

Section
11

Locks Operations

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11.1 Organization and Responsibilities

a. Locks and Facilities Maintenance Division Executive Manager

The Locks and Facilities Maintenance Division (OPE) main activities are the operation and maintenance of locks complexes, the administration and maintenance of other ACP facilities, and the sanitation and up keeping of grounds. An executive manager heads the division, assisted by a unit of staff engineers in charge of the planning and execution of locks projects, procurement and assets administration, risk control, and statistical evaluations; a team of technical writers who maintain, control and distribute the operations and maintenance manuals, along with other documents and technical material. A Human Resource Unit provides administrative support to the manager's office, section and unit offices.

b. Organization

The Locks and Facilities Maintenance Division manages five (5) locks complexes. These are: Gatun, Pedro Miguel and Miraflores for Panamax ships; Agua Clara and Cocoli for Neopanamax vessels. Section managers control overall operation and maintenance of locks complexes. They are assisted by a maintenance supervisor and an operation supervisor who overseeing an organized work force of foremen, journeymen, craftsmen, control house personnel, boatmen and line handler crews that perform different tasks for the operation and maintenance of the locks.

Besides, Locks and Facilities Maintenance Division has a Facilities Maintenance and Civil Works Section responsible for all construction and civil engineering work (masonry, carpentry, painting, etc.) along with the sanitation, vector-control and vegetation management performed directly by the section or through small contracts at all locks complexes and at other ACP installations. This section also provides support for, or exercises major investment projects or programs.

Also, there is a Facilities Management Unit responsible of the management and inspection of ACP buildings and facilities; provides transit quarters; manage contracts for buildings such as cleaning and janitorial services, air conditioning maintenance and repair, alarm installation, carpets and blind installation, and exterior building decoration.

11.2 Operations

Lockages are a team effort. The general responsibility for locks operations and lockages is shared among the participants.

a. Lines of Authority

(1) The Locks and Facilities Maintenance Division, through its lockmasters, on duty at any time, is responsible for handling, in coordination with the pilot/transit advisor, all vessels in the locks. This operation includes all the line handling procedures, since the first locomotive cable is thrown; until all lines are cast off fast aboard.

(2) At each locks, an operations supervisor is in charge of operations.

(3) The responsibility for each lockage is delegated to the lockmaster assigned to the lockage. He is in charge of all locks resources and procedures concerned with that lockage. On weekends, holidays, from 1500-0700 hours nightly, and at all other times when the operations supervisor is not on duty, the senior lockmaster present is in charge of the locks.

(4) If, for any reason the lockmaster is not present, the senior control house operator is in charge of the locks.

(5) When lockages are in progress (except for relay operations of vessels of more than 900 feet), the pilot is responsible specifically for directing the navigation and

movement of his vessel. Locomotive operators are under his direction while their cables are secured to the ship.

b. Coordination

The Control House, under the supervision of the operations supervisors, is the center of operations at each of the locks. The Locks and Facilities Maintenance Division, through the operations supervisor and/or the control house operator(s), shall maintain liaison with Maritime Traffic Control Unit (OPTC-T) and shall recommend changes when conditions at the locks arise which require a modification or permit improvement of the transit schedule.

c. Communications

The Locks and Facilities Maintenance Division shall keep OPTC-T and Canal Operations Captain on duty informed of all special rules or orders in force; OPTC-T will also be notified concerning conditions existing at the locks that may affect normal lockages in any way. A "Daily Lockage Log" shall be prepared to cover daily business at each lock. No vessel of any kind (excluding Locks and Facilities Maintenance Division floating equipment if it has no impact on operations) shall be allowed to enter any lock without previous authorization from Transit Operations Division (OPT). When given, this authorization usually covers all locks. If any vessel is seen approaching the locks with the evident intention of entering and for which no orders have been received, OPTC-T shall be notified immediately. All lockage operations shall be conducted in an orderly and quiet manner, avoiding lengthy discussions. The lockmaster shall prepare a written report of all the important incidents affecting lockage operation, submitting it to the appropriate operations supervisor as soon as possible.

Communications during lockages are coordinated between locks personnel and the following units:

(1) *OPTC-T*: OPTC-T is responsible for maintaining a continuing schedule for transiting ships through the Canal and dispatching vessels accordingly. Other units shall not make changes in the transit schedule without the knowledge and concurrence of OPTC-T.

(2) *Pilots*: The pilot may request special handling, in accordance with approved locks operating procedures depending upon characteristics of the vessel, such as hydraulic assist, etc. Conversely, the lockmaster may request actions concerning movement and location of a vessel in the locks to ensure a safe lockage.

(3) *Other Authority Units*: The Canal Operations Captain is the senior operations officer over all maritime operations throughout the Canal operating area. He is delegated full authority to coordinate activities and provide operational supervision over all personnel engaged in daily transit operations. All differences in interpretation of rules and regulation or any departure from prescribed operating procedures must be referred to the Canal Operations Captain for resolution.

d. *Lockages*

Handling vessels at the Locks shall be done as prescribed in the Handbook of Lockage Procedure of Locks and Facilities Maintenance Division (SCM-OPE-09-004).

11.3 Maintenance

The efficient operation of the Canal requires the interactive, safe, reliable, and efficient performance of all locks equipment and structures. Special attention must, therefore, be paid to equipment maintenance due to the extreme conditions of load, duty cycle and exposure in a tropical environment; with special emphasis on the application of new technologies and improved materials. For maintenance purposes, locks machinery is classified as above water and underwater.

a. *Line of Authority*

A maintenance supervisor is responsible for equipment maintenance at all locks. Light construction and maintenance of structures and fender system will be the responsibility of a supervisory civil engineer.

b. *Coordination and Communication*

(1) All maintenance work at the locks shall be scheduled in order to minimize the interference of the locks operations. If there is a lockage in progress, work shall momentarily come to a stop only if it, interferes with the lockage procedure or causes a safety hazard.

(2) The day-to-day maintenance functions are coordinated by the Maintenance Supervisor through personal communication with the Operations Supervisor and craft foremen, with the Maintenance Engineers and Planners, who plan and execute the routine maintenance. The Maintenance Supervisors are responsible for coordinating the support required for overhauls with other divisions through meetings, written communication and work orders. In order to perform this task, the supervisors shall request the technical advice and support from the division staff. Project Planners and foremen play an important role in the overhauls planning providing different crafts inputs. The Maintenance Supervisors, also, are responsible for establishing the scope of projects and for establishing the proper lines of communication between different crafts within and external to the section.

(3) Control House Operators and Lockmasters communicate with Leaders to remove equipment from service and to relay service calls.

c. *Locks Outages Notification*

The Executive Vice Presidency for Operations, Transit Operations Division, Maritime Traffic Control Unit, Canal customers and other Canal units affected must be notified of all planned major outages which duration affects normal Canal operations. An Advisory issued by the Board of Inspectors Executive Manager must reach customers

no less than one month prior to the start a major outage. The Locks and Facilities Maintenance Division is responsible for advising the Executive Vice Presidency for Operations of outages with sufficient time to allow notification of customers within the required time period.

d. Administrative Functions

Supervisors and managers shall initiate personnel actions for which they are responsible according to regulations contained in the ACP Personnel Administration Regulations, Human Resources Department policies, and in Bargaining Unit agreements. They must participate in selection and promotion boards to which they are appointed. Supervisors occupy key positions in the operation of a successful safety program and are responsible for enforcing safety regulations as outlined in the Safety Handbook for the Locks and Facilities Maintenance Division (SCM-OPE-09-008).

e. Maintenance of Locks Plant

The Locks and Facilities Maintenance Division is responsible for the maintenance and repair of locks machinery and equipment besides the inspection and control of these operations when they are performed by others. It is also responsible for ensuring that sufficient spare parts are on hand or manufactured to support the maintenance function, and for the inspection and quality control of major components and parts manufactured or reconditioned by others.

(1) *Maintenance Management System*: Above water equipment is fully accessible for inspection and repairs. This allows the implementation of dynamic preventive and predictive maintenance programs subject to ongoing evaluation and improvement.

(a) *Locks Locomotives*

Locks locomotives are unique in design and are used only at the Panamax set of locks. Locomotives are equipped with two independent traction units, each driven by a 216kW (290 hp) electric motor. Additionally, they have two independently operated windlasses, each provided with a high tension steel cable that measures approximately 150 meters (492 feet) in length when new. The 2.54 cm diameter (1-inch) cables have a breaking strength of about 506,207.6 Newton's (113,800 lb.). The available lockage speeds for the locomotives are 1.6, 3.2, 4.8, 6.4 and 8 km/h (1, 2, 3, 4 and 5 mph); the additional speeds for traveling light are 9.6, 14.4 and 16.1 km/h (6, 9 and 10 mph).

The *Locks Locomotive Preventive Maintenance Program* is based on the manufacturer's recommendations and the experience gained over years of operation. The locomotives and their major mechanical components, such as the traction and windlass units, are maintained at the Locomotive Component Repair Facility at Pedro Miguel Locks. . Electrical motors are repaired at the Armature Shop of the Energy Division. It should be noted that the service life of locomotives and major components are constantly under evaluation.

(b) *Lighting*: The Locks and Facilities Maintenance Division is responsible for exterior wall lighting, turning on high mast lights shortly before official sundown, or at anytime the control house operator determines the need for them to ensure adequate illumination for the safe transit of vessels through the locks.

(2) *Overhauls*: Underwater machinery and equipment, such as miter gates and valves, are not readily accessible for inspection and repairs. Special provisions must be taken to service these, using methods designed to minimize the effect on Canal operations. Normally, a dry chamber or culvert is required, but divers are also assigned whenever possible. Planning must be done well in advance and replacement cycles frequently updated. There must also be timely procurement of materials and advance training of personnel. Similarly, because overhauls require the concerted efforts of all major departments and divisions of the Authority, early coordination of these resources is required. The Engineering Division has the responsibility for the design criteria of underwater and surface machinery equipment for overhaul. The Locks and Facilities Maintenance Division is responsible for actual performance and coordination of the efforts of all participating units. Corrosion mitigation is one of the principal objectives of the Underwater Equipment Maintenance Program and is achieved through coating systems, cathodic protection, use of corrosion resistant metals, and substitution of metallic components with non-metallic materials.

(3) *Special Projects*: Special projects for installation, replacement, maintenance or modernization of lock's machinery, equipment and structure are continuously formulated. Locks internal force and resources are assigned to different task until completion of the project.

(4) *Diving*: The Locks and Facilities Maintenance Division has a highly trained diving force that inspects and maintains underwater equipment, as required, to ensure continuous operation of the locks. The maintenance supervisor, in coordination with the operations supervisor, will approve the performance of maintenance operations, repairs, or inspection of underwater equipment and structures with diving qualified craftsmen. The maintenance supervisor at each lock is responsible for all locks diving operations, including those performed by other divisions or contractors within locks areas.

11.4 Safety and Emergency Response

Vessels designated as significant explosive or fire hazard category must be handled in accordance with the restrictions set forth in operations procedures and in the Handbook of Lockage Procedure.

a. *Emergency and Contingency Plan*

The Locks and Facilities Maintenance Division has overall responsibility for immediate action in emergency situations at the locks and in adjacent water areas at locks entrances until the arrival of the unit(s) officially designated to respond to the emergency. The Locks and Facilities Maintenance Division assumes initial command of rescue/evacuation and other appropriate response until the arrival of the Incident Commander(s), when it assumes a support role.

b. *Emergency Flood Control*

The Environment, Water and Energy Management Executive Vice President (EA) is responsible for declaring lake flooding emergencies and activating the Flood Control Operations Center. The Locks and Facilities Maintenance Division Executive Manager is responsible for executing the applicable emergency flood plans and procedures contained in the Flood Control Manual. Operation of emergency flood control facilities will be under the direct command of the Flood Control Operations Center Director and will remain under his direct control throughout the duration of the flood emergency. The Executive Vice President who has been assigned the responsibility for flood control has the authority to order locks culvert spilling. The Locks and Facilities Maintenance Division is responsible for correcting or alleviating any abnormal conditions existent at the locks after the termination of a flood emergency through normal ACP procedures or by activating appropriate contingency plans.

c. *Fire Fighting System*

According to the stated goal of providing the Panama Canal Locks with the best possible protection from disasters capable of causing damage or disruption of locks operations, the locks are equipped with foam firefighting systems. This equipment is capable of delivering a water / foam mixture at the correct concentration to critical locations to effectively fight fires occurring within the locks. The Locks and Facilities Maintenance Division is responsible for maintaining the system and all fire fighting equipment at the locks.

d. *Radar Operations*

To protect locks personnel from hazardous exposure, pilots must ensure that radars are secured or placed in standby mode when vessels are in the locks.

11.5 Security

(1) The Protection and Emergency Response Division (OPP) is responsible for the security and safeguard of Locks facilities. This includes the vigilance of locks perimeter fencing, entry of vehicles and locks personnel, or other Authority employees, contractors and visitors. The procedures governing entry into locks areas are detailed in the current memorandum on this subject.

(2) Crew members or any person jumping from a transiting ship into Canal waters, the locks, or any other ACP floating structure or equipment, shall be reported immediately. The person shall be put under the custody of the Protection and Emergency Response Division until the ship's agent is contacted and the individual is turned back to the ship or to the Panama National Migration Service.

(3) Ship's personnel shall not climb over the side on a pilot ladder or boatswain's chair for any purpose, including reading of the vessel's draft.

11.6 Miraflores Spillway

The control of Miraflores Lake level, to ensure proper clearance between the keel of a vessel and the locks sills, will be achieved by means of the Miraflores Spillway or by locking water through Pedro Miguel Locks. The Locks and Facilities Maintenance Division is responsible for the operation of the Miraflores Spillway. The established policy requires that Miraflores Lake shall be maintained at an elevation between 53.5 feet (16.31 meters) and 54.0 feet (16.46 meters), raising temporarily to 54.5 feet (16.76 meters) when necessary, for the passage of deep draft ships. The required normal spills must be performed with minimum effect on vessel transit. . Emergency spilling is regulated by flood control procedures.

11.7 Vehicular crossing

The Agua Clara vehicular rolling gates, the Gatun vehicular bridge and the ferry service provides pathway between the east and west banks of the Canal on the Atlantic side of the Isthmus. Due to its importance in providing access to communities along the western Atlantic coast, on Gatun Lake and further inland, the pathway should not be closed without giving the public sufficient notice. Signs providing the dates and times of planned closures shall be posted at each entrance of the vehicular pathway in advance, and the Locks and Installation Maintenance Division must notify the Corporate Communications Office so that announcements can be made through appropriate channels. The office should also be notified in the event of unplanned outages, such as emergency situations.

Furthermore, the Cocoli vehicular rolling gates are used to provide pathway between the continental and island sides of the locks for internal operation.