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The design of the decorative arts and sculpture conservation laboratory at the Getty Center

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The History of the Department

THE DEPARTMENT OF DECORATIVE ARTS and Conservation was started by Barbara Roberts in 1981. With the settling of Mr. Getty's estate and the plans for building the collection for the new museum in Brentwood, she enlarged the department to a staff of four conservators by the time the Sculpture Department was created in 1984. The following year, the new lab was completed, and with the Antiquities and Paintings Conservation Departments, the Department of Decorative Arts and Sculpture Conservation moved into their new quarters in a separate building next to the Getty Ranch House. Concurrently, the Getty was making a serious commitment to the protection of its collections from the hazards of earthquakes. During 1984 and 1985 we added two mountmakers and one additional conservator to the department, so the lab that had been designed for three was now housing seven. In subsequent years, a conservation assistant and one or two interns were added, making overcrowding a very serious problem.

The land for the Getty Center was purchased in 1983, and Richard Meier was hired the following year. Meier spent his first year touring museums all over the world with the senior staff of the Museum and the Trust. By early 1986 we were involved in planning for the future needs of the department, for the labs and for other facilities for the new museum. Before we could plan spaces, we had to project the size and makeup of a department that was to be responsible for two curatorial collections. All of the museum's collections were growing quite rapidly and we expected that to continue indefinitely, but that has not in fact been possible. Barbara Roberts wrote an initial profile of a department that included 15-20 staff and 41,000 square feet of space. These plans were never realized, and the department now consists of five conservators of whom one is the department head, two mountmakers, one department assistant and a steady stream of interns.

The Program

By late 1986, we were writing the user profiles for our lab which described our work, our requirements for space, services and adjacencies. These involved negotiations with the administration because we were being asked to plan, not only for the facilities of the department, but first for the future make-up of the department. By the next step of the process, the writing of the program for the lab, we had agreed on an objects lab for three conservators, a gilding lab for two conservators and a furniture lab for three conservators. Ample space was also allocated for interns, mountmakers and contract or visiting conservators. Office space was programmed for an office for the department head, his/her assistant and a shared office for the staff and the object files. In the end we described a suite of rooms including: an objects lab, a clock lab, a gilding lab, a furniture lab, a shop for wood and metal working machines, a walk-in spray booth and a wet lab for aqueous treatments. This space program was revised in January 1987.

Our program called for services such as: single and three phase power for the machines, general and task lighting that could be positioned over work and balanced to the temperature of daylight, black-out shades and mini-blinds on the windows, teleports where necessary, task exhaust that could be moved to cover the whole room, independent environmental controls in the wet lab so that we could acclimatize objects to our conditions gradually, an emergency power shut-off and alarm to the control room in the shop for accidents, a hoist that would allow us to sling objects and take them to any part of the lab, electricity and compressed air available throughout the lab, sinks and refrigerators in all labs and ovens for the object lab and for the mountmakers. Most importantly, we wanted quiet ventilation, which, in the end, required a retrofit to achieve.

Our basic concept was to have spaces with all of the necessary services built-in. However, we wanted



floor plans that were as flexible as possible so that the spaces could be re-arranged to accommodate different projects. The basic work station consisted of a desk area along the exterior wall with a knee hole and file drawers, and a work bench perpendicular to that. Quiet work was planned for the shared office where the object files were to be kept.

Our specifications for the HVAC system called for the same draw on the task exhaust that we had in Malibu—1,640 CFM, with 20,000 CFM in the spray booth, but with a variable control so that we could turn it down for cleaning projects. We wanted to be able to have completely still air in the gilding lab for leafing, but we were to learn that the fire code prohibited ventilation shut-off switches in work spaces. We specified that the make-up air for the task exhausts and the spray booth be conditioned to our set points, which are 70° F and 52% RH. The project engineers, John Altieri and Ken Weiber of ASW, also specified that the labs were to have 100% make-up air. Our noise criteria was set at NC 40.

Careful consideration was given to adjacencies. We planned an art service corridor with a packing and unpacking room to which objects would be taken directly from the dedicated art loading dock. The Museum Services Lab of the Conservation Institute, which is responsible for the analysis of the museum's collection, was positioned at the

very end of this corridor in close proximity to the Scientific Department of the GCI. It houses the X-radiography, X-ray diffraction and X-ray fluorescence rooms, as well as a general analytical lab. Also along the corridor are the Photo Services labs, the Registrar's office, and the collection store-rooms. We were very careful about planning for the movement of works of art. Since the galleries are in five separate pavilions, we had to plan a way to get objects to both gallery floors of the pavilions as well as to all of the service areas without going outside. We calculated the minimum dimensions required to move objects and planned the architecture accordingly. Each door along the art path was to have minimum dimensions of ten feet in width and fifteen feet in height. In the service areas, we achieved this by designing doors with removable five-foot transoms.

Earthquakes were another consideration in planning the labs: any piece of furniture on casters was to have lockable wheels. The cabinets, including files, were all to be heavily secured to the walls, and all drawers and cabinets were to have latches to prevent them from swinging open. Bookshelves over work stations were to have restraints for the books that consisted of pivoting metal bars across the shelves.

We asked for a central vacuum system for the whole museum, but it was prohibited by the fire



code due to the danger of dust explosion in the ducting. We also asked for and got an isolation room in which infested objects could be treated upon arrival.

As in most building projects, the production and review of drawings was to be divided into three phases: the schematic drawing phase, in which the general configuration of the lab would be decided, the design development drawing phase, in which the details would be worked out, and finally, the construction drawing phase, in which the detailed drawings would incorporate the working drawings from the many subcontractors.

The Schematic Phase

Our schematic phase involved working out the floor plan of the lab. Our original plan had been for the mountmakers to work in several spaces; they would fabricate the mounts in the shop, but they would then work in either the furniture or the objects labs to do the fitting and finishing. However, we became increasingly concerned that this would leave them without a proper work space, so we struggled to design the shop to accommodate a fitting area. In the end, consultant Murray Frost urged us to build a separate room for this function so that the objects would not be in the shop with the machines. Fortunately, we were able to implement this suggestion, and we located the mountmakers' fitting room in a corner of the shop

beneath a skylight, thereby maintaining daylight in all principal work spaces. We also worked on the traffic flow beneath the hoist by trying to have access on both ends of the wet lab.

Our spaces as drawn in the schematic phase totaled 6,700 sq.ft. and were subdivided as follows:

Object Lab	1,134 sq. ft.
Wet Lab	210
Clock Room	135
Total Office	666
Total Hall	810
Gilding Lab	532
Furniture Lab	1,266
Spray Booth	154
Mountmaking	285
Wood Shop	1,462
Metal Shop	285

The ability to read and understand drawings, including all of the terminology and symbols became critical, and we had seminars to that end. One lesson learned was that every single note, comment, or list had to be identified with the names of the sender, the addressee, the date and the subject, as we were starting to build thick files. We resolved to write all documents with memo headings that contained all the necessary information. It also became clear that information was power in such a complex project; the ability to



show that requests had been long-standing and previously-approved enabled us to prevail in a number of contested decisions. Attention to the many details was also critical because everyone was overwhelmed by the scale of the project and follow-up was sometimes uncertain.

In 1989 Barbara Roberts left the Museum and the author was named department head. One change that he wanted to make immediately was the flooring in the labs. It had originally been specified as linoleum and he wanted to have the end grain wood block that was to be used in other locations. Since the wood cost considerably more than the linoleum, it was considered an add-on at a time when none was being approved. He persevered and ultimately compromised the specified wood cabinets for laminate in exchange for the wood flooring. This process of trade-off was common to the project. However, it points out the importance of proposing the ideal in the original program, because every project is cut back and add-ons are often impossible.

The Design Development Phase

The design development phase involved meeting with lab consultant Earl Walls from San Diego, who was helpful, but who lacked familiarity with art conservation labs. Two of the main challenges of this phase were designing a way for the doors to seal around the track for the hoist and the resolution of the ceilings. The ceilings required a fully coordinated plan, in order to include: lighting on

moving tracks, a set of gallery lights for checking work in gallery lighting, the task exhaust on slide tracks, the general HVAC duct work, the drop down electrical outlets and compressed air hoses, and the track for the hoist. All of this had to fit in three feet between the required fifteen foot clearance and the eighteen foot slab height. After repeated meetings without solutions, we realized that hoisting sculpture was risky and that it presented an insurmountable challenge, so it was eliminated. Instead we installed suspension hooks in the main labs.

Our lab posed a serious water hazard to the Drawings and Manuscripts curatorial offices directly below us. We therefore eliminated all floor perforations except the sinks and planned for a three-ply rubber barrier under the lab's floor. The requirements of the Americans with Disabilities Act were another factor in this phase of the planning. It meant that we could not build a work space with architectural impediments to a conservator confined to a wheelchair, which required that we have some adjustable work tables and that we reduce the depth of one sink in each space.

The Construction Documents and Construction Phases

Our review of the construction documents was a challenge because we were confronted with hundreds of sheets of highly detailed drawings which showed details that were quite important, but which were hard to read. Examples of this are the gang switching of the lights which turns them all on at once, or the side stretchers on the work tables which meant that we could not sit with our legs under the tables while working. There was a cabinet that had been designed specifically for the storage of sheets of plywood, but whose dimensions were compromised by the division of the cabinet across its height. We should have been far more attentive to these details. There were other situations where we called for changes, which were never made on the construction documents, and we failed to notice it. At this stage, we were also coordinating the lists of lab furniture and fixtures, which were charts listing every item that had to be

supplied, the supplier, the department responsible for ordering and paying for it, and any special requirements. This was an exacting task, but it went well and it helped us to organize the procurement of our equipment.

Construction of the lab went well, and we visited often as a department so that we would be familiar with the spaces. We knew that we would be under tremendous pressure to move in quickly and to hit the ground running. Our move was delayed until early March 1997. We had to move the collection at the same time we moved the lab and install the twenty-four galleries for which we were responsible by Thanksgiving of that year. We had always insisted that all punch list work had to be completed before we moved in so that we would not have construction personnel in the lab with the works of art. Unfortunately, that was a condition that the builders could not meet so that, despite our insistence and protests, we were hampered with ongoing work in the labs during an already busy and stressful period.

Off-gassing of building products had always been a threatening question because we knew that we would not have the luxury of letting the building sit idle for a period of time before we brought the collection to it. To remedy this, we had, at the beginning of the project, set up a program of testing every single building material that was proposed for use in a gallery, a storeroom or a lab. The Museum Services lab of the Getty Conservation Institute under David Scott hired Ron Schmidting to do the testing, which consisted of the Oddy test, (28 days in vials with Cu, Pb, Ag) the sodium azide test, pH and formaldehyde for which the lower limit of detection of this test is 50 ppb.¹ Cecily Grzywacz and I also set up a study of the air quality with Rick Pribnow, the Head of Facilities. This study, which has not yet been published, comprises sampling both gaseous and particulate pollutants at two outdoor locations as well as indoors before and after the fans and in the galleries. We sampled for both outdoor and indoor generated pollutants. The outdoor pollutants were sulfur dioxide and ozone. The indoor pollutants that we sampled were: formaldehyde, acetaldehyde, formic acid and acetic acid, all of which are organic carbonyl pollutants. We also

sampled for hydrogen sulfide through a collaboration with the Brookes-Oxford lab. The sampling of the particulate pollutants was carried out by the lab of Dr. Glenn Cass at Cal Tech in Pasadena. We were completely assured by the results of the air quality study, which proved that not only was the system doing its job, but that the environment posed absolutely no threat to the collection. The filtration in the ventilation system that services the labs consists of 30% pre filter, 95% after filter, carbon filter and 60% post carbon in both the outside air fan and the A/C fan for the labs. The labs receive 12,000 CFM. of this extraordinarily clean air, with no recycled air.²

We were less fortunate with the environmental controls because construction of the museum was being carried out in phases, so some parts of the building were far behind the part in which our lab is located. They were therefore still bringing the controls on line and testing the smoke evacuation system when we were insisting on strict adherence to the temperature and relative humidity parameters. This was further complicated by their having to shut the system down for testing, which meant that we would unexpectedly lose our task exhaust in the middle of treatments. This added to the tension during a very busy period.

The Punchlist and Retrofit Phase

The punchlist and retrofit period was perhaps the most challenging because we were in the space and we also had to convince the building program that costly modifications were necessary. Minor oversights and problems included soap, towel dispensers and drying racks at every sink, the replacement of drawer glides that were not of sufficient quality to handle the weight of the filled drawers, rubber tiles on concrete floors, and reprogramming the computer that controlled the lights so that they could all be left off at night. A more serious problem was a drain line from the environmental control that had never been connected to the appropriate sink trap. During a test, water drained directly over one of the only perforations in the floor gasket, creating our worst nightmare: a water leak through the floor just outside of the manuscripts storeroom. This had been caused by one subcontractor thinking that the other was responsible for the connection and



vice-versa. Following that, we insisted that they remove all the covers from the plumbing connections so that we could verify that they were all properly finished. The sink was also removed and the pipes were sealed.

We also encountered problems fitting an oven and a refrigerator into spaces that had been built to house them. Some of the work tables had to be shortened because the staff using them had changed since they had been specified, and the new staff members were not comfortable working at that height.

The biggest project of the retrofit was major modification of the task exhaust and return air duct systems. In spite of our attention to the noise level of the task exhaust, it turned out to be unacceptable. We had, with some skepticism, accepted Plymovent trunks instead of the Nedermans that we had had in Malibu as an economy and because the Nedermans would require booster fans in each of the trunks, which we equated with noise. We also requested and got sliding trunks after getting positive feedback from colleagues in several labs that had them. In addition to high noise levels, we were dissatisfied with the draw on the task

exhaust, which was inconsistent from trunk to trunk. In researching the issue, we found that there were no industry standards for the draw on task exhaust. We were told that our problems stemmed from the distance of some of the trunks from the fans, which were on the roof. Other factors were the leakage along the lips of the sliding rail, the internal braces inside the trunks and the number of turns in the run of the ducting. This all resulted in leakage of 50% and of a drop of 50% of the static pressure. All of these factors contributed to the noise, which was further exacerbated by the Phoenix valves, whose function it is to open and close the return air duct as the task exhaust is turned on and off. The system is designed to maintain a constant volume of air going through the lab. The engineers had oversized all of the duct work in the belief that a given volume of air moving slowly though large ducts would be quieter than the same volume moving rapidly through a small duct. However, the design did not work because the large ducts meant that when the Phoenix valve closed during the use of the task exhaust, the opening was very small and the air had to accelerate to get through it, creating a lot of noise. In the end, all of the Phoenix valves had to be enclosed in insulated sheet metal, all but

one of the sliding Plymovent tracks were replaced with fixed mounts, the elbows in the trunks were changed from 6" to 8", and all of the joints in the trunks were sealed. The fans were also reset to have a higher initial draw. We were asked to set the acceptable draw for the face velocity of the trunks, even though no industry standard existed. Our health consultant advised 200 ft/min. at a distance of 6" from the face of the trunk. Unfortunately, this translated to 2,700 ft/min., which would almost pull paint off of an object. We ultimately set the performance criteria at 330 CFM at the face, or 150 ft/min. 6" from the face. After the retrofit, our range of cubic feet per minute measured at the faces of the trunks had gone from 185–300 CFM to 355–434 CFM, which equaled 129–157 ft./min. at 6".

Since our biggest complaint with the HVAC was the noise it made, we consulted the sound engineer to help us measure and understand the sources of the noise, which is measured in units called NC for noise criteria. To give a frame of reference for noise levels in work spaces, a quiet library is approximately NC 20–25, an office is typically NC 30 and the criteria for our lab was NC 40. However, in measuring our spaces with the consultant, I learned that there is not a direct correlation between the NC rating and the discomfort experienced by the occupant of the space. This is because NC rating is calculated by taking decibel readings at about 8 different frequencies and plotting them on a graph. The rating comes, not from an average of the different readings, but from the highest decibel reading of any of the frequencies. However, the human ear is far more sensitive to some frequencies than to others. You could therefore have an NC 40 reading that was intolerable in one space and the same NC rating in another space that was very comfortable. In fact we had just that: some spaces that were very pleasant had a higher NC rating than spaces that were unbearable. In the end, we learned to insist that the background noise be tolerable regardless of the NC rating.

The final result is a beautifully lighted and equipped suite of labs of generous proportions. One lab is noisier than we would like, but we feel very fortunate that the architects and the building

program went as far as they did, not only to build and equip our lab, but also to fix the problems that we missed initially. My advice to anyone designing a lab is to talk to colleagues and get specific names, models and numbers of all systems, equipment and fixtures. The success of the space for the users ultimately depends on the attention to detail during the planning.

Endnotes

1. David Scott, June 2, 1998 and Cecily Grzywacz, June 2, 1998.
2. Rick Pribnow, May 27, 1998.