

SECTION 28 50 00 – EVACUATION SYSTEMS

1.01 SUMMARY:

- A. ^{A16}**Scope:** Scope of work shall be in accordance with Paragraph 1.01 D. of Section 01 81 26 (Communications, Control, Safety, and Security Systems), as required, for notification and safety of **locks'** personnel in the **Works**.^{A16} Specifically, for emergency evacuation or movement of persons from a dangerous place to a place of safe refuge due to the threat or occurrence of a disastrous event. This Section of the Employer's Requirements shall be read in conjunction with the Sections listed in Table 28 50 00-1.

B. **Related Sections:**

Table 28 50 00-1: Related Sections	
1.	Section 01 81 26 - Communications, Control, Safety, and Security Systems.
2.	Section 25 11 00 - Data Processing Equipment.
3.	Section 26 33 00 - Direct Current Equipment.
4.	Section 27 10 00 - Structured Cabling Systems for Communications Inside Plant.
5.	Section 27 11 16 - Cabinets, Racks, Frames, and Enclosures.
6.	Section 27 21 00 - Data Communications Equipment.
7.	Section 27 51 16 - Public Address Systems.
8.	Section 28 13 00 - Access Control Systems.
9.	Section 28 16 46 - Vehicular Control Systems.
10.	Section 28 23 00 - Closed Circuit Video Systems.
11.	Section 28 31 00 - Fire Alarm Systems for Buildings.
12.	Section 28 60 00 - Attendance Control Systems.

1.02 REFERENCE:

- A. **Applicable Publications:** Refer to Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.02.

1.03 REQUIREMENTS:

A. **General Requirements:**

1. **General:** The Contractor shall meet all applicable requirements of the Section 01 81 26 (*Communications, Control, Safety, and Security Systems*).
2. **Best Practices:** Evacuation/mass notification systems shall be in accordance with the following critical best practices:
 - a. Know your resources and their alternatives.
 - b. Internalize the plan via practice.

- c. Expect to make decisions based on incomplete information.
 - d. The fewer people involved in decision-making and communication, the better.
 - e. One size does not fit all: Push alerts simultaneously and in different formats.
 - f. Pre-define “emergency” and communicate it to the community.
 - g. Layer your approaches to communication.
3. **Interoperability and Coordination:** Evacuation systems shall be coordinated with other systems specified on Table 28 50 00-1.

B. Hardware/Equipment and Materials:

- 1. **Bridges and Gateways:** Shall be as required to allow signal routing and interface with various systems.
- 2. **Cables:** Shall be fire retardant and sized as required.
- 3. **Data Processing (DPE) and Peripheral Equipment:** Monitors, printers, servers, and workstations shall be in accordance with Section 25 11 00 (*Data Processing Equipment*).
- 4. **Digital Signage:**
 - a. Signage shall be suitable for MNSs, have size and brightness as required, and have 100/1,000 or faster Ethernet interface.
 - b. Units shall capable of color displays, as well as scrolling and flashing text messages with user selectable text.
- 5. **Strobe Lights:** Shall be as specified in Section 28 16 00 (*Intrusion Detection Systems*).
- 6. **Other Hardware:** Shall be in accordance with the selected technology.

C. Software: Shall be furnished as required.

D. Installation:

- 1. **Data Communications Equipment (DCE), DPE, and Peripherals:** Shall be installed at security guard booths and guard houses nearest the designated emergency exit areas.
- 2. **Digital Signage:** Shall be installed at high visibility areas of entry/exit points.

3. **Lights:** Shall be distributed in the [Site of the Works](#) and installed in easy to see locations.

E. Action Plans and Procedures:

1. Scenarios shall include bomb threat, hazardous chemical contamination or leak, fire in a building, fire in a vessel, security breach, terrorist attack, utility outage, and all other similar events.
2. Plans shall be prepared for the following:
 - a. To prevent an emergency from affecting a large number of occupants and areas whenever possible.
 - b. To provide response strategies to assist the management team in responding to and managing emergency events.
 - c. To have efficient evacuations and to minimize panic.

1.04 DESIGN CRITERIA/SYSTEM PERFORMANCE:

A. General:

1. **Problem to be Solved:** Evacuation systems shall solve the following the following business needs:
 - a. To effectively integrate ^{A8}the applicable^{A8} attendance, digital signage, emergency notification (public address), fire, life safety, security, telephone systems, vehicular control, ^{A8}WiMax, ^{A8} and wireless fidelity (WiFi) devices as required for –
 - 1) Locks campus mass notifications of a wide range of emergencies and disasters to personnel indoors and outdoors, and
 - 2) Evacuations in a coordinated and immediately responsive way.
 - b. To facilitate emergency evacuation or movement of locks operating personnel from a dangerous place to several safe locations upon a threat or occurrence of a disastrous event.
 - c. To have instant access to last known whereabouts of all missing personnel by close coordination with access control system (ACS) and attendance control systems.
 - d. To provide means to quickly find out which persons are in evacuation designated points and which ones may be needing assistance.

2. **Restrictions to be Considered:**

- a. Since the systems are likely to have equipment from different manufacturers together, various interfaces may be required. Such interfaces shall be managed by software to serve as the “glue” to hold the alerting systems and make them work together.
- b. Bidirectional interoperability is required for alerting systems with campus, as well as the Employer’s safety and security administrative units for real time information sharing.
- c. The systems shall have successfully undergone an application usability test within the last two years of the anticipated installation date.

B. **Design Criteria:**

1. Evacuation systems shall be fully supervised, and upon threats, convert multiple systems into robust, interactive, high speed mass notification systems (MNSs) suitable for use in effective crisis communications.
2. Evacuation systems shall meet all applicable requirements of 29 CFR PT 1910.165, 29 CFR 1926 (including OSHA), ASIS, NFPA 72, NFPA 101, and NFPA 130.
3. Evacuation systems and related systems shall meet all applicable life safety requirements of UL 864.
4. MNS shall take precedence over fire alarm notification as allowed by NFPA 72.
5. Distributed intelligence, multiple command centers, and peer-to-peer networking are highly desirable for availability and survivability.
6. MNSs shall effectively balance three design elements: action plans, alerting systems, and protection systems.
7. Depending on evacuation system design, reliable AC or DC power is required from systems specified in Section 26 33 00 (*Direct Current Equipment*).
8. System availability shall equal or exceed 99.99% of time.

C. **System Performance:**

1. Evacuation systems shall be activated from a control room and/or an authorized Canal protection guard. The system shall allow the authorized person (Canal protection guard) activating it, to specify the type of emergency that requires an evacuation, to the evacuation system.
2. The Contractor solution shall have the following capabilities:

- a. Automatic notification and employee roll call. This requires sending multiple notifications at the same time to the same or different recipients.
 - b. Distinguish between reaching a live recipient and reaching an answering machine or voice mail.
 - c. Intelligently cycle through sending the same message to voice and text devices.
 - d. Automatic fail over to redundant equipment should main equipment fail.
 - e. Set the default order of devices used to contact recipients.
 - f. Create groups of recipients and identify group leaders for particular groups.
 - g. Setup recurring notifications.
 - h. Request as many redial attempts as required.
 - i. Resend a notification only to those who did not respond to the original notification.
 - j. Stop a broadcast at any point in time after initiation (override).
 - k. Export all report data to HTML or PDF formatted files.
 - l. Allow administrators to view results of notifications in real-time via the web.
3. Upon activation, the system shall automatically send the proper pre-recorded message through the public address system described in Section 27 51 16 (*Public Address Systems*), followed by activation of the fire alarm system annunciation circuits in the emergency mode, as described in Section 28 31 00 (*Fire Alarm Systems for Buildings*), digital signage, and the exterior audiovisual annunciation devices required by this Section.
 4. The systems shall direct locks personnel being evacuated to exit all buildings and facilities and proceed to the designated safe meeting points. At such points, they will signal arrival by passing their coded identification cards by the access control station as described in Section 28 13 00 (*Access Control Systems*).
 5. The information from attendance control system described in Section 28 60 00 (*Attendance Control Systems*) and ACS shall be available to generate reports listing which employees who have entered the locks, without exiting, have not reported arrival at the designated meeting point. These reports shall be available from both the control room operator and canal protection security personnel via DPE described in Section 25 11 00 (*Data Processing Equipment*).

6. Systems shall continuously do the following:
 - a. Interchange data with access and attendance control systems.
 - b. Supervise the status of emergency and exit lights for physical safety of personnel.
7. The Employer prefers (but does not require) that evacuation systems monitor the corresponding public address systems (PASs) for adequate sound volume and audio message intelligibility.
8. Systems shall have a total of no less than sixteen pre-recorded voice messages ready to be sent to the public address system depending on an event. The systems shall also have the corresponding equivalent text messages for digital signage, telephone sets with screens, and WiFi devices. One such application shall be to avoid welding near locks chambers when a transiting vessel carries dangerous cargo.
9. Upon emergencies, the system at the incumbent lock site shall also do the following:
 - a. Broadcast the appropriate warning message corresponding to the actual threat, to assist in convincing people to leave the complex.
 - b. Report a list of who is where and who is missing (or has not reported), and considering who came in for work in the same work shift or day.
 - c. Report a list of who appears to need assistance.
 - d. Assist in helping evacuees find each other.
10. MNS messages shall include what is happening, what to do, where to go, and when it is safe.
11. The systems shall be capable of providing people instructions based on specific spaces, building floors, buildings, sites, campus of buildings, geographic regions, and globally.
12. Evacuation systems shall have the ability to leverage networked, wired, wireless technologies, and interconnect different types of systems in to a unified notification system.
13. The systems shall distribute live and pre-recorded messages as follows:
 - a. **Audio:** Aural voice messages via public address and telephone systems.
 - b. **Video:** Computer pop-ups, and streaming media of moving video images and graphics.

- c. **Text Data:** Computer and visual display messaging in real time, including cell and personal communications service (PCS) phones, internet protocol/session initiating protocol (IP/SIP) phones, paging receivers with screen, digital signage devices, and DPE connected to local area network (LAN) and wireless LAN (WLAN) (including WiFi and WiMax devices).

14. For security reasons,

- a. Application servers shall be locked down with no extraneous services running on them.
- b. The solution shall have security to prevent inappropriate use and to maintain privacy of contacts, including login and password authentication.
- c. The systems shall have means for security audit reporting.

1.05 SUBMITTALS: The following shall be submitted for substantiation purposes:

- A. **Design:** The following shall be in accordance with Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), ^{A8}Subparagraph 1.05 D.^{A8}:
 - 1. Block diagram for hardware.
 - 2. Calculations, including system availability.
 - 3. Critical path method (CPM) diagram, with monthly updates.
 - 4. Descriptive literature.
 - 5. Drawings.
 - 6. Protection methods for corrosion, electrostatic discharge (ESD), fungus/humidity, lightning/surge, power distortion and harmonics, radio frequency interference / electromagnetic interference (RFI/EMI), thermal, and vibration.
 - 7. Quality assurance and control plans.
 - 8. Recommended action or evacuation plans and procedures.
 - 9. Specifications.
 - 10. Strengths, weaknesses, opportunities, and threats (SWOT) analysis.
- B. **Re-submittals Just Prior to Purchasing Materials:** All items in A. above that have changed from original submittal shall be resubmitted in a design conference in accordance with Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.05.

C. **Right After Factory Quality Control Tests (FQCT) and Factory Inspection Tests (FIT):**

1. Test reports.

D. **Upon Receipt of Shipped Items in Panama:**

1. Instruction manuals for administration, installation, maintenance, and operation.
2. Packing lists.

E. **Prior to Issuance of Taking-Over Certificate:**

1. As-built drawings.
2. List of recommended spare parts.
3. Software licenses.
4. Test reports.
5. Training services.

1.06 QUALITY ASSURANCE: Shall include the following in accordance with Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.06:

- A. Factory quality control tests (FQCT).
- B. Training services for no less than ten persons from the Employer's Personnel.
- C. Final field inspection tests (FFIT).
- D. Spare parts.
- E. Technical support.
- F. Upgrades and enhancements shall be provided seamlessly and at no additional cost to the Employer during the [Defects Notification Period](#).
- G. Warranty.

END OF SECTION