SECTION 13 10 00 - DESIGN CRITERIA FOR MULTIMEDIA CLASSROOMS

1.1 PRIMARY MISSION

A. The primary mission of every educational institution is to provide instruction. Since most conventional instruction takes place in a classroom, it is imperative to recognize its importance to the total learning environment experienced by the students. However, classrooms have historically suffered from a lack of attention, both in original design as well as construction. Students should have a classroom learning environment that allows them to see anything presented visually, to hear any audible presentation and to be physically comfortable. All of these factors are fundamental and equally important in designing an environment that is conducive to learning.

B. The requirements for audiovisual presentations are undergoing a continuous change from an audio-visual supported environment to an electronic based media environment. This change in requirements is expected to continue into the future as the change in computer based information, digital communications and digital technology continues.

C. Designing a multimedia based facility which accommodates information and presentation technologies to meet today's needs and future needs requires careful planning and organization. It requires the close collaboration of Architect, Mechanical Engineer, Electrical Engineer, Lighting Designer, Audio-Visual Specialist, Information Technologist and Instructor. Infrastructure design for "multimedia classrooms" must address requirements for A/C power, HVAC systems, cable distribution, ceiling heights, structural support, noise control, lighting, ergonomics and interior room acoustics. It is imperative that careful planning for technology become an integral part of the building's architectural design process in order to provide an infrastructure that will not only accommodate current technologies but one which can adapt to the rapid evolution of information and presentation technologies well into the future.

D. The guidelines put forth in this document are not intended to be either static or stand-alone. They are not intended to establish rigid standards for the design, construction, or renovation of multimedia classrooms. They are general guidelines that will need to be adapted to specific applications and within specific projects early in the planning process. These guidelines are aimed at creating instructional spaces that are adequate for current requirements yet fully adaptable to the needs of the future.

E. Case Western Reserve University's Multi-Media Information System (MMIS) is more than simply installing audio-visual equipment into the classroom. It is part of the University's approach to an "electronic learning environment" in which Instructors, as well as students, are given access to information resources which are available beyond the four walls of the traditional classroom. It can enhance the educational process by incorporating all senses into the learning experience. Architecture, acoustics, electrical and mechanical systems, as well as the media system itself, must all be optimized in order to achieve a quality learning environment. Temperature and humidity should be stable and comfortable. The room should be acoustically sound and free from distracting noise and outside disturbances. Lighting should be appropriate for each use and easily controllable. Electrical systems should be appropriately designed and rated for use with electronic media. The projected images should be large enough and bright enough for everyone in the room to see without experiencing fatigue. Special control systems are an important component of each facility and are designed to greatly reduce the

complexity of system operation. This allows the instructor to concentrate on his or her presentation instead of being distracted by a series of complex equipment control functions.

1.2 GENERAL CLASSROOM CHARACTERISTICS

A. Classrooms should be concentrated on the lower floors of buildings. This provides the students, disabled students in particular, with better access and allows support services to be provided more conveniently.

B. Classrooms should be located away from noise-generating activities taking place either outside or within the building. Classrooms shall be located away from loud machinery, vending machines, offices, labs and traffic areas as well as outside traffic noise.

C. The size of the classroom should be designed to accommodate the programmed number of occupants as well as provide for additional support space. The support space must take into consideration both the set-up and use of audio-visual equipment, access for the disabled, an instructor workstation, circulation and empty floor space needed to keep the students from being seated too close to a chalkboard, projection screen, or video monitor.

D. In order to accommodate an information display large enough to display images of adequate size, it must be placed high enough from the floor to provide unobstructed sight lines. The front wall and ceiling (including structural members) should be designed at a height and width, which is large enough to accommodate the proper installation of appropriately, sized and number of displays.

E. There shall be no columns in any classroom. Columns placed within the room's interior space severely hamper room arrangement and student viewing of the instructor and visual aids.

F. The front wall of the room behind the instructor area should have no protrusions (structural or otherwise) into the room so that chalkboard, markerboards, projection screens or information displays can be installed across the entire wall of the instructor area.

G. There should be no decorative elements such as paintings or other artwork located within the classroom.

H. The overall noise criterion of less than 30 is required. The maximum sound level shall not exceed 35dBA.

1.3 CLASSROOM SHAPE

A. A rectangular shaped room is best.

B. The ideal room dimension ratio is 1(H): 1 1/2(W): 2 1/2(L).

C. The length of the room should not exceed its width by more than 50%.

D. The instructor area and information displays should be located on the narrow wall of the room. Rooms wider than they are deep usually present unacceptable viewing angles for information displays and for information written on the chalkboard/markerboard.

1.4 CLASSROOM SURFACES AND FINISHES

A. The front wall (i.e. the wall at the sending end of the classroom), should be hard surfaced (e.g., drywall, masonry or wood) with no special acoustical shaping or treatment.

B. The front three-quarters of each sidewall should be constructed of hard (acoustically-non absorbent) materials (e.g. drywall, masonry or wood). These walls can be painted or vinyl-surfaced, but should not employ fabric covering or any other acoustically absorbent finish.

C. Install acoustically absorbent finish on the rear one-fourth of the sidewalls in order to absorb useless reflections and to dampen standing waves, which reduces the room's "boominess".

D. Install acoustically absorbent material on the rear wall.

E. Ceilings should be of light color and of nonreflective material.

F. Painted surfaces should be light in color (preferably light blue or beige for good video reproduction) and should be a durable finish to allow washing.

G. Acoustically absorbent surfaces should be light in color, preferably light blue or beige, for good video reproduction.

H. In general, black or white surfaces should be avoided.

I. The classroom floors shall be carpeted with an anti-static, high traffic, commercial grade carpeting with no padding.

J. The reflectance values of paints, vinyl coverings, laminates and other finish materials should be selected to enhance ambient illumination and the illumination at work surfaces. The following values are recommended:

1. Ceilings: 70% - 90%
2. Walls: 40% - 60%
3. Floors: 30% - 50%
4. Desktops: 35% - 50%
5. Chalkboards: 20% - 30%

1.5 WALL CONSTRUCTION

A. Walls shall be mechanically isolated from the building structure and shall be isolated at the top and bottom with a Neoprene seal or equivalent.

B. Walls shall go from slab to slab in order to reduce noise paths into the room.

C. Three layers of 5/8" drywall shall be used on all interior face of walls and two layers of 5/8" drywall shall be used on all exterior face of walls.

D. Drywall seams should be staggered and each layer shall be taped and mudded individually.

1.6 WINDOWS

A. All window treatments shall be opaque and capable of eliminating all outside light from reaching the information displays. Window treatment shall be installed with channels in order to provide a light-tight abutment to the window frame.

B. A motorized window shading system, which can be integrated, with external audio-visual control systems shall be installed for each window.

1.7 DOORS

A. Doors shall be located in the back of the classroom in order to minimize disruption.

B. Doors shall be 2" thick sound-rated or at a minimum solid core to prevent noise from entering the room.

C. Doors shall be equipped with acoustically rated compressive seals.

D. All doors shall be a minimum of three feet wide and shall be equipped with a vision panel made of shatterproof glass and tinted to reduce light transmission. The area of the glass shall not exceed 100 square inches and shall be double pane with acoustically rated seals.

E. Because ventilation louvers permit sound transmission, doors shall not contain louvers.

1.8 CEILINGS

A. A minimum 9-foot ceiling height shall be utilized for rooms with less than 20 people. For rooms with a capacity between 21-49 people a minimum ceiling height of 10 feet shall be used.

B. Soffits shall be avoided as they can cause unwanted acoustical reflections.

C. The surface of the ceiling must be designed to accommodate the required acoustical properties of the room. The area of the ceiling to be acoustical tile is a function of ceiling height.

1. A 9 foot ceiling height calls for 40% - 50% of the total ceiling area to have acoustic tile.
2. A 10 foot ceiling height calls for 50% - 60% of the ceiling to have acoustic tile.

D. The acoustic tile shall be arranged in the form of a U around the perimeter of the room, with the opening at the front and the remainder of the ceiling a hard material such as drywall or plaster.

E. Ceiling tiles with a Noise Reduction Coefficient (NRC) of .55-.65 and a minimum Sound Transmission Coefficient (STC) of 40 shall be used.

F. Access hatches must be installed in the ceiling wherever drywall or plaster is used to facilitate access to the entire ceiling cavity.

1.9 SEATING REQUIREMENTS

A. For preliminary planning purposes, 20 square foot per student should be used. This will allow

for seating, circulation, media equipment, and space requirements to meet accessibility standards and adequate lecture space.

B. Classroom HVAC Requirements:

1. Classrooms shall be maintained in accordance with the general building specifications regarding temperature and humidity.
2. System components (fans, ductwork and diffusers) shall be selected to meet the sound criteria of NC 20 to NC 25
3. Projection booths, rear projection rooms and control rooms shall be equipped with separate HVAC systems or zoned independently of the classroom.

C. Classroom Lighting Requirements:

1. All classrooms must have a minimum of four lighting zones. These zones include:

   a. Ceiling recessed VDT parabolic luminaries for the room's general student area.
   b. One zone for the faculty workstation;
   c. one zone for the demonstration and lecture area and
   d. one zone for the chalkboard or markerboard.

2. Each zone shall be independently controllable via its own separate switch.
3. General guidelines for the selection of light fixtures should include the use of recessed lamps in sharp cutoff luminaries or shielded to provide controlled lighting with minimal light spill on information displays and to avoid shining light directly in the instructor's or student's eyes.
4. The lighting temperature of all lamps shall be specified at 3500°K.
5. Switching controls shall be located near the room entrances and on the front wall near the instructor's workstation.

D. Classroom Power Requirements:

1. Any audio-visual system requires clean, high quality ac power to operate correctly and reliably, with the lowest possible hum and noise. A conservative number of AC power circuits shall be dedicated exclusively to the audio-visual systems.
2. Electrical boxes must be staggered and shall not be placed "back to back" on any interior room surfaces.

1.10 LEVELS OF CLASSROOM TECHNOLOGY

A. The evolution of the classroom technology has resulted in the development of a three-level approach to system design and implementation. Each level is designed to add additional functionality to the overall system. They are based upon a foundation consisting of a well-designed classroom environment and campus network. The following table shows the components available to each level of classroom technology.

1. Level 1 :

   a. Projection Screen

b. Video Projector
c. Projector Remote Control
d. Laptop Computer Connection
e. Auxiliary Audio and Video Connection
f. Stereo Audio Playback
g. CWRUnet Faceplate
h. Telephone (optional)

2. Level 2 :

a. Projection Screen
b. Video Projector
c. Projector Remote Control
d. Laptop Computer Connection
e. Auxiliary Audio and Video Connection
f. Stereo Audio Playback
g. CWRUnet Faceplate
h. Telephone
i. VCR/DVD Player
j. Document Camera
k. Computer with Lectern LCD Display
l. Wireless Mouse
m. Integrated AV Control System
n. Teaching Station (optional)
o. Remote AV System Support
p. Touch Panel Control
q. Instructor Speech Reinforcement (optional)
r. Student Speech reinforcement (optional)
s. White Board with Image Capture (optional)

3. Level 3 :

a. Projection Screen
b. Video Projector
c. Projector Remote Control
d. Laptop Computer Connection
e. Auxiliary Audio and Video Connection
f. Stereo Audio Playback
g. CWRUnet Faceplate
h. Telephone
i. VCR/DVD Player
j. Document Camera
k. Computer with Lectern LCD Display
l. Wireless Mouse
m. Integrated AV Control System
n. Teaching Station
o. Remote AV System Support
p. Touch Panel Control
q. Video Conferencing Enabled
r. Instructor Camera
s. Instructor Microphone

t. Student Camera
u. Student Microphones
v. Remote Site Display
w. AV Recording Enabled (optional)
x. Instructor Speech Reinforcement (optional)
y. Student Speech reinforcement (optional)
z. White Board with Image Capture (optional)

B. The Level 1 system starts with a ceiling mounted video projection system that is chosen to best meet the requirements of the classroom environment. A projection screen provides an ideal viewing surface for data or video, displaying clear, bright images. A convenient interface plate provides connections for network, computer, video and audio sources. The system is controlled by a user-friendly remote control panel that allows users to turn the system on and off, select various input sources and adjust audio volume. Wall-mounted program speakers provide stereo sound for a complete multimedia experience. Each classroom also contains a telephone that allows faculty technical support should the need arise. The Level 1 classroom is designed to be deployed as a short-term solution and in rooms that seat less than 20 people.

C. The Level 2 system includes all the components and features found in the Level 1 system along with the addition of greatly enhanced presentation capabilities. Every Level 2 classroom features a teaching station that is specially designed to house the room's technology, yet has a relatively small footprint (2' x 4') that is no larger than the desks that are currently located in each classroom. The teaching station features a height-adjustable surface, which allows the system to be operated from a standing or sitting position. The teaching station also features a retractable keyboard and mouse tray, along with a built-in LCD monitor, which serves as a confidence monitor that provides the ability to display the same image on both the built-in monitor and projection system, allowing instructors to maintain eye contact with their students. A document camera serves as a significant upgrade from the traditional overhead projector. Not only does it offer the ability to display overhead transparencies, but it can be used to image (and capture) pages from a book or periodical, hand written notes, pictures, photographs, x-rays and even three-dimensional objects. All these images can be saved as html pages that can be retrieved over the network. A rack-mounted combination VCR/DVD player allows the instructor to incorporate the highest quality video in the classroom. The system is controlled by a user-friendly remote control panel that contains all the features found in a Level 1 classroom along with simple transport controls of the VCR/DVD players. The control system also features an expanded set of browser-based controls that enable access to more advance system control features, such as chapter and menu search of DVD titles. It also enables remote support of the classroom in that it allows technical support personnel to access classroom systems from a central location.

D. The Level 3 system includes all the components and features found in the Level 2 system along with a unique set of features, which enables the classroom to function as a video conference facility. A Level 3 classroom can be used as an endpoint for video conferences.

1.11 STANDARD A/V CLASSROOM LAYOUTS AND DETAILS

A. Attachment 13 10 00.01: Sheet A1 shows the Floor Plan and Reflected Ceiling Plan of a typical A/V Room is approximately 21' x 25'.

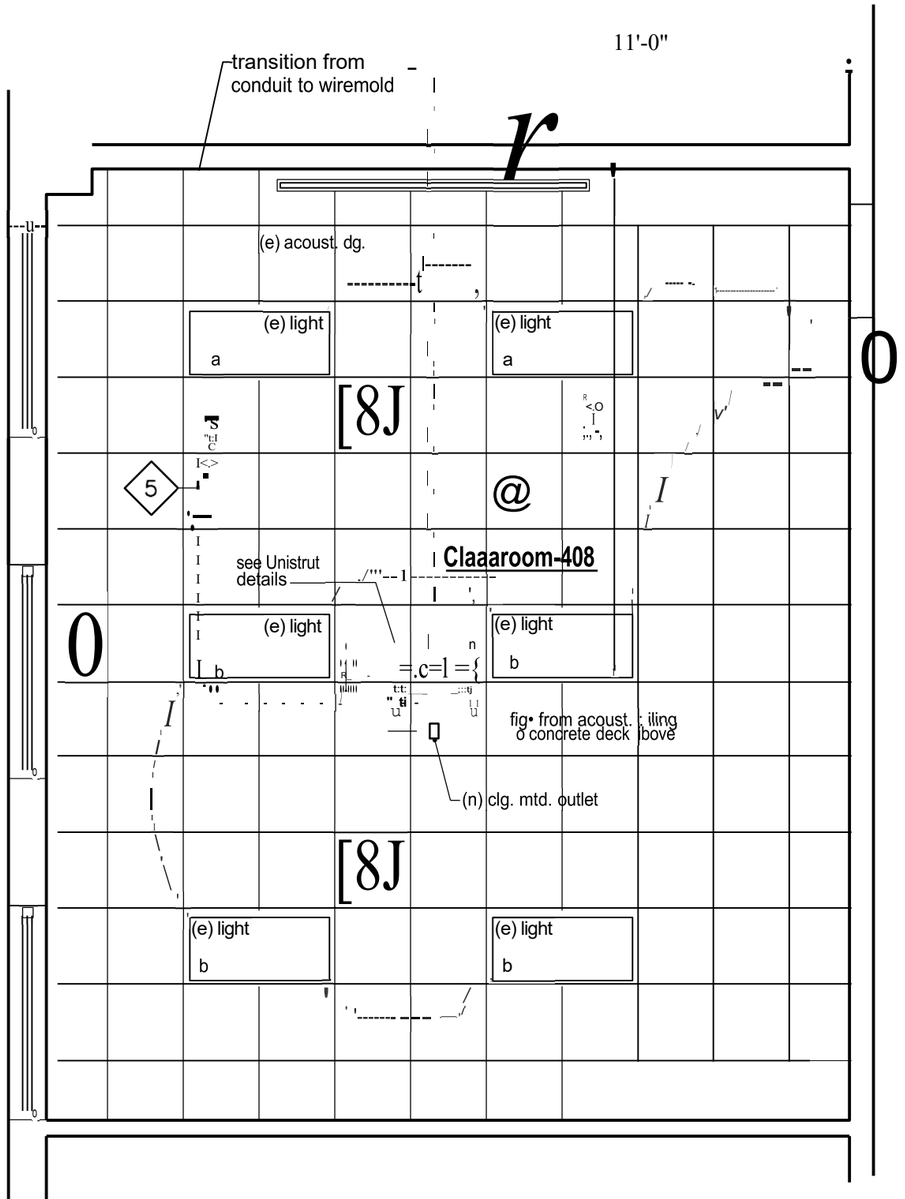
B. Attachment 13 10 00.02: Sheet A2 shows the Floor Plan and Reflected Ceiling Plan of a typical

A/V Room is approximately 22’ x 22’.

C. Attachment 13 10 00.03: Sheet A3 shows Unistrut Details for hanging screens and projectors.

D. Attachment 13 10 00.04: Sheet A4 shows an Interior Elevation of each Room.

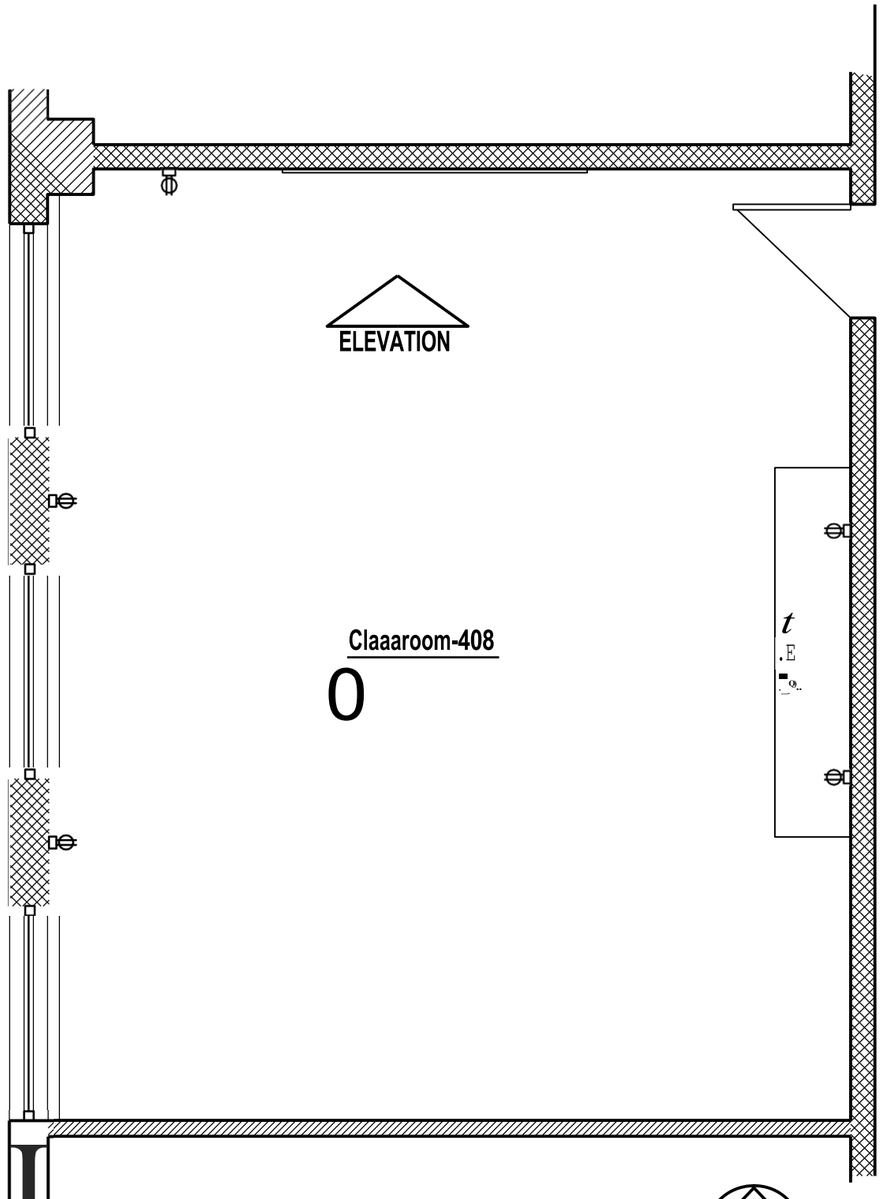
END OF SECTION



Ceiling Plan - Olin Rm. 408

1/4" = 1'-0"

2



Floor Plan - Olin Rm. 408

1/4" = 1'-0"

1

Drawing Notes:

0 Contractor to remove existing surface mounted single light switch and install new double light **switch** box. **Rewire** existing 6 lights as shown on ceiling pion.

Contractor to install Owner supplied motorized projector screen, Draper Premier, 6'h x **B'w.** Install screen approximately 4" off wall. See Dtl. 3 on Sheet A3. Modify acoustical cening as required to install screen and install a new opening in ceiling for screen lowering. Supply power as required and install Owner supplied switch. Wiremold by electrical contractor.

0 Install wiremold for new outlet boxes. 3 and 4 gang outlet boxes to be supplied by one wiremold

0 **New** speakers supplied **and** installed by Owner. Contractor to install bridle rings for Owner supplied speaker cables. Speaker cables to connect speakers to projector. Contractor to install **speaker** cables, Owner to install cable terminations.

Contractor to install 1-1/2" conduit from projector to above wiremolds. Contractor to install **wiremold** and gong outlet boxes. Contractor to install Owner supplied cables from projector to outlet boxes. Owner to install cable terminations.

0 Contractor to point all new exposed wiremold, conduits and outlet boxes to match existing adjacent walls. All patching and pointing to be included in their bid.

CWRU
Olin Bldg. - Rm. 408
A/V Installation

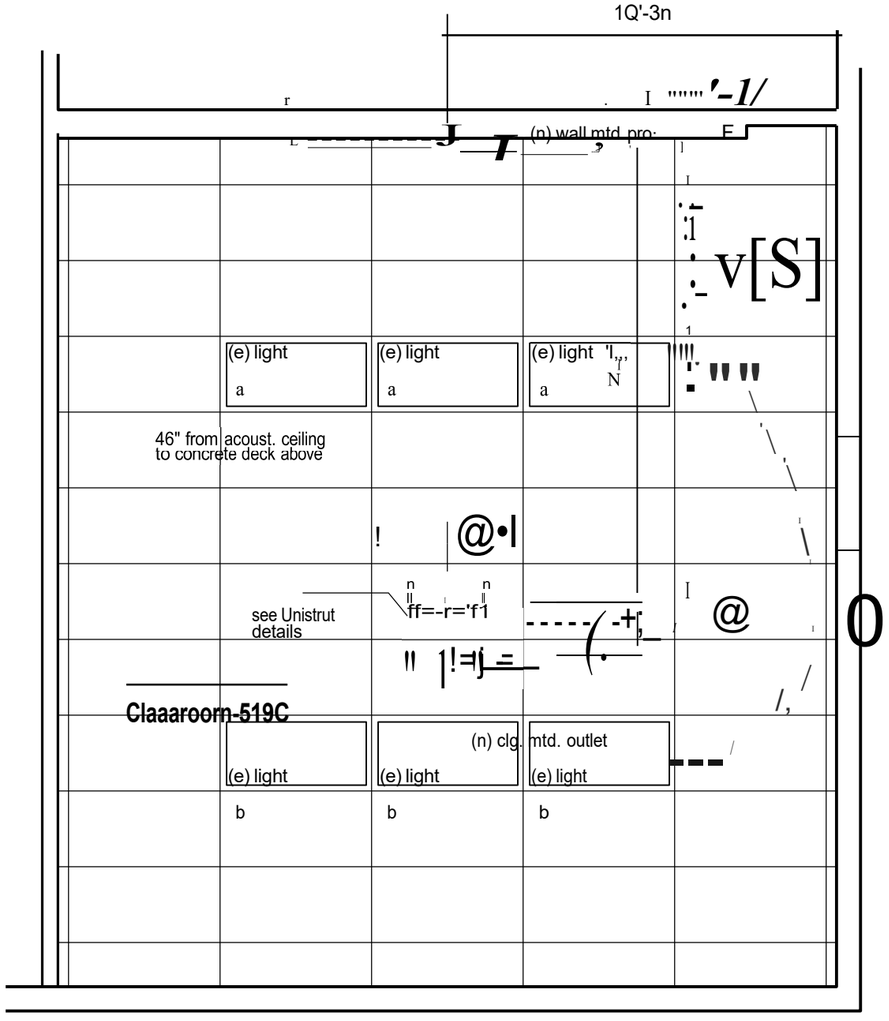
10600 Euclid Avenue
Cleveland, OH

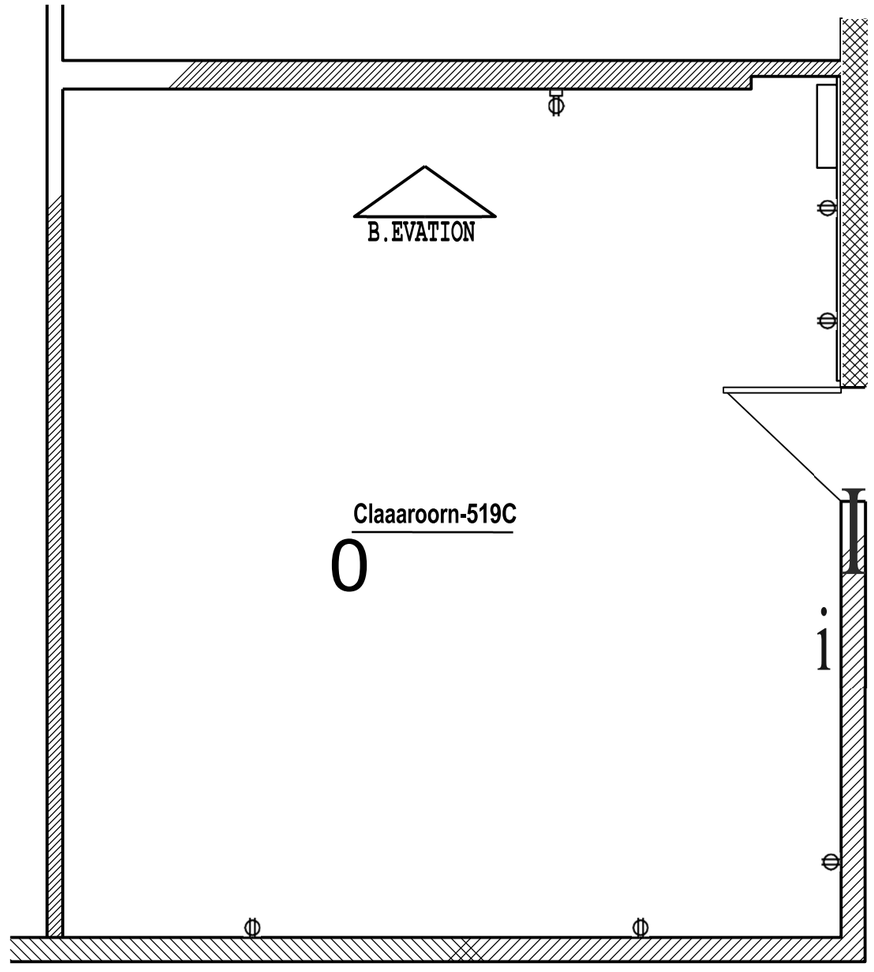
0904

SMITH Architects
10 North Main Street, 114
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Floor Plans

A1





Drawing Notes=

0 Contractor ta remove existing surface mounted single light **switch** and install new double light **switch** box. **Rewire** existing 6 lights as shown on ceDlng pion.

0 Install wiremold for new outlet boxes. 3 and 4 gong outlet boxes to be supplied by one wlremold.

0 New speakers supplied and installed by Owner. Contractor to install bridle rings for Owner supplied speaker cables. Speaker cables to connect speakers to projector. Contractor to install speaker cables, Owner to install coble terminations.

Contractor to instoll 1-1/2" conduit from projector to above wlremolds. Contractor to Install wlremold and gong outlet boxes. Contractor to install Owner supplied cables from projector to outlet boxes. Owner to Install coble terminations.

0 Contractor to point all new exposed wiremold, conduits and outlet boxes to match existing adjacent walls.

0 Contractor ta install Owner supplied wall mounted manual projector screen, Draper lumo2 60" x 80", os close os possible to celling. Install blocking so that the screen is installed out from the wall post the wlremold.

CWRU
Glennan Bldg. - Rm. 519C
A/V Installation

10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects
10 North Main Street, 114
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Floor Plans

Ceiling Plan - Glennan Rm. 519C

1/4" = 1'-0"

2

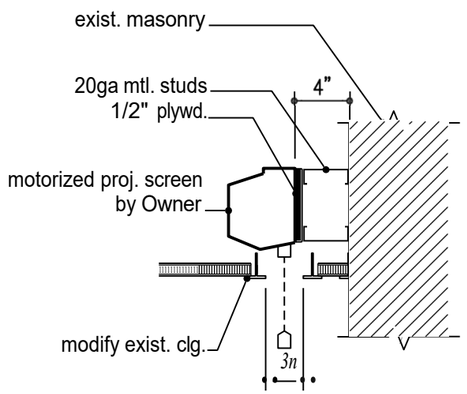
Floor Plan Glennan Rm. 519C

1/4" = 1'-0"

Refer-,ce North

1 **A2**

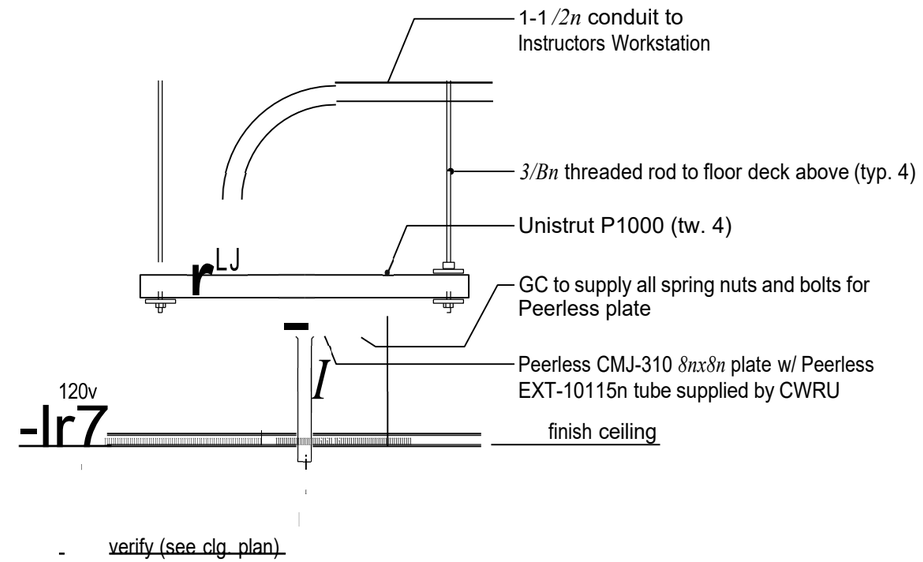
No.	Remarks	Date
	Bid Set	2/27/09



Olin Room 408 Proj. Screen Dtl.

1" = 1'-0"

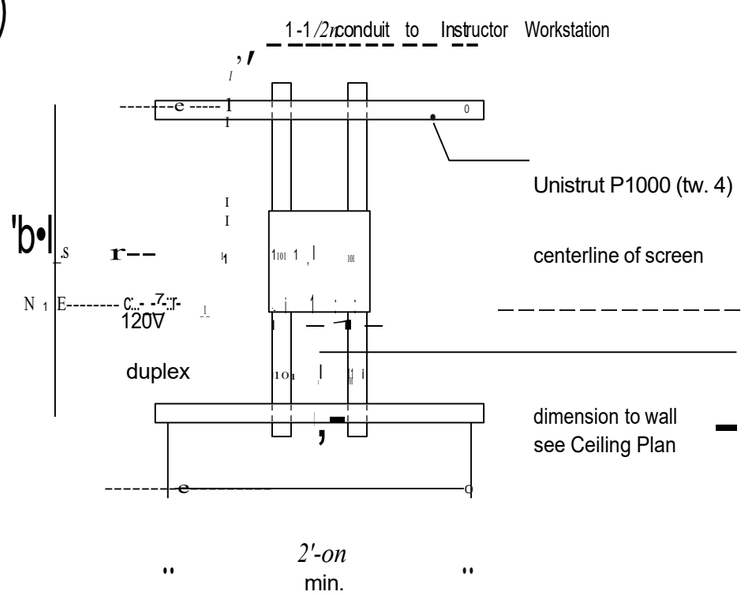
3



Project Unistrut Section

1" = 1'-0"

2



CWRU
Olin / Glennan Bldgs.

A/V Installation

10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects

oject Unistrut Plan

1" = 1'-0"

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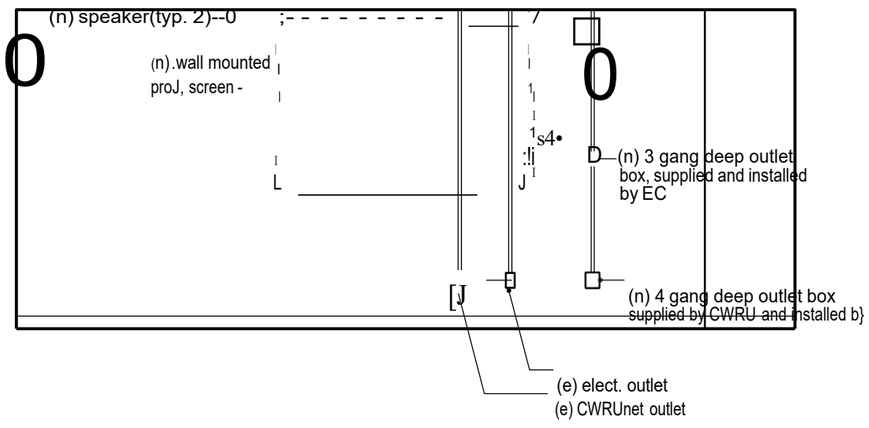
Details

1

A3

No.	Remarks	Date
	Bid Set	2/27/09



Glennan Room 519C Elevation

1/4" = 1'-0"

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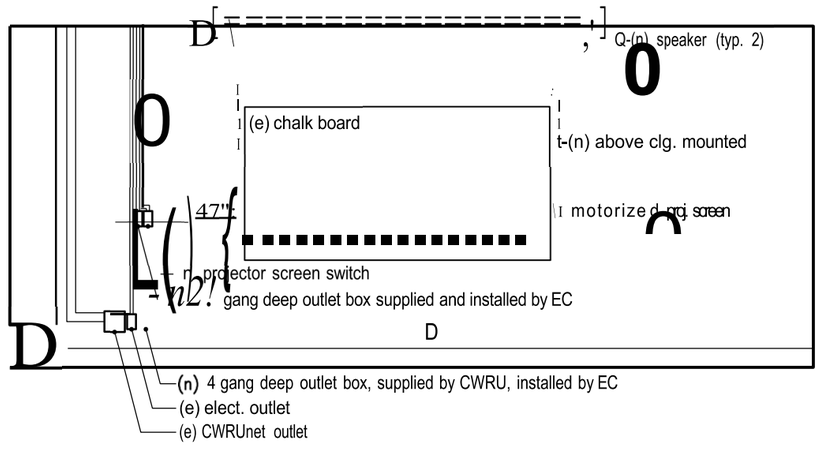

Olin Room 408 Elevation

1/4" = 1'-0"

1

CWRU
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AN Installation

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Elevations

A4