Best Practices Guide for Teaching and Learning Spaces

2010 - References: Alex Solunac, Ron Stevens, Classroom Design Manual 3rd edition

PART 1 GENERAL – Applicable to all Teaching and Learning Spaces (TLSs)

1.1. Introduction

This guide is to be used as a reference guide for best practices for standards dealing with the design of learning and teaching space at the University of Victoria. As each room has its own unique properties, the following standards apply to very basic requirements for providing a standard that is expected in teaching spaces on campus. This guide is by no means the only reference that architects or designers should use. *It is essential that Client Technologies be involved in every step of the process with the design and development of learning and teaching spaces on campus*.

Students have the fundamental right to a classroom learning environment that allows them to:

- see anything presented visually (sight lines),
- hear any audible presentation free from noise and distortions (acoustics), and
- be physically comfortable (air flow, temperature, furniture, etc.)

regardless of the method of instruction used. Any classroom design plan should first meet these requirements before meeting other needs.

As there are very different requirements for learning and teaching rooms, this guide focuses on five categories:

1. Lecture Halls,
2. Classrooms,
3. Computer Labs
4. Sciences Labs
5. Videoconferencing Rooms.

Separate guidelines have been provided for each type of classroom. However, the boundaries between them are not absolute and require some interpretation based on individual facilities and applications.

The provisions of this part (PART 1) apply to all Teaching and Learning Spaces, unless otherwise noted. Parts 2 to 6 specify additional requirements specific to each type of space.

1.2. Design Elements

1. Site and spatial relationships

Teaching and Learning Spaces (TLSs) should be separated from noise-generating activities inside or outside the building. To reduce external noise, sound buffers must separate classrooms from areas such as streets, parking lots, housing areas, plazas or other areas where students gather, recreation sites, athletic fields, waste pickup sites and loading docks. To reduce internal noise, classrooms should be isolated from building mechanical systems, elevators, restrooms, vending areas and other noise generating areas.

2. Building Entrances

To reduce the impact of exterior noise and temperature differences, all building entrances should have two sets of doors, one from the outside into a vestibule and a second from the

vestibule into the building. Building entrances should be near classrooms to limit the distance students must travel through non-instructional areas to reach classrooms.

Large capacity classrooms and lecture halls should be located closest to the building entry. Large numbers of students walking through hallways can disturb classes already in session; consider sound absorbing surfaces in corridors, where necessary to control noise.

If classrooms must be located on upper floors, the stairways must accommodate the number of students who may leave and arrive at the same time.

3. Restrooms

Restrooms shall be located on each floor and their capacity be calculated according to the number of students in the area during the class change, rather than to the capacity of the classrooms. To prevent noise transmission, classrooms and restrooms shall not have a common wall or ceiling.

4. Doors

All classroom and lecture hall doors shall be min. 900mm wide and have a vision panel in order to prevent injury when being opened. Vision panels shall be of shatter-resistant glass, tinted to reduce light transmission. Code permitting, the area of glass shall not exceed 375cm^2 (60 sq in). The base of the vision panel shall be at 1070mm and the top not lower than 1820mm (42" to 72") above the floor.

Door handles shall be leaver type (not knobs) for accessibility. All doors shall be equipped with hardware that provide a slow and quiet closure to a tight sound seal when fully closed. To facilitate traffic flow during the change of classes, provide door hold-open hardware.

Doors shall not contain ventilation louvers, as they permit sound transmission from hallways.

Doors should be located to minimize congestion problems in the hallway when classes are changing. When possible, doors should be recessed into the room so that the door does not swing into the hallway and shall not swing into the primary flow of traffic, to minimize the danger of someone in the hallway walking into the leading edge of the door. If it is necessary for the door to open into the hallway, provide visual identification (such as the tile pattern on the floor) to indicate the amount of space required by a swing-open door.

5. Spatial Configuration

There must be no posts, pillars or any other obstructions anywhere inside a TLS, that would block the view of the teaching area or screens from any seat.

6. Seating

At least 10% of the seating in all classrooms shall be for left-handed students.

All classrooms shall provide seating for students with a disability (1 for up to 25, 2 for 26 – 50, 4 for 51 – 300, 6 for 300-500).

Tablet armchairs shall provide the student with at least 1,000cm^2 (150 sq in) of writing surface and 1.2 to 1.4m^2 (13 – 15 sq ft) of space.

Classrooms with tables and chairs require a minimum of 1.85m^2 (20 sq ft) for each student.

Tables shall be 460 - 610mm deep.

1.3. Acoustics – Lecture Halls and Classrooms

1. General - Good listening conditions (i.e. a quiet room) depend on four basic factors:
    1. The amount of noise entering the room from outside sources.
    2. The loudness of the various sound sources within the room (with or without amplification)
    3. The distribution of sound to all parts of the room
    4. The fidelity and clarity of the sound (lack of echo, reverberation, distortion etc.)

2. Walls

Walls should have a minimum Sound Transmission Class (STC) rating of 52. All walls shall extend to the structural floor or roof above (do not stop at the dropped ceiling). This will reduce noise transmission as well as improve security.

Higher STC ratings and special wall construction details must be included whenever classrooms must be located adjacent to, above or below restrooms, mechanical rooms, elevator shafts etc.

Concrete masonry units may be used as structural walls, but may have to be covered with another finish in order to provide proper acoustics.

3. Ceiling

Sound must be loud enough to be heard by people sitting at the rear of the room as well as those at the front. The ceiling is the most critical element inside the room assuring effective distribution and appropriate volume of sound throughout the room. The ceiling should act as a sound mirror, reflecting sound downwards to blend with the direct sound. This is why the ceiling should include significant amounts of hard surfaced material.

The surface of the ceiling must be designed to accommodate the required acoustical properties of the room. The area of the ceiling that should be covered with acoustical tile is related to ceiling height.

Ceiling height clearance		Proportion of Acoustic Tile
2,440mm	(8')	40 to 50 percent
3,050mm	(10')	50 to 60 percent
3,660mm	(12')	50 to 60 percent

*These numbers assume the use of acoustical tile with a Noise Reduction Coefficient (NRC) of 0.70 typical (0.55 minimum) in a ceiling suspension system.

4. Floors

Classrooms with less than 75 students should have carpeted floors unless the walls and ceilings contain acoustically absorbent material, otherwise they can have a hard surface.

The colors of the floors should remain within the medium spectrum and complement those of the walls.

5. Isolation from Mechanical System Noise

The mechanical systems supporting classrooms shall generate a background noise of no more than NC 35. To achieve this, the HVAC system requires careful design, competent instillation and balancing, and regular maintenance. Factors that influence the design of a quiet operating system include air handlers or fans located away from the classrooms; low velocity of air within the room; and proper sizing and acoustical treatment of ducts, returns and diffusers.

1.4. Lighting Systems and Controls

1. General Lighting

The control of light in a general purpose classroom has become increasingly important with the growing use of technology. While adequate lighting levels can be achieved through a variety of approaches, it is essential that all instructional spaces have a range of lighting possibilities, from a comfortable level for reading and seeing the chalkboard to sufficient darkening at the projection screen to accommodate various types of projection while still permitting enough light in the seating area for note taking. Selection of lighting systems should meet program requirements while achieving energy efficiency.

The room lights should provide 550 to 650 lux (50 to 60 foot-candles) at each writing surface, including the teaching station. Diffusers used in ceiling fixtures shall be non reflective. General lighting shall be uniformly distributed throughout the room. Excessive illumination can be as debilitating to students as too little illumination.

2. Types of Lighting

   Provide ceiling recessed fixtures, to avoid interference with visual image projection. Light fixtures shall not be mounted near the projection screen where they could interfere with the projected image. *Hanging lighting is not to be used in lecture halls, classrooms, seminar rooms, laboratories, computer labs, video conference rooms or any teaching areas.*

3. Note-Taking/ Dimmable Lighting

   To provide low light in the seating area so that students can take notes during projection, two approaches are commonly used in general purpose classrooms. In both approaches, the front zone near the screen is turned off.

   For rooms with incandescent lights, dimmers work well and provide excellent control of the lighting levels.

   With fluorescent lights, controlling individual tubes within each fixture provides the ability to lower light levels (i.e. turning off two of three tubes in a three tube fixture). For example, one switch can be an on/off control for two of the tubes in a three tube fixture. A second switch can control the third tube. In a room with 50 foot candles of light at the student work surface, turning off two tubes can reduce the level to 16 2/3 foot candles.

4. Chalkboard Lighting

   Illumination of the chalkboard shall be 10-15 lumens distributed uniformly across the entire writing surface. If the lecture hall or classroom is designed with a large amount of chalkboard/whiteboard, the lights over the writing surface should be controlled in separate sections to permit illumination of a portion of the board while one projection screen is in use. Proper selection and installation of the board lighting should ensure that the lamps in the fixtures will not be visible to students seated in the front rows. The board lighting should not interfere with the raising/lowering of the screen(s).

   Acceptable chalkboard lighting product: Insight - Compact-5 CF5HO T5HO Lamp / SMM Wall Mount / Multiple Luminaire Run.

   Lighting shall run the full length of the boards and the switches for the lighting should be labeled and located close to the teaching area. For long runs of lighting, they should be in two switchable zones.

5. Ambient Light

   Ambient light within the room should be controlled so that it is far away from the projections screen(s) and is not a visual distraction. Blackout blinds, curtains or shutters are required for this.

6. Emergency and Aisle Lighting

   Emergency lighting and exit signs shall be self illuminating and be located so that they do not interfere with the image on the projection screens, or provide visual distraction to the audience

7. Controls

   All switching shall be kept simple, with the user in mind. Light switches shall be clearly labeled as to function. Standardization among rooms is recommended. There should be a simple on/off switch located at the entrance door of the room. If there is more than one door to the room, there should be switches located at each door. A bank of light switches should be located in the teaching area near or at the podium. This will allow the professor the ability to change lighting with little disruption to the class.

The lighting shall be banked so that it is possible to switch zones of ceiling light from the front to the rear of the room so as to maintain higher light levels in the rear of the room while reducing the light level in the front when using various projection devices at the front of the room.

A work light must be provided in the instructor area but care should be taken to insure that the light does not spill onto the projection screen. A ceiling mounted incandescent pot light with barn doors or baffles above the teaching area are acceptable, or a desk mounted gooseneck task light is also acceptable.

To accommodate projection needs, room lights should be switched by zone, with the zones running parallel to the screen. At least two zones are needed, one for the projection screen area at the front of the room and the other for the seating area. The larger the room the more zones are required.

All automated light control systems should provide for a manual override.

1.5. Electrical and Telecommunications Services

1. General

It is essential that all teaching rooms be provided with ample electrical power to meet all present-day needs as well as have additional power available for future applications.

The number of electrical outlets in the room depends in part on the special functions that may be assigned to the room. In general, rooms below a capacity of 50 should have a single duplex outlet in each side wall of the room, one fourplex outlet in the centre of the rear wall of the room, and three outlets in the front of the room (one fourplex outlet located in the centre of the front wall and one duplex outlet near each corner). A computer lab or science lab will require many more outlets located on bench or desk areas. The number of outlets required is very much dependent on the user's needs.

No outlets anywhere in the classroom should be controlled by a switch that could be confused for a light switch.

In rooms with capacities of 50 to 75, there should be two outlets evenly spaced in each side wall, three fourplex outlets at the front wall, and two fourplex outlets at the rear.

All wall outlets shall be mounted 450 to 610mm (18" to 24") above the floor. In addition, electrical service (and conduit / cable trays) should be provided in the ceiling for future projection and wireless communication capability.

All classrooms shall be connected to campus networks for voice, data, and video communication.

All low-voltage connections should be separated from the electrical circuits to the room. The low-voltage services should be isolated from each other through separate conduit. These services include controls for the audio, video, data and voice feeds. These circuits should not be tied to ground.

All conduits should have pull strings in them when installed.

All conduits, trays and cabling should be clearly labeled at all termination locations so that a knowledgeable person who has never seen the installation before can identify the services in the room.

2. AV Cabinets

UVic has two standard AV cabinets: "B" and "D" type (**see Appendix 1 & 2**).

There are other kinds of existing cabinets on campus, but all new teaching rooms are destined to have a B or D type cabinet. Both cabinets are to have power and data.

The cabinet is both, the instructor's teaching desk and the operation center for the teaching space. The cabinet shall provide lighting, projection, sound and electric blinds control, as well as space to place a laptop, notes and other instructional material.

As each room has its own AV requirements, a brief overview of standards for the cabinet can be explored, but it is by no means set for each room, as requirements vary.

Power: Cabinets should have a double gang outlet in the cabinet. This should be located in the Technician access area. A single gang outlet should be located on the top of the cabinet for instructor use. Additional power may be required depending on the nature of the room.

Data Port location:

.1 "B" type Cabinets should have eight data ports, including six located in the Technician access area. Two data ports should be located on the top of the cabinet for instructor use. Additional data may be required depending on the nature of the room.

.2 "D" type Cabinets should have four data ports, including two located in the Technician access area. Two data ports should be located on the top of the cabinet for instructor use. Additional data may be required depending on the nature of the room.

Lighting: If lighting switches are to be located on the cabinet, they should be labeled and located to one side, as to not interfere with the teaching space required for notes or a laptop.

Screen or blind controls: If these controls are to be located on the cabinet, they should be labeled and located to one side as to not interfere with the teaching space required for notes or a laptop.

3. Video Data Projectors

Video Data Projectors (VDPs), have become the main electronic teaching tool in classrooms. As other older technologies such as 16mm film and 35mm Slide Projectors are becoming rare in classrooms, the VDP has the option of showing slides (Power Point, Keynote, etc.) and video. It has the ability to be flexible as technology advances and changes. The VDP is usually mounted on the ceiling of a classroom or in the ceiling of a media booth if it is a large lecture hall.

For optimum results with a VDP, control of natural and artificial light is critical. Window coverings must be opaque. Room lights must be designed so that the projected image is not washed out, and allow for note taking – dimmable to 5 to 10 foot-candles over the student area.

The conduit that provides a feed from the cabinet to the VDP should be 2 inches in diameter. At the location of the ceiling mount for the VDP there should be a single gang for power and a data port.

4. Audio Conduit

All speakers conduits shall be 50mm (½ inch) diameter if it is for a single cable run. If more cables are expected to travel in the same conduit, the diameter of the conduit should rise with the number of cables. Speaker locations are at the front of a room usually one speaker on each side of the screen. Larger rooms will require additional speakers and their locations will have to be decided at the design phase. All speaker conduits should home run to the AMP in the AV cabinet or booth.

5. Shutdown Timers

Shutdown Timers are devices developed at UVic to safely shutdown VDPs that have been left on after a class has finished. The shutdown timer is a motion sensor, and therefore has to be installed at a location in the room where the sensor has a clear view of the room. It should be placed up close to the ceiling and it requires a dedicated ½" conduit with a single gang box at the sensor location with a home run to the cabinet. It should not be placed behind a pull down screen or in an area where things can be placed to block its view.

1.6. Projection Surfaces, Chalkboards and Whiteboards

1. Screens

   Lecture theatres should always have a high ceiling at the front of the class to accommodate a projected image on the wall surface above the chalkboards (*the projection surface*). Often in large lecture theatres, two or three projected images are projected concomitantly. The wall that is to be used as a projection surface shall be painted a C4 flat paint.

   Electric Screens are not desirable as they cover chalkboard space when they are down; they can malfunction, and the turn-around time for repair is extensive and expensive.

   Classrooms, Labs and Seminar Rooms shall have a 2,130mm (84") Da-Lite, matte white, wall mounted pull down screen. This is a standard in all UVic classrooms. Screens shall not be mounted near an air exhaust/intake duct since airflow can cause the screen to move.

2. Visual Display Surfaces

   All Lecture Halls and Classrooms shall be equipped with Chalkboard Slider Units (2 deep or 3 layers) – black surface, located at the front of the classroom

   1. The length of sliders, in relation to the overall chalkboard length, shall be determined to minimize vertical lines (a 16' chalkboard shall have 2 – 8' sliders).
   2. Sliders shall be mounted at 915mm above floor and extend to 2,130mm (1,220mm overall height, including frame).
   3. Whiteboards shall not be used in these spaces, due to fumes, increased maintenance and costs.

   Boardrooms or labs shall be equipped with fixed chalkboards, whiteboards and tackboards, as directed by FMGT.

PART 2 LECTURE HALLS

2.1. General

Lecture Halls are defined as any TLS that can seat more than 50 students.

Lecture Halls should be located on the ground floor near entrances to facilitate the movement of students in and out of the hall.

2.2. Design Elements

1. Space Geometry - General

   The complexity of design increases with the size of the space. It is not a linear process; design mistakes that may go unnoticed in a small seminar room will be magnified many times in a large lecture hall to the point that the space may become dysfunctional.

2. The Room

   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.

   Depth to width ratio shall be no greater than 1.5, measured at the midpoint of the seating area.

   All lecture halls should have more than one entrance to the room.

3. Floor

   The desirable slope of the floor in a lecture hall is 1:12. If the rise from one row to the next is not more than 100mm, then the seating in each row shall be offset to permit clear visibility to the front of the room.

   The slope of the floor in a lecture hall should maximize sight lines.

   Provide adequate landings to sloped floors that extend over 9m (30 feet).

4. Stage

   There should be no stage or elevated area at the front of the room. This is required in order to maximize the area above the chalkboards for the projection of images from the Video Data Projector(s) (VDP). Also, as observed and stated by UVic faculty, a stage hampers teaching and separates the class from the teacher.

5. Ceiling

   Ceiling heights will vary, depending upon the size of the room. All lecture halls will have VDPs installed in them. There must be a clear path between the VDP and the projection surface.

   Optimum ceiling height guidelines are listed below:

Distance to last row	Rear of the lecture hall	Front of the lecture hall
15,250 mm (50 ft)	3,050 mm (10 ft)	5,180 mm (17 ft)
22,900 mm (75 ft)	3,050 mm (10 ft)	6,700 mm (22 ft)
30,500 mm (100 ft)	3,050 mm (10 ft)	8,550 mm (28 ft)

6. Projection Screen

   The screen has an aspect ratio of 4:3

   Typically, the bottom of the screen area is at the same elevation with the top of the chalkboard and projects outwards to allow the installation of chalkboard lighting.

   The distance from the screen to the farthest viewer: no more than four times the screen width

   The distance from the screen to first row of seats: no less than two times the screen width

2.3. Acoustics

Attempt to provide walls that are not parallel. Walls shall have a rough or textured surface.

2.4. Lighting Systems and Controls

See the same titled heading in PART 1, above.

2.5. Electrical and Telecommunications Services

1. AV Cabinets

   UVic requires that a "B" type cabinet is installed in lecture halls. (Appendix 1).

   In all large lecture halls a height-adjustable lectern is required for presenters with a disability. UVic is using the *Egan 2002 ADA Lectern* for lecture halls.

2. Video Data Projectors

   See the same titled heading in PART 1, above.

3. Audio Conduit

   Lecture halls require additional speakers and their locations will have to be decided at the design phase.

4. Shutdown Timers

   Conduit to cabinet - provide:

   - 50mm (2") conduit to the VDP location, (one 50mm conduit per VDP).
   - individual 13mm (½") conduit to each speaker location.
   - 13mm (½") conduit running to the shutdown timer.
   - Extra conduit as required by the design of the room.

5. Projection Booths

   Lecture halls shall have projection booths at the back of the rooms. These rooms are to provide security and to isolate the sound and heat generated by the VDP(s) from the main room. The booths are to be keyed to a technician access only key. The booths can in many cases house AV and data support equipment. The booths shall:

   .3 have a large window that looks out into the lecture hall.

   .4 provide power and data for each VDP location on the ceiling in the booth.

   .5 have adequate air flow, as the VDPs generate a substantial amount of heat.

   .6 be provided with a 50mm (2") conduit for each VDP. This conduit in most cases runs to the front of the lecture hall to the AV /Instructor desk.

   .7 have lights that are on a dimmer system, controlled from within the room.

   Access to the booths should be from outside the lecture hall. This is to provide technicians with a way to enter the booth while classes are in session without disturbing the class.

2.6. Projection Surfaces and Chalkboards

1. Screens

   Maximize the projection area above the chalkboard, to allow for a larger projected image to be seen by students. This is a critical issue: the projected image shall be as high on the wall as possible. Items like hanging lights, HVAC and conduit can cause problems with viewing and are not acceptable.

2. Chalkboards

   See the same titled heading in PART 1, above.

PART 3 CLASSROOMS

3.1. General

Classrooms are defined as any TLS that can seat 20 - 75 students and have at least 32.5m² (350 sq ft) of space. They are the most numerous on the UVic campus. Well designed classrooms are a critical factor in creating an appropriate environment for effective instruction.

3.2. Design Elements

1. Space Geometry - General

   Classrooms shall be designed so that the length is approximately 1.5 times the width of the room. Rooms that are wider than they are deep normally present unacceptable viewing angles for projected materials and for the chalkboard. With the increased use of projected materials, especially computer imaging, the shape and dimensions of classrooms are more critical than ever before.

2. The Room

   The front wall (including thermostats, light switches, etc.) of the room behind the instructor area should have no protrusions into the room so that a chalkboard can be installed across the entire wall of the instructor area.

3.3. Acoustics

See the same titled heading in PART 1, above.

3.4. Lighting Systems and Controls

1. Note-Taking / Dimmable Lighting

   See the same titled heading in PART 1, above AND provide:

   - multiple zones running from front to back of classroom.
   - dimmable fluorescent fixtures for general seating area. Sufficient light is required for student note taking during instruction with VDP, with no light wash on screen surface.
   - separate or dedicated task light (focus, dimmable) at instructor's millwork location.
   - control of lights for room, located at teaching area.

2. Instructor Lighting

   A desk mounted goose neck light is required for instructor's use. This is to be mounted on the desktop of the "B" or "D" cabinet.

3.5. Electrical and Telecommunications Services

1. AV Cabinets

   UVic requires that a "D" type cabinet or a "B" type cabinet is to be installed in classrooms (depending on size of room or requirements for equipment, please see attached PDF).

   In all large classrooms a height-adjustable lectern is required for presenters with a disability. UVic is using the *Egan 2002 ADA Lectern* for lecture halls.

2. Video Data Projectors - see the same titled heading in PART 1, above

3. Audio Conduit - see the same titled heading in PART 1, above

4. Shutdown Timers

   See the same titled heading in PART 1, above AND provide:

Conduit to cabinet:

- 50mm (2") conduit to the VDP location, (one 50mm (2") conduit per VDP).
- individual 13mm (½") conduit to each speaker location.
- 13mm (½") conduit running to the shutdown timer.
- extra conduit required depending on the design of the room.

3.6. Projection Surfaces and Chalkboards

1. Screens

   Often in classrooms two images are projected on to the screens; one from the VDP and one from the Overhead projector.

   Classrooms should have a high ceiling at the front of the class to accommodate a projection surface on the wall above the chalkboards.

   When the ceiling height does not allow a projection surface on the wall above the chalkboards, provide 2,150mm (84") Da-Lite, mate white, wall mounted pull down screens. Install screens as high as possible.

2. Chalkboards

   Chalkboards sliders as described in the same titled heading in PART 1, above .

PART 4 COMPUTER AND SCIENCES LABS

4.1. General

Computer labs and Science labs are similar in room layout, but often the electrical and data requirements are very different.

These points should be examined with the user groups for these kinds of rooms as their requirements will be very specific with concern to the kind of equipment (and amount of equipment) that is used in the rooms.

As far as Audio Visual needs are concerned, the same rules that are found in the first five pages of this document can be applied in these kinds of rooms. There is often more HVAC in these rooms due to heat from computers or to exhaust chemical smells from experiments. The requirements to keep the noise level down are often more of a challenge in these rooms.

4.2. Design Elements

1. Space Geometry - General

   The projection screen or chalkboard defines the front of the room. The cabinet shall be mounted in this area so that teaching faculty can utilize the screen and chalkboard easily.

4.3. Acoustics

See the same titled heading in PART 1, above AND provide:

4.4. Lighting Systems and Controls

1. General Lighting - see the same titled heading in PART 1, above
2. Controls - see the same titled heading in PART 1, above
3. Chalkboard Lighting - see the same titled heading in PART 1, above

4.5. Electrical and Telecommunications Services

1. AV Cabinets

   Provide extra power outlet in labs to accommodate the extra electronic items that are used. There should be extra data and power located in areas where AV is required.

   Most labs use a “D” type cabinet.

2. Video Data Projectors

   If a VDP is to be installed, it is usually mounted on the ceiling, 4,300mm (14’) from the center of the pull down screen.

3. Audio Conduit

   At the location of the ceiling mount for the VDP there should be a single gang for power and a data port.

4.6. Projection Surfaces and Chalkboards

1. Screens

   Provide 2,150mm (84”) Da-Lite, mate white, wall mounted pull down screens. Install screens as high as possible.

2. Chalkboards - see the same titled heading in PART 1, above

PART 5 SEMINAR AND MEETING ROOMS

5.1. General

As classrooms that can accommodate up to 20 students, *Seminar Rooms* are designed to facilitate interaction and face-to-face discussion among students and instructor. These rooms sometimes are used also for departmental meetings or conferences, but their primary use is for small class instruction.

5.2. Design Elements

1. The Room

   The projection screen or chalkboard defines the front of the room. If achieving maximum capacity is an objective, a single entrance at the front of the room will allow the incorporation of the entry space into the instruction area. A single rear entrance reduces interruptions from late-arriving students but will require more space.

   Although a formal teaching or presentation area is usually not as elaborate in a seminar/meeting room, the front of the room shall be large enough to accommodate a lectern or ”D” type cabinet, and provide enough space for an overhead projector on a cart.

5.3. Acoustics

See the same titled heading in PART 1, above AND provide:

5.4. Lighting Systems and Controls

1. General Lighting - see the same titled heading in PART 1, above
2. Controls - see the same titled heading in PART 1, above
3. Chalkboard Lighting - see the same titled heading in PART 1, above

5.5. Electrical and Telecommunications Services

1. AV Cabinets: ”D” type cabinet installed when instructed by FMGT.
2. Video Data Projectors

   If a VDP is to be installed, it is usually mounted on the ceiling, 4,300mm (14’) from the center of the pull down screen.

3. Audio Conduit

   The conduit that provides a feed from the cabinet to the VDP shall be 50 mm (2”) in diameter. At the location of the ceiling mount for the VDP there should be a single gang for power and a data port.

4. Dedicated Circuits

   The room shall have one or more dedicated circuits on a breaker not shared by any other room, and at least one grounded 120 volt duplex outlet centered on each wall mounted 450-610mm (18-24”) above the floor.

5.6. Projection Surfaces and Chalkboards

1. Screens

   Provide 2,150mm (84”) Da-Lite, mate white, wall mounted pull down screens. Install screens as high as possible.

PART 6 VIDEOCONFERENCE ROOMS

6.1. General

Videoconferencing is continually gaining importance as an effective method of communication and the design of these rooms shall reflect their significance.

6.2. Design Elements

1. The Room

   The room design shall provide excellent sightlines between the videoconferencing camera and everyone in the room. Therefore, the room shall be of a square or wide rectangle design.

2. Paint

   The room should be painted in a light blue or light gray color In order to enhance skin tone. Benjamin Moore paint numbers 1627 or 829 are ideal. The worst wall color to use is white, as it creates too much of a contrast and can literally erase the faces of participants by casting facial features in deep shadow.

3. Furniture

   Conference room tables: A lighter, but not reflective, surface is good as it will allow for some light bounce from VC lighting up into the faces of the participants causing less shadows on their faces.

6.3. Acoustics

1. General

   The videoconference room design has a tremendous impact on the audio and video systems used in the room. The room acoustics affect both the microphone pickup and the audio playback in the room. Room acoustics are a critical element in minimizing the echo-cancellation problems, and potential feedback problems.

   HVAC noise, reverberation and reflections that may not be noticeable to a person seated in the room can be problematic when a microphone is open in the room. A microphone does not have the sophisticated biological processing that the human brain has for ignoring unwanted sounds in favour of the desired sounds. The performance of the entire audio chain is directly tied to the decay of sound in the room.

   Videoconference rooms shall not be built next to or share a wall with a washroom. Plumbing noises can bleed though walls.

2. Walls

   Fabric on the walls: not always necessary if the first two items can provide sufficient sound dampening.

3. Ceiling

   Provide acoustic ceiling tiles or sound absorbent panels to reduce bounce echo off of the conference room table.

4. Floors

   Flooring shall be carpet to reduce bounce echo and to prevent audible noise from shoes or chair legs on the floor.

5. Doors and Windows

The door(s) into the videoconference room shall be made of solid wood and have rubber around the bottom to prevent outside noise from entering the room. There should be no vents in the door that will allow for outside noise to compromise the video conference.

If there are windows in the room they must be double pane and they must provide a solid seal to prevent outside noise from entering the videoconference.

6. Isolation from Mechanical System Noise

The HVAC systems should be dampened so that they cannot be heard when a conference is in session. A droning background noise can be picked up by microphones and transmitted at a much louder volume to the distance sites.

6.4. Lighting Systems and Controls

1. General Lighting

Lighting for videoconference rooms is one of the most important factors in successful videoconferencing. The goal is to have the room evenly lighted to prevent harsh light shadows on the percipients faces and bodies, but to have the front of the room, where the screens or monitors are situated, as dark as possible so that the distant site's images are bright and not washed out from the lighting in the room. The lighting controls should be set up in banks from the front of the room to the back. Scoop lighting (lighting that is manufactured for Videoconferencing rooms) should be used in the room. The Scoop lighting should be on separate lighting controls from the regular room lighting.

Left: **regular room lighting,** ***Right:*** **videoconferencing lighting**

The lighting controls for the room should be set up with the following options:

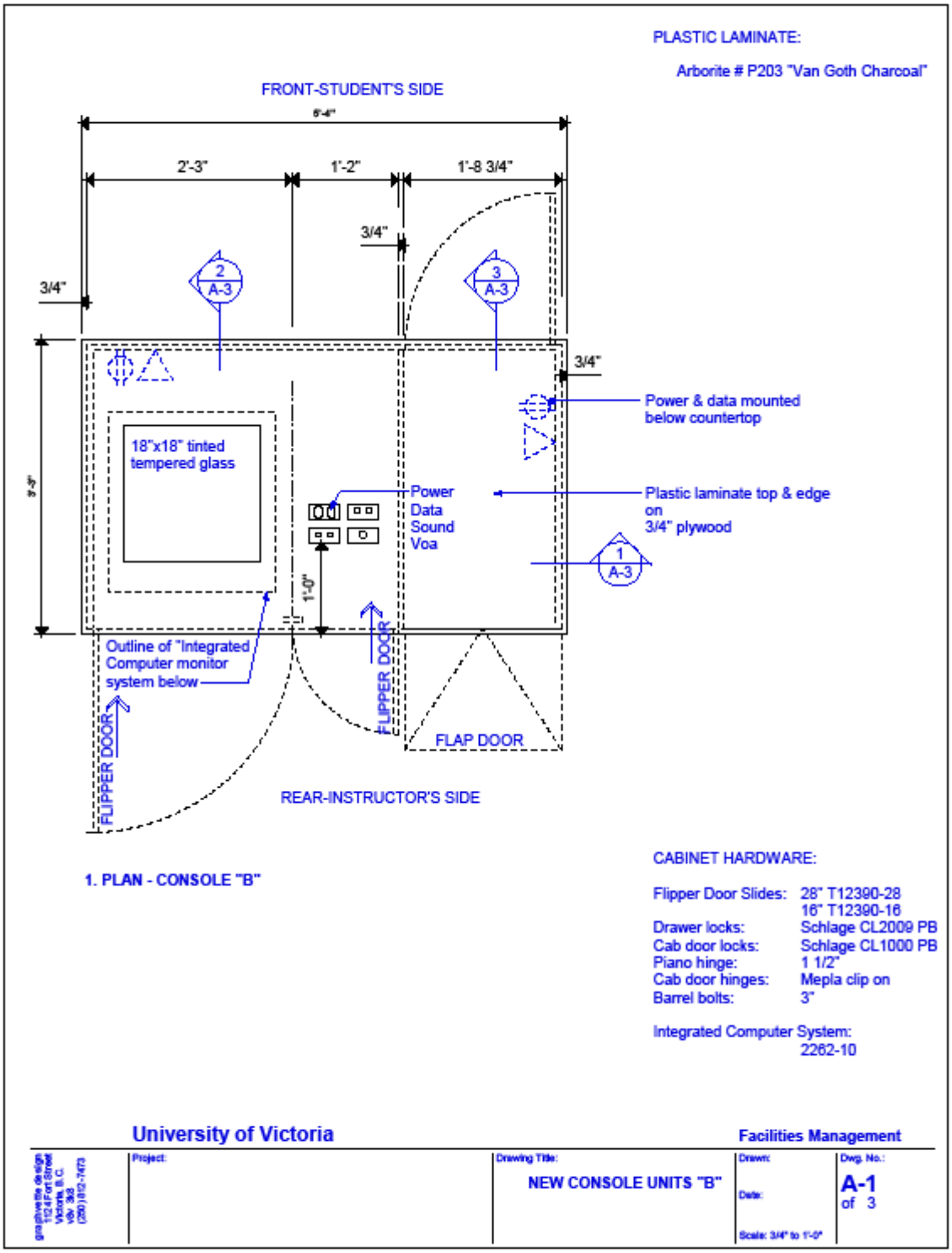
1. Scoop lighting should be used to prevent unwanted spill from the room lighting to fall on the screen or monitors. It is essential to use this lighting when designing a videoconference room.
2. Hanging lighting should not be used in a videoconference room.
3. Regular room lighting should be flush-mounted in the ceiling to avoid interfering with visual image projection and so that the camera on the videoconference unit can be on a wide shot of the room and not have the lights in its field of view.
4. Incandescent lighting can be used in videoconference rooms. Many rooms have both the scoop lighting and regular room lighting on dimmers.
5. Ambient light can cause problems with videoconferencing. Heavy blackout drapes or curtains are preferred for windows. They also work to dampen the reflective nature of sound in the room. Venetian blinds are not good as they can cast shadows or patterns on the faces of the people in the conference, and are poor for light control.

6.5. Electrical and Telecommunications Services

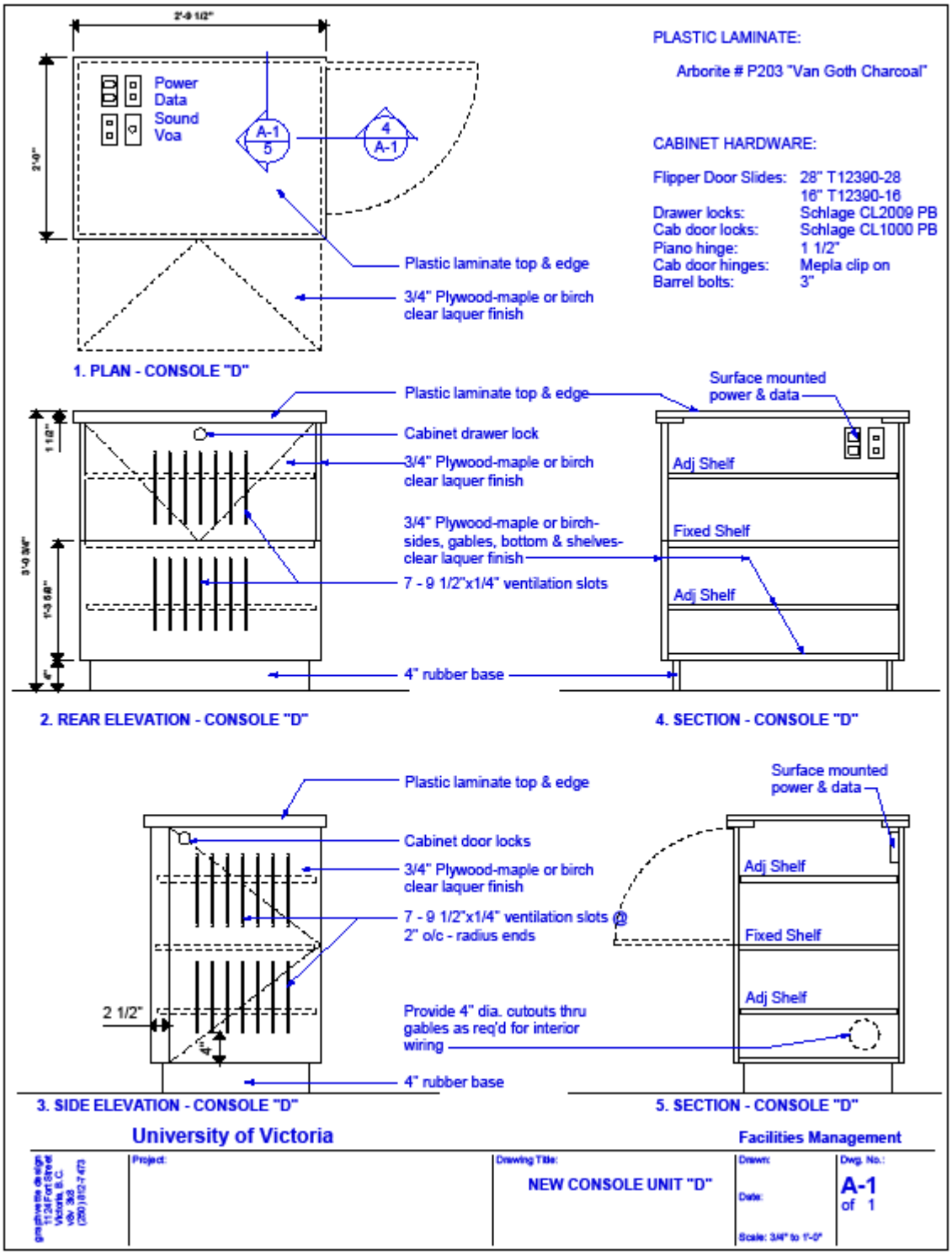
Electrical and data outlets should be located in a few key places in the room. Provide:

1. A dual gang power outlet on the wall where the monitors are to be placed. This is to provide power for the monitors, the codec and video camera.
2. Two data ports located in the same area as above.
3. 38mm (1 $^{1}/_{2}$") conduit in place next to the above power and data ports. This conduit shall run to an area where the room computer or laptop will be used. This might be at a podium or desk or under the conference table depending on the set up.
4. A dingle gang power and data under the conference table.
5. Standard power and data ports on the walls of the room to accommodate laptops.

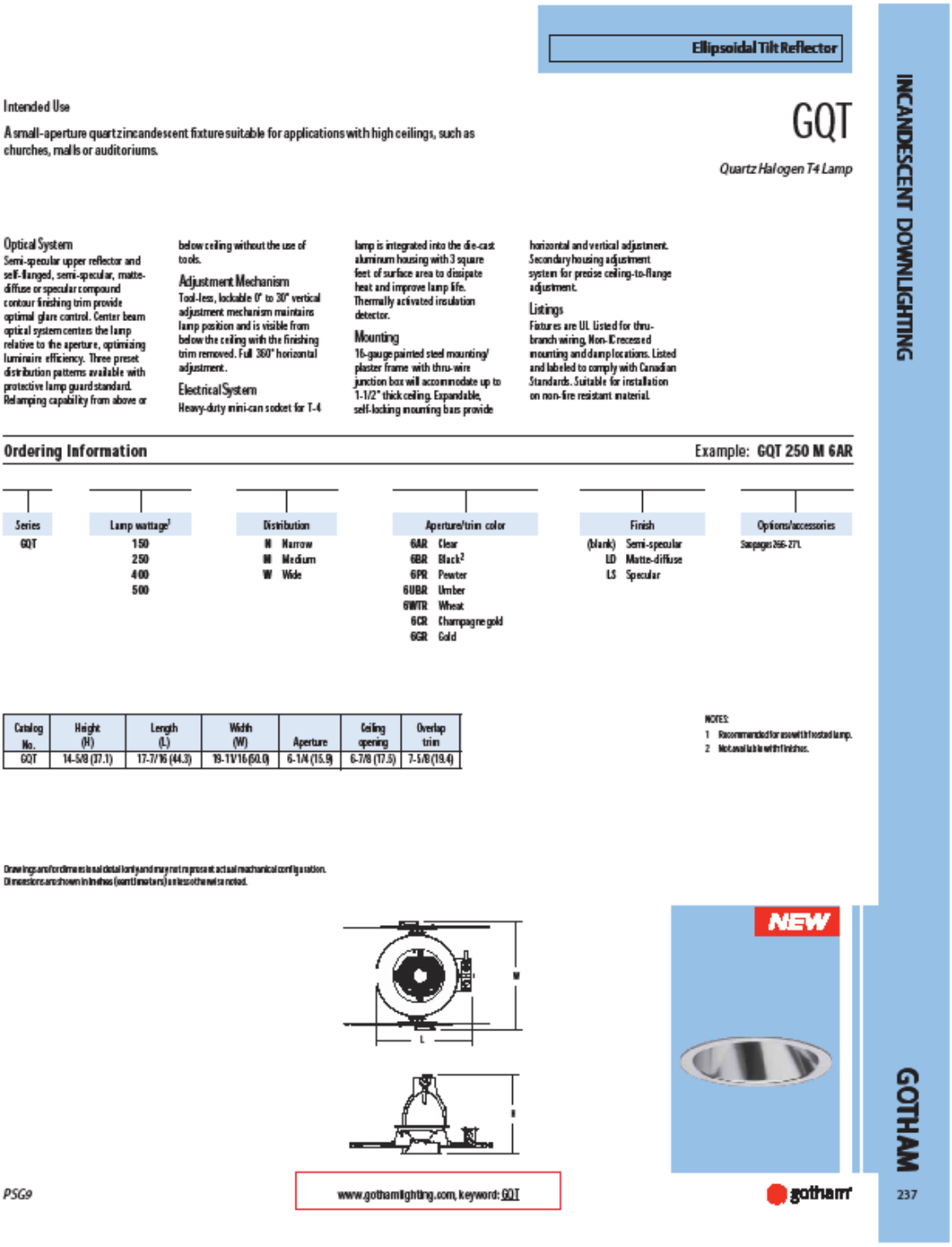
Appendix 1: Specific Equipment - Cabinet B



Appendix 2: Specific Equipment - Cabinet D



Appendix 3: Sample front of classroom lighting



Ellipsoidal Tilt Reflector

INCANDESCENT DOWNLIGHTING

GQT

Quartz Halogen T4 Lamp

Intended Use

A small-aperture quartz incandescent fixture suitable for applications with high ceilings, such as churches, malls or auditoriums.

Optical System
Semi-specular upper reflector and self-flanged, semi-specular, matte-diffuse or specular compound contour finishing trim provide optimal glare control. Center beam optical system centers the lamp relative to the aperture, optimizing luminaire efficiency. Three preset distribution patterns available with protective lamp guard standard. Relamping capability from above or below ceiling without the use of tools.

Adjustment Mechanism
Tool-less, lockable 0° to 30° vertical adjustment mechanism maintains lamp position and is visible from below the ceiling with the finishing trim removed. Full 360° horizontal adjustment.

Electrical System
Heavy-duty mini-can socket for T-4 lamp is integrated into the die-cast aluminum housing with 3 square feet of surface area to dissipate heat and improve lamp life. Thermally activated insulation detector.

Mounting
16-gauge painted steel mounting/plaster frame with thru-wire junction box will accommodate up to 1-1/2" thick ceiling. Expandable, self-locking mounting bars provide horizontal and vertical adjustment. Secondary housing adjustment system for precise ceiling-to-flange adjustment.

Listings
Fixtures are UL Listed for thru-branch wiring, Non-IC recessed mounting and damp locations. Listed and labeled to comply with Canadian Standards. Suitable for installation on non-fire resistant material.

Ordering Information Example: GQT 250 M 6AR

Series	Lamp wattage[1]	Distribution	Aperture/trim color	Finish	Options/accessories
GQT	150 250 400 500	N Narrow M Medium W Wide	6AR Clear 6BR Black[2] 6PR Pewter 6UBR Umber 6WTR Wheat 6CR Champagne gold 6GR Gold	(blank) Semi-specular LD Matte-diffuse LS Specular	See pages 266-271.

Catalog No.	Height (H)	Length (L)	Width (W)	Aperture	Ceiling opening	Overlap trim
GQT	14-5/8 (37.1)	17-7/16 (44.3)	19-11/16 (50.0)	6-1/4 (15.9)	6-7/8 (17.5)	7-5/8 (19.4)

NOTES:
1 Recommended for use with frosted lamp.
2 Not available with H finishes.

Drawings are for dimensional detail only and may not represent actual mechanical configuration. Dimensions are shown in inches (and millimeters) unless otherwise noted.

PSG9

www.gothamlighting.com, keyword: GQT

gotham

GOTHAM 237

Appendix 4: Sample Lectern for Instructors with a disability

202 ADA Lectern

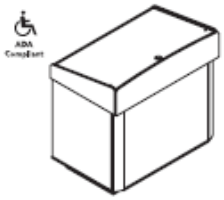
EGAN

Height-adjustable 202 ADA Lectern is equipped with a push button, electric-lift mechanism that adjusts the working height from 34–44". Inside clearance accommodates wheelchair access and complies with the Americans with Disabilities Act. Wiring grommets for field setup of laptops, tablets and microphone.


S2LH

202 ADA Lectern

(S2LH)



Code	Dimensions
S2LH	Upper-Height Position: 39"w x 44"h x 25"d
	Lower-Height Position: 39"w x 34"h x 25"d
	Worksurface: 38"w x 24"d
	Inside Clearance: 30"w x 24"d

- Electric lift motor has a one-year warranty.
- Aluminium extrusion "bumper" corners help prevent damage when moving.
- 2" locking casters for easy mobility.

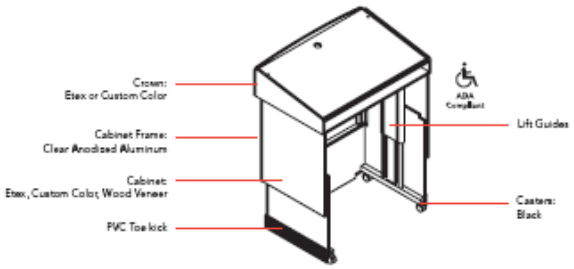
* Custom Color and Etex in any combination.
† Two Custom Colors in any combination.

Finish Combinations

Crown	Lower Cabinet	Price
Etex	Etex	$4,370
Etex*	Custom Color*	$4,490
Same Custom Color		$4,490
Custom Color†	Custom Color†	$4,610
Etex	Veneer	$5,390
Custom Color	Veneer	$5,510

Lectern Options

Code	Price	Description
B	$160	Lamp—12" electric goose neck lamp complete with dimmer switch.
T	$130	Clock/Timer—Liquid Crystal Display clock timer with front control buttons. The clock is flush-mounted in the top right corner of the crown support. Battery included.



Specify Crown finish followed by cabinet finish, as shown in sample code below.

Select An Etex Finish

EganMetallic	Black	Charcoal	Gray	Platinum	Putty	Sand	Slate	Taupe
EM	BL	CL	GR	PT	PY	SN	SL	TA

Select A Wood Veneer Finish

Light Oak	Medium Oak	Dark Oak	Black Oak
LO	MO	DO	BO

Cherry	Mahogany	Natural Maple	Walnut
CH	MA	MP	WA

- Veneer available on Cabinet only with an Etex or Custom Color Crown.
- For Custom Color, specify your desired color System ID, see page 44.
- For Custom Stain, add $120. Details on page 44.
- For Custom Logo details, see page 43.
- Custom Color Volumes are available on this product, see page 44.

How To Order This Product:

S2 LH PT MP BT

202 Lecterns & Centers	ADA Lectern	Crown Finish: Etex Platinum	Cabinet Finish: Maple Veneer	Options: Lamp, Clock/Timer