 **Email:** Jeff.lippiett@kaymacltd.co.uk	Demolition Refurbishment of the bridge
Gilpin Demolition Group	**Address:** Whitecleave Quarry Plymouth Road, Buckfastleigh Devon TQ11 ODQ **Contact:** Sam Gilpin **Tel:** 01364 644 611 **Email:** sam.gilpin@gilpindemolition.com	Demolition
Jack Tighe LT	**Address:** Redbourne Mere, Kirton in Lindsey, Gainsborough, Lincs. DN21 4NW **Contact**: Sam Valentino **Tel:** 01652 640003 **Email:** samv@jacktighe.com	Painting
LifeSpan Structures Ltd	**Address:** Basepoint Havant,Harts Farm Way, Havant, Hampshire, PO9 1HS **Contact:** Martin Richardson **Tel:** 023 9244 9700 **Email:** martin@lifespanstructures.com	FRP deck designing and manufacturing
Beaver Bridges	**Address:** 15 Rural Enterprise Centre, Stafford Drive. Battlefield Enterprise Park, Shrewsbury SY1 3FE **Contact:** Henry Beaver **Tel:** 01743 453 48 **Email:** henry@beaverbridges.co.uk	Suspension Bridge designing and manufacturing
Weldlec Ltd	**Address:** Unit 26, South Cornelly Ind Est South Cornelly CF33 4RE **Contact:** Neil Morgan **Tel:** 01656 745 822 **Email:** neil.morgan.weldlec.co.uk	Refurbishment of bridge

CONTRACTOR	CONTACT DETAILS	AREA OF SUPPORT
Dorothea Restoration	**Address:** Unit 4, William Street, St Phillips, Bristol BS2 ORG **Contact:** John Wallis **Tel:** 0845 4780773 **Email:** john@dorothearestorations.com	Repairing works of wrought iron girders.

ANNEX E. AUTHORITIES CONSULTED

AUTHORITY	CONTACT	AREA
Natural England	**Contact:** Katey Stephen **Email:** Katey.Stephen@naturalengland.co.uk	Environmental permit
Environment Agency	**Contact:** Faye Bratley **Email:** enquries.environment-agency.gov.uk	Environmental permit
Wye Valley AONB	**Contact:** Andrew Blake **Email:** aonb.officer@wyevalleyaonb.org.uk	Environmental permit Planning
Forest of Dean Planning	**Contact:** Jo Gallagher **Email:** jo.gallagher@fdean.gov.uk	Planning