

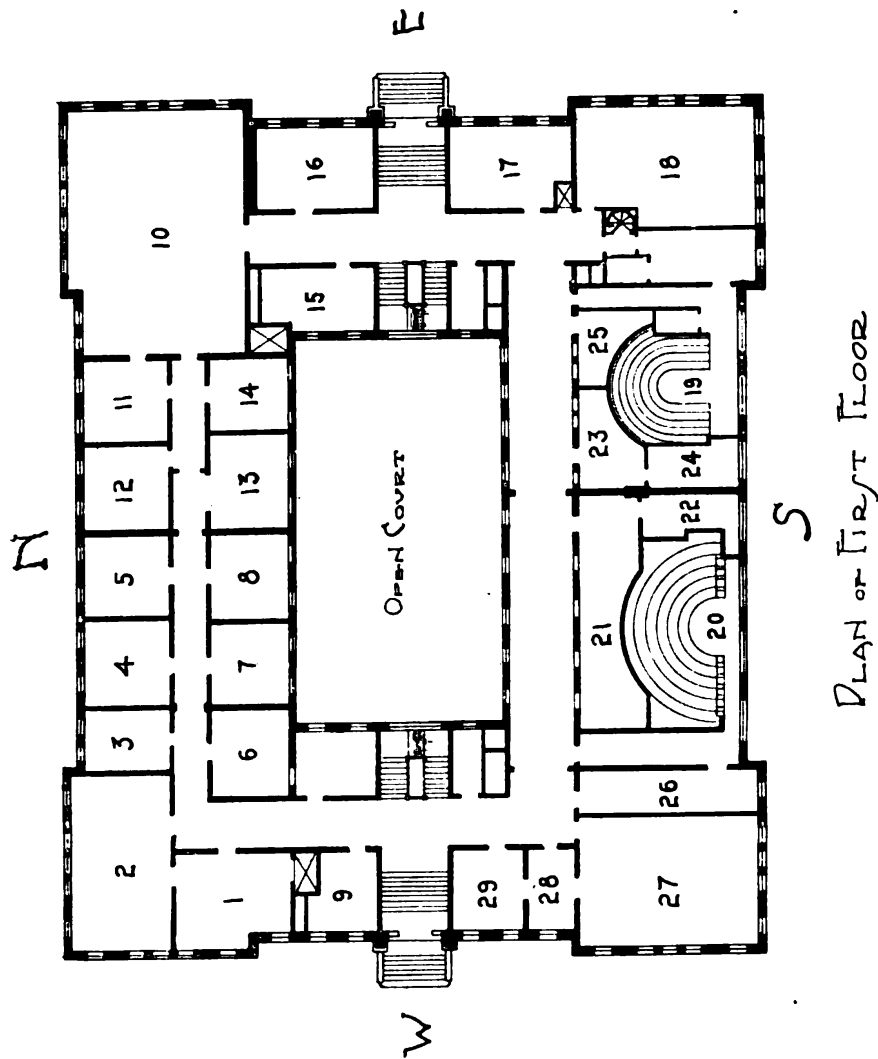
DESCRIPTION OF THE CHEMICAL BUILDING OF THE
UNIVERSITY OF MICHIGAN.PRELIMINARY CONSIDERATIONS.

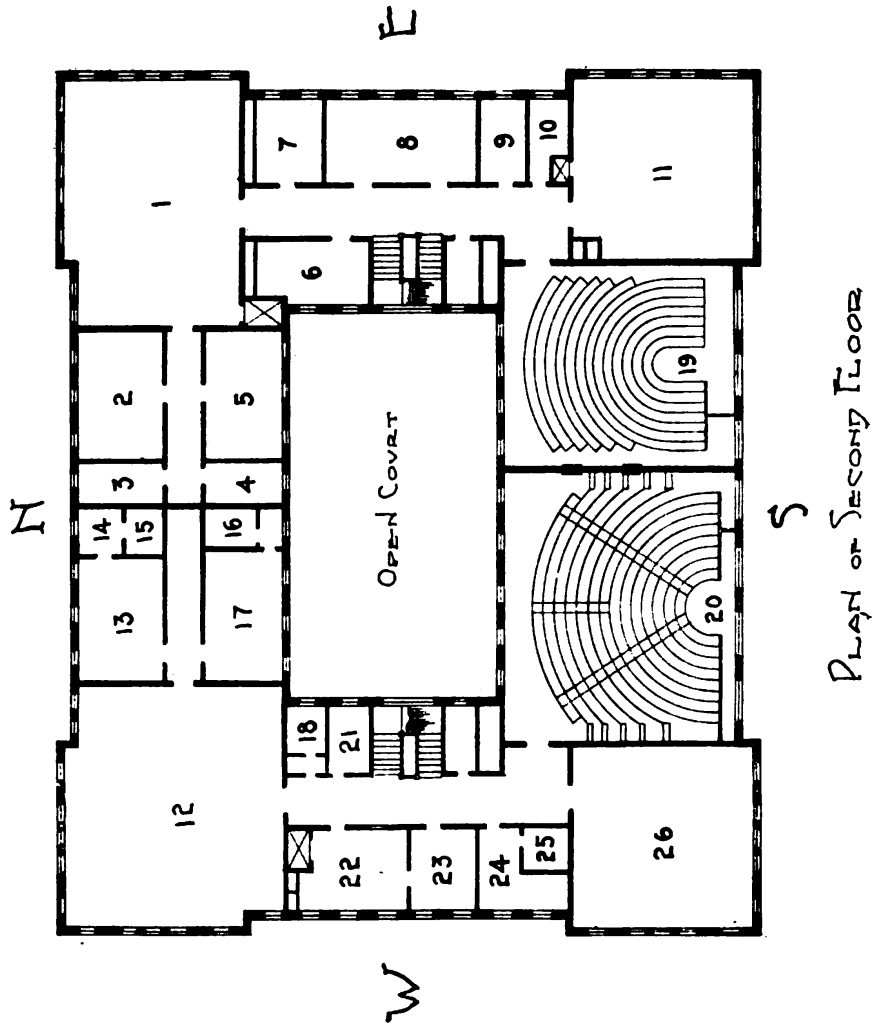
The general arrangement has resulted from an attempt to meet certain requirements, some of which are common to all chemical laboratories, and some of which are local, which required the following provisions to be made:

1. A fire-proof building with corridors and stairs so arranged that in case of fire or accident there would always be a clear way of egress from any part of the building.
2. A grouping of the work into departments so that each head of a department should be as closely as possible in touch with the work for which he is responsible.
3. Laboratory facilities for 600 to 700 students each semester in elementary general chemistry, and qualitative analysis.
4. Laboratories for quantitative analysis, organic chemistry and pharmacy which should accommodate 50 to 75 students each.
5. Smaller advanced laboratories for a wide variety of work.
6. A library with shelves for 10,000 books and seats for nearly 100 students.
7. Hoods in each laboratory with individual flues running unbroken through the roof.
8. Large lecture rooms on the ground floor, so as to avoid crowds on the upper floors.
9. An adequate system of mechanical ventilation.
10. A visible and easily removed system of plumbing.
11. An arrangement for receiving and dispensing supplies which should serve the various laboratories conveniently, and with a minimum number of clerks.

GENERAL DESCRIPTION OF THE BUILDING.

The building is located on the east side of the proposed "Mall," which is to be an important feature in the campus of the future and which will run from the library building north-erly to North University Avenue. The building is rectangular in shape, its west side, 230 feet in length, facing the Mall, and its north side, 130 feet in length, facing North University Ave-





nue in line with Barbour Gymnasium. It is four stories in height, each story being 13 feet $1\frac{1}{2}$ inches in the clear, with the exception of the north and south ends of the top floor where the ceiling has been omitted, so that the additional height of the attic has been gained. The first floor is 18 inches below the grade level, and there is no basement except in the center of the building. The attic slopes from a height of seven feet at the highest point to four at its lowest and is not useful except for storage purposes. The total height of the building is sixty-four feet from the grade line to the top of the parapet wall; the total floor area is 104,500 square feet; and the cubic contents, 1,666,000 cubic feet. The building contains 125 rooms.

The outside walls are built of brick faced with "Iron Spot" vitreous brick of slightly varying shades of brown laid up in cement mortar with recessed joints in straight bond. Buff Bedford limestone with tooled face is used for the grade and belt courses, for the main entrance and for the bases and cap stones of piers. The cornice and frieze are of terra cotta of the same shade and texture as the limestone. All of the windows are glazed with plate glass, and the exterior of the building has been so designed as to admit a maximum of light.

The entire foundation of the building is of concrete; the outside walls and those of the courts are brick; the columns and beams of reinforced concrete; the floors of reinforced concrete and tile; and the roof of the same material, covered with composition roofing. The building is thus entirely fire-proof in its construction, but as a further safeguard is divided into five parts by fire walls extending from the ground through all stories and through the roof. The interior partitions throughout are built of hard-burned hollow brick, and are in general only four inches thick. The furnace and hood flues are built of the same material and are provided with lining of vitreous tile except where fire brick is needed. The interior finish is of the simplest, almost all the floors and ceilings being finished in cement.

HEATING AND VENTILATION.

The laboratory is heated by a combined direct and indirect system, the heat lost through the walls and windows being re-

placed by direct radiation. There are 15,773 square feet of direct radiation, the greater part of which is placed along the outside walls. The fresh air brought into the building is heated to proper temperature before it is supplied to the various rooms. There is a system of automatic temperature regulation with one or more thermostats in each room, which controls the amount of steam admitted to both the direct and indirect radiators.

The building is ventilated by means of eight fans, which supply a total of 100,000 cubic feet of air per minute to the various rooms. Three exhaust fans remove 10,000 cubic feet of air per minute from the toilet rooms, hydrogen sulphide generating room, and the lecture tables and hoods in the lecture rooms.

ELECTRIC LIGHTING AND POWER.

There are 302 incandescent circuits in the building, supplied from sixteen distributing panels enclosed in iron cabinets. All ventilating fans, the elevator, and all other devices in the building requiring motor power are operated by electric motors. The electricity used for light and power comes from the central station on the campus.

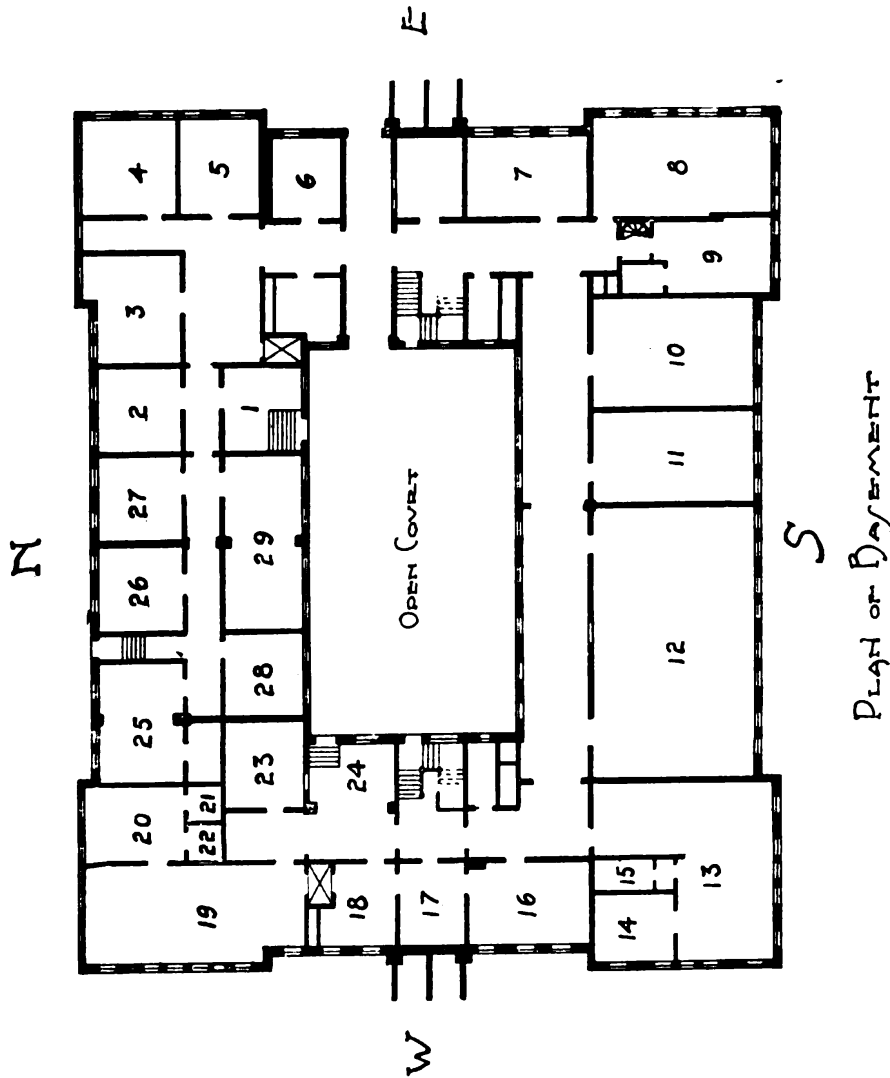
There are, in addition, a number of experimental circuits for charging storage batteries, distributing current from the same, and for electrolytic and electric furnace work.

PLUMBING.

There is a system of pipe trenches running around the first floor just within the outside walls, which connects with the general tunnel system of the University, and carries all electric wires, steam, gas, water, compressed air and waste pipes. From this trench groups of risers mount to the various laboratories. There are 274 units of laboratory working tables in the building, each accommodating from one to twelve students, and 112 hoods. All of the tables and hoods have plumbing, and it requires 221 soap stone sinks to supply the building. These sinks are connected with drain lines by extra strong lead connections so as to make the repairs as few as possible. In addition, the tables are all designed with removable cupboards underneath them so that the whole of the plumbing system may be exposed and readily re-

paired. All water and steam risers are jacketed so that there will be no condensation of moisture to drip from them.

The fire protection of the building consists of a system of 4 inch mains with five risers, in connection with which on each floor there are five hose racks, each containing seventy-five feet



of 2 inch linen fire hose. The system has a constant pressure supply from the city, and four connections for city steamers on the outside.

There is a separate system of mains and drop risers which conveys hydrogen sulphide from its generating room in the attic to all of the main laboratories and most of the private research rooms.

All pipes carrying water, gas, steam, compressed air or hydrogen sulphide are provided with T's just below each ceiling and above each floor. These T's if not at present needed are plugged to allow future connections to be made when desired, without the necessity of taking down any pipes.

The sanitary system consists of eighteen water closets and eleven urinals, all of the most approved patterns.

COST OF BUILDING.

The original contract for the building called for all structural work and complete heating system, all wiring and all plumbing, including all piping, cocks, sinks, and waste pipes on the laboratory tables, but it did not include the wood work of these tables. The cost of the building as shown by the original contract is given below:

Cost of building	\$181,108.75
Cost of heating plant	35,687.00
Cost of plumbing	18,181.65
Cost of wiring	12,200.00

Total cost of building and equipment.....	\$247,177.40
Total cubic contents of building.....	1,666,000 cu. ft.
Cost of building, per cu. ft. (cents).....	10.85
Cost of equipment, per cu. ft. (cents).....	3.95

Total cost, per cu. ft. (cents).....	14.80
Total floor area	104,500 sq. ft.
Cost of building, per sq. ft. floor area.....	\$1.74
Cost of equipment, per sq. ft. floor area.....	.63

Total cost, per sq. ft. floor area.....\$2.37

Messrs. Smith, Hinchman and Grylls are the architects.