Chapter 6
Appurtenant Structures and Other Considerations

6-1. General

This chapter discusses elements of a navigation lock project that are not part of the actual lock structure. These elements include features such as the lock control house, control stations, access bridge, service bridge, operation and maintenance buildings, elevators, public access (including persons with disabilities), and lighting requirements. Plate 9 shows the location of several structures discussed in this chapter.

6-2. Lock Buildings

The types of buildings and their functions include the lock control house, lock control stations, administrative buildings, operation and maintenance buildings, and other buildings. The layout and design of these buildings should be developed through an interdisciplinary team effort involving the district lock operations personnel, architectural, and engineering design personnel. The lock buildings should be built for durability and minimum maintenance and should incorporate appropriate aesthetical treatment. The buildings should contain adequate space for electrical and mechanical equipment and should be constructed for noise reduction where necessary. The buildings should have heating and cooling capabilities consistent with their function. They should also have adequate lighting and potable and waste water treatment facilities. Also, the buildings should provide safe and adequate facilities for visitor access (including persons with disabilities as required by regulation) as well as the features needed for efficient lock operation. Among these features, designing for safety and fire resistance is of primary importance. The design for safety should comply with EM 385-1-1, and it should satisfy local ordinances. The local building codes will be used for fire and safety. Exceptions to local ordinances will normally require approval by higher authority.

a. Lock control house. The primary function of these enclosures is to provide shelter for the master controls and associated equipment used to operate the lock gates and the filling and emptying system. On almost all existing locks, these control enclosures are located on the lock walls next to the upstream lock gates. Moreover, for locks adjacent to navigation dams, it is advantageous to locate the lock so that the axis of the dam is in line with the upstream lockage. The upstream location provides the best vantage point from which to visually monitor navigation traffic and conditions upstream of the dam. These locations are based on using site surveillance for control of lock operations. Some newer projects have incorporated the latest technology for surveillance and control by locating the routine controls remote from the lock wall. As the technology improves, even more flexibility for the location of control operations will be available. Two important design considerations are: to assure that the control house does not infringe on the space required for passage of tows, and to assure adequate visibility of locking operations, preferably with the lock operator seated behind the controls. The interdisciplinary team should plan the control house in the early phases of lock layout studies to ensure adequate coordination among operation and visitor access, lock operating equipment, aesthetical treatment, operating requirements, engineering, and other requirements. The operating equipment in the control house should be located above project design flood. If not so located, it should be designed to resist flood damage. Also, the design should provide an entranceway to the control house during the project design flood conditions.

b. Local control stations. In some older locks, a small building or enclosure located next to the upstream gate and/or the downstream gate contains controls for the gates and the filling and emptying valves. Thus, these older locks are operated from the controls nearest to the gate being operated. This location allows the operator to view both the upstream and downstream sides of the gate before it is opened or closed to assure that no accidents will result from the gates obscuring small boats from view. With modern surveillance technology, control stations other than the control house will be necessary only for emergency conditions and for gate maintenance. The control stations on the lock walls can be fixed structures or can be portable to permit removal before flooding conditions. Normally, provisions for heating, air conditioning, and plumbing will be minimal in the control stations, consistent with the amount of time an operator is required to stay in the station.

c. Operation and maintenance buildings. These buildings are normally located onsite, separate from the lock structure. Visitor reception, lockmaster offices, and administrative offices are included in the operations building.

d. Paint, oil, and lube storage. An area is also needed to accommodate storage of paint, oil, and

lubricants if the lock is remote from a suitable existing facility. To satisfy aesthetic purposes and fire codes, these buildings are separated from the lock and other site buildings.

e. Water treatment plant, waste water treatment, and disposal systems. Onsite, separate housing is required for these functions when local utility systems are not available. Housing for these systems should be screened from public view or should be designed with aesthetically pleasing exteriors.

f. Emergency generator building. Frequently, an emergency generator is provided at the lock and will require housing either in the control house or at some distance from the lock structure.

6-3. Esplanade

An esplanade is an area adjacent to the lock where the various buildings, staging areas, and parking facilities are located. Frequently, backfill is placed on the landside of the lock to form the esplanade. This esplanade also provides easy access to the lock for maintenance. Ideally, the esplanade surface should coincide with the top of the lock wall. However, the elevation of the esplanade should be high enough to prevent undesirable sediment and debris deposits during flooding. The upstream and downstream limits of the esplanade will be determined by the slope requirements and the geometry of the lock. In some of the newer locks, an extensive operation and maintenance complex and visitor facilities were not considered essential. In these cases, hydraulic, structural, navigation, and sedimentation concerns led to the decision to use a reduced esplanade. The presence of esplanades affects the soil loads imparted to the lock structure. The backfill should contain freely draining material complete with collector pipe and filter to maintain the backfill saturation at a level near that of the lower pool. The freely draining material should be capped with impervious material to minimize saturation from the esplanade surface. A vertical impervious zone should be provided adjacent to the upstream lock gate to minimize seepage of the upper pool into the freely draining material.

6-4. Access Bridge

The most cost-effective access to the lock wall is via the earth fill esplanade. However, sometimes a bridge is the only alternative. Vehicles and pedestrians can reach the lock by the same roadway or bridge. However, control of visitor access and safety may justify providing two bridges.

a. Pedestrian. A pedestrian bridge can be constructed on top of cutoff walls (floodwalls connecting the lock to high ground). These bridges will probably be used to carry heavy tools and equipment to the lock, as well as for pedestrian access, and should be designed accordingly.

b. Vehicle. This access bridge will probably require a pier substructure and foundation. If piles are exposed to the atmosphere and to a fluctuating water surface above ground, consideration should be given to using concrete piling instead of steel piling for bridge support. Whether vehicle access is by land or by bridge, the design should provide for adequate turnaround and parking facilities by the lock. Bridges should be designed for a minimum load of HS20 as specified in American Association of State Highway and Transportation Officials (AASHTO) Standard Specificatons for Highway Bridges. Careful consideration should be given to the bridge design loadings, particularly if cranes or other heavy off-road equipment will use the bridge for access to the lock.

6-5. Emergency Access

In planning the lock layout, a strategy should be developed for access between opposite sides of the lock during flooding or with loss of the lock gates. Usually, a highway bridge will cross the waterway within proximity of the lock and will be adequate for such access. Frequently, galleries, which cross the lock through the gate sill, provide a means of emergency access. If no other access alternative is feasible, then access will be by boat. In addition, a means should be provided to enter the lock control house whenever the normal entrance is not available due to flooding conditions.

6-6. Service Bridge

A service bridge provides access between piers on a navigation dam and occasionally for elevated access across the lock. Usually, the primary purpose of the bridge is pedestrian access to the various structural features for project operation and maintenance personnel. In some cases, the service bridge has multiple purposes such as to transport and install emergency bulkheads with hoist cars or gantry cranes as well as to provide for crew access. The service bridge can also serve as a public road and provide support for utility lines when appropriate. Coast Guard regulations define the vertical navigation clearance a service bridge must have when spanning a lock chamber. The structural design for the bridge should correspond to the purposes of the bridge as required in the AASHTO or

American Railway Engineering Association (AREA) standards.

6-7. Public Access, Observation Platforms, and Visitor Centers

Facilities should be provided to accommodate visitors during lock construction as well as during lock operations after construction is completed. In the development of these facilities, the safety of the visitor should be a major consideration. Consideration should be given to using observation platforms during construction. If the lock is located in or near a metropolitan area, then the lock design should accommodate public viewing of the locking procedures and a description of the lock operations in the visitor center.

6-8. Provisions for the Disabled

Facilities must provide appropriate access for employees and visitors with disabilities, per current regulations.

6-9. Elevators

The use of an elevator should be limited to those projects in which it is necessary to accommodate visitors and persons with disabilities or to access the control house operating floor or the adjacent dam pier when either is elevated considerably above the lock wall. However, the primary means of vertical transport of freight should be by means of the crane provided at the lock.

6-10. Lock Lighting

Modern locks are designed with high mast lighting which provides the illumination necessary for navigating the lock at night. The design of the high mast lighting should provide an adequate level of resistance to wind induced vibrations. Additional lighting requirements on a lock include mooring bitt recesses and navigation guard and traffic control lights. The standards that apply to lock lighting are discussed in ER 1130-2-306.