

S. JAMES GOLDSTEIN

## DESIGN DEVELOPMENT OF THE KOSSIAKOFF CONFERENCE AND EDUCATION CENTER

### GENERAL SITE CONSIDERATIONS

From the time I first began working with him in the summer of 1961, Dr. R. E. Gibson emphasized his concern about preserving – and reserving – APL’s front (south) lawn. That practical and philosophical concept was very much a part of our thinking in locating, shaping, and landscaping the library, as well as Building 4, designed at the same time. And a decade later it was part of our thinking in placing Buildings 7 and 8. It was William Mautz who, during the same summer of 1961, mentioned to me that he could foresee that someday APL might have to expand its evening classroom capacity onto that lawn, but that it would be quite a challenge to preserve the lawn’s character while building on it.

So when I was invited in the spring of 1980 to meet with Drs. C. O. Bostrom and A. G. Schulz, among others, to discuss the planning of a new auditorium and classroom building, my subconscious had been imprinted for 20 years with Dr. Gibson’s concerns for preserving the quality of APL’s beautiful, and heretofore untouched, front yard.

After receiving the charge from Dr. Bostrom as to the intended scope and purpose of the new building, I began to try to put the parts together. My first in-

stinct as a designer was to conceive an “earth-sheltered” energy-conservative arrangement that would literally bury the bulk of the building beneath the lawn. Confirming some of the validity of that initial concept was an early request from APL to have an underground handicapped-accessible connection to the intended new east parking lot (which is well down a hill, and thus nearly on the same level with a depressed building). But the more we talked out all of the planning issues, the more desirable it became to perch the building on the site rather than to attempt to hide it there.

As in most situations of invention, Thomas Edison’s “99% perspiration” had to come first. We went through numerous and exhausting iterations of the complex relationships of initial classrooms, future classrooms, auditorium, dining area, kitchen, lobby, projection rooms, mechanical equipment spaces, etc., all to fit with the topography and circulation patterns of the site, before the flash of inspiration finally hit.

At that moment of insight, it was vividly apparent that “invention does indeed come to the prepared mind.” Dr. Gibson’s concern and Mr. Mautz’s admonition were the background, the premises, of the







solution. Coupled with those ideas were the notions of separate but identical closed forms for the auditorium and the classrooms, integrated with an open form for the dining area. The latter is our key response to the site planning issues because it is the dining area that, when stepped gently down the south slope, matched perfectly with the existing lawn and aimed directly at the picturesque tree-ringed APL lake. Internally, the auditorium's slope very easily fitted the eastward slope of the site. And a circular form for the two large closed elements is the optimum geometry for two reasons: (a) it yields the minimum perimeter for the maximum enclosed area and (b) it provides receding surfaces whenever one glances at the cylinders in perspective, thus tending to diminish the apparent bulk of each cylinder on-site. So, months after beginning, we finally had the general design solution for the building's exterior, interior, and landscaping.

I have described this design evolution in some detail because the genesis of the solution came from a sincere desire to respect Dr. Gibson's view of the importance of preserving the character of the site.

#### PROGRAM PLANNING

Fine tuning of the mathematics and the implications of combinations of slightly different sizes of auditorium, classrooms, dining room, lobby, kitchen, audiovisual control room—coupled with various structural column spacings in two directions, separate structural materials, and two or three different heating, ventilating, and air-conditioning schemes—

constitute the architects' and engineers' palettes for final composition.

The earliest idea of the new auditorium's size was to have a room that would be some multiple larger than the seating capacity of Parsons, the existing auditorium. Gradually, the figure 500 emerged as the appropriate one. The dining concept was much more elusive as to size, relationship to the auditorium, purpose, character, potential convertibility to other purposes, and number of levels. In the beginning, we thought that some sort of balcony (two-story relationship) concept would be preferable because of the multiple-use flexibility (in combination with classrooms) that such a concept might offer. But it gradually became apparent that the flexibility tail was wagging the planning dog. By concentrating on the simple question of how big each of the separate parts should be, before mixing in any interchangeability concepts, we could resolve the first-order questions. We decided, with APL management, that the dining room had to be big enough for 500 coffee-break and luncheon guests who might be attending a morning or an all-day symposium in the auditorium. That, in turn, would require a storage room able to house up to 500 stackable seats and an appropriate number of folding tables.

Dr. Bostrom and his colleagues then requested that we provide suitable space for 300 guests for a catered dinner for Hopkins alumni, APL staff, and other University-related functions. This implied a large enough area for a pre-dinner reception for 300. By dividing our 500-seat dining room into a "large half"



and a “small half,” we were able to provide the latter as the site for the reception, with the former as the 300-seat dining area. By stepping the two halves, the reception (for standees) could occur in a lower-ceiling room, while the seated dinner would take place in a higher-ceiling space.

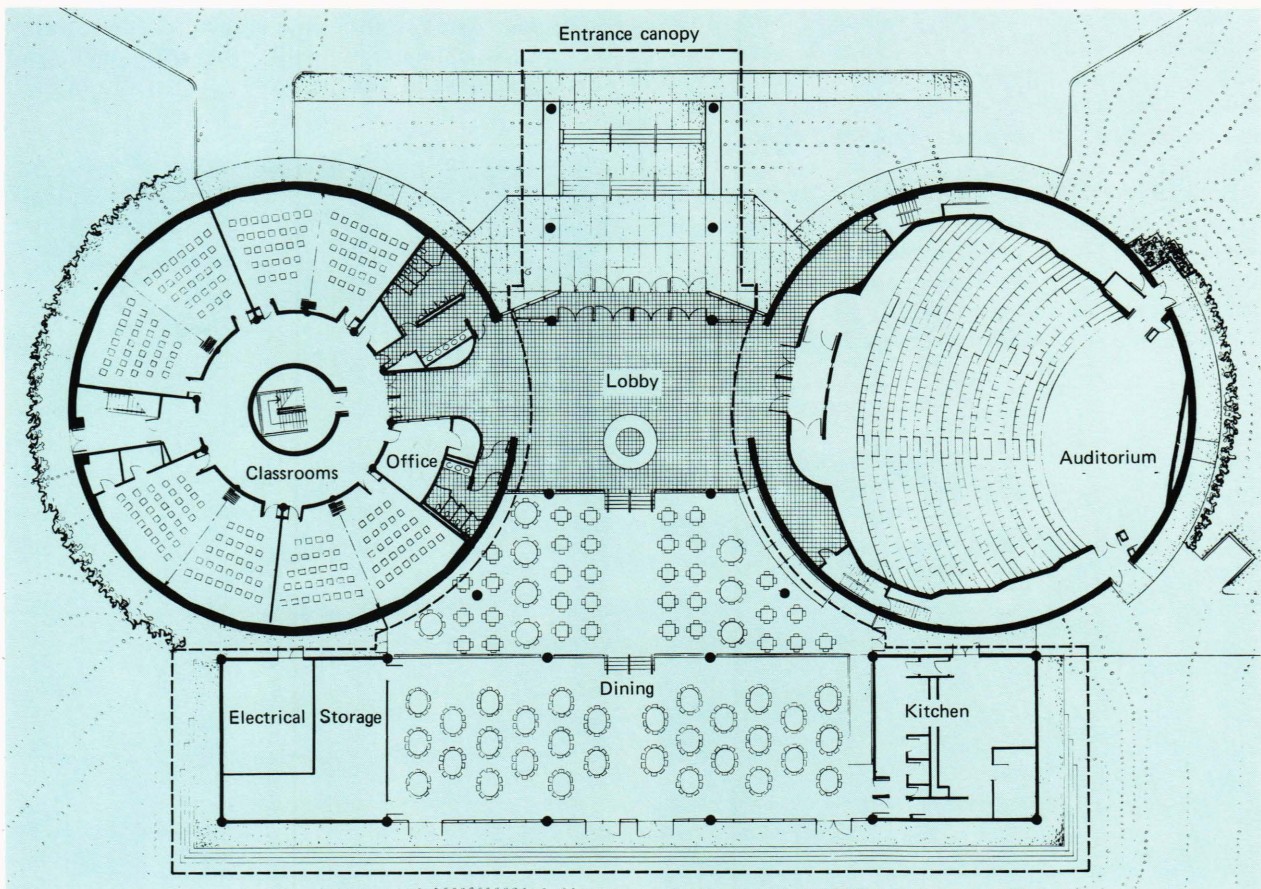
But the use of the central dining area for receptions and dinners in the evening meant an inherent visual and auditory conflict – with students arriving for evening classes in the classroom ring, even though dinner parties would occur relatively infrequently compared to the regularity of the classroom functions. Dr. Bostrom urged that we develop a subtle way of separating the two groups so that both could co-exist in the adjacent spaces. And so we decided to step down the upper portion of the dining room from the lobby and to insert glass panels between, to provide the separation without loss of subtlety.

The sizes of the classrooms were set early on – capacities of approximately 25 to 30 students, with the ability to combine rooms in pairs to permit seating 50 to 60 in a single space. Once the overall shape of the classroom wing was set as circular, there immediately arose several philosophical conflicts that related to and affected the size, shape, and quantity of the classrooms and the positions of service core elements (stairs, an elevator for the handicapped, restrooms). The prime philosophical conflict arose in finding that

the number of future classrooms could not be a precise figure but was really anybody’s guess; thus a closed shape, such as cylindrical, denoted and symbolized certainty, whereas an open form, recognizing and symbolizing uncertainty, would be far more appropriate. Our most difficult design dilemma was in attempting to resolve this matter. We finally elected to pick an arbitrary position by staying with the closed form and accepting the consequences of a limiting form and a finite number of initial (eight) and future (up to ten) classrooms.

By careful iterations of larger and smaller circles, we finally hit upon a 110 foot outer diameter as being a satisfactory size for both auditorium and classroom wings, yielding acceptable capacities for both. The APL staff tested the validity of the classroom concept by making a full-sized mockup with furniture, to be certain that every aspect, real and imagined, could be tested in advance.

The auditorium wing presented its own geometrical problems because of the need to accommodate two sets of stairs (necessary to serve the elevated projection rooms), two coatrooms (to serve 500 people), and two sets of mechanical equipment rooms. Our final design decision was to have all of the foregoing shaped to engirdle the auditorium, thus providing acoustic and thermal buffering of the auditorium from the exterior.





The kitchen design presented interesting economic and management issues. Because the entire new facility may not be scheduled for daily use for some years into the future, it was decided that only limited “box lunch” menus, to serve 500, would be catered from the kitchen. For dinners served to 300 or more persons, it was decided that only pre-prepared meals would be catered from the kitchen.

## STRUCTURE AND ENVELOPE

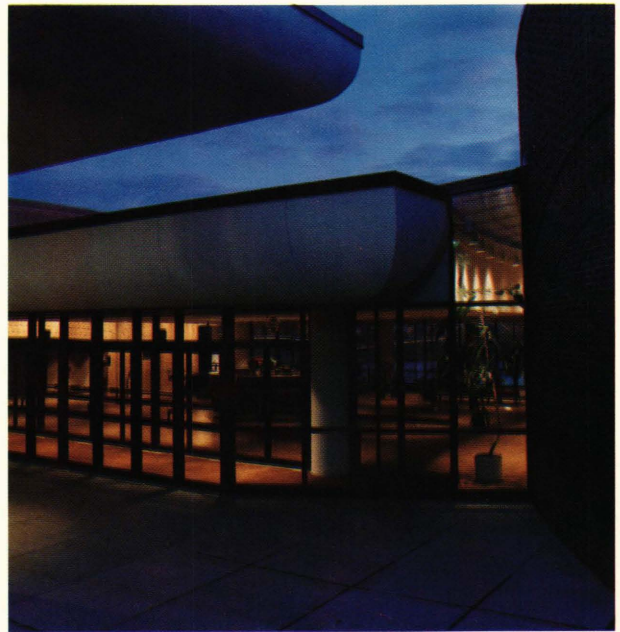
With the Gibson Library design in mind, the first thought was to use a waffle-patterned structural concrete roof in the dining area. This method of construction, however, was beyond the reach of the project budget. The alternative was to use a structural steel skeleton throughout, which permitted the easy integration of small-sized structural elements into the fabric of the building.

The auditorium wing is framed around its perimeter, with steel columns embedded at regular intervals in the exterior wall and another group of interior columns concealed within the interior partitions of the auditorium itself.

The classroom wing also has perimeter steel columns embedded in the exterior wall, with another group of interior columns set 30° apart in the inner partitions of the classrooms. These interior columns are given expression in the circular corridor by encasement in a semicircular enclosure of stucco on metal lath.

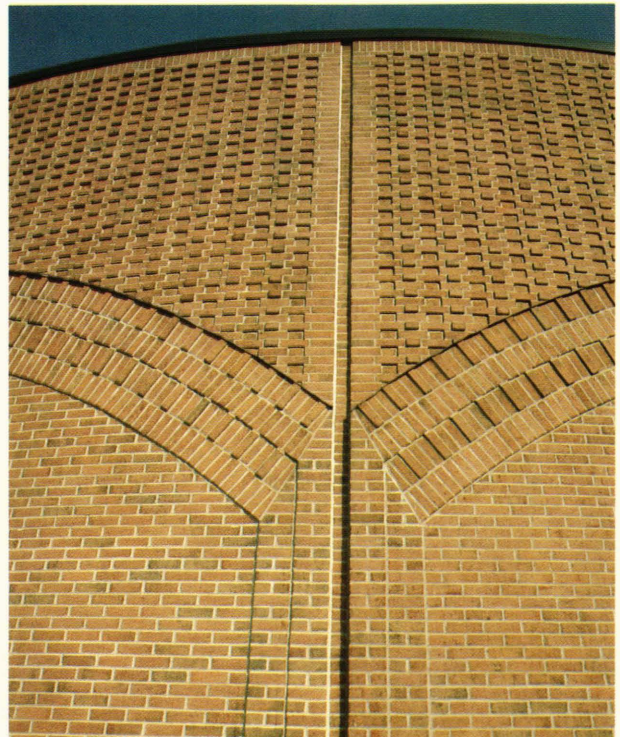
The entrance-canopy-lobby-dining-kitchen areas are primarily framed in rolled structural steel members, independent of the classroom and auditorium wings. The column spacings have been carefully chosen for bay size to yield optimum usable interior areas.

Both of the 110-foot diameter circular drums are wrapped on their exteriors with decorative brickwork, and the brick patterns are continued into the lobby and dining areas. Transparent curtain walls of double-glazed (insulating) fixed glass and doors frame the south view of the tree-lined APL lake, with



inner and outer sets of single-glazed doors forming a vestibule at the north entry.

The decorative brick patterns, including the arches, applied to exterior and interior surfaces of the two cylinders were the result of much discussion with APL management on the esthetics of the project. Although circular forms in public architecture go back at least two thousand years (e.g., the Pantheon in Rome), the usage is still rather infrequent, and surface decoration was therefore deemed appropriate





to avoid giving an industrial character to the structure. It was then decided, after considerable graphic experimentation with size, spacings, and heights, to use projecting arches, in order to suggest a historical vocabulary. Serendipitously, open arches (slightly lower in height, to fit the circumstances) provide respective portals from the lobby to each of the classroom and auditorium wings. The intense projecting pattern and texture of the brickwork above the arches was chosen to contrast with the smooth and restrained patterned brickwork below the arches. There is an APL precedent for that intense texture. It may be seen in the interior face of the north wall of the link (corridor) of the Gibson Library.

## ENERGY CONSERVATION AND BUILDING SYSTEMS

Heavy use of insulation is the watchword in planning for maximum energy conservation in a building envelope, and this prescription was followed to the letter in the Kossiakoff Center. The current DOE standards were the basis for the thermal design of exterior opaque walls, windows, roofs, skylights, and doors.

The exterior walls have several different types of insulation built in, depending on position above and below grade and on construction type. But in all cases, the overall coefficient of heat transfer achieved is 0.05 Btu per hour per square foot, coupled with a large thermal mass (because of the masonry). Roof insulation was placed on the steel deck to achieve an overall coefficient of 0.03.

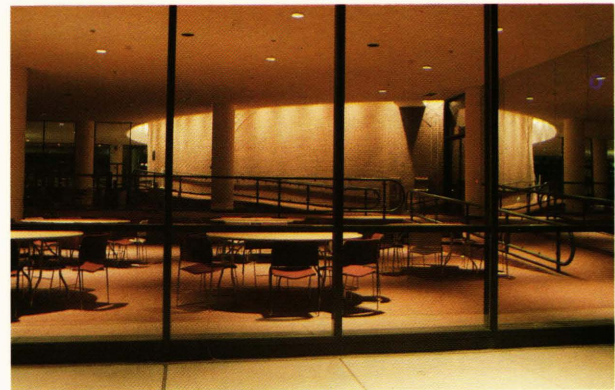
All windows and interior skylights are double glazed. The main entrance doors are single glazed because their placement in two parallel lines to form a vestibule achieves an effect similar to double glazing.

Some unusual additional design steps were taken to conserve energy: the east, north, and west exterior faces of the brick cylinders are placed partially below grade. This earth shelter provides significant additional insulation plus an element of year-round temperature stability for those areas. Furthermore, the inner walls of the auditorium required substantial acoustic mass and acoustic insulation to ensure good hearing conditions in the auditorium. These steps also ensured high thermal mass and efficient thermal insulation of the auditorium walls. Construction details were carefully developed to minimize heat leakage: all perimeter column enclosures are heavily insulated, all through-wall joints are caulked on the interior and the exterior, all exterior doors are heavily weatherstripped, and opaque exterior doors are internally insulated and their door frames are of the thermal-break type.

The conceptual design of the dining room provided for a “passive solar” condition, for it faces south to capture sun exposure (with a 12 foot roof overhang to limit unwanted summer intrusion), heavy masonry interior construction is provided to achieve high thermal mass, and enough skylighting is placed to limit the need for artificial lighting during the daytime.

Most important, the planning and design of the two closed-form entities – the circular classroom wing and the auditorium wing – have achieved automatically both no-window and minimum-exterior-exposure conditions, ensuring maximum thermal independence from the ambient. And the passive solar dining room, although heavily (double) glazed, is essentially triangular in plan, with two long sides protected from any external exposure, thus ensuring maximum winter solar response (insolation, penetration, absorption, and retention). It should be noted that the fact that the classrooms would be used predominantly by the Evening College suggested that external view windows would be unnecessary; hence the choice of the closed form for the classroom wing. Similarly, audiovisual requirements in the auditorium mandated the closed form there.

Winter use of the classrooms requires some unusual combinations of control sequences and comfort-conditioning. Even though there is minimum external exposure and heavy insulation is provided for each classroom, some heating is required during unoccupied hours. However, the moment a classroom has its lights on and several occupants are present, the thermal need shifts to a cooling requirement. Decentralized (per classroom) equipment and controls ensure simplicity and accuracy of match of capacity and performance to the variable load. The actual classroom air movement is achieved with individual fan-coil units mounted above the ceilings of the re-





spective coat alcoves in the rear of each classroom. Noise control for the fan units was a specific design consideration, and A. C. Stucki played a significant role in ensuring acceptable performance of the units. All heating is provided by electrical resistance units.

Auditorium, dining, and lobby air-handling systems have energy-conservative enthalpy controls to ensure that chillers will not run nor heating be supplied during late spring and early fall when 100% (or a major percentage of) outdoor air can be circulated within the building. In keeping with all APL energy conservation practices, lights and air-conditioning systems will be off when the spaces are unoccupied.

### INTERIOR MATERIALS: TEXTURES, PATTERNS, AND COLORS

Because of the predominance of brick in the lobby and dining areas, a warm natural earth-tone palette was the basis of all color and material choices throughout. The quarry tile in the lobby was the first material chosen, and its varying (“flashed”) color was selected to be darker than the wall bricks, larger in scale, and polygonal in shape (both to avoid repeating the brick patterns and to avoid rectilinearity near the curved shapes of the two large cylinders). At the entrances to the cylinders, rectangular quarry tiles were placed in a curved pattern in order to em-



phasize the transition from lobby to the respective wing. The quarry tile flooring is continued into the two coatrooms of the auditorium wing and up to the circular corridor of the classroom wing.

Within the entrance areas of each wing, curved walls are covered with an earth-toned ribbed-textured carpet for noise control, and the adjacent ceilings are covered with the same ribbed carpeting in a cream color. The auditorium is entered through light (and sound) locks that have dark brown ribbed-carpeted walls.

The dining room carpet (chosen to reduce noise) has a specially selected small-scale pattern of several





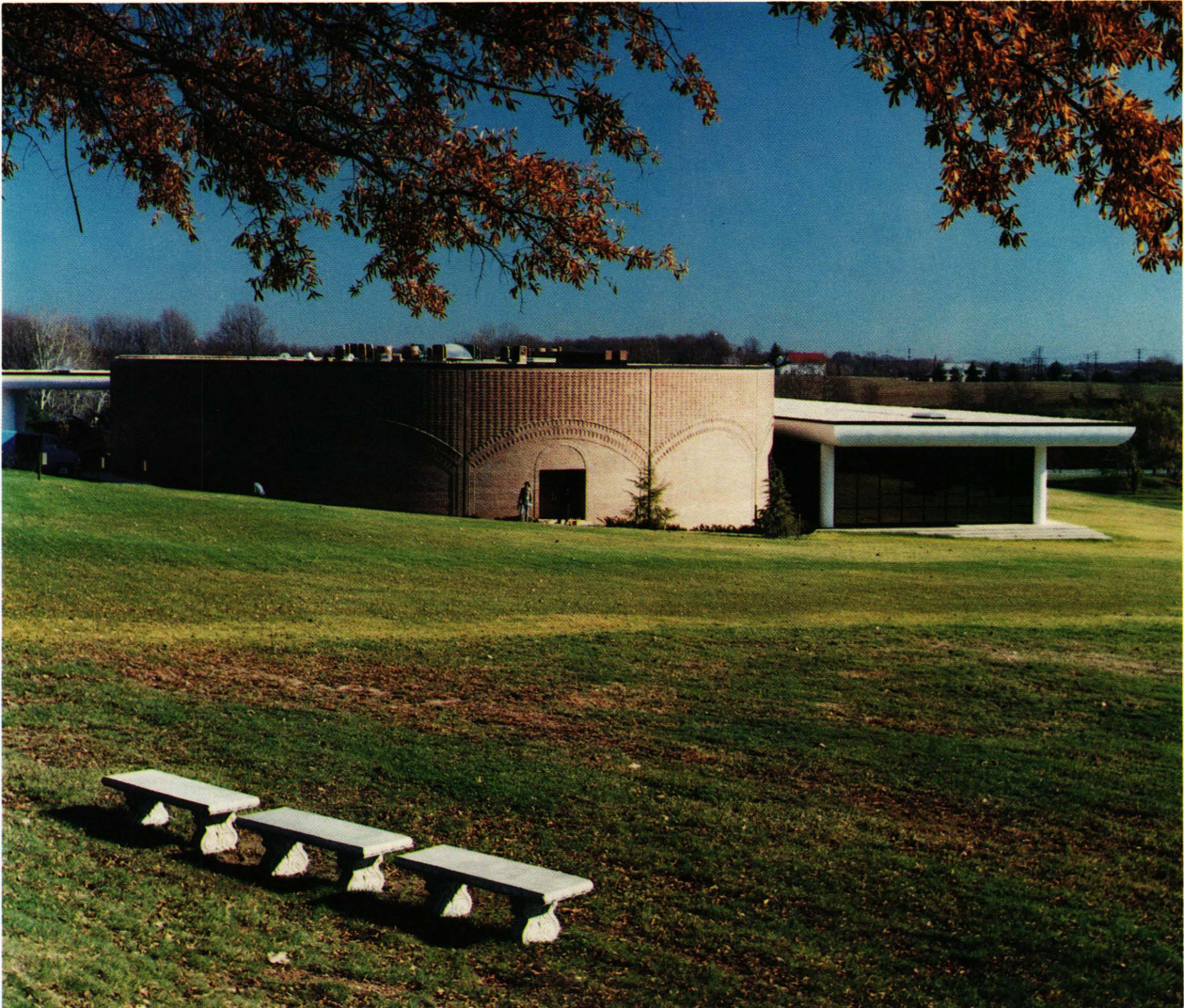
colors. The colors reflect both brick and quarry tile shades, plus a red tone that appears elsewhere throughout the building as an accent color. Dining tables (of varying sizes and shapes, selected for ease of handling for storage and setup) have two color themes: one is a light wood tone, chosen to be used farthest from the bright south window wall; the other is a deep red color, to be placed nearest the south wall. Stackable dining chairs were selected to provide comfort with minimum weight and profile.

The east and west walls of the southerly portion of the dining room are fully mirrored and are as intriguing a touch as we imagined they would be. When seen from almost any distant point in the dining room, the mirrors extend and amplify the view of the tree-ringed lake; when seen from nearby, the mirrors extend and amplify the near space. And for continuity, the mirrored wall effect was continued around the three exterior sides of the kitchen area east of the dining room and the storage and electrical equipment area west of the dining room.

The auditorium itself has an interior wall pattern of dark vertical wood ribs applied at 6-inch intervals over a dark brown speaker cloth, which in turn covers areas of fiberglass insulation. The fiberglass absorbs sound in the wall areas that could cause echoes. The rib pattern was chosen to intensify the circular appearance of the room, thus masking some of the irregularities deliberately introduced into the reflective wall surfaces for sound reinforcement.

The ceiling plane and the very large front projection surface are a warm off-white tone that, in high contrast to the dark tone of the rest of the walls and the relatively nonreflective tone of the carpet, provides an intense visual situation that focuses attention on the front projection wall.

Returning to the lobby, the central feature is a specially designed circular reception desk. Within the desk are numerous telecommunication connections to systems inside and beyond the building, for use by receptionists and security personnel.





## AUDIOVISUAL CAPABILITIES

As Reported By:  
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Assistant Supervisor  
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Twenty years ago, a typical APL conference room was equipped with a single pull-down screen and portable stand for film and slide projectors. Today, dual-screen, rear-projection systems with multimedia audiovisual capabilities are commonplace in conference areas throughout the Laboratory.

This concept was incorporated into early planning and design of the Kossiakoff Center Auditorium audiovisual system in order to maintain the same audiovisual communication capabilities. For example, a presentation using various media, such as overhead transparencies,  $2 \times 2$  slides, motion picture film, or videotape used in any Laboratory dual-screen conference area, could be given in the new auditorium without changing the format.

The front wall of the auditorium serves as a projection surface that is  $18 \times 36$  feet. This surface provides dual  $18 \times 18$  foot screens that are merely a scaled-up version of the  $5 \times 5$  foot dual screens in the other Lab conference areas.

The audiovisual control room, very appropriately named the "Sky Suite" by Dr. C. O. Bostrom during the dedication ceremonies, is spacious and impressively practical for technical support of conferences. The control room, with many observation windows, is divided into three separate areas of operation. The center area contains dual high-intensity overhead projectors, dual high-intensity  $2 \times 2$  projectors, and a single high-intensity 16-millimeter motion picture projector. Any dual combination of this array can be projected simultaneously. The dual-screen features are not necessarily practical for some presentations, so all projectors have adjustable bases for center-screen alignment. When this mode is favored, the  $2 \times 2$  slide projector and overhead projector can be superimposed and dissolved when the visuals are changed. Several types of large-screen video projectors are presently being evaluated to complete this versatile, high-quality projection system.

The entire building is provided with a conduit layout for audio and video signal distribution. The audio cable network of the auditorium and the control room includes microphone lines for three podium locations, multiple lines that terminate in floor jacks at several locations for panel discussions or special meetings, and microphone jacks in the seating area for audience participation. The cable net-



work terminates in jack panels at the control room. This affords an extended capability for patching any combination of microphones or associated audio devices to the input of the sound system, which can automatically mix microphones through a 16-input, dual-channel console that provides outputs to audio recorders, the auditorium sound reinforcement system, and a separate stereo playback capability.

The video cable network provides outlets to meet the distribution requirements of various combinations of video signals from monitors, computer terminals, and computer graphic displays. Six TV camera outlets at strategic locations within the auditorium are prewired with video and sync lines. Multiple color cameras can be adjusted and switched from the control room during video recording operations. The right section of the room is used for all audio and video control functions.

Each classroom in the educational section of this complex has conduits for television and computer data that are interconnected with the control room and other parts of APL.

The lobby reception desk and dining area are also interconnected to the audiovisual network by means of audio and video cables. The dining area has a separate sound system with automatic microphone mixing and input/output connections to the control room. Video outlets allow the operation of cameras or video monitors from the central control room.

The audiovisual network and systems in use have proven very satisfactory thus far. The technical qualities and expandable features designed into the system enhance the operation and purpose of the Kossiakoff Conference and Educational Center.