

SECTION 27 41 16.51 – INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT  
FOR VIDEO CONFERENCING CLASSROOMS

SECTION 27 41 16.61 Integrated Audio-Video Systems and Equipment for Video Conferencing Classrooms [Refer To Video Conferencing Classrooms as ITV Classrooms]

THE STANDARDS FOR Minimum Technology Enhanced Classroom Design WILL APPLY TO ITV CLASSROOMS WITH THE FOLLOWING ADDITIONS.

**1.01 Basic ITV Technology Enhanced Classroom, ITV Additions**

- A. ITV Video Conferencing is a simulation of face-to-face delivery of education using video conferencing technology. The environment is highly customized with technology and environmental features which maximize this simulation.
- B. Each student seat will be supplied with a permanent wired microphone for interaction with the instructor and recording of class experience.
- C. Each student seat will have both power and data for laptop connectivity to receive digital instructional materials and virtualized content.
- D. Ceiling height must be no less than 10' AFF, and no greater than 11' AFF.
- E. No windows are allowed in this type of room.
- F. No Whiteboards or Chalkboards are allowed in this type of room.
- F. Room layout should be relatively square, or if rectangular, at a ratio not exceeding 1.5 to 1. Staging area shall be on the narrow wall.

**1.02 Projections Screens, Front and Back Wall of the Classroom, ITV Additions**

- A. ITS will always specify screen. Contractor will install ceiling recessed screens if/when specified.
- B. Where ceilings do not exceed 10', ITS currently specifies a fixed wall mounted screen: #252212V Draper Clarion projection screen, 137", 16:10, CH1900V Pearl White w/Veltex [72-1/2" x 116" x 137"] Top of screen should be installed flush with the finished ceiling.
- C. Where ceilings exceed 10', ITS currently specifies: Ceiling recessed Draper Access Series V Custom Size (16:10 GREEN GUARD matt white XT1000E), Electrically Operated with no more than a 6" drop material at top of screen when lowered.

- D. Optimal distance between the first row of seating and the projector screen is 1.5 x the width of the specified screen. Optimal distance for ITV to farthest is 4-x screen height.
- E. If electrical screens are used in larger rooms, wall-mounted raise/lower switches would be required adjacent to lighting controls, centralized at location of instructor's lectern. These switches would need to be clearly marked with text "Screen Control," "Raise," and "Lower."
- F. The bottom of the screen should be a minimum of 4 feet above the audience floor, allowing those seated toward the rear of the audience to see the full screen.
- G. For ITV simulation: All student seats to be within 70-degree side-to-side cone established from center of screen. No greater than 30-degree horizontal angle to centerlines on screen, and no greater than a 30-degree vertical angle defined from the eyes of the closest student viewer to the top of any screen; horizontal line parallel to the floor that extending through the eyes.

### **1.03 Data Projector Mounting, Front and Rear of Classroom, ITV Additions**

- A. ITS will specify, order, and install projector, determine exact placement based on configuration of room and ceiling height.
- B. In general, the projector is ceiling mounted approximately 12' - 16' from screen to front of projector lens in a room with standard 9'6" or 10' height ceiling. Distance from screen to front of projector lens varies with size of screen, which is determined by height of ceiling and depth of room, and projector model/type.
- C. The projector ceiling mounting kit is aligned to be centered on the projector screen—center row of ceiling grid should be clear between 0' – 20' (from projection screen) of all A/C vents, smoke detectors, ceiling fans, lighting, etc. to allow for future repositioning of projector infrastructure.
- D. HVAC intake/exhaust ducts should not be located any closer than 6' to the projector location; this will eliminate circulation competition with the projector's own fan and cooling unit.
- E. ITS currently specifies the Chief CMS-445, 2' x 2' Tile Replacement Projector Kit. Contractor will install per manufactures specification with anchors to concrete deck in the location specified by ITS, and provide one (1) 120VAC I.G. quad electrical outlet and one (1) network drop installed directly into the Chief CMS-445. Power should be supplied through a 15' flexible whip that will allow the mount to be repositioned later to another location, as the projector model requires.

**1.04 Multimedia and Video, ITV Additions**

- A. Control/support cabinet and equipment rack may be located at front side – a support workstation may also be positioned at the front side of the classroom. It could occupy the corner of the room adjacent to the instructor media lectern; it will be on the opposite wall from and directly across the room from the doorway. There would be additional monitors, mixers and multimedia equipment at this station.
- B. Wall mounted cameras will be installed adjacent to front and rear projection screens. Provide double gang mud ring 2' below AFC (Above Finished Ceiling) for low voltage lines, with one (1) 1-1/2" conduit run AFC.

**1.05 Networking and Communications, ITV Additions**

- A. Six (6) total Category 6 or better network connections direct from the MDF/Switch, wall mounted adjacent to the 120VAC I.G. quad electrical outlet at the side wall of the classroom 5' from the front projection wall and on the side of the room opposite the main entry. The lines will have a ten-foot service loop AFC. The connections are for the control cabinet.
- B. A single data connection on the ceiling will be installed adjacent to the ceiling outlet for BOTH projectors; front and rear facing. (See 1.03-E).
- C. A second double gang outlet, for other low voltage lines, with two 1-1/2" conduits will be run above ceiling line. The box will be mounted adjacent to the data box and the quad power outlet at the front wall of the classroom on the same side of the classroom as the podium. The box will be approximately 5' from the teaching wall, on the sidewall.
- D. A single analog telecommunications line will be installed in a second data faceplate as the six data lines above. The line will have a ten-foot service loop above ceiling line.
- E. A single gang outlet with one 1-1/2" conduit will be installed in the wall, 2' below the ceiling and stubbed out to above the ceiling line, for low voltage lines/wall mounted camera. The box will be in the front corner of the classroom opposite the instructor media lectern.
- F. Each student seat location must be provided a single Category 6 or better network connection direct from the MDF/Switch into either fixed furniture, or accessible floor box. ITS will specify furniture, contractor will purchase and install, coordinated with ITS.

### **1.06 Power, ITV Additions**

- A. Provide isolated ground (I.G.) and neutral power circuits that are clean of ambient and stray signals for the lectern/tech projector circuit(s). No other powered items are to be tied into circuits supporting instructional technology. All equipment is to be on the same phase.
- B. A quad outlet (120 VAC I.G.) will be installed on the front wall of the classroom on the same side of the classroom as the media cabinet, approximately 5' from the front corner, at standard height. It will be on the same side of the classroom as the media support station. The instructor media lectern is located in front corner of the room on the wall opposite the doorway.
- C. A quad outlet (120 VAC I.G.) will be installed in the ceiling approximately 12' from the front screen for the front projector and the ceiling mounted camera. Conduit will be installed to a point four feet above and centered over the projector mounting location. Outlet will be connected to the conduit by a fifteen-foot flex cable. (See 1.03-E)
- D. A quad outlet (120 VAC I.G.) will be installed in the ceiling, approximately 12' from the rear screen, centered on the wall, for the rear mounted projector. Conduit will be installed to a point four feet above and centered over the projector mounting location. Outlet will be connected to the conduit by a fifteen-foot flex cable (See 1.03-E)
- E. A duplex outlet will be installed in the wall, 2' below the ceiling adjacent to the duplex low voltage box. The box will be in the front corner of the classroom opposite the instructor media lectern. The outlet will support a wall mounted camera.
- F. Instructional Furniture requires 4' of clearance behind, for access, and 2' of clearance, on each side, for cooling/air flow of equipment. Floor penetrations for instructional furniture are to be located to provide the above clearances.
- G. Each student seat location must be provided a single 120VAC I.G. electrical outlet into either fixed furniture, or accessible floor box. ITS will specify furniture, contractor will purchase and install, coordinated with ITS.

### **1.07 Floors, ITV Additions**

- A. Floor and other elements surrounding classrooms to have an Impact Isolation Class (IIC) that prevents sound transmission into room from floors or equipment

surrounding the classrooms. Refer to ANSI/ASA S12.60 for minimal requirements.

- B. Use carpet tiles in classrooms, equal or greater than 10 stitches per inch; Antron 6.6 fiber nylon, yarn weight of 20 to 30 ounces; multi-dark colors to not show spills; stain, moisture & wear resistant; impervious and thick Unibond type backing material not affected by moisture; edge curl resistant with no edge ravel; glue resistant to wet cleaning, anti-static, UL Class A.
- C. All penetrations and wall elements to be sealed and designed to minimize noise entry into room.
- D. The needs of ADA access and pathways must be addressed. Only seating tiers are allowed in classrooms with 100 or more student seats, as long as accessible positions are located at the front, back and middle of the room and visual sight lines are maintained between student positions, instructor and screens.

#### **1.08 Ceiling, ITV Additions**

- A. Use regular 2' x 2' lay-in acoustical tile in exposed metal suspension system tiles (not narrow designs or metal edged tiles). Use non-sagging (humidity resistant) lay-in acoustical tile for most classroom ceiling areas to allow easy overhead access. Should result in a Noise Reduction Coefficient of .90.

#### **1.09 Walls, ITV Additions**

- A. Acoustical treatment of the wall which will result in a Noise Reduction Coefficient of .90. Acoustical panels mounted on interior walls are preferable.
- B. Should not be located near high occupancy areas such as libraries, computer rooms, common areas, and departmental offices. Nor should classrooms be near mechanical rooms, toilet rooms, lobbies, or elevator shafts.
- C. All penetrations and wall elements to be sealed and designed to minimize noise entry into room.
- D. Noise level is to be no higher than  $NC = 30$  in general and  $NC = 20$  at grills or registers. ANSI/ASA S12.60-2002 sets 35 decibels for maximum background noise for unoccupied school classrooms. Separate classrooms should not share same plenum area as sound will carry over into adjacent rooms. Walls or sound-attenuation barriers must be used to insure each classroom's audio environment is isolated from each other.

### **1.10 Entrances, ITV Additions**

- A. Entry/exit should be at back of room. Doors shall be located opposite the designated instructor station or the far corner of the adjacent wall.
- B. Doors shall be a minimum of 36” wide and contain a small window, have quiet operational and closing characteristics. Minimize noise transmission into classroom from corridors – no door transfer grills.
- C. Doors shall have drop sill plates and edge sound treatment where high noise levels may occur outside of the door (some classes run two periods so should not be disturbed by class changes). Consideration for them to also have bumpers, gaskets, sound strips, nylon bushings, silencers or sound strips on the strike jambs and hardware to minimize closing and impact noises and noises outside the door.

### **1.11 Lighting, ITV Additions**

- A. Do not place any ceiling light fixtures within 7’ of any projection screens, unless reflectors restrict lights directly downward to not spill or reflect onto screens. The front panel of lights reflecting onto the screen will be independently controlled.
- B. Plan for the instructor to adjust all the lighting levels for his needs from near the teaching position. All lights will be controlled from a minimum of two points; near entry/exit to room, and near location of instructor/media cabinet. Besides being able to completely shut off the front panel of lights near the projection screen, the other lights in the room should be able to be dimmed by switching off either half the fluorescent bulbs in each fixture, or either one or two bulbs in each fixture should they only contain three bulbs.
- C. First switch panel above the sidewall quad power outlet positioned so the instructor can easily adjust lighting while standing behind lectern or media cabinet (approximately two feet from front wall on side wall opposite the main entry.) All lighting controls must be clearly marked with engraved switch plate with 1/8” high lettering.
- D. Fixtures shall be full spectrum fluorescent type. Generally, the fixtures should be 2’x 4’ parabolic fluorescent. Light levels will be 50-70 foot candles via recessed fluorescent fixtures, and lighting shall be glare free, with the appropriate colored lamps that do not flicker or provide uneven light.
- E. Fire-alarm strobes are not to be placed behind projection screens, which when in the down position would block the light from the strobes.

**1.12 Multimedia and Other Hardware, ITV Additions**

- A. Technology hardware will be installed by ITS, in most cases. The cost of these items will be estimated by ITS, included in the construction budget, purchased under state contract by ITS, and installed by ITS, or under their supervision. ITS will provide a spreadsheet of items and cost estimates as required. Based on time lapse between initial cost estimate and selection of items and actual time of construction, ITS may alter equipment selection based on costs or features, or both.