

SECTION 11 52 23 – VIDEO WALLS

1.01 SUMMARY

- A. ^{A19}**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 display of C CVS, computer, and process control system (PCS)-generated graphics in control rooms of main control buildings.^{A19} ^{A16}This section of the Employer's Requirements shall be read in conjunction with the Sections listed in Table 11 52 23-1.
^{A16}
- B. **Related Sections:**

TABLE 11 52 23-1: RELATED SECTIONS			
1.	Section 01 81 26	-	Communications, Control, Safety, and Security Systems.
2.	Section 01 81 36	-	Operations and Maintenance Buildings and Facilities – Program.
3.	Section 25 11 00	-	Data Processing Equipment (DPE).
4.	Section 28 23 00	-	Closed Circuit Video Systems (C CVS).
5.	Section 40 95 13	-	Process Control Hardware.
6.	Section 40 96 45	-	Process Control Software.

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. The ^{A17}Contractor ^{A17} shall meet all applicable requirements of Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), paragraph 1.03.
 2. Every video wall shall have a single remote keyboard and mouse in accordance with Section 25 11 00 (*Data Processing Equipment*), adjustable foot levelers, and heavy duty fine tuning mechanism for precise positioning and adjustability.
 3. Service parts and support shall be available directly from the manufacturer for a minimum period of 5 years after the date of product discontinuation.
- B. **Items to be Provided:**
1. Video wall cubes for special PCS and C CVS displays.
 2. Video wall controllers for multi-screen displays.

3. Supporting structures.
4. All required power and signal cabling.
5. All required video interfacing and connectors.
6. Remote keyboards and mice.
7. Operating software.

C. Hardware:

1. Video Wall Cubes:

- a. The cubes shall have the following or better characteristics:

TABLE 11 52 23-2: VIDEO WALL CUBES CHARACTERISTICS		
Brightness	Intensity	1,200 ANSI Lumens
	Uniformity	^{A5} 95% for each individual cube (with no hot spots) and 90% for any two adjacent cubes of video wall array. ^{A5}
Contrast		1,600:1 (full field)
Cube	Back Lighting	^{A20} Dual lamp source with stable color temperature, for example, Ultra High Performance (UHP) lamp ^{A20}
	Resolution	Scalable up to 1,920 x 1,200 pixels per cube ^{A3} for non-HDTV signals, and up to 1,080i and 1,080p for the applicable HDTV signals. ^{A3}
	Technology	DLP or SED with color prisms as required, without color wheels
Display	Refresh Rate	Up to 80 fps
	Size	1,702 mm (67”) diagonal
	Surface	Flat, anti-reflective, high contrast material
	Viewing Angle	160° horizontal and vertical
MTBF	(deleted)	(deleted)
	Light Source	10,000 hours (at 100 watts)
	^{A20} DLPs (if used) ^{A20}	100,000 hours
	All Other Parts	500,000 hours

- b. There shall be no noticeable burn-in problems or degradation in the first 60,000 hours of use.
- c. Units shall monitor internal temperature and be capable of displaying information on a panel display and on the systems’ GUI. GUI shall be web-based.
- d. Lamps shall be redundant and LED or UHP type, or better. The Employer strongly prefers long life LED lamps.

2. **Video Wall Controllers:**

- a. Controllers shall be modular and scalable.
- b. Units shall have no less than four (4) NTSC or HDTV inputs with BNC connectors for [CCVS](#), and four (4) DVI or RGB inputs for computer generated graphics. Controllers shall also be capable of receiving video applications via Ethernet LAN, and shall be scalable to eventually accept up to 18 signals from previously authorized devices. The Employer prefers having HDMI port(s) too.
- c. Outputs' type and quantity shall be as required for the specified screen array.
- d. Hard disk (or massive storage) shall be hot swappable and sized as required.
- e. ^{A19}Memory shall be sized as required, with no less than 2 GByte random-access memory (RAM), and expandable to a minimum of 4 GB. ^{A19}
- f. Video processing shall be 32-bit or better, with no less than 10 bit for color processing and 13 bit for color correction.
- g. Controllers shall be packaged in a rack mounted case with thermostatically controlled fans, removable air filters, redundant storage arrays, and redundant hot-swappable power supplies.
- h. Units shall be remotely controllable, diagnosed, and managed via Ethernet LAN port.
- i. Multi-language support shall include English and Spanish.
- j. [Controllers shall be coordinated with and capable of handling the cubes provided at maximum capacity for all inputs simultaneously.](#)

3. **Cables:**

- a. [Cables between controllers and cubes shall have sufficient bandwidth. If metallic, these shall be 100% shielded.](#)

D. **Software:** Shall be furnished as required, and shall be upgradeable.

E. **Installation:**

1. **Video Walls:**

- a. Video walls shall be furnished for LMCS operators display areas in control rooms at the upper level of main control buildings.

- b. Video walls shall be installed so that direct sunlight does not hit the display surfaces. Also, there shall be a clearance of at least 1,000 mm (39.37") behind the video wall components to facilitate access to maintenance personnel.
 - c. Video walls shall be mounted on a frame in accordance with Section 27 11 16 (*Cabinets, Racks, Frames, and Enclosures*) away from the nearest walls.
 - d. CCVS and computer generated window displays shall be laid out in a visually ergonomic way.
- 2. **Video Wall Controllers:**
 - a. Video wall controllers shall be installed on a firm support, providing easy access to interconnection ports and panel functions.
 - b. Units shall be placed in a cool, well lighted, and dust free environment.
- 3. **Remote Keyboard and Mice:**
 - a. Remote keyboard and mouse for the video wall system shall be installed on top of the Locks operator consoles.
- 4. **Cleaning:** The contractor shall clean daily to remove all residues when cutting, drilling, filing, or other similar work is performed.
- 5. **Lamps:** The contractor shall minimize turning the lamps on/off repeatedly to avoid reducing lamp useful life.
- 6. **Ventilation:** The contractor shall provide supplemental power ventilation when soldering, welding, or other fume producing operations must be performed.

1.04 DESIGN CRITERIA/SYSTEM PERFORMANCE

A. General:

- 1. **Problem to be Solved:** Video wall systems shall solve the following business needs:
 - a. Provide a high resolution, dynamic image processing and display screen, for a set of different video sources and formats, like CCVS video, computer generated graphics, or any other as required in LMCS control rooms.
- 2. **Restrictions to be Considered:**
 - a. Video walls shall not be oriented so that sunlight hits it directly or at angles that cause annoying effects.

B. Design Criteria:

1. Video wall systems shall be suitable for real-time, seamless display of simultaneous multiple video inputs on a 24-hour a day, 7 days a week basis.
2. The system should be user friendly, flexible, reliable, easy to use, configure, program, and setup.
3. For ergonomic reasons and visual comfort, video walls shall meet all applicable human engineering requirements of MIL-STD-1472F. When calculating overall display area size, particular attention shall be given to eye and head rotation, as well as viewing angles.
4. For displays with text, overall video wall size shall be such that eye-to-text distance is less than 150 times the text height, and viewing angle for such text is 0.5° or larger as perceived from human eyes, whichever rule is the strictest.
5. Vertical viewing angle to the overall display area shall be as close as possible to 15° .
6. Video wall systems shall have redundant cooling systems, hard drives (or massive storage), and power supplies.

C. System Performance:

1. High resolution, flicker free, full frame rate capability shall be maintained for all windows simultaneously, including video and computer generated graphics. There shall be no dropped frames from the input sources, image overlaps, nor noticeable parallax errors.
2. Full resolution display shall be possible for every input. There shall be no reduction in performance and quality as the number of inputs increases.
3. Video wall systems shall have low operation and ownership costs.
4. Systems shall have the following capabilities:
 - a. Ability to display static and animated image files in **BMP**, GIF, JPEG, and PNG formats.
 - b. Ability to select display windows independently, and display up to 12 windows on a single screen.
 - c. Ability to interactively adjust, optimize, and save timing parameters for each individual input signal.
 - d. Ability to move display windows instantly or over a programmed time period.

- e. Automatically detect input signals’ timing and synchronize to them.
- f. Crop, image freeze, pan, and zoom capabilities for each and every window.
- g. Drag and drop window positioning and sizing, with ability to display in correct aspect ratio and stretched to fit (one mode user selectable).
- h. ^{A7}Provide the ability to overlap display windows and interactively assign each window’s display priority.^{A7}
- i. Independently position each window anywhere on the screen array and scale it to any size.
- j. Overlap, overlay, or stretch windows across screens.
- k. Provide independent, adjustable brightness, color, and contrast controls for each window.
- l. Allow placement of descriptive window captions and text overlays.
- m. Provide independent labeling and border capability for each window. Borders shall have user adjustable thickness up to 100 pixels, and have user selectable colors.
- n. Provide up to 24 user programmable display configuration presets, considering size and positioning of individual display components. At least one such preset shall be available for emergency display mode.
- o. Provide means for adjusting brightness, color, contrast, and gamma on a cube basis and globally.
- p. Automatic switch-in of a secondary lamp within one minute of main lamp failure.
- q. Automatic color recalibration to compensate for lamp spectral differences upon lamp change.
- r. Provide on line help.

5. Each video wall system shall have the following or better characteristics:

TABLE 11 52 23-3: VIDEO WALL SYSTEM CHARACTERISTICS		
Array	Size	Two (2) rows x two (2) columns
	Spacing	Not to exceed 0.2 mm between display viewable borders of adjacent cubes
	Surface	Flat
Colors		16.7 million
EMC	Emissions	In accordance with 47 CFR Part 15
	Immunity	In accordance with CENELEC EN 55024

TABLE 11 52 23-3: VIDEO WALL SYSTEM CHARACTERISTICS		
MTBF	Major Modules	50,000 hours
Safety		In accordance with IEC/UL 60950-1
Useful Life		Seven (7) years

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*), paragraph 1.05 D:
 - 1. Calculations, including display area size (to verify compliance with MIL-STD-1472) and system availability.
 - 2. Conceptual display sketch.
 - 3. CPM diagram, with monthly updates.
 - 4. Descriptive literature.
 - 5. Estimated type, number, and cost of consumables, including fans, filters, and lamps.
 - 6. ^{A19}Protection methods for corrosion, ESD, fungus/humidity, lightning/surge, power distortion and harmonics, radio-frequency interference/electromagnetic interference (RFI/EMI), thermal, and vibration. ^{A19}
 - 7. Quality assurance and control plans.
 - 8. Shop drawings.
 - 9. Specifications.
 - 10. SWOT analysis.
 - 11. Any other data required for review.
- 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 FQCT:**
 - 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*):

- A. Final Field Inspection Tests (FFIT).
- B. Training Services for no less than six (6) Employer trainees.
- C. Warranty.

END OF SECTION