and forty cents each and expects to use them probably fifteen times more. This iron covering is well greased before using.

At this time a good number of new cells were constructed, also covered with iron. These were well built but without the same care in smoothing the surface on account of the iron covering. These cells slip out of the concrete so easily as to show a great advantage in the use of a metal covering which presents a smooth unbroken surface to the concrete. It obviates also the swelling of the wood covering, from dampness which made the drawing of the first

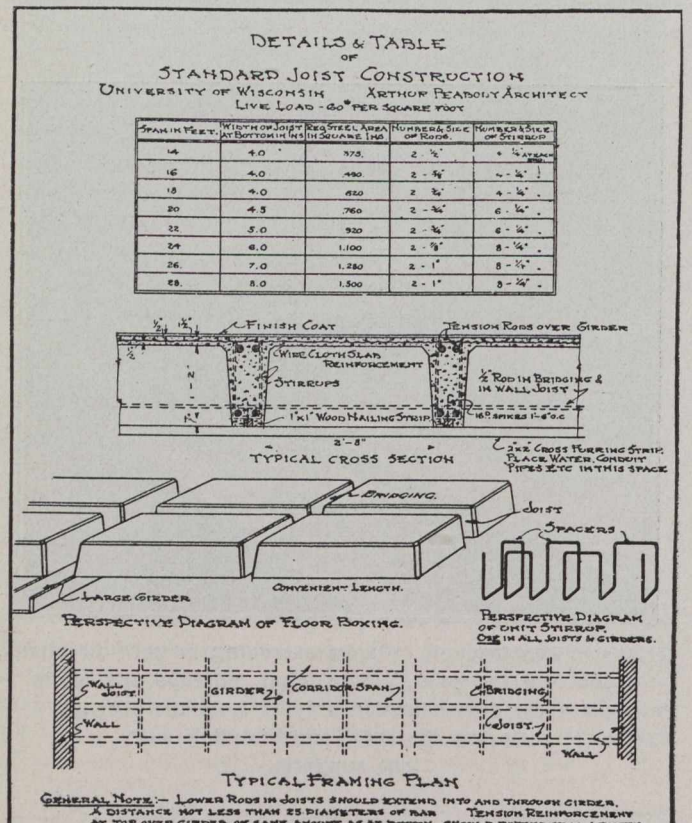

Diagram Showing Joist Construction.

cells rather hard at times and destructive to the cell. The life of a cell depends of course on the treatment it receives. Some were wrecked the first time they were used. Many of them were in apparent good order except as to the lower edges after fifteen casts. Their weight occasioned some damage, especially if allowed to fall to the ground on being drawn. The most convenient size of cells appears to be two feet, eight inches wide by six and one-half feet long. Beyond this size they cannot be so easily handled. Some cells were made seven feet long and a few five feet. At times it is necessary to build special cells to finish out a span.

Variation in strength of floors was made in spacing the cells farther apart, making the concrete joists wider for the heavier floor. The percentage of steel was then increased according to rule. The joists were sometimes left exposed over laboratories, and made a very presentable appearance. This gave opportunity for the convenient support of shafts, etc. Electric conduits were there left exposed, following the direction of the joists and cross bridgings. In other buildings plastered ceilings were attached in the ordinary manner. Steam coils were suspended from hangers secured by drilling the joists at the neutral axis. For line shafts bolts were cast in the concrete at regular intervals, to which timbers carrying the shaft hangers were bolted.

The floor sheet, two and one-half inches thick including the sand finish, seems fragile. In walking over the floors the resonance of the parts between joists suggests the same thought. Experience, however, shows that, except for the mechanical difficulty of casting the floor could be thinner. Floors have been broken during construction, but by blows which would break other floors considered amply strong. On one instance a scaffold plank fell about sixteen feet, striking on end. At another time a piece of sandstone three feet long, weighing about four hundred and fifty pounds, fell the same distance upon the floor. Each of these accidents made a break about a foot square, leaving the steel fabric but little damaged, and the repair of the floor very easy. Drilling through the floor for extending steam risers or setting anchor bolts shows the strength to be ample if not excessive.

All floors thus far constructed have been covered with a finishing coat of cement and granite, following the usual method in sidewalk work. This coat must be put on to the sheet at the time of pouring, and is a source of trouble and anxiety, especially in winter. The mixture is probably too rich, resulting in some contraction and cracking. The recent practice of tamping the rough concrete and floating smooth may be a decided improvement. There is no great need for a granite finish in floors. The surface must be covered anyway with some material less hard and unyielding than stone. Linoleum and cork carpet have proved very successful and are pleasant under foot.

Where concrete floors are exposed the surface wears off a disagreeable dust that is untidy in appearance, and injurious to everything. This may be ground off and the hard concrete exposed, or the floor may be coated with special paint which resists wear and closes the pores of the concrete, preventing the absorption of water.

An example of the use of the system, with resulting costs is shown in a floor constructed in the Mining Laboratory of the University of Wisconsin. The floor area was approximately 4,500 square feet. The superimposed load was taken at 200 pounds per square foot. This work being done by the University forces gave an opportunity to know exact costs, as follows:

		Per square foot.
Crushed limestone, sand and Portland cement	$474.00 or	10.54 cents
Lumber for girder and post forms, etc.	252.00 or	6.60 cents
Cost of placing false work and cells	250.00 or	5.55 cents
Cost of steel reinforcement	354.00 or	7.86 cents
Labor of placing steel and pouring concrete	200.00 or	4.44 cents
Labor of removing false work	50.00 or	1.11 cents
Use of 200 cells at 1/15 original cost	33.00 or	.73 cents
Total cost	$1,613.00 or	35.83 cents

The cost of lumber for girder and post forms is, of course, too high, no allowance being made for the value of the material after removal. This lumber was not greatly damaged, but the exact value is hard to set down, as no subsequent floors of good area have been constructed by the University where it could be used. If the material could be taken to be as durable as the cells the proportionate lumber cost would be brought down to $16.70 instead of $252, and the total cost to $1,387.70 or 30.84 cents per square foot.

In applying this system it is to be noted that except in the items of concrete and steel a light floor will cost as much as a heavy one. It can be cast with the same cells, planks, shores, etc., and with approximately the same amount of labor. The increase on the heavy floor would, of course, be in the labor of pouring the larger amount of concrete. In