The New Physics Building at the Ohio State University

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The new Physics Building at the Ohio State University is described and pictured. Floor plans are shown and special features of the building are discussed.

IN 1945 the Ohio Legislature made an appropriation for the construction of a new physics building at The Ohio State University, but the steel shortage and the immediate priority assigned for this building suggested that it would be at least two years before actual construction could begin. One year later the chairman of the Department of Physics and Astronomy appointed a committee to make a thorough survey of the space needs of the entire department. This committee obtained from the members of the permanent staff estimates of the space demands of every part of the department's program, both as it then existed and as it was projected on the basis of the growth that could be expected within a "few" years. The committee studied available reports[1] on other physics buildings, discussed sizes and types of lecture rooms, and suggested an approximate location which each of the various types of rooms should have in a new building. These specifications included such special requirements as the need for areas in which there were no windows. Finally the committee reported its findings to the university architect, whose office prepared sketches for a building that would provide the space requirements of some 200 000 square feet as outlined by the building committee and would, in general, satisfy all other needs.

The housing requirements can be understood by consideration of the present size of the department. In the school year 1951–1952, the active permanent staff totaled 22, exclusive of those associated with astronomy and optometry groups. There were 100 undergraduate majors in physics, half of whom were enrolled in the College of Arts and Science and half in the College of Engineering. There were somewhat more than 150 graduate students. Of the latter, 30 assisted in the teaching activities and 35 others were employed on a part-time basis to participate in sponsored research investigations. About 20 technical assistants had full time employment in shops, laboratories, and other service facilities.

The appropriation for the physics building, materially increased by the Ohio Legislature in 1947, was sufficient to build only approximately one-third of the projected building when materials became available. The building committee was charged with the responsibility of recommending which of the activities of the department should be housed in the new building and which would have to remain in Mendenhall Laboratory of Physics. The site chosen was close to the chemistry and engineering buildings of the campus. This site causes some inconvenience because of its separation from Mendenhall Laboratory, but its choice is part of a long-range plan of bringing the physical science departments together in the vicinity of the so-called "engineering quadrangle." After considerable study the staff decided that space should be provided in the new building for two lecture rooms, three additional classrooms, offices for most of the physics staff, advanced laboratories, and most of the research programs. To remain in Mendenhall Laboratory were the instrument shop, the elementary laboratories, the library, several classrooms, the lecture room and other facilities of a descriptive course in physics and astronomy, and certain research laboratories for which special provisions had previously been made.

[1] The following references describe physics buildings or facilities at various institutions and are of interest to building committees. B. H. Dickinson and R. H. Noble, Am. J. Phys. **18**, 378 (1950); C. E. Howe and F. G. Tucker, Am. J. Phys. **17**, 245 (1949); Design of Instructional Laboratories, A Symposium, Am. J. Phys. **13**, 182 (1945), B. J. Spence, Am. J. Phys. 11, 208 (1943); M. Masius, Am. J. Phys. **10**, 307 (1942); W. P. Davey, Am. J. Phys. **10**, 102 (1942). This last reference contains a complete bibliography of previous building reports.

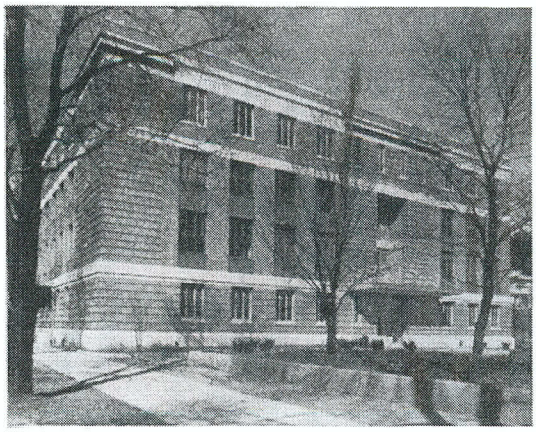

FIG. 1. The Ohio State University Physics Building viewed looking about 30° north of west.

GENERAL FEATURES

During the summer of 1948 construction was begun on a four-story-and-basement structure for the physics department; this building was finally occupied early in 1951. The new Physics Building is of modified classical Renaissance architecture, as are other buildings in the area. The exterior is red brick, trimmed in limestone and with green brick spandrels below the windows on the second and third floors. Aluminum casement windows are used throughout the structure and Venetian blinds have been provided for each window, except for those in certain laboratories equipped with light-tight shades. Figure 1 shows the front of the building as viewed by a camera pointed approximately 30 degrees north of west. The building is 121 ft long, 92 ft wide, and has a wing 42 ft by 66 ft. Future plans are to complete the building by extending it northward as is indicated in Fig. 2.

One of the objectives sought in the design of the building was flexibility. Toward this end there are generous vertical service shafts which carry electrical conductors, water, gas, compressed air, and connections to a vacuum pump to the various laboratories. The design of these service shafts is such that it is relatively easy to add any of the special facilities which a physicist is likely to require in his research laboratory. The internal walls of the building are of unglazed yellow tile. These walls, while not portable, do not bear any load and are fairly economically moved.

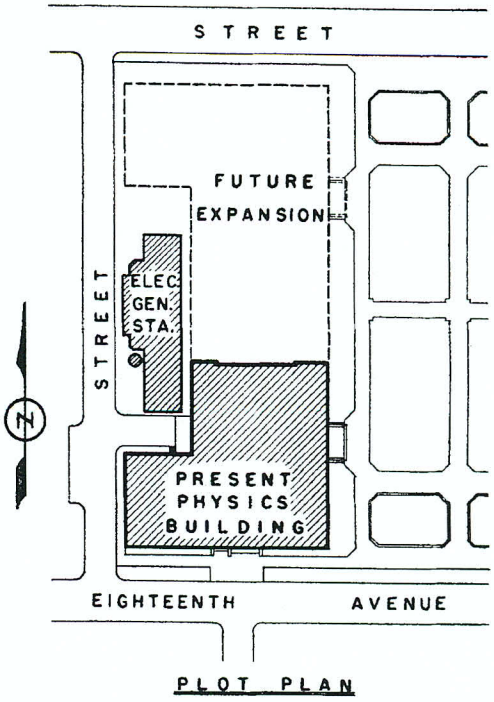

FIG. 2. Plot plan showing the relation between the existing portion of the physics building and its proposed extension.

At the present time the roof of the building is flat and has associated with it certain facilities for making meteorological measurements. A platform on the shed which houses the elevator controls is used for making observations and for balloon launchings. It is planned that a fifth floor and a sloping copper roof will be added so that this building will harmonize with other buildings in the engineering quadrangle. Figure 3, which is a sectional drawing of the building, includes the existing portion and these contemplated additions.

In planning the building it was decided that an effort would be made to put the facilities used by large numbers of students on the first and second floors so far as possible. Not only is this more convenient for students, but it provides quieter research rooms and minimizes confusion in the halls. Accordingly, the lecture rooms and the largest of the three recitation rooms are located on the first floor, and the other classrooms on the second floor. Most of the advanced laboratories are on the second and third floors. The basement and the fourth floors are largely

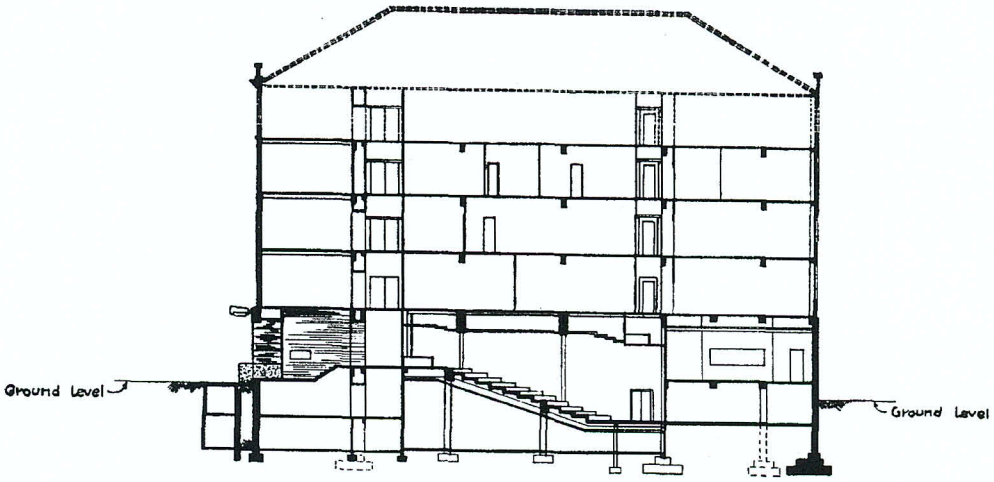

FIG. 3. North-South section of the physics building. In addition to the existing four floors and basement, a proposed fifth floor and sloping roof are indicated.

devoted to research activities, although one lecture room does reduce the basement area available for this purpose; classes in meteorology are taught on the fourth floor.

LECTURE ROOMS

Inasmuch as the two lecture rooms and their common apparatus-storage rooms require a large volume of the space and because these lecture rooms must be conveniently accessible to the public, their locations were the first selected and then the rest of the building was planned around them. The lecture rooms have 235 and 116 seats, respectively.

Large Lecture Room.—Figure 4 is a photograph of the interior of the larger lecture room, taken from a back corner. It is located so that the students ordinarily enter directly from the first floor level at the rear of the lecture room. The slope is such that it drops 11 ft in 50 ft, with the result that the lecturer stands at the basement floor level. This is illustrated in Fig. 3. This slope is sufficient to permit occupants of all seats to have a reasonably good view of the lecture table and of apparatus placed on the floor near the table. This relatively steep slope has the disadvantage of making it difficult to conduct examinations since students may view the papers of occupants of the row ahead of them. There is an entrance at the lecture table level from the basement hall on one side and an entrance from the lecture preparation room on the other. The ceiling is acoustically treated. Seats are of the fixed-arm single pedestal type, fastened to the floor. At the rear of the room is a projection table equipped for either motion pictures or slides. Ventilation is provided by an air conditioning system.

The lecture table consists of a fixed section 14 ft long with a top 39.5 in. wide. In this fixed section there are a sink, hot and cold running water, several outlets for gas, compressed air, and vacuum, a steam line, and several drawers and cupboards. Also in the fixed section is an electric distribution panel which permits the use

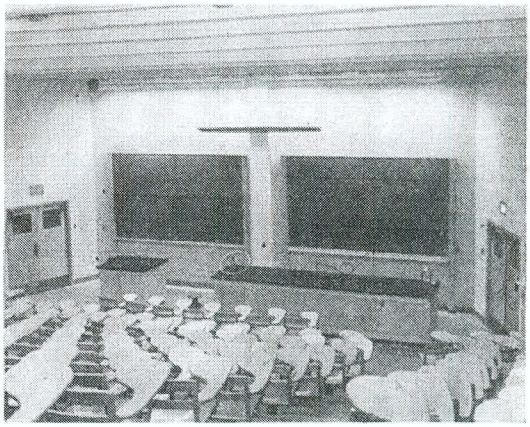

FIG. 4. View of the large lecture room, taken from the south-east corner.

of any dc voltage available at the central switchboard. Built into this distribution panel is a Variac useful for many demonstrations involving alternating voltages. The fixed section of the lecture table is located considerably off center. As many as three movable sections, each four feet long, may be rolled into place next to the fixed section. A jumper system with Jones plugs permits the supplying of power to these movable sections from the fixed section in a matter of seconds. The movable sections may be prepared in the lecture preparation room and wheeled into the designated space when desired. In some cases it is most convenient to use the space normally occupied by one or more movable sections for the location of other apparatus. For example, in demonstrating the conservation of angular momentum with a turntable it is convenient to place the rotating platform in the position commonly occupied by one of the movable sections. In this way the students have a good view of the entire apparatus and the lecturer has room to maneuver.

Behind the lecture table there are two 12-ft green chalk boards, each with a large fixed section and a counter-balanced movable section which slides vertically in front of the fixed section. Directly above the lecture table there is a catwalk to which there is access from the lecture preparation room. This is indicated in Fig. 3. From this catwalk it is possible to suspend such equipment as pendulums, an Atwood machine, and other apparatus.

The room has no outside windows. Illumination is by fluorescent lights recessed in the ceiling. These lights can be turned on and off from a number of places around the lecture table and at several points on the walls. In addition to the fluorescent lights there are three spotlights which are directed toward the lecture table; each is operated by a separate switch.

Small Lecture Room.—The smaller lecture room also has a sloping floor but the pitch is considerably less than that of the larger room; actually the lecturer stands only about four feet below the floor level at the rear of the room. This room also has no outside windows; the fluorescent lights recessed in the acoustic ceiling may be controlled from a number of points in the room, including several locations on the lecture table.

The room has a fixed lecture table 12 ft long and 39.5 in. wide. This fixed section contains the same facilities as does the one in the larger lecture room. It also is off center in the room so that one movable section, indentical to those previously described, can be wheeled in from the lecture preparation room. The slope of the floor makes the lecturer's position two feet below the first floor elevation and the movable table must, therefore, be rolled down a ramp to bring it into the room. The small lecture room has one large fixed green chalk board, and a counter-balanced movable board which slides vertically in front of the fixed section.

Apparatus Storage.—A common lecture-preparation room serves both lecture rooms. The lecture-preparation area is partly at the basement level and partly at the first floor level. An inside stair connects the two levels and there is a dumb-waiter for the transportation of small equipment. For very heavy equipment it is necessary to wheel the apparatus a few feet to the elevator.

FLOOR PLANS

First Floor.—The plan of the first floor is shown in Fig. 5. In addition to the lecture rooms, apparatus storage and one classroom, there are also located the department office, the chairman's office, one other office, a large staff room, and a suite of rooms devoted to low temperature research.

The department office, a room approximately 21 ft square, contains the desks of the departmental secretaries, the inevitable filing cabinets, and the department mail box. Connected to the office on one side and accessible only through the office is a small room of some 210-ft^2 area in which mimeograph equipment and departmental supplies are kept, while on the other side is the office of the chairman, which may be entered either from the departmental office or from the hall. Telephone wires to various offices and laboratories in the building are run in parallel to an answering box in the main office, so that when any telephone in the building is not answered promptly a secretary can take a message.

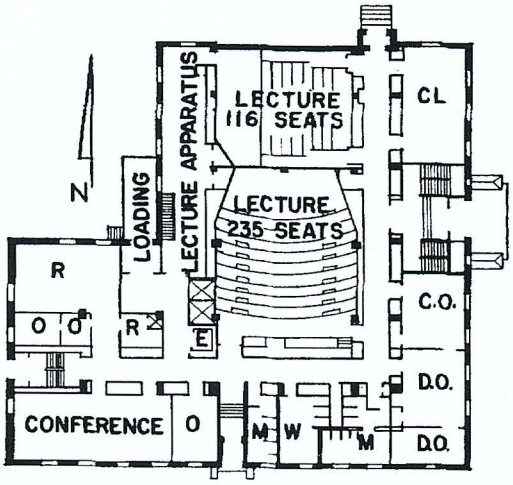

FIG. 5. First floor plan.

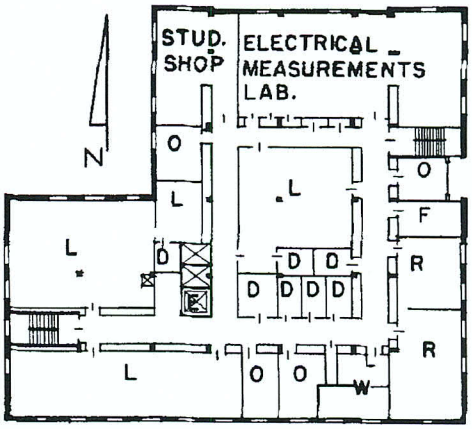

FIG. 8. Third floor plan.

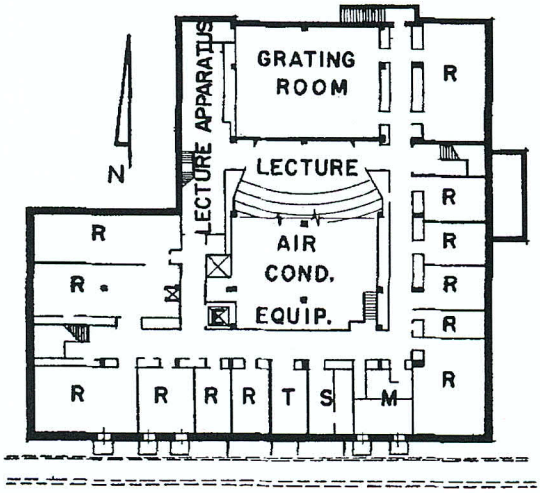

FIG. 6. Basement plan.

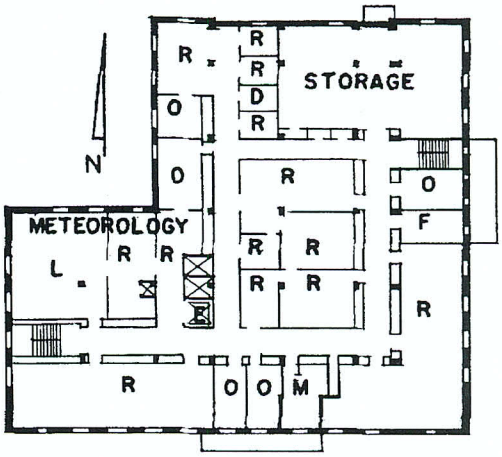

FIG. 9. Fourth floor plan.

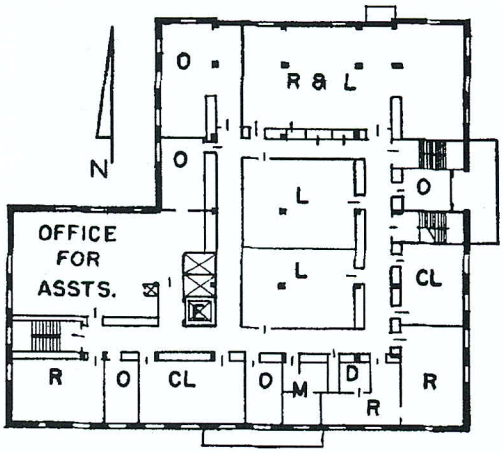

FIG. 7. Second floor plan.

Key to designations on floor plans in Figs. 5 through 9

Cl Classroom
C.O. Chairman's office
D.O. Departmental office
D Darkroom
E Elevator
F Fan room
L Laboratory for experimental courses
M Men's room
O Office
R Research room
S Main switchboard and generators
T Transformer
W Women's room

Basement.—The arrangement of the basement rooms is shown in Fig. 6. The large lecture room and the apparatus storage room occupy roughly half of the available area. Most of the remainder of the space is used for various researches. The largest of these rooms has been kept free from posts so that it may be used for a ten-meter Rowland circle. In all of the basement research rooms the floors are independent of the building itself. They are supported on separate footings and are mechanically insulated from the building by cork pads. Most of the basement rooms have no windows; a few have areaway lighting. Also in the basement is the main switchboard and generator room.

The area under the sloping floor of the large lecture room has been utilized for the location of much of the mechanical equipment required for heating and ventilating the building and for air conditioning the large lecture room. As is indicated in Fig. 3, there is a sub-basement floor which is about 6 feet below the ordinary basement floor level. A false ceiling made of sound absorbing material on the underside of the floor of the large lecture room prevents the noise of the mechanical equipment from disturbing occupants of the lecture room.

Upper Floors.—The plans of the second, third, and fourth floors are shown in Figs. 7, 8, and 9, respectively. In general, the use to which each room is put is indicated on the floor plan.

Each of the offices is approximately 20 ft long and 10 ft wide. The length of these rooms is determined by the corridor-to-outside-wall distance; it is somewhat greater than is actually required for a satisfactory office. It is proposed that when the building is enlarged, a wing of somewhat smaller offices be included. Each office is equipped with a green chalk board, desks, a table, chairs, bookshelves, a coat tree, and filing cabinets. The two offices directly above the main entrance to the building have large areas of glass brick in the outside east wall.

ELECTRICAL FACILITIES

Because experimental physics requires the use of large amounts of electrical power, much attention was given to the facilities needed for distribution of electricity.

All rooms are supplied with several 110-v alternating current outlets, protected through circuit breakers in the halls near the room. Three-phase 208-v power is provided in certain rooms where its use was foreseen. It is available through the main switchboard to all laboratories.

Direct current is provided by a dual generator from which 125- or 250-v potentials may be obtained. Although it was decided that storage batteries should not be included in the original installation of electrical equipment, it was anticipated that the time would come when they would be required, and therefore distribution facilities for battery power were included in the switchboard purchased.

Generator dc, battery dc (in the future), three-phase ac, and supplementary single-phase ac power are distributed through the main switchboard in the basement to eleven large distribution panels. There is at least one of these on each floor. Special distribution panels are provided in each of the lecture rooms and in the electrical measurements laboratory. Through the distribution panels power may be supplied to small subdistribution panels located in the various laboratories. The number in each laboratory varies from one in the small research rooms to 26 in the electrical measurements laboratory. The electrical distribution system and the associated equipment were purchased from the Standard Electric Time Company.

SERVICE FACILITIES

In addition to electrical facilities, most of the laboratory rooms are supplied with a small sink, hot and cold water, gas, compressed air, and a vacuum line.

All interior rooms of the building are heated and ventilated by a forced-air system. Provision is made for air conditioning these rooms, but at present refrigeration is provided only for the large lecture room. External rooms are heated by hot water radiators and forced air.

The elevator, which is key operated, is slightly over 6 ft square. The elevator door has a sliding section for ordinary use, but the entire door can be swung open on hinges in such a way as to admit an object a full six ft wide, thus making the elevator useful for the movement of large equipment.

At the rear of the first floor there is a receiving room adjacent to a loading platform, to which trucks can back to discharge their loads. This loading platform is conveniently close to the elevator and the lecture-preparation rooms.

RECOGNITIONS AND ACKNOWLEDGMENTS

It is not feasible to acknowledge here the work of every person who made substantial contributions in connection with the new building. However, special recognition must be given to a few. The vital function of preparing and presenting to the Legislature of the State of Ohio the case for a new physics building was performed by President Howard L. Bevis, Vice President and Business Manager Jacob B. Taylor, and Dean Emeritus Alpheus W. Smith, at that time chairman of the Department of Physics and Astronomy. Professor H. H. Nielsen, who succeeded Dean Smith as department chairman, was active in many phases of the building program. University Architect Howard Dwight Smith and his staff designed the building and supervised its construction. Many of the department's interests were in the hands of the building committee, whose members were as follows: the late Professor Alva W. Smith, who was chairman until 1948, M. L. Pool, G. Shortley, J. A. Hynek, D. Williams, and the authors. Many of our other colleagues made valuable suggestions and contributions.

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