

Guidance notes on the passage through locks and swing bridges

Introduction

For many years rowing clubs have tended to limit their rowing activities to the stretch of water between local limits of navigation or locks - whichever comes first. With the increase in touring rowing that has developed over the last 20 years or so there is now a need to row longer distances requiring the passage through these locks. Unfortunately, the skills needed to do this safely will be new or unknown and indeed many lock keepers themselves have little or no experience with unpowered craft.

These notes have been put together drawing on the experience of members of the recreational rowing committee and other colleagues to help provide awareness of the likely issues that will be encountered in passing through a lock and to advise on good practice.



History

The first 'pound' locks were believed to have been invented in China in the 10th century A.D. The earliest locks used in the UK are thought to date from the 17th century built on rivers to maintain navigation where weirs had been constructed to power watermills.

Soon after this, the great age of canal construction began linking river systems for the transfer of goods by barge. As this involved passing over watersheds the canal needed to climb and drop down inclines. Steep inclines required a greater number of deep locks so slowing the passage of the freight-carrying barges. Many of the canal systems used 15 foot wide barges. Where the topography made the construction of locks uneconomic the engineers had to resort to tunnels. To help reduce cost, narrow canal boats were introduced, 72 feet long (22m) by 6ft 9ins wide (2.1m). This meant that narrow locks were also introduced to the system, primarily in the Midland region.

With the coming of the railways in the first part of the 19th century canals became increasingly uneconomical and by the mid 20th century many of them had been closed and abandoned.

The second half of the 20th century saw a revival in the canal network mainly for recreational use with many canals being reopened by volunteers and involving the reconstruction of the locks, dredging and re-watering.

Types of locks and their key components

The types of lock you are likely to encounter as part of a rowing tour will probably be associated with rivers or wide canals capable of carrying the 15 foot wide broad beam craft.

NB. Narrow locks (less than 15 feet wide) are not suitable for rowing boats.

The diagram at the end of this document shows a typical lock. Some of the components have been labelled with letters which are referenced in the text below.

There will be variations on this arrangement but essentially every lock will have top gates and bottom gates and a series of valves or penstocks which are called 'paddles' and operated by either a 'rack and pinion' manual mechanism or hydraulics on more modern installations.

There are two types of paddle:

1. 'Ground' paddles (B) where the flow of the water from the higher level passes through a culvert in the ground behind the lock gate mountings and enters the lock chamber through the sidewall. These are normally found at the top end of the lock.



A view of bottom gates.

The pillar on the side of the lock is a manually rack and pinion operated headstock for the ground paddle showing the removable paddle key or windlass

2. 'Gate' paddles (A), as the name suggests, are situated on the gates themselves and usually found at the bottom gates. However gate paddles can also be located on the top gates particularly in large locks with hydraulic mechanisms.

A general view of bottom gates.

The drum on the gate beam is a hydraulically operated headstock for the gate paddle.



It is important to be aware of the position of the cill as boats need to be kept clear when the lock is being emptied otherwise the stern of the boat could be caught on the cill eventually severely damaging the boat as the water level falls

Another key component of a lock is the cill (C). This is a ledge at the top end of the lock chamber where a step is needed to allow for the changes in level in the channel bed. It is normally clearly marked on the top and side of the lock chamber walls.



A general view of an empty deep lock.

The cill is where the waterfall starts

Typical locking procedure

River locks are often manned which means the operation of the lock is left to the lock keeper. These locks will probably be large compared to canal locks. Most lock keepers on the Thames are well acquainted with rowing boats and their need for them to maintain stability using their oars or sculls.

Always follow the instructions of a lock keeper. If you feel there is a potentially dangerous situation developing inform the lock keeper quickly and clearly.

However, Thames locks below Oxford are electronically operated and may be used out of lock-keeper's hours by following instructions on the control panel.

If the lock is unmanned the tour group needs a land based (shore) lock operator's party. If there is no 'shore' party, a member(s) of the crew needs to be disembarked at a landing stage (D) which is usually found close to the approach to the lock. **Make sure they have a paddle key (aka windlass) to operate the paddles. All members of the touring party should wear life jackets in and around locks.**

Opening lock gates

Lock gates are heavy – 2 tonnes are not uncommon – so they are furnished with long beams to provide leverage. On large gates the operation is often hydraulically assisted but on most canals and smaller rivers they are manually opened and closed. When the water levels are equal it is possible to open the gates by pushing against the far end of the long gate beams. However, even a small difference of water level on either side the gate will make it impossible to open. The best way to check the water levels are equal is to ensure there is not even the smallest amount of turbulence on the lower side. Water will only flow as long as the paddles are open so don't be impatient and close them prematurely.

'Locking down'

Most tours taking place on rivers will travel downstream which means that the boats will be 'locking down', i.e. they will be entering the lock when it is full and exiting at the lower level after the water has been released. As long as the water is released reasonably slowly there is little turbulence caused within the lock chamber meaning the whole locking operation is smooth.

When you arrive at the lock and find the lock chamber is empty you will need to fill it; but first check there is not another craft approaching that could take advantage of the empty lock. Always be considerate to other boaters and help them where you can. Usually they're a friendly lot but will expect good lock etiquette from you!

If you are lucky and the chamber is full then open the top gates allowing the boat to pass into the lock chamber. This needs to be done carefully with the oars or sculls maintaining the balance of the boat. The cox should use a canoe paddle to propel the boat into the chamber. Depending on the size of the lock it may be possible to fit several boats into the chamber at one time. If there is sufficient width boats can be side by side allowing the oars or sculls to be held for extra stability. This is called 'rafting up'. Close the gates and ensure the top paddles are in the closed (down) position.

With the boats away from the top gates and the cill, in a controlled way open the bottom paddles. As the water falls the paddles can be progressively opened to compensate for the loss of head. When the water levels are equal, the bottom gates can be opened allowing the boats to exit the lock chamber. Again this is best achieved by the cox using a canoe paddle.

'Locking up'

There are occasions when you may need to 'lock up' i.e. entering an empty lock chamber, flooding it and exiting at the high level.

Extra caution is needed as opening the top paddles too quickly will create excessive turbulence in the lock chamber making the boats unstable

If 'locking up' and the chamber is full, ensure the top gates and paddles are closed. After checking to see there are no other craft approaching the lock, open the bottom paddles to empty the lock chamber. If there are no boats in the chamber coming down the paddles can be opened fully straightaway. Ensure no boats are close to the bottom gates as emptying the chamber will cause a lot of turbulence immediately below the bottom gates. Once the chamber is empty the gates are opened to allow the boats to enter. As with 'locking down' this needs to be done carefully.

When the bottom gates are closed and the bottom paddles closed, the top paddles can be partially opened with care. Make sure none of the boats are in the proximity of the area of turbulence near the top gates. In a deep lock this turbulence can be very disruptive as the photo shows.



A gate paddle fully open showing the force of water that can enter the lock chamber. The cill can be seen on the right hand side at the base of the gate

Leaving a lock

When leaving a lock on a river it is accepted practice to leave the exit gates open and the paddles down. On canals where water needs to be conserved the exits gate are left closed and the paddles down.

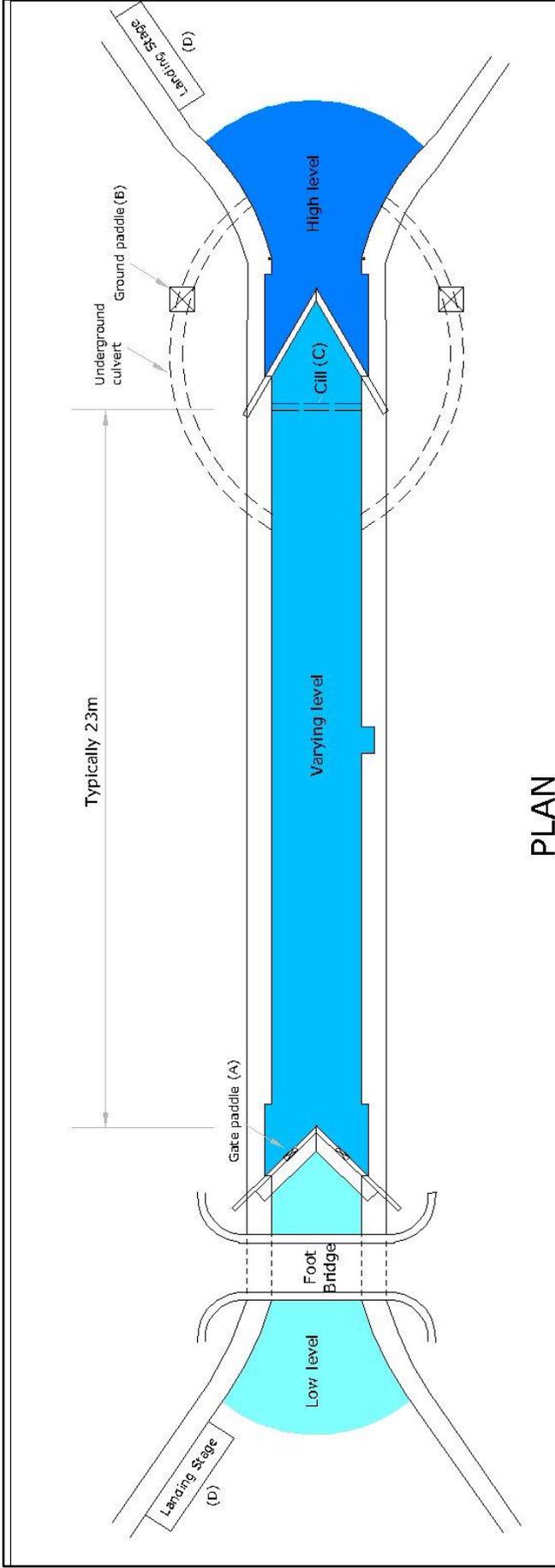
A brief note about swing or lift bridges



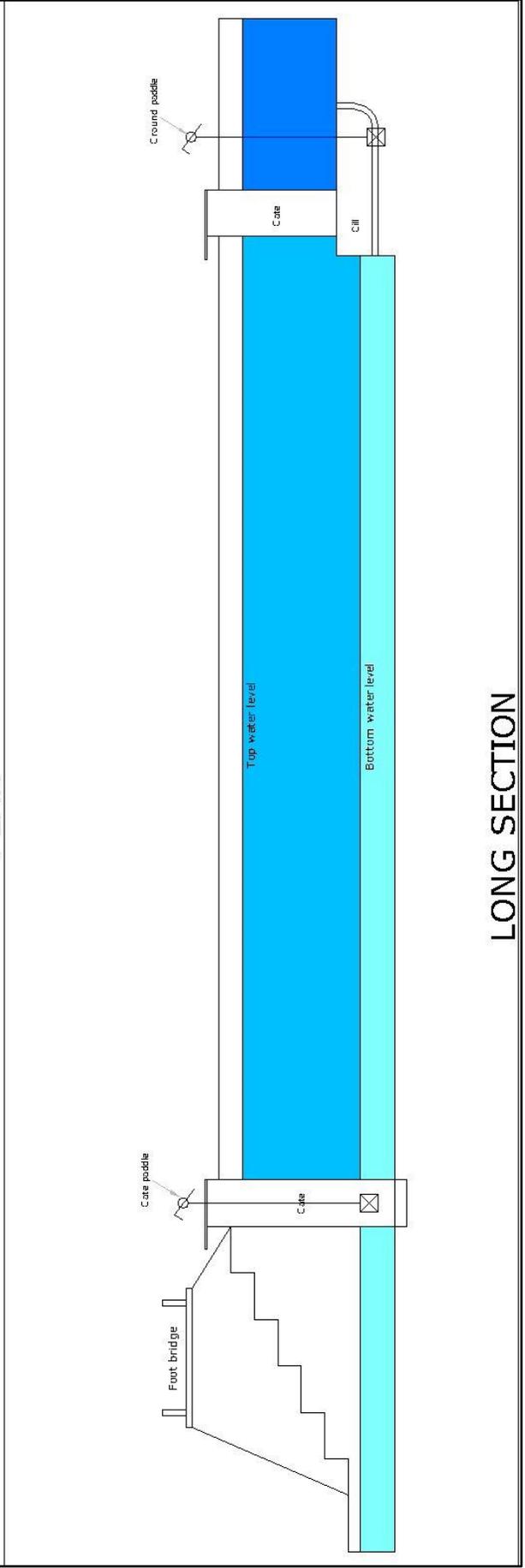
Occasionally you may come across a swing or lift bridge. The photo shows an open lift bridge; swing bridges rotate horizontally on a fulcrum.

Most are hydraulically powered and have a control panel which needs a 'Watermate' key obtainable from chandleries at a modest price.

You may also need a windlass to release the holding bolt and some muscle power to open and shut the bridge if it is not power assisted.



PLAN



LONG SECTION

Guidance notes on the passage through locks

The Do's and Don'ts at a glance

Do's

1. Always wear a life jacket when passing through or working around locks.
2. If the lock is being operated by a lock keeper always follow his or her instructions.
3. Fill and empty the lock chamber in a controlled manner.
4. Be vigilant for potential problems such as boats or oars catching on gate furniture, side chains or ladders.
5. Beware of slippery surfaces around lock sides caused by rain or frost.
6. Be courteous to lock keepers and other boaters on the waterway.
7. If in doubt stop and think about what you are doing and whether it may potentially cause a problem.

Don'ts

1. Open the bottom paddles if the top gates are open.
2. Open the top paddles if the bottom gates are open.
3. Try and fit too many boats into the lock chamber. It is best to wait for the next cycle rather than cause an accident.
4. Rush!

Acknowledgements:

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