

VALUE ENGINEERING PROPOSAL

PROPOSAL NO:	S-5	PAGE NO:	1 OF 5
DESCRIPTION	Eliminate Dewatered Condition From Lock Design and Use T-Wall Design With Struts		

ORIGINAL DESIGN:

The existing lock design is a pile founded U-Frame structure. The U-Frame is designed for all loading conditions including the dewatered condition. The primary reason for lock dewatering is to allow inspection of the concrete surface and to perform repairs in the dry. The necessity for inspection of concrete surfaces is more critical for lock chambers that contain filling and emptying systems than those that do not. The added expense for a dewatered condition is additional piles that resist uplift forces and additional piles at the upstream and downstream bulkhead monoliths to resist the unbalanced lateral load. (See Drawing No 1)

PROPOSED DESIGN:

It is proposed that the capability to dewater be eliminated. With the dewatering condition eliminated, it is no longer to construct a U-Frame to provide a seepage resistant chamber. Delete the floor slab and use a structure consisting of two T-Walls connected by struts that are articulated at the juncture with the T-Walls so that moment is not transferred. The T-Walls would be designed to resist gravity and overturning forces while the struts would carry the horizontal loads. The resulting foundation would use vertical piles since the horizontal loads would be transferred to the opposite wall through the struts. The backfill elevation has been designed so that the lateral force from the condition in which the water elevation in the lock is greater than that outside the lock is approximately equal. Therefore, the struts are only in compression. It is estimated that the base of the T-Wall would be about 2/3 of the wall height, about 35 feet. And the struts would be the same thickness as the chamber slab, approximately square and spaced at 100-foot intervals. (See Drawing No 2)

ADVANTAGES:

1. Savings in first cost.
2. Reduced construction time due to reduced pile driving time.

DISADVANTAGES:

1. Cannot inspect concrete surfaces in the dry.
2. Cannot dewater entire chamber for repair.

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JUSTIFICATION:

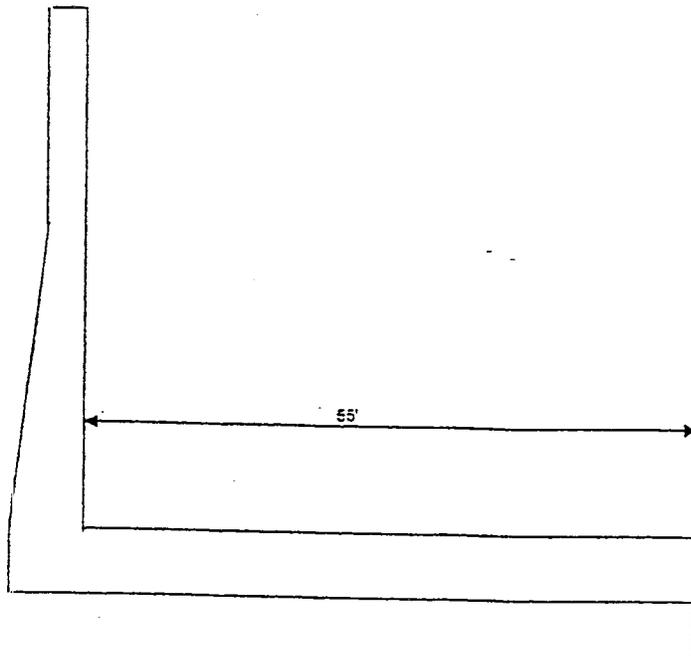
Since the chamber monoliths do not contain a filling and emptying system, deterioration due to high velocity flows or cavitation is not a concern. The greatest potential for damage is the surfaces of the concrete exposed to abrasion from barge traffic. This area is generally above the waterline and can be observed without dewatering. Additionally, repairs can be effected more expeditiously by using a semi-circular cylinder that seals against the lock wall by hydrostatic pressure. Good sound concrete can be ensured by designing the lock walls with adequate cover over the reinforcement and by consolidating the concrete to avoid intrusion of corrosive agents. Deterioration from freeze-thaw cycles is not a concern due to the location of the project. Abrasion can be minimized by the appropriate use of wall armor.

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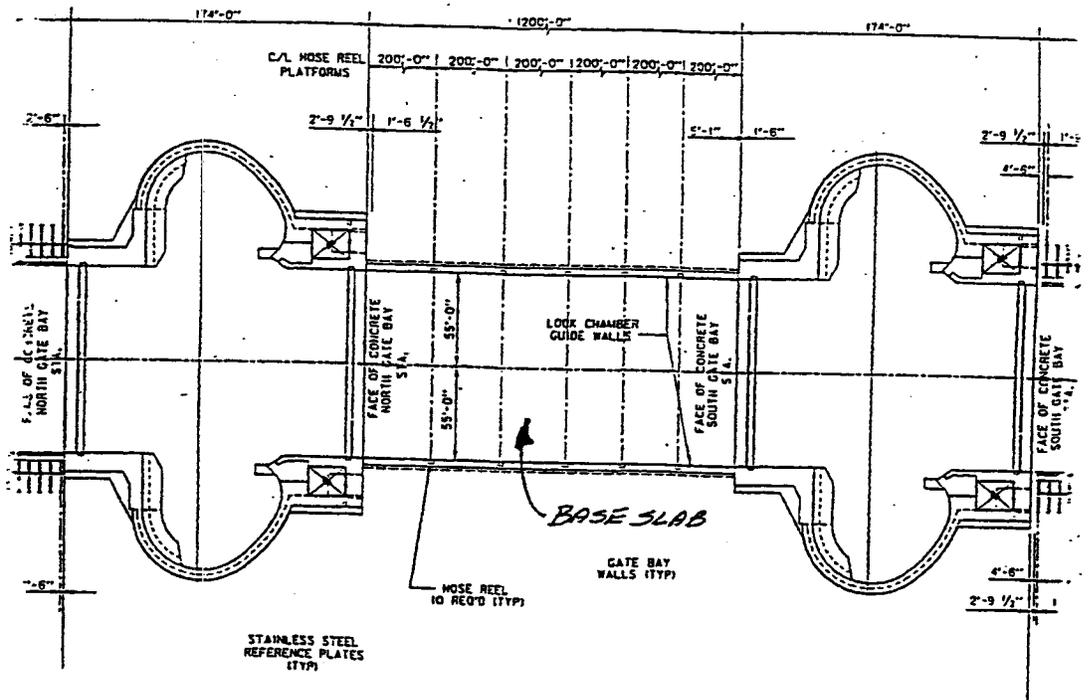
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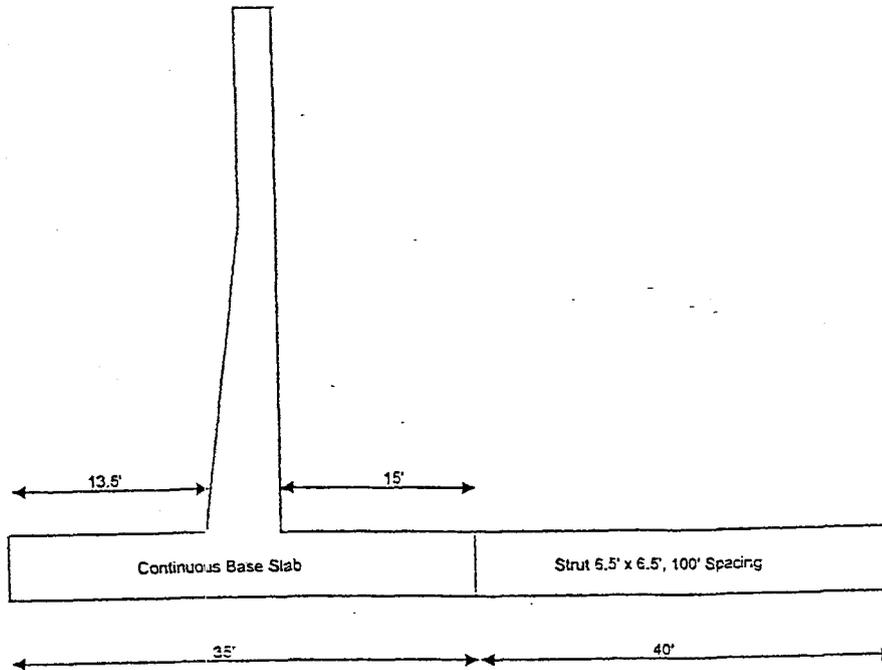
DRAWING NO. 1



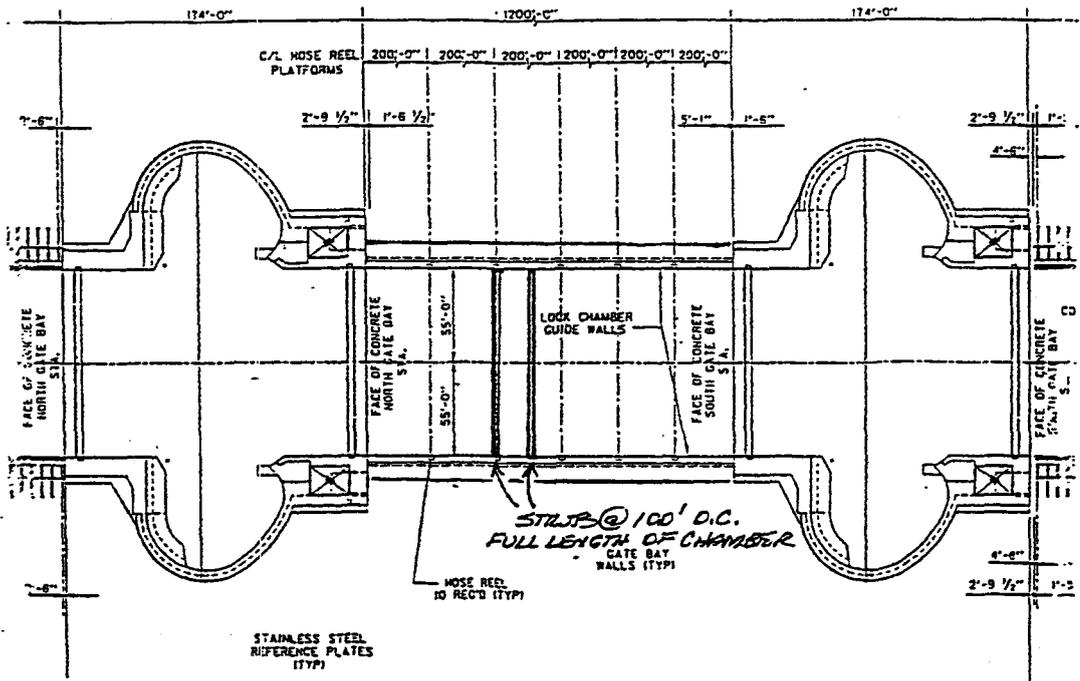
Existing X-Section (Symmetrical about Lock Centerline)



Original Lock Chamber Plan



Proposed T-Wall with Struts



Proposed Lock Chamber Plan

