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Modjeski & Masters, New Orleans, La.

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LESSONS LEARNED FROM MARINE ACCIDENTS WITH MOVABLE BRIDGES

By: Donald F. Sorgenfrei, P.E.
Modjeski and Masters
Consulting Engineers

INTRODUCTION

Based on many surveys performed following marine incidents with movable bridges there are a number of items that have played a key roll in the cause of accidents as well as accident prevention. In many cases, had there been more awareness of the bridge owner or marine operator of these items, many accidents could have been avoided and losses mitigated. These items are presented as Lessons Learned from Marine Accidents with Movable Bridges.

Since a number of these incidents have not been settled and/or owner's permission to discuss their particular case have not been secured, no references citing specific cases will be given. Inference to a specific incident is not intended.

Most marine accidents occur at night or around daybreak and many are associated with strong currents, wind or errant operations. Although this implies that accidents are all marine operator negligence, this is not true. A marine vessel is entitled to use all of a channel of a navigable waterway and to assume the waterway is free of dangerous obstructions. This not always is a given condition and thus makes the owner liable also. The bridge owner is required to conform to the requirements of the bridge permit over a navigable waterway and conform to established federal regulations on the operation of the bridge to properly display and use required navigational aides. These federal requirements are fully explained in the Code of Federal Regulations CFR 33, Navigation and Navigable Waters.

LESSONS LEARNED

A. Marine Vessels

The most common reason for marine incidences is that the vessel was not under control. This is particularly common where under powered tows try to navigate waterways during high water when additional power and steerage is needed. There is not much a bridge owner can do about errant vessels other than insist that the Coast Guard police the waterways.

At several troublesome bridge sites, owners have been successful in having the Coast Guard establish regulations over tow size and horsepower when a river stage reaches a certain level. This has drastically reduced major incidents at these locations.

Having the tow under control also applies to oversized tows with large wind sail areas. On waterways where there is difficult maneuvering and the tow must slow down to align for passage, the lack of speed often allows cross winds to misdirect the tow

causing accidents. This can be overcome by tows having or calling for an assist tug to help it through an opening. A single tug pulling an empty ocean going barge on a howser line, through a difficult passageway having a cross wind is inviting trouble.

Why do the accidents always seem to occur at night time or near daybreak? Naturally the reduced visibility of the waterway plays an important part but many incidents result from inexperienced and unauthorized persons running the vessel while the captain tries to get a few hours sleep. Vessels cutting corners on proper manning the wheel often pay the price. Resolving this matter lies with the Coast Guard in assuring only licensed pilots operate vessels. Fines are often too low to prevent violation of this requirement.

B. Bridge Clearance

Waterway operators use published clearance information yet many incidents can be traced to clearance errors. These errors are in the actual bridge opening dimensions being misrepresented in published information and in calculations made by users in determining if they have sufficient clearance.

First, waterway opening dimensions particularly for bascule bridges are not always accurate or are misrepresented. The published width opening is for an unlimited height unless there are footnotes advising of a restricted height at a certain width. Some published opening widths are erroneously showing the waterway clearance between fenders neglecting the bascule span overhang into the waterway. This may not be a problem for most pleasure craft but it is a definite problem for ships. Another problem is published clearances which are not corrected to account for skewed waterways which result in a lesser opening width.

Second, clearance errors are made more frequently by users miscalculating their height and in some cases width. Height errors have been made by not accounting for an uneven keel and underestimating the actual height which could be substantially different from bow to stern. Errors have been made by ships having cargo booms raised prior to berthing which exceed the height normally used in calculating the needed clearance under a bridge.

An argument can be made that clear air space gages on bridge piers may prevent some accidents but such gages tend to put unwarranted liability on bridge owners in maintaining such devices. These gages are of little use on waterways having limited sight distance, where ship stopping distance exceed the ability to read the gage or where waterway sediments or marine growth readily obstructs the gage face.

C. Navigational Aides

Although most marine incidents are caused by marine vessels not under control or failing to take measures to assure safe passage through a bridge opening, there are many accidents in which the

bridge owner was responsible by not providing the required lighting, signals, permit conditions, and even lack of maintenance. In such cases the bridge owner can and is often held accountable for the incident. In many cases simple attention to details of conformance to the requirements could have prevented the liability.

Navigation Lights

It goes without saying that the bridge must display navigation lights in accordance with the Coast Guard requirements. At one location a query was made of a bridge maintenance man why the green center channel light was mounted so high, not allowing clear 360 degree visibility. The answer was that the game warden wanted the light at that location. Another incident involved a major accident where a bridge was being repaired and the workers took off the 360 degree green light during at daytime to do their work and only wired it up on the handrail for nighttime. It was not visible to a tow for determining the channel alignment and the bridge was struck. Another incident involved a bridge where the green light was lit before the bridge attained full height and the boat advanced upon seeing the green lights and struck the bridge.

Vandalism always seems to be a problem with keeping lights lit. Bullet proof lens protectors are available and where fixtures are commonly stolen, housings must be built to secure the fixtures.

Signals

The operators of each vessel requesting a drawbridge to open is required to signal the drawtender and the drawtender is required to acknowledge that signal. The signal is to be repeated until acknowledged in some manner by the drawtender before proceeding. It is acceptable that the signal be a sound signal, visual, or by radio telephone but it must be proper for that type signal. For sound signals, the proper calling and response horn blasts is essential. Flag signals are infrequently used except for some pleasure craft which raise and lower a white flage (handkerchief to indicate request for opening). A recent incident comes to mind where a tow radio-telephoned a bridge for passage and received a bogus response from another boat. The tow proceeded and could not stop in time to prevent an accident. At locations where radio signaling has been a problem a bridge owner may wish to install an endless taperecorder to monitor radio transmissions as a means to protect itself.

D. Draw Operations

The opening requirements for movable bridges state that drawbridges shall open promptly and fully for the passage of vessels. This does not mean that the bridge can decide to only partially open the bridge for small craft. That is a bad habit that will make a bridge owner liable for failure to comply with full opening requirements.

Should a bridge have a problem in not being capable of fully opening due to malfunctions, this should be reported to the Coast Guard who can issue a marine notice.

The owner should occasionally verify that the bridge actual open position clearances match the bridge permit clearances. This is of particular interest in bascule and vertical lift bridges where limit switches may have been reset or where counterweight ropes have stretched or where there has been general land subsidence which has reduced clearances.

E. Fendering

Those movable bridges with fenders must also comply with the bridge permit for presence and position. The more frequent incidents involve fender protrusions either drift caught in a fender or a portion of a fender displaced. Steel plate corners and exposed fasteners can cause ignition of a vessel from sparks. All metal should be recessed or covered. An incident occurred where a protection system of tires strung on cables were attached by welded lugs. In time the tires were displaced leaving exposed lugs that ripped open a barge, causing it to sink; the owner was liable.

F. Lack of Maintenance

The lack of bridge maintenance has been cited in a number of incidences. A bascule bridge with a heavy leaf would drift down and could not be detected by the operator on the other side of a double leaf bascule. The operator had been cited on numerous occasions for lowering the bridge onto boats when in fact the brakes would not hold and the span drifted down. The brakes should have been properly repaired or replaced when this first happened and a span height gage installed on the control panel to monitor the span position. Another lack of maintenance incident involved encased bridge piers. Over the years the sheet piles pulled away from the concrete and protruded into the waterway. To make matters worse, the sheet piles were then cut off underwater but not deep enough. A barge was gouged and later sunk. The owner was liable for the incident.

G. Accident Investigation - Repairs

Once an accident occurs the incident should be immediately reported to the Coast Guard. The determination of whether the site is safety should follow. This includes a determination whether hazardous cargo is leaking as well as whether the bridge is in danger of failure.

Key pieces of information should be obtained and recorded by the bridge tender. Often this information is crucial in determining liability. The following information should be recorded:

Vessel: name, owner, direction, speed, alignment in channel, draft, list, unusual observations.

Bridge: position at time of accident, time opened, time requested opening, time of accident.

Weather: storm conditions, visibility, wind speed and direction.

Waterway: tide stage - direction - current, river stage.

Some bridge owners that have experienced marine accidents have devised accident forms so that all of the above information is secured by filling in blank spaces.

The determination of bridge damage should be performed immediately by a qualified inspector prior to operating the bridge following the accident. This may be urgent, particularly if the bridge is in damage of failure or additional damage may be done if moved.

When possible, a formal joint survey should be made by representatives of the bridge and vessel. At that time, or shortly thereafter, the bridge owner should advise of his intended course of action. If necessary, emergency repairs should be performed to secure the bridge and if possible restore it to use, even if on a limited base. Permanent repairs should follow.

Often the repairs become the major area of concern especially when there has been little discussion between the owner and vessel representatives as to what repairs are required. Repairs should return the structure to a "whole" condition. Sometimes there is a fine line between required repairs and betterments. If there are multiple means for repairing the damages, often multiple bid options and allowing the market place to determine the least cost will service both parties.

H. Areas For Improvement

There are many areas for improvement to prevent marine accidents. Other than assuring compliance with rules and regulations governing waterways, two items are: the replacement of bridges obstructing navigation and improving waterway alignment either side and through the bridge opening.

A mechanism is provided under the Truman-Hobbs Act to fund replacement of bridges declared an obstruction to navigation. It is not an easy task to get a bridge funded but it can be done. It involves formal complaints from waterway users as to the unreasonable obstructive nature, a Coast Guard investigation and hearing, and a matter of available funds. This whole process can take a number of years.

Waterway alignment improvements could greatly reduce marine accidents particularly where there is sufficient bridge opening size. This is particularly applicable where there have been major

changes in increased marine traffic, size of vessels and incidences. These improvements should include guide dolphins, guide walls, larger and stronger fenders and other means to assist in aligning a vessel for passage through an opening. These measures are beyond the responsibility of a bridge owner and should be considered by the government.

CONCLUSION

Accidents do happen and will continue to happen and there is often little a bridge owner can do to prevent them. If the bridge owner is in strict compliance with the bridge permit and operating regulations and mitigates the damages then there should be no fear of liability. The requirements of bridge owners are all defined in 33 CFR and any questions concerning compliance can be directed to the District Coast Guard Commander.