

building  
to  
learn

kingsgate footbridge

notes to  
contractor



constructionarium

### **Construction Overview (Key points):**

- Steel tube piles pushed into ground.
- Concrete pile caps with cast-in holding down bolts and turntable assembly.
- Concrete deck units cast separately.
- Leg attachment and deck lifting. Requires lifting plan.
- Attachment, rotating of units and final connection.
- Reinforced earth approach embankments.
- Accuracy of construction and setting out critical.
- Consider programme to determine amount of shuttering required and embankment construction.

### **Main Project Specific Safety Issues:**

- Working adjacent and over water.
- Working with Concrete (placing, compacting and shuttering.)
- Lifting of heavy concrete units.
- Heights (embankment and completed deck)

### **Major materials considerations (project specific):**

- Steel tubes for piles.
- Structural steel for turntable base and legs, including all bolts / nuts / washers.
- Reinforcement for pile caps and bridge decks.
- Ply and timber for temporary deck and deck units.
- Cast-in lifting points with associated connectors, shackles and chains etc (see general notes below.)
- Concrete for pile caps and deck units.
- Landscape fabric (Terram) for reinforced earth embankment.
- Scaffold for handrails to deck, including sockets to cast into deck upstands.
- Possible inclusion of mini excavator for approach embankments if considered excessive work by hand, or if team is struggling to finish.

### **Smaller plant, equipment and materials (generally available in stores, though check beforehand):**

- Concreting accessories. Including spacer blocks, release agent, tie wire with nips, vibrating poker (small diameter head), and finishing float.
- Sufficient hand tools and power tools for shuttering.
- Sufficient shovels, barrows etc for embankment.
- Through ties, water plates and wing nuts for shuttering (if you choose to form the shutters this way.)
- Spanners and socket sets for bolting up.

### **General Notes:**

- Cast-in fixings should be of the threaded socket type, with a hole to enable a rebar loop to be passed through the fixing to tie them down into the deck base slab. Since the concrete will be very green these should be checked by the contractor before the students cast them in. It is recommended that the load capacity of each lifting point should be 50% of unit weight in case the chains are not equally on all four points. Use four way brothers to lift, with as long chains as possible to minimize horizontal loads on fixings, or lifting beam. Deck unit must be braced internally across its width during lifting to minimize stress on deck sides

(upstands) due to angle on the chains. Must be the subject of a proper lifting plan, agreed by students with the contractor, though they have all week to do this. Contractor must check individual unit weights and make sure plant, chains etc available can do the lift. Previously a 30t excavator has been used for lifting purposes, but note that machine must be tested and certified to appropriate weight. (Note, specific type of fixing not listed because dependent on lift procedure. To be determined by contractor.)

- It is not recommended that the students be allowed to mix concrete for the deck units. Ready mixed concrete will provide greater consistency and early strength.
- The supporting contractor must monitor the construction of the units to satisfy themselves that the lifting operation will be safe and supervise the lift. Students must decide what to do but all instructions must go through the contractor's lift supervisor.
- Fix handrails to deck before lifting. Ensure constructed properly and signed off by approved person. Approach embankment may require scaffold handrail near waters edge.
- Dimensional accuracy is key otherwise the legs, baseplates and deck units will not line up, or when they 'swing' the bridge it will clash or have a big gap. Also excessive concrete will add to the weight of the units for lifting.
- The deck units could be cast in several ways but the main two would be 'normal' or 'inverted'. Normal way up requires either a two stage pour or a hanging shutter. Inverted can be cast in one but must then be rolled to the correct orientation.
- Deck units should be formed on a temporary deck to ensure a stable platform.
- Quantity of timber, ply etc depends on the nature of the temporary deck and whether one or two sets of deck shutters are made.
- Fabricator used for steel elements:
  - Fussey engineering
  - Lancaster Approach
  - North Killingholme
  - Immingham
  - Lincolnshire
  - DN40 3JZ
  - T. 01469 540 644
  - F. 01469 540 849