

## **DESIGN CRITERIA AND REQUIREMENTS FOR CLASSROOMS**

### **PART 1 - General**

**1.0** This guideline is intended to guide the Offices of Facilities Planning, Facilities Design and Construction, and/or the Design Professional in specifying equipment for the various types and sizes of general purpose classrooms. Different types of classrooms are identified, but these are not intended to restrict architectural development or engineering. In recognition of rapid changes in technology, design professionals should verify specific technology to be incorporated. Further special departmental needs beyond these basic guidelines (e.g., laboratory classrooms, special purpose classrooms) should be delineated in the Facilities Program and specific needs verified during the design phase.

#### **1.1 Audio Visual Issues**

- A.** All new classrooms should be designed to provide, at a minimum, front wall space for 9 (units high) x16 (units wide) format projection screens.
- B.** The height of the projected image is determined by taking the distance of the farthest student from the projection screen and dividing it by 6. Therefore, ceiling height at the front of the room should allow for that height image plus 4'. This guideline is based on locating the instructor console at the side of the room. Placement of the instructor console in the center of the lecture area is not recommended for smaller classrooms. See General Guidelines for Lecture Halls for guidelines related to placement of console in center of lecture area.
- C.** Projection screens mounted above the marker board must clear the board's marker (chalk) tray. Typically, provide 6"-8" clear from the face of the marker board to the back of the screen. The projection screen in its lowered position must not cover light switches and outlets.
- D.** Ceiling-mounted projectors or wall-mounted projection screens should not conflict with the lighting fixtures or access to lighting fixtures for changing lamps.

#### **1.2 Owner Provided Equipment**

- A.** Furniture and equipment not included in the construction cost, but provided and installed by FSU may include:
  - 1) Standard marker boards
  - 2) Instructor console
  - 3) LCD projector and bracket
  - 4) Electronic marker board
  - 5) ENO board
  - 6) Voice lift system or PA system including speakers, unless specifically noted in the Facilities Program to be provided as part of the construction cost.
  - 7) Security access card reader.

In some cases, it may be desirable for the contractor to supply and install certain items (e.g., marker boards, projection screens, instructor consoles (if custom cabinetry)), or to install certain owner-provided equipment (e.g., projector mounts, marker boards). Such situations should be discussed with the FSU project manager and the Assistant Director of Instructional Technology prior to the finalization of the construction documents.

## **PART 2 – Standard Space Types**

### **2.1 Class I Classroom: Up to 49 students, electronically equipped, non-tiered**

#### **2.1a Area and Affiliated Spaces**

- 1) Classroom Area: Min. 20 NSF/Student, max. 24 NSF/Student
- 2) Number of Accessible Seating Spaces: One
- 3) Lectern Area: Included with student area
- 4) Electronic Equipment Room: None

#### **2.1b Furnishings and Equipment**

- 1) Seating: Standard student desks with fixed arm tablets.
- 2) Accessible Seating: Desks and loose chair for accessibility-impaired students:  
One station
- 3) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Table top desk and chair
  - Marker Board: 4' ht. X 16' length (typical)
  - Projection Screen: Electric, matte white screen, typically 84"W x 84"H; recessed mounting not required, mounted on front wall of classroom. Switch is to be located adjacent to the instructor console.
  - LCD Projector: A ceiling-suspended LCD projector bracket centered on the projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projector is to be made only by ACNS.
  - Instructor console, approximately 30"(d) x 66"(w) x 37"(h), containing a computer, VCR, DVD player, video switching equipment, amplifier, laptop interface, and document camera. The instructor console shall be located with approximately 3'-6" clear distance between the front wall and the rear face of the instructor console.
  - Speakers (mounted within 2x2 ceiling grid)

#### **2.1c Architectural Features**

- 1) Room Shape: traditional rectilinear, 2:3 ratio oriented to instructional area at front of room.
- 2) Ceiling Height: Min. 10 feet.
- 3) Doors: Min.one, with narrow door light, located at front of the room
- 4) Floors: Vinyl tile, carpet preferred

- 5) Walls: Light color, min. 85% reflectivity.
- 6) Ceilings: 2 x 2 acoustical panels and grid, white.
- 7) Additional Acoustical Treatment: As required.

**2.1d Lighting**

- 1) Recessed 2 x 4 fluorescent, parabolic, controlled by Lutron dimming system. Ballasts shall be dimming ballasts made by Lutron Electronics Company.
- 2) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lock out the other nor change the preset controls of the dimming system.
- 3) There shall be two dimming zones – Zone 1 for the front row of light fixtures above the seating area, and Zone 2 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls shall be by "Lutron Electronics Company."
- 4) General lighting (full on / full off) shall be located at the Classroom entrance.
- 5) In renovation projects where the budget will not support the installation of a dimming system, "inboard/outboard" switching should be used, and the row of lights at the front of the room should be switched separately.
- 6) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.

**2.1e Power Outlets**

- 1) Quadraplex adjacent to each communications outlet, standard duplex receptacles other walls.

**2.1f Special Equipment Power Requirements**

- 1) LCD Projector Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for the LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (must be on same phase). Depending on the anticipated load from the projector and the equipment in the instructor console, two dedicated circuits may be required. A "kill switch" located adjacent to the instructor console should be provided that will interrupt power to the receptacle that supplies power to the LCD projector. This switch may be located adjacent to the dimmer controls. This switch should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle on the wall beside the instructor console.

### **2.1g Data/Communications Outlets and Infrastructure**

- 1) One RJ45 outlet at front and rear walls.
- 2) One RJ45 data outlet with 4 data circuits shall be provided on the wall beside the instructor console.
- 3) Provide one concealed 2" diameter conduit (with pull string) running from the LCD Projection Bracket to a junction box beside the instructor console. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 4) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box beside the instructor console (for low-voltage control of projection screen).
- 5) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box beside the instructor console (for AV interface to dimming system).

### **2.1h Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### **Example of Satisfactory Type 1 Classroom(s) on Campus**

Bellamy 003, Bellamy 11

## **2.2 Class II Classroom: 50 to 99 students, electronically equipped, non-tiered**

### **2.2a Area and Affiliated Spaces**

- 1) Classroom Area: Min. 20 NSF/Student, max. 24 NSF/Student
- 2) Number of Accessible Seating Spaces: Two
- 3) Lectern Area: Included with student area
- 4) Electronic Equipment Room: None

### **2.2b Furnishings and Equipment**

- 1) Seating: Standard student desks with fixed arm tablets. For larger rooms, tables and chairs may be considered, along with fixed seating (see specifications for Class III classrooms)
- 2) Accessible Seating: Desks and loose chairs for accessibility-impaired students: Four stations (if fixed seating is used).
- 3) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Table top desk and chair
  - Marker Board: 4' ht. X 24' length (typical)

- Projection Screen: Electric, matte white screen, typically 96"W x 96"H; recessed mounting not required, mounted on front wall of classroom. Switch is to be located adjacent to the instructor console. For larger rooms, an electric screen sufficient to yield an image height of  $1/6^{\text{th}}$  the distance of the farthest student from the projection screen, with recessed mounting, should be considered.
- LCD Projector: A ceiling-suspended LCD projector bracket centered on the projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projector is to be made only by ACNS.
- Instructor console, approximately 30"(d) x 66"(w) x 37"(h), containing a computer, VCR, DVD player, video switching equipment, amplifier, laptop interface, and document camera. The instructor console shall be located with approximately 3'-6" clear distance between the front wall and the rear face of the instructor console.
- Speakers (mounted within 2x2 ceiling grid)

### **2.2c Architectural Features**

- 1) Room Shape: traditional rectilinear, 2:3 ratio oriented to instructional area at front of room.
- 2) Ceiling Height: Min. 10 feet.
- 3) Doors: Two, with narrow door lights. Main entry is located at front of the room
- 4) Floors: Vinyl tile, carpet preferred
- 5) Walls: Light color, min. 85% reflectivity.
- 6) Ceilings: 2 x 2 acoustical panels and grid, white.
- 7) Additional Acoustical Treatment: As required.

### **2.2d Lighting**

- 1) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lock out the other nor change the preset controls of the dimming system.
- 2) There shall be two - three dimming zones – Zone 1 for the front row of light fixtures above the seating area, Zone 2 for the middle set of light fixtures, and Zone 3 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls shall be by "Lutron Electronics Company."
- 3) General lighting (full on / full off) shall be located at the Classroom entrance.
- 4) In renovation projects where the budget will not support the installation of a dimming system, "inboard/outboard" switching should be used, and the row of lights at the front of the room should be switched separately.
- 5) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire

whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.

**2.2e Power Outlets**

- 1) Quadruplex adjacent to each communications outlet, standard duplex receptacles other walls.

**2.2f Special Equipment Power Requirements**

- 1) LCD Projector Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for the LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (must be on same phase). Depending on the anticipated load from the projector and the equipment in the instructor console, two dedicated circuits may be required. A "kill switch" located adjacent to the instructor console should be provided that will interrupt power to the receptacle that supplies power to the LCD projector. This switch may be located adjacent to the dimmer controls. This switch should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle on the wall beside the instructor console.

**2.2g Data/Communications Outlets and Infrastructure**

- 1) One RJ45 outlet at front and rear walls.
- 2) One RJ45 data outlet with 4 data circuits shall be provided on the wall beside the instructor console.
- 3) Provide one concealed 2" diameter conduit (with pull string) running from the LCD Projection Bracket to a junction box beside the instructor console. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 4) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box beside the instructor console (for low-voltage control of projection screen).
- 5) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box beside the instructor console (for AV interface to dimming system).

**2.2h Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

**Example of Satisfactory Classroom(s) on Campus**

Bellamy 023, Carothers 303, Grover Rogers (OSB) 108

## **2.3 – Lecture Halls--- Design Issues and General Guidelines for All Lecture Halls**

- 2.3a** To provide good sight lines and acoustics, lecture halls should be a modified fan-shaped design. Student seating can be arranged up to 45 degrees off the center axis of the room to provide good viewing angles from all seats. In no case shall a student be required to view a projected image from a line-of-sight angle more acute than 30 degrees. The depth of the room should be no greater than 1.5 times the width of the room, measured at the midpoint of the seating area. Balconies should be avoided.
- 2.3b** Placement of aisles should be sufficient such that an instructor may walk around in the seating area during an exam and proctor the exam (i.e., can easily see each and every seat).
- 2.3c** Ceilings in smaller lecture halls should be at least 15 feet high at the front of the room and, even with tiered seating, at least 9 feet high at the rear. Ceilings in larger halls should be at least 20 feet high at the front and at least 10 feet high at the back. Consider that in larger lecture halls, it will be highly desirable to place the bottom of the projected image at the top of the marker board (7' AFF) so that the instructor will not walk in front of the projected image. Remember, the height of the projected image is 1/6th the distance of the farthest student from the projection screen (e.g., if the farthest student is 60' from the projection screen, the height of the projected image is 10' making the ceiling height at the front of the room at least 17') which will determine the height of the ceiling.
- 2.3d** Acoustics are one of the most important features in good lecture hall design. All surfaces in the room should be studied, shaped, and tested integrally with the design of the floor plan so that amplified voice systems will augment, not replace, the natural voice volume. ACNS strongly recommends that an acoustical consultant be retained when constructing new lecture halls, or making a major renovation of an existing lecture hall.
- 2.3e** The ceiling is the most critical element in insuring that the sound in the lecture hall is distributed evenly and at appropriate loudness to all portions of the seating area. The ceiling should act as a sound mirror, reflecting sound downward to blend with the sound from the speaker system. To achieve this, the ceiling should be sloped or stepped, and the majority of the ceiling should be a hard surface. If the ceiling has too much sound absorbent material, the loudness will diminish at the back of the room. To enhance the instructor's voice projection, the ceiling should be hard-surfaced nearest the instructor, and tilted at an angle from the ceiling to the front wall, similar to the ceiling of an orchestra shell.
- 2.3f** Since lecture halls generally do not have windows, extra care must be given to the use of interior finishes, colors, and décor to provide visual interest to the room. The use of side-wall dimming fixtures should also be considered.
- 2.3g** If theater-style fixed seating is used, the vast majority of the seats (>90%) should have a minimum seat width of 21 inches.

## **2.4 Class III Classroom: 100+ students, tiered seating, Standard Lecture Hall**

### **2.4a Area and Affiliated Spaces**

- 1) Classroom Seating Area: Min. 17 NSF/Student, max. 19 NSF/Student. (Area includes aisle ways within seating area.)
- 2) Number of Accessible Seating Spaces: Five for 101 to 125 persons
- 3) Lectern/Podium: Minimum of 8' from front wall for the width of the front wall.
- 4) Electronic Equipment Closet: 25 NSF for single stacked rack of equipment. Will require HVAC supply.
- 5) Projection Room (optional): approximately 200 NSF, depending on configuration. Will require HVAC supply.
- 6) Foyer (optional): To accommodate students waiting on change of classes. This area may contain rest rooms. Sound isolation is important.

### **2.4b Furnishings and Equipment**

- 1) Seating: Fixed continuous desktop with pedestal mounted swing-out chairs. Accessible seating shall have continuous desktop surface for wheelchair access. Provide one loose chair per accessible station matching pedestal chairs. Desktops may be equipped with power/data modules (ports) for each seating station. If so, modules shall consist of one duplex receptacle and two ports for data connectors. Each module shall be equipped with a cord with a three-prong plug for connecting into the wiring harness. The power wiring harness shall be enclosed in a wire trough below the countertop with a metal divider to separate power from data cables. Theater-style fixed seating may also be used in larger lecture halls. At least 90% of the seats should have a minimum seat width of 21 inches. Seats must include large or over-sized tablet arms.
- 2) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Table top desk and chair
  - Marker Board: 4' ht. X 24' length (typical)
  - Projection Screens: Two electric screens, with recessed mounting. Switch is to be located adjacent to the instructor console. Use of two fixed, aluminum framed, stretched vinyl screens, should be considered. Viewing angles should not be worse than 30 degrees for the seats on the side to the farthest edge of the projected images.
  - LCD Projectors: Two ceiling-suspended LCD projector brackets centered on the appropriate projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projectors is to be made only by ACNS. Depending on the size of the room and the height of the ceiling, a projection room may be necessary to house the LCD projectors.
  - Instructor console, approximately 30"(d) x 72"(w) x 40"(h), containing a computer, VCR, DVD player, AMX control system, video switching equipment,



laptop interface, and two document cameras. The instructor console shall be located with a minimum of 4' clear distance between the front wall and the rear face of the instructor console.

- Speakers, mounted at the edges of the front wall. May be recessed into front wall.
- Equipment rack, located in Electronic Equipment Closet, containing audio equipment.
- (Optional) Electronic Marker Board, approximately 4' x 8', mounted on front wall.

#### 2.4c Architectural Features

- 1) Room Configuration: Modified fan-shaped design. Straight rowed tiered risers or curved risers oriented to front of the room. 45-degree orientation to the front corner of the room may also be considered if room shape is rectilinear. Placement of instructional furniture and equipment and specifically the instructor console shall not conflict with student seating sightlines to the marker board(s) and projection screens.
- 2) Ceiling Height: Min.9 feet at rear of room; min. 15 feet at front of room at projection screen. For large rooms (~200 seats), would prefer ceiling height of 20' at front of room.
- 3) Doors: Min. two, each with narrow door light.
- 4) General non-seating floors: Vinyl tile, prefer carpet
- 5) Tiered Risers: Carpeted with vinyl nosings and risers
- 6) Walls: Light color, min. 85% reflectivity.
- 7) Ceilings: 2 x 2 acoustical panels and grid, white.
- 8) Additional Acoustical Treatment: Voice projection system or PA system should augment the natural voice volume. Some wall treatment should be considered.
- 9) Electronic Equipment Closet: This space shall only open into the main classroom. No exterior doorways are permitted.
- 10) (Optional) Projection Room: This space shall open into a corridor or foyer.

#### 2.4d Lighting

- 1) Recessed 2 x 4 fluorescent, parabolic, controlled by an approved dimming system to include dimming ballasts and occupancy sensors . Refer to Electrical requirements included in Division 16 of these Guidelines.
- 2) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lockout the other nor change the preset controls of the dimming system.
- 3) There shall be a minimum of three dimming zones – Zone 1 for the front two rows of light fixtures above the seating area, Zone 2 for the middle two rows of light fixtures and Zone 3 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls must be compatible with the approved dimming system.
- 4) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard.

The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.

- 5) Special lighting to illuminate maps or charts may be required. Such lighting shall be zoned separately to allow control via the AMX control system.
- 6) For larger rooms, aisle lighting should be considered.

#### **2.4e Power Outlets**

- 1) In addition to outlets for the seating system, provide general room perimeter outlets.

#### **2.4f Special Equipment Power Requirements**

- 1) LCD Projectors Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for each LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (it must be on the same phase). Depending on the anticipated load from the projectors and the equipment in the instructor console, two dedicated circuits may be required. A "kill switch" should be provided that will interrupt power to the receptacle the LCD projector is plugged into. This switch should be located in the Electronic Equipment Closet or the Projection Room, and should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle in the floor at the location of the instructor console.
- 3) Provide duplex receptacle for electronic marker board at appropriate wall elevation.
- 4) Provide one quad power receptacle in the Electronic Equipment Closet.
- 5) Provide one quad power receptacle in the Projection Room in the vicinity of the projectors.

#### **2.4g Data/Communications Outlets and Infrastructure**

- 1) Provide one concealed 2" diameter conduit (with pull string) running from each LCD Projection Bracket to a floor located junction box at the instructor console. May be part of the path from the instructor's console to the Electronic Equipment Closet or Projection Room. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 2) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box beside the instructor console (for low-voltage control of projection screen).
- 3) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box beside the instructor console (for AV interface to dimming system).
- 4) Instructor console data circuits: Specify five Category 5 data circuits and receptacle at the instructor console.
- 5) Provide one (1) 1" conduit and pull string from electronic marker board to instructor console.
- 6) Provide four (4) 2" conduits and pull strings from the instructor's console to the Electronic Equipment Closet or Projection Room.
- 7) Provide one (1) 1" conduit from Electronic Equipment Closet to each speaker.

## 2.4h Room Security

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### Example of Satisfactory Classroom(s) on Campus

Example 45-degree room orientation: Bellamy Building Room 021, 100 seats

Example Straight row orientation: Bellamy 102

Example Curved riser orientation: Rovetta 101

## 2.5 Class IV Classroom: 100+ students, Combination Lecture/Demonstration

### 2.5a Area and Affiliated Spaces

- 1) Classroom Seating Area: Min. 17 NSF/Student, max. 19 NSF/Student. (Area includes aisle ways within seating area.)
- 2) Number of Accessible Seating Spaces: Five for 101 to 125 persons OR as required per code. Review location with FSU project manager and FSU Building Code Official.
- 3) Lectern/Podium/Demonstration: Minimum of 8' from front wall for the width of the front wall.
- 4) Electronic Equipment Closet: 25 NSF for single stacked rack of equipment. Will require HVAC supply.
- 5) Projection Room (optional): approximately 200 NSF, depending on configuration. Will require HVAC supply.
- 6) Preparation Room: approximately 200 - 300 NSF, depending on materials stored.
- 7) Foyer (optional): To accommodate students waiting on change of classes. This area may contain rest rooms. Sound isolation is important.

### 2.5b Furnishings and Equipment

- 1) Seating: Fixed continuous desktop with pedestal mounted swing-out chairs. Accessible seating shall have continuous desktop surface for wheelchair access. Provide one loose chair per accessible station matching pedestal chairs. Desktops may be equipped with power/data modules (ports) for each seating station. If so, modules shall consist of one duplex receptacle and two ports for data connectors. Each module shall be equipped with a cord with a three-prong plug for connecting into the wiring harness. The power wiring harness shall be enclosed in a wire trough below the countertop with a metal divider to separate power from data cables. Theater-style fixed seating may also be used in larger lecture halls. At least 90% of the seats should have a minimum seat width of 21 inches. Seats must include large or over-sized tablet arms.
- 2) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Table top desk and chair

- Marker Board: 4' ht. X 24' length (typical)
  - Projection Screens: Two electric screens, with recessed mounting. Switch is to be located adjacent to the instructor console. Use of two fixed, aluminum framed, stretched vinyl screens, should be considered. Viewing angles should not be worse than 30 degrees for the seats on the side to the farthest edge of the projected images.
  - LCD Projectors: Two ceiling-suspended LCD projector brackets centered on the appropriate projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary, and are to be used only for planning purposes. Final determination of the exact location of the projectors is to be made only by ACNS. Depending on the size of the room and the height of the ceiling, a projection room may be necessary to house the LCD projectors.
  - Instructor console, approximately 30"(d) x 72"(w) x 40"(h), containing a computer, VCR, DVD player, AMX control system, video switching equipment, laptop interface, and two document cameras. The instructor console shall be located with a minimum of 4' clear distance between the front wall and the rear face of the instructor console.
  - Speakers, mounted at the edges of the front wall. May be recessed into front wall.
  - Equipment rack, located in Electronic Equipment Closet, containing audio equipment.
  - (Optional) Electronic Marker Board, approximately 4' x 8', mounted on front wall.
- 3) Demonstration Bench:
- Sink (may require special waste line)
  - Air supply and Gas supply
  - GFI electrical outlets
  - (Optional) Exhaust system
  - Camera that is connected to AMX control system and video switching equipment.

### 2.5c Architectural Features

- 1) Room Configuration: Modified fan-shaped. Straight rowed tiered risers or curved risers oriented to front of the room. 45-degree orientation to the front corner of the room may also be considered if room shape is rectilinear. Placement of instructional furniture and equipment and specifically the instructor console shall not conflict with student seating sight lines to the marker board(s) and projection screens.
- 2) Ceiling Height: Min.9 feet at rear of room; min. 15 feet at front of room at projection screen. For large rooms (~200 seats), would prefer ceiling height of 20' at front of room.
- 3) Doors: Min. two, each with narrow door light.
- 4) General non-seating floors: Vinyl tile, prefer carpet
- 5) Tiered Risers: Carpeted with vinyl nosings and risers
- 6) Walls: Light color, min. 85% reflectivity. Consider the use of an accent wall (usually the rear wall)
- 7) Ceilings: 2 x 2 acoustical panels and grid, white.
- 8) Additional Acoustical Treatment: Voice projection system or PA system should augment the natural voice volume. Some wall treatment should be considered.

- 9) Electronic Equipment Closet: This space shall only open into the main classroom. No exterior doorways are permitted.
- 10) (Optional) Projection Room: This space shall open into a corridor or foyer.
- 11) (Optional) Preparation Room: This space shall open into a corridor or to the exterior. It may require an exhaust system, or special storage (e.g., hazardous materials).

#### **2.5d Lighting**

- 1) Recessed 2 x 4 fluorescent, parabolic, controlled by dimming system. Ballasts shall be dimming ballasts compatible with the approved dimming system and occupancy sensors. Refer to Electrical requirements in Division 16 of this Guideline.
- 2) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lockout the other nor change the preset controls of the dimming system.
- 3) There shall be a minimum of three dimming zones – Zone 1 for the front two rows of light fixtures above the seating area, Zone 2 for the middle two rows of light fixtures and Zone 3 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls must be compatible with the approved dimming system.
- 4) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.
- 5) Special lighting to illuminate maps or charts may be required. Such lighting shall be zoned separately to allow control via the AMX control system.
- 6) Special lighting to illuminate demonstration area may be required. Such lighting shall be zoned separately to allow control via the AMX control system.
- 7) For larger rooms, aisle lighting should be considered.

#### **2.5e Power Outlets**

- 1) In addition to outlets for the seating system, provide general room perimeter outlets.

#### **2.5f Special Equipment Power Requirements**

- 1) LCD Projectors Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for each LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (it must be on the same phase). Depending on the anticipated load from the projectors and the equipment in the instructor console, two dedicated circuits may be required. A "kill switch" should be provided that will interrupt power to the receptacle the LCD projector is plugged into. This switch should be located in the Electronic Equipment Closet or the Projection Room, and should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle in the floor at the location of the instructor console.
- 3) Provide duplex receptacle for electronic marker board at appropriate wall elevation.
- 4) Provide one quad power receptacle in the Electronic Equipment Closet.

- 5) Provide one quad power receptacle in the Projection Room in the vicinity of the projectors.
- 6) Provide a minimum of one GFI quad power receptacle in the demonstration bench.

### **2.5g Data/Communications Outlets and Infrastructure**

- 1) Provide one concealed 2" diameter conduit (with pull string) running from each LCD Projection Bracket to a floor located junction box at the instructor console. May be part of the path from the instructor's console to the Electronic Equipment Closet or Projection Room. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 2) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box beside the instructor console (for low-voltage control of projection screen).
- 3) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box beside the instructor console (for AV interface to dimming system).
- 4) Instructor console data circuits: Specify five Category 5 data circuits and receptacle at the instructor console.
- 5) Provide one (1) 1" conduit and pull string from electronic marker board to instructor console.
- 6) Provide four (4) 2" conduits and pull strings from the instructor's console to the Electronic Equipment Closet or Projection Room.
- 7) Provide one (1) 1" conduit from Electronic Equipment Closet to each speaker.
- 8) Provide two (2) 1" conduits (or chase) from demonstration bench to instructor console.

### **2.5h Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### **Example of Satisfactory Classroom(s) on Campus**

Example Straight row orientation: Fisher Lecture Hall, Carraway 101

## **2.6 Class V Classroom: 100+ students, Combination Lecture/Performance Venue**

### **2.6a Area and Affiliated Spaces**

- 1) Classroom Seating Area: Min. 17 NSF/Student, max. 19 NSF/Student. (Area includes aisle ways within seating area.)
- 2) Number of Accessible Seating Spaces: Five for 101 to 125 persons OR as per code requirements.

- 3) Lectern/Podium: Minimum of 8' from front wall for the width of the front wall. ADA access (for instructors) must be maintained for this area.
- 4) Performance Stage: Consult with Individual Department.
- 5) Electronic Equipment Closet: 25 NSF for single stacked rack of equipment. Will require HVAC supply.
- 6) Projection Room (optional): approximately 200 NSF, depending on configuration. Will require HVAC supply.
- 7) Ticket Office: approximately 200 NSF.
- 8) Foyer (optional): To accommodate students waiting on change of classes. This area may contain rest rooms. Sound isolation is important.

### **2.6b Furnishings and Equipment**

- 1) Seating: Fixed auditorium seating with large or over-sized folding tablet arms. Accessible seating shall have continuous desktop surface for wheelchair access. Provide one loose chair per accessible station matching auditorium seats.
- 2) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Table top desk and chair
  - Marker Board: 4' ht. X 8' length, portable (typical)
  - Projection Screens: Two electric screens, with recessed mounting. Switch is to be located adjacent to the instructor console. Viewing angles should not be worse than 30 degrees for the seats on the side to the farthest edge of the projected images.
  - LCD Projectors: Recessed projector lifts centered on the appropriate projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projectors is to be made only by ACNS. A projection room may be considered to house the LCD projectors.
  - Instructor console, approximately 30"(d) x 72"(w) x 40"(h), containing a computer, VCR, DVD player, AMX control system, video switching equipment, laptop interface, and two document cameras. The instructor console shall be located with a minimum of 4' clear distance between the front wall and the rear face of the instructor console. Easily accessible storage for this console must be provided.
  - Speakers, mounted at the edges of the front wall. May be recessed into front wall.
  - Equipment rack, located in Electronic Equipment Closet, containing audio equipment.
  - Voice amplification system used for instructional purposes should be separate from system used for performances.

### **2.6c Architectural Features**

- 1) Acoustics: ACNS strongly recommends that the design professional retain an acoustical engineer to assist with the design of the room, along with the specification of any voice amplification system to be used for performance purposes.
- 2) Room Configuration: Traditional auditorium orientation, sloped or tiered floor.
- 3) Screen. For large rooms (~200 seats), would prefer ceiling height of 20' at front of room. Performance considerations may call for even higher ceiling heights.

- 4) Doors: Min. two, each with narrow door light.
- 5) General non-seating floors: Carpet
- 6) Tiered Risers: Carpeted with vinyl nosings and risers
  - 3) Walls: Light color, min. 85% reflectivity. Consider the use of an accent wall (usually the rear wall)
  - 4) Ceilings: 2 x 2 acoustical panels and grid, white.
  - 5) Additional Acoustical Treatment: Voice projection system or PA system should augment the natural voice volume. Wall treatment must be considered.
- 10) Electronic Equipment Closet: This space shall only open into the main classroom. No exterior doorways are permitted.
- 11) (Optional) Projection Room: This space shall open into a corridor or foyer.

#### **2.6d Lighting**

- 1) Classroom and performance lighting should be separated, with separate controls and capable of being programmed separately. Refer to Division 16 for further requirements related to occupancy sensors.
- 2) Classroom and general-purpose house lighting (e.g., aisle lights): Prefer recessed 2 x 4 fluorescent, parabolic, controlled by approved dimming system. Ballasts shall be dimming ballasts compatible w/approved dimming system.
- 3) Performance: Requirements determined by Department, in consultation with ACNS.
- 4) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lockout the other nor change the preset controls of the dimming system. Classroom and general-purpose house lighting shall also be controlled from the control booth.
- 5) There shall be a minimum of three dimming zones – Zone 1 for the front two rows of light fixtures above the seating area, Zone 2 for the middle two rows of light fixtures and Zone 3 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls shall be by "Lutron Electronics Company."
- 6) If the room will contain permanently-installed whiteboards, to completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.
- 7) Aisle lighting shall be provided.

#### **2.6e Power Outlets**

- 1) In addition to outlets for the seating system, provide general room perimeter outlets.

#### **2.6f Special Equipment Power Requirements**

- 1) LCD Projectors Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for each LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (it



must be on the same phase). Depending on the anticipated load from the projectors and the equipment in the instructor console, two dedicated circuits may be required. A "kill switch" should be provided that will interrupt power to the receptacle the LCD projector is plugged into. This switch should be located in the Electronic Equipment Closet or the Projection Room, and should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).

- 2) Provide one quad power receptacle in the floor at the location of the instructor console.
- 3) Provide duplex receptacle for electronic marker board at appropriate wall elevation.
- 4) Provide one quad power receptacle in the Electronic Equipment Closet.
- 5) Provide one quad power receptacle in the Projection Room in the vicinity of the projectors.
- 6) Provide a minimum of one GFI quad power receptacle in the demonstration bench.

### **2.6g Data/Communications Outlets and Infrastructure**

- 1) Provide one concealed 2" diameter conduit (with pull string) running from each LCD Projection Bracket to a floor located junction box at the instructor console. May be part of the path from the instructor's console to the Electronic Equipment Closet or Projection Room. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 2) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box at the instructor console (for low-voltage control of projection screen).
- 3) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box at the instructor console (for AV interface to dimming system).
- 4) Instructor console data circuits: Specify five Category 5 data circuits and receptacle at the instructor console.
- 5) Provide one (1) 1" conduit and pull string from electronic marker board to instructor console.
- 6) Provide four (4) 2" conduits and pull strings from the instructor's console to the Electronic Equipment Closet or Projection Room.
- 7) Provide one (1) 1" conduit from Electronic Equipment Closet to each speaker.
- 8) Provide two (2) 1" conduits (or chase) from demonstration bench to instructor console.

### **2.6h Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### **Example of Satisfactory Classroom(s) on Campus**

Example: Williams 123 (Conradi Theater)

## **2.7 Class VI Classroom: Computer Classroom, 24-32 Students**

### **2.7a Area and Affiliated Spaces**

- 1) Classroom Area: Min. 24 NSF/Student, max. 28 NSF/Student
- 2) Number of Accessible Seating Spaces: One
- 3) Lectern Area: Included with student area
- 4) Network Equipment/File Server Room: approximately 100 NSF (will require HVAC supply)

### **2.7b Furnishings and Equipment**

- 1) Seating: Tables (minimum of 60" x 30") and task chairs.
- 2) Accessible Seating: Desks and loose chair for accessibility-impaired students: One station
- 3) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Marker Board: 4' ht. X 16' length (typical)
  - Projection Screen: Electric, matte white screen, typically 84"W x 84"H; recessed mounting not required, mounted on front wall of classroom. Switch is to be located adjacent to the instructor console.
  - LCD Projector: A ceiling-suspended LCD projector bracket centered on the projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projectors is to be made only by ACNS.
  - Instructor console, approximately 30"(d) x 66"(w) x 37"(h), containing a computer, VCR, DVD player, video switching equipment, amplifier, laptop interface, and document camera. The instructor console shall be located with approximately 3'-6" clear distance between the front wall and the rear face of the instructor console.
  - Speakers (mounted within 2x2 ceiling grid)
  - One computer per student.

### **2.7c Architectural Features**

- 1) Room Shape: traditional rectilinear, 2:3 ratio oriented to instructional area at front of room.
- 2) Ceiling Height: Min. 10 feet.
- 3) Doors: Min. one, with narrow door light, located at front of the room
- 4) Floors: Carpet
- 5) Walls: Light color, min. 85% reflectivity.
- 6) Ceilings: 2 x 2 acoustical panels and grid, white.
- 7) Additional Acoustical Treatment: As required.

#### **2.7d Lighting**

- 1) Recessed 2 x 4 fluorescent, parabolic, controlled by Lutron dimming system. Ballasts shall be dimming ballasts made by Lutron Electronics Company.
- 2) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lock out the other nor change the preset controls of the dimming system.
- 3) There shall be two dimming zones – Zone 1 for the front row of light fixtures above the seating area, and Zone 2 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls shall be by "Lutron Electronics Company."
- 4) General lighting (full on / full off) shall be located at the Classroom entrance.
- 5) If lighting is not dimmable, then "inboard/outboard" switching should be used, and row of lights at front of room should be switched separately.
- 6) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.

#### **2.7e Power Outlets**

- 1) Quadraplex adjacent to each communications outlet, standard duplex receptacles other walls.

#### **2.7f Special Equipment Power Requirements**

- 1) LCD Projector Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for the LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (must be on same phase). A "kill switch" located adjacent to the instructor console should be provided that will interrupt power to the receptacle that supplies power to the LCD projector. This switch may be located adjacent to the dimmer controls. This switch should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle on the wall beside the instructor console.
- 3) Provide one quad power receptacle on wall at the end of each "finger" of tables. Typically, each "finger" will have 4 computers.
- 4) In some cases, tables with built-in power and data will be used.

#### **2.7g Data/Communications Outlets and Infrastructure**

- 1) One RJ45 data outlet with 4 data circuits shall be provided on the wall beside the instructor console.
- 2) One RJ45 data outlet per "finger" of tables (typically, 4 computers per "finger"), with sufficient data circuits for the number of computers. Because of the number of data circuits involved, the design professional is strongly encouraged to

investigate the use of data raceways, and wire trays (above ceiling) instead of the standard method of one 1" home-run conduit per outlet. If raceway is chosen, please consult with ACNS for specifications.

- 3) Provide one concealed 2" diameter conduit (with pull string) running from the LCD Projection Bracket to a junction box beside the instructor console. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 4) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box at the instructor console (for low-voltage control of projection screen).
- 5) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box at the instructor console (for AV interface to dimming system).

### **2.7h Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### **Example of Satisfactory Classroom(s) on Campus**

Hoffman 104, Carothers 315A

## **2.8 Class VII Classroom: Distance Learning Classroom, 24-32 Students**

### **2.8a Area and Affiliated Spaces**

- 1) Classroom Area: Min. 24 NSF/Student, max. 28 NSF/Student
- 2) Number of Accessible Seating Spaces: One
- 3) Lectern Area: Included with student area
- 4) Additional space for peripherals (e.g., fax machines) should be provided. Extra storage and work counters may also be needed.
- 5) (Optional) Equipment Room: approximately 100 NSF (will require HVAC supply)

### **2.8b Furnishings and Equipment**

- 1) Seating: Tables and Chairs are preferred. Tables should be 18" deep by 60" wide. For some rooms, standard student desks with fixed arm tablets may be considered.
- 2) Accessible Seating: Desks and loose chair for accessibility-impaired students: One station
- 3) Instructional Furniture and Equipment:
  - Portable stand-up lectern
  - Marker Board: 4' ht. X 16' length (typical) [Should be light gray in color.]

- Projection Screen: Electric, matte white screen, typically 84"W x 84"H; recessed mounting not required, mounted on front wall of classroom. Switch is to be located adjacent to the instructor console.
- LCD Projector: A ceiling-suspended LCD projector bracket centered on the projection screen and located between 12'-0" and 18'-0" from the center of the bracket to the face of the projection screen, depending on the size of the projected image. These distances are preliminary and are to be used only for planning purposes. Final determination of the exact location of the projectors is to be made only by ACNS.
- Instructor console, approximately 30"(d) x 66"(w) x 37"(h), containing a computer, VCR, DVD player, video switching equipment, amplifier, laptop interface, and document camera. The instructor console shall be located with approximately 3'-6" clear distance between the front wall and the rear face of the instructor console.
- Fax machine.
- Videoconferencing equipment, including cameras.
- Speakers (mounted within 2x2 ceiling grid)
- Additional video monitors or LCD projectors as necessary to display people at remote location.

### **2.8c Architectural Features**

- 1) Room Shape: traditional rectilinear, 2:3 ratio oriented to instructional area at front of room.
- 2) Ceiling Height: Min. 10 feet.
- 3) Doors: Min.one, with narrow door light, located at front of the room.
- 4) Windows: No windows.
- 5) Floors: Carpet
- 6) Walls: Light color, min. 85% reflectivity. The front wall should be painted a light gray.
- 7) Ceilings: 2 x 2 acoustical panels and grid, white.
- 8) Additional Acoustical Treatment: As required.

### **2.8d Lighting**

- 1) In order to obtain a quality video image of the instructor and students, additional lighting sufficient to generate 90 – 100 foot-candles should be installed.
- 2) Recessed 2 x 4 fluorescent, parabolic, controlled by an approved dimming system. Ballasts shall be dimming ballasts shall be compatible with the approved dimming system..
- 3) Lighting shall be controlled at the room's entrances and adjacent to the instructor console. Lighting shall be such that no one location can lock out the other nor change the preset controls of the dimming system.
- 4) There shall be two dimming zones – Zone 1 for the front row of light fixtures, and Zone 2 for the remaining light fixtures. Dimming controls shall be located near the instructor console. Dimmer controls shall be compatible with an approve dimming system.
- 5) General lighting (full on / full off) shall be located at the Classroom entrance.

- 6) If lighting is not dimmable, then "inboard/outboard" switching should be used, and row of lights at front of room should be switched separately.
- 7) To provide adequate illumination of the instructor, one or more additional fixtures specifically designed for videoconferencing may be required.
- 8) To completely illuminate the whiteboard and the instructor area, we prefer a continuous, end-to-end row of 2 x 4 fluorescent fixtures, installed parallel to and running the length of the whiteboard. The fixtures shall be located at a distance from the whiteboard such that the light is evenly dispersed across the entire whiteboard. The fixtures shall be equipped with white, flat diffuser inserts. This row shall be separately switched as either full-ON or full-OFF.

#### **2.8e Power Outlets**

- 1) Quadraplex adjacent to each communications outlet, standard duplex receptacles other walls.

#### **2.8f Special Equipment Power Requirements**

- 1) LCD Projector Power: A duplex receptacle shall be provided above ceiling (in the vicinity of the projector bracket) for each LCD projector. The receptacle should be circuited on the same dedicated circuit as the power for the instructor console (must be on same phase). A "kill switch" located adjacent to the instructor console should be provided that will interrupt power to the receptacle that supplies power to the LCD projector. This switch may be located adjacent to the dimmer controls. This switch should be a keyed switch (e.g., Hubbell Lock-type switch, #1221L).
- 2) Provide one quad power receptacle on the wall beside the instructor console.

#### **2.8g Data/Communications Outlets and Infrastructure**

- 1) One RJ45 data outlet with 5 data circuits and one analog telephone circuit shall be provided on the wall beside the instructor console.
- 2) Provide one concealed 2" diameter conduit (with pull string) running from the LCD Projection Bracket to a junction box beside the instructor console. The conduit shall be fitted with a plastic bushing ring at the projector location. All 90-degree elbows shall be "communication sweeps", and there shall be no more than three such sweeps per conduit run between the projector and the junction box at the instructor console.
- 3) Provide one concealed ¾" conduit (with pull string) running from the motorized projection screen to the junction box at the instructor console (for low-voltage control of projection screen).
- 4) Provide one concealed ¾" conduit (with pull string) from dimming control system bus to the junction box at the instructor console (for AV interface to dimming system).
- 5) Additional conduit may be required for camera locations and video monitor (or LCD projector) locations.

## **2.8g Room Security**

- 1) In addition to keyed lever latchsets and closers, provide card access system (low voltage) entry to the selected main entry door. All doors accessing the room shall have door security contacts wired to the security system. Provide wall and/or ceiling mounted motion sensors in the room.

### **Example of Satisfactory Classroom(s) on Campus**

BEL 008

**END OF SECTION**