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THE STRATTON LOCK EXPANSION PROJECT

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EXTENDED ABSTRACT

Introduction

The William G. Stratton Lock, formerly known as McHenry Lock, provides lockages for recreational boating traffic on the Fox River and has been in service since 1960. The Lock serves as the passageway between the Fox Chain of Lakes in northern Illinois, and the Fox River. An average of 15,000 boats pass through the aging locks annually. The lock originally measured approximately 18x60 feet and, due to its relatively small size, users often experienced long wait times.

The existing gate monoliths are comprised of mass concrete pile-founded structures. The approach wall and chamber walls consist of a tied-back steel sheet pile wall system with a concrete anchor wall. The lock floor contains of a concrete strut/waler system with stone revetment infill. The lock miter gates are horizontally-framed steel, retaining approximately 5 to 6 feet of head (chamber lift).

Engineering Evaluation and Alternatives

An engineering study was conducted in 2012 to evaluate options to increase the capacity of the lock, including alternatives to expand the length of the existing lock (Figure 1) or to construct a separate lock adjacent to the existing lock (Figure 2). Each alternative would nearly double the lockage capacity, thus reducing the lockage time to satisfactory levels for recreational boating traffic.

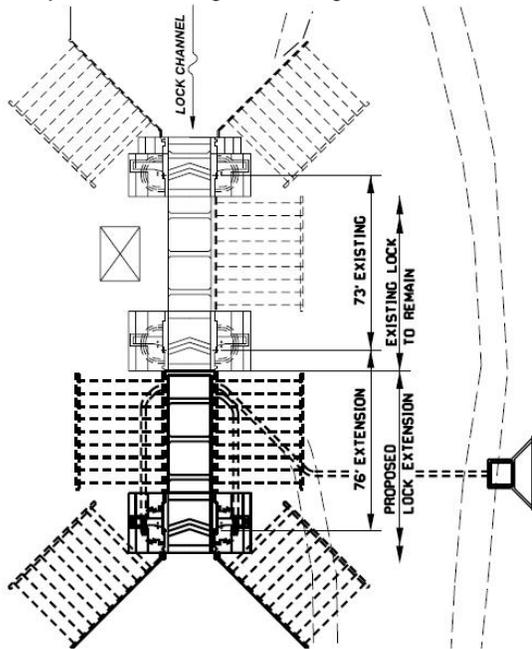


Figure 1: Alt 1 (Extend Existing Lock)

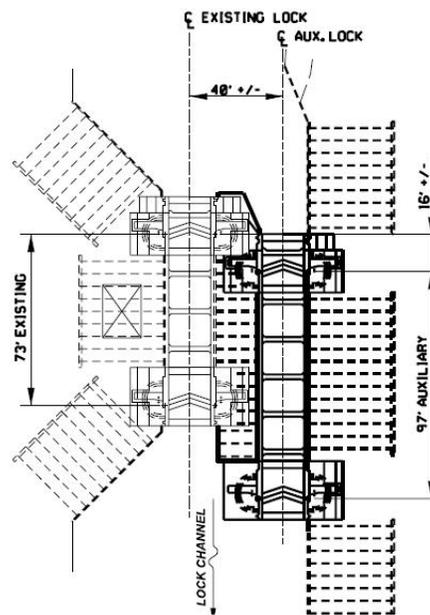


Figure 2: Alt 2 (Construct Adjacent Lock)

A detailed comparison of each alternative was made, considering primary factors such as cost, construction schedule, flexibility and ease of operation, ingress and egress times for boaters, and ability to facilitate potential future renovations and maintenance needs. Expansion of the existing lock chamber in the downstream direction (Alternative 1) was selected, roughly doubling the length of the usable lock chamber to 18x120 feet.

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Design and Construction

Design for the lock expansion included rehabilitation of the existing lock chamber, modifications to the existing lower gate monolith, installation of a new lower gate monolith, reconfiguration of filling/emptying systems, extension of lock walls, safety improvements, and new lock mechanical and electrical systems. The existing horizontally framed steel miter gates were repaired and the lower lock gates relocated to the new lower gate monolith.

Doubling the lock length would improve to the filling/emptying system would have allowed twice as many boats within the lock chamber, but the lock would also take twice as long to fill or empty. Therefore, improvements to the capacity of the filling and emptying systems was required to provide a satisfactory lockage time.

It was critical that the filling/emptying improvements did not cause high turbulence in the lock that would result in potentially unsafe conditions for boaters in the chamber. Filling system capacity was increased by providing a supplemental filling system that transferred water from upper pool, through a conveyance pipe, and to a diffuser system installed within the floor of the extended lock (Figure 3). The emptying system capacity was increased by providing larger emptying ports within the new lower gate monolith and intercepting the existing emptying ports (mid-chamber) and extended them downstream.



Figure 3: Diffuser System in Extended Lock Floor

The design was completed in 2013 and the lock expansion project was constructed in the winter of 2014 at a cost of nearly \$4 million dollars. The rehabilitated lock has been in service now for several years and, given its increased capacity, has greatly reduced wait times and enhanced the boating experience for recreational boating users on the Fox River.



Figure 4: Extended Lock Near the Completion of Construction (Looking Downstream)