DESIGN CONSIDERATIONS FOR CREATING AN EDUCATIONAL PHOTO DARKROOM

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(Dedicated to Darkroom Productivity, Universal Accessibility, Environmental Safety and ease of Teaching and Learning through Excellence in Design)

As a photography professor, perhaps you've dreamed of teaching in your own custom-designed darkroom. Your students could easily produce high quality photographs within a class period in this efficient workspace.

Imagine your department chairperson informing you that your school is going to build a new fine arts building. You must submit your design for the photo darkroom at a planning meeting with the architect in thirty days. You have a lot of work to do. The following *design considerations* will help you accomplish the task efficiently and effectively.

Keep in mind your design should be compliant with the *Americans with Disabilities Act* Guidelines and must comply with Federal, State and Local regulations.

Start early to plan; you have only 30 days! No doubt a new teaching facility has been a dream and you have lots of ideas and needs. So let's get started:

1 - Define Your Requirements
With reference to your curriculum and class size, list what you want your students to learn, period by period. Ask your chairperson how much floor area is available for your new facility, the budget figure and then request money for the assistance you will need.. Immediately contact your associates in other schools who have successful photo programs/facilities and ask for their recommendations..

2 - Seek Professional Help
If you feel inadequate to create your own design, engage a *professional darkroom design specialist* (check references). Explain your need for a conceptual design (plans and elevations) that will meet your budget - in thirty days! The charge for this service is usually minimal when considering the cost of the casework and equipment. Plan carefully because major changes cost time and money.

3 - Provide Sufficient Work Space
Classroom and darkroom space is determined by the student class enrollment. Your three basic areas are: (1) This Classroom includes: film processing and print finishing as well as lecture/student work area (and maybe a shooting studio). (2) Black &White Processing Darkroom and (3) Color Print Processing Darkroom (and you may need a room for alternative processes).

(1) The Classroom includes 2 or more film/reel loading darkrooms, film processing sink (allow 24" wide along the rail of the sink for each student to develop film in a light tight tank), filtered hot-air film drying cabinet, print dryer and/or print drying

film in a light tight tank), filtered hot-air film drying cabinet, print dryer and/or print drying screens, print mounting equipment and large layout tables where students can work. The Classroom floor space usually adds up to 60 square feet per student. The space increases when the Classroom includes a shooting studio (add another 200 to 300 square feet of floor space to your total figure).

(2) Essential features in all B&W Print Processing Darkrooms are an enlarger station for each student and a central walk-around processing sink with a print washer and squeegee board. There are many types of enlarger stations, some with drawers (including locks and light-tight lids), some with shelves (with or without doors); and others with print drying screens or any combination of these features. Enlarger stations 36" or 42" wide work well. There must be at least one special enlarger station for a wheelchair student (minimum width of 36"). The enlarger stations should be located around the perimeter of the room. A large walk-around print processing sink(s) with print washer and squeegee board are centered in the room. Allow 24" at the sink rail for each student and assume half of your students will leave their enlarger stations to work at the sink at a given time. Plan for 45 square feet of floor space for each student, and provide a 60" diameter wheelchair-turning-circle in all rooms.

(3) The same features found in the B&W darkroom are found in the Color Print Processing Darkroom except the sink is replaced with a color print processor. It is very helpful to mount the processor through the wall between the darkroom and the classroom so that the prints deliver to the classroom (see Fig 1.) where they can be evaluated in white light. A light tight seal around the wall opening is very necessary. A sink for cleaning processor racks will be necessary and should be located near the processor in the classroom. 40 square feet of floor space per student is about right for a color printing darkroom.

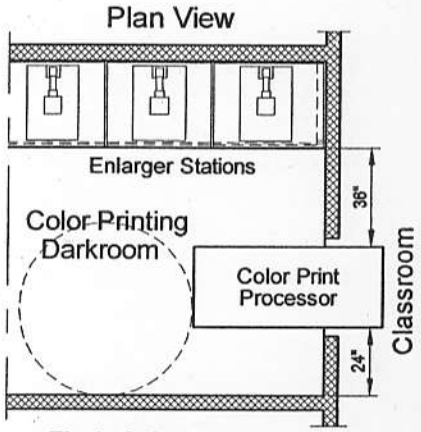

Fig 1. Color Processor
Mounted through a wall

In general: Ceiling heights should not be less than 9 to 10 feet to allow sufficient safelight reflection and headroom below the fixture. Provide tall storage cabinets, base cabinets and wall cabinets throughout the facility to give adequate space for materials and supplies Provide lots of wall display panels; students love to exhibit their work.

4 - Control the Light

(1) Film/Reel loading rooms have no safelights. Hinged doors to these rooms must have light-tight thresholds and perimeter door sealing to totally stop light. The wheelchair loading room (see Fig 2.) should have a turning circle of 60" diameter. The Classroom will be lighted with ordinary white light. If there is a studio in the classroom, windows will need blackout blinds to totally control light.

(2) The B&W Print Processing Darkroom should be lighted with "yellow" (Kodak Wratten #OC) safelight. Hang safelights pointed to the ceiling to create a soft, indirect light to permeate the darkroom. Also provide white tungsten light for general illumination, for teacher demonstrations and for cleaning.

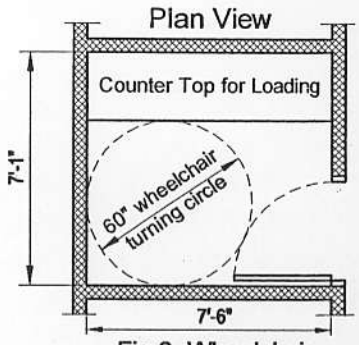

Fig 2. Wheelchair Loading Darkroom
Door swing must clear turning circle

Quick and easy flow of traffic in or out of the darkroom is best accomplished by a dark entry, sometimes called a "maze" or a "zig-zag" (see Fig 3.). A birdseye or plan view of a dark-entry-maze is a cluster of two "U" shaped walls turned toward each other to give an "S" traffic flow.. Wall to wall clearance in the maze must be 42" or more to accommodate a wheelchair. Another type of dark-entry is a hallway 60" wide with a light sealed door at each end (see Fig 4.). This presents a problem if both doors open at the same time. Black curtains do not adequately seal off white light. Another solution to controlling the light is to use a rotary door (a rotating cylinder within a stationary cylinder); this type of door stops light and saves floor space but provides only one-way traffic-flow for only two or three students at one time (See Fig 5.). The Color Print Processing Darkroom should be lighted by a "dark yellow" (Kodak Wratten #13) safelight.

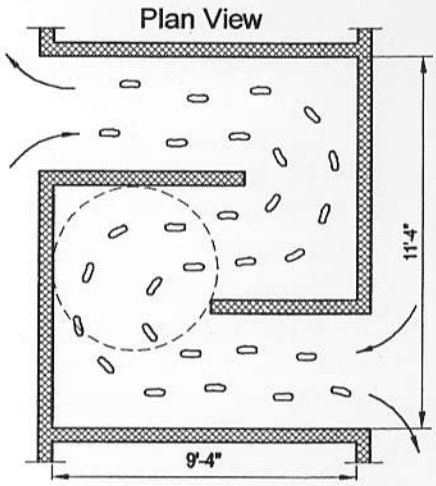

Fig 3. Dark Entry "Maze"
Two-way traffic & no doors

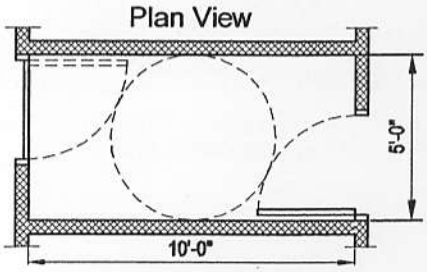

Fig 4. Two-door Dark Hall
Open only one door at a time

Fluorescent light is not a good choice for any darkroom because of the "afterglow" that radiates when the fluorescent lights are turned off. If your darkroom has a *"lay-in tile"* type ceiling, be sure that light from other rooms does not enter your darkroom. A ceiling of *"Dry-wall"* construction painted white reflects safelight very well and minimizes dust particles often emitted by tile ceilings.

5 - Select Correct Finishes

Finishes for Classroom, B&W Print Processing Darkroom and Color print Darkroom:

Walls:	flat, very-light-gray paint
Ceilings:	flat-white paint (to reflect safelight)
Floors:	anti-slip floor tile in slate-gray color (example: Armstrong Step Master Excelon Tile #50702)
Dark Entries:	flat-black ceiling, flat-black walls

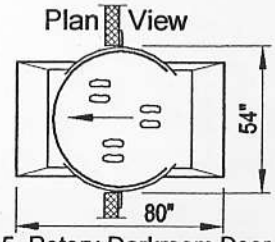

Fig 5. Rotery Darkroom Door
2 or 3 students in one direction
Requires minimum floor space

and flat-black floor
DO NOT paint darkrooms black; safelight does not reflect from black ceilings and walls, and it produces a depressed feeling!

6 - Provide Adequate Ventilation
The B&W and Color print processing darkrooms must have 15 air changes per hour while introducing up to 25% fresh air continuously. Local ventilation is necessary where chemical fumes are created; for example, open trays and tanks of chemistry in a sink and at a color processor. Chemical fumes must be evacuated the entire length of the sink so that the fumes are directed away from the breathing zone of students, captured in the hood and conducted to a duct system designed by a mechanical engineer. Another method of evacuating chemical fumes is by using a slot-vented sink with intake slots along the entire length of both sides of the sink. In this type of sink the fumes are directed through a slot in the sink rail to a duct system under the sink and then to a house duct system designed for this type of sink. A color processor must have a dedicated fume exhaust vent-hood as well.

7 - Eliminate Corrosion
Darkroom chemicals corrode metal and stainless steel sinks, print washers and squeegee boards. Metal sinks require frequent cleaning, maintenance and eventually replacement because of the corrosive action of the chemicals. Fiberglass is a better choice, but sinks constructed of polyvinyl chloride, (PVC plastic), are the best choice. PVC is inert to all darkroom chemicals, requires very little cleaning and should not need replacing. At most, the chrome faucets may need replacement after a number of years. Likewise, it is wise to install vent-hoods made of PVC to exhaust chemical fumes created at a sink and at a color processor.

8 - Select Casework and Equipment Built for Photographers
Select a line of casework (enlarger stations and cabinets) that are especially designed for photography; for example: institutional grade cabinets with features such as view-lights built into counter tops, drawers with a light tight lid; and enlarger stations and enlarger booths with drawers, shelves and/or print drying screens. Light baffles between enlarger stations are very necessary for light control. Tall storage cabinets, base cabinets with a number of print drying screens and classroom work tables are just some of the special casework for classrooms and darkrooms. As mentioned above, sinks, print washers, pass through washers and squeegee boards made of PVC are long lasting, easy to clean and a wise investment; however never use solvents in PVC sinks. Look for products with these special and necessary features you and your students will need.

9 - Provide for Safety
Consider both *personal* safety and *environmental* safety.

OSHA (Occupational Safety and Health Administration) regulations state that students and teachers must be protected from chemical fumes, corrosion build up,

chemical spills and slippery floors. *OSHA* requires your lab have a written safety program, and that it be taught to all students taking your courses . All vessels, hoses and pipes containing chemistry must be labeled. All open containers, tanks and trays of working solutions must be labeled. There must be *MSDS* (Material Safety Data Sheet) for each chemical, displayed in the darkroom, in an easy-to-find binder for quick reference when there is an emergency. A dual-head eye-wash unit must be located at each sink. Fire extinguishers must be provided to comply with local fire codes. A first-aid kit must be easily accessible.

Chemical fumes must be adequately captured and removed with a vent-hood above each sink if slot-vented sinks are not used. Sinks where chemical corrosion occurs must be kept clean. Color processors must likewise be vented (color developer is the most dangerous chemical in the darkroom). Room air must be changed, cleaned and replenished with fresh-air 15 times per hour.

During processing developer and stop bath contaminates fixer producing *spent-fix*. *Spent-fix* contains silver and is rated as a hazardous waste. *Spent-fix* must be desilvered before being conducted to the drain according to the *EPA* (Environmental Protection Agency) and local codes. When the silver has been removed, *spent-fix* is no longer a hazardous waste. All chemical effluent should be diluted and tested for *ph* (parts hydrogen) and neutralized before being conducted to the drain.

Mixing liquid chemicals can safely be accomplished in a sink equipped with an overhead vent-hood or slot-vents. Mixing powder chemicals must be done in a fume-hood. A careful study of the MSDS information will indicate whether respiratory equipment should be worn.

Remove trash daily and schedule regular cleaning, especially faucets. Although acids (stop bath and fixer) will not corrode PVC, acids will corrode plumbing fixtures.

10- Consider the Utilities

Darkroom utilities require special consideration:

ROOM AIR must be filtered (clean and dust free), stale air evacuated and fresh make-up air supplied with at least 15 air changes per hour. Room air should be at 70 to 74 degrees Fahrenheit. Relative humidity should range from 55 to 70%.

WATER must be in adequate supply and must be clean and clear; this is essential for all processes. Water should be filtered to at least 20 microns and delivered at constant static pressure of 45 psi. Water hardness should be limited to 40 to 150 ppm (parts per million) of CaCO2. The alkaline/acid *ph* (parts hydrogen) reading should be between 7 to 8.5. The temperature of hot water should vary between110 to 120 degrees F and cold water should be at 50 degrees F or lower. A water chiller will be needed if 50 degrees can not be maintained during summer months.

DRAIN LINES and TRAPS should be PVC to resist the affect of acids in the effluent. Where a silver recovery system is located under a sink, the sink drain line must have a "T" fitting inserted above the trap with a 3/4" male hose adapter to receive the desilvered *spent-fix* effluent. A silver recovery system must desilver spent-fix before being conducted to the drain. It is wise to dilute and neutralize all effluent chemicals before sending them to the drain. Consult your local sewer codes. A floor drain is a good feature for any darkroom.

ELECTRICAL OUTLETS and SWITCHES: Duplex outlets are necessary at each enlarger station. A locally switched outlet is required where a view light is mounted in a counter top. Ceiling mounted safelights require ceiling outlets on a switched circuit. An outlet above each vent-hood shelf will provide for a process timer. A pedestal floor outlet is necessary under a sink where an automatic silver recovery system is to be located. *GFI* (Ground Fault Interrupter) type outlets must be installed near sinks and processors. Brightness of light is expressed in "foot candles." So the general tungsten white-light illumination in the darkroom should be 30 foot candles for instructional purposes and housekeeping. It is good to locate the switch for white light about 54 inches above the floor to eliminate the accidental exposure of light sensitive materials. Another way to eliminate this problem is to put a guard over the white light switch.

Now you know the requirements. Immediately engage a *professional darkroom design specialist* to help you with your design. You have only thirty days to design, price and present your plan.

Your plan should fulfill all of your requirements and should not exceed your budget. Your presentation should include:

1. Conceptual drawings: plan views and elevations of the casework and equipment in each room
2. Written specifications for the casework and equipment
3. A product catalog sheet for each item and keyed to the floor plan
4. Include a copy of this article as reference for the architect and decorator
5. A schedule listing all items and listing cost of each
6. A cost analysis listing the casework, equipment, shipping and installation

By following these *considerations* and with *professional* help, you will be able to present your conceptual design at an architectural planning meeting. The result will be an excellent facility for teaching and learning the art of photography; it will be productive, accessible and safe.