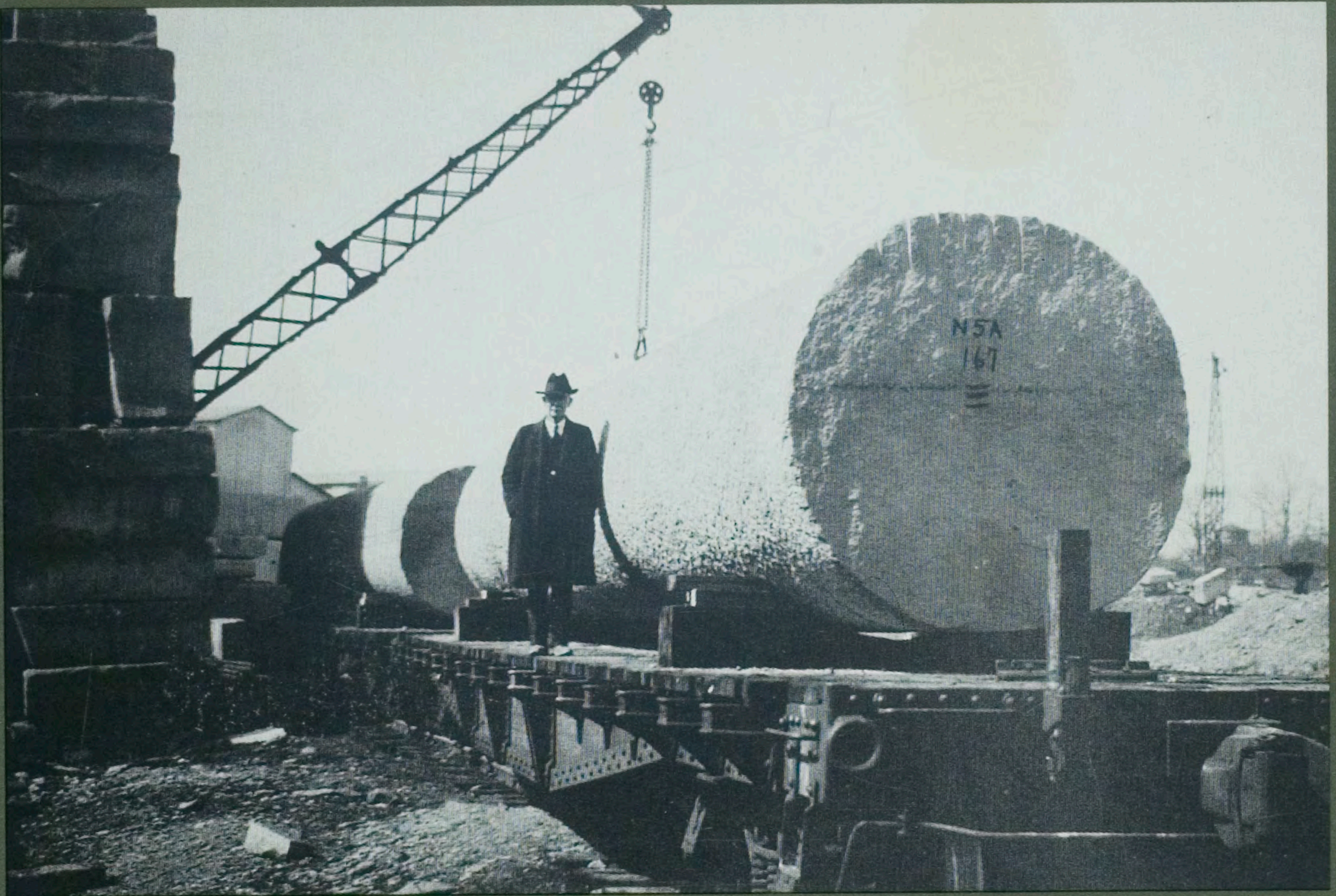


Pittsburgh

HISTORY

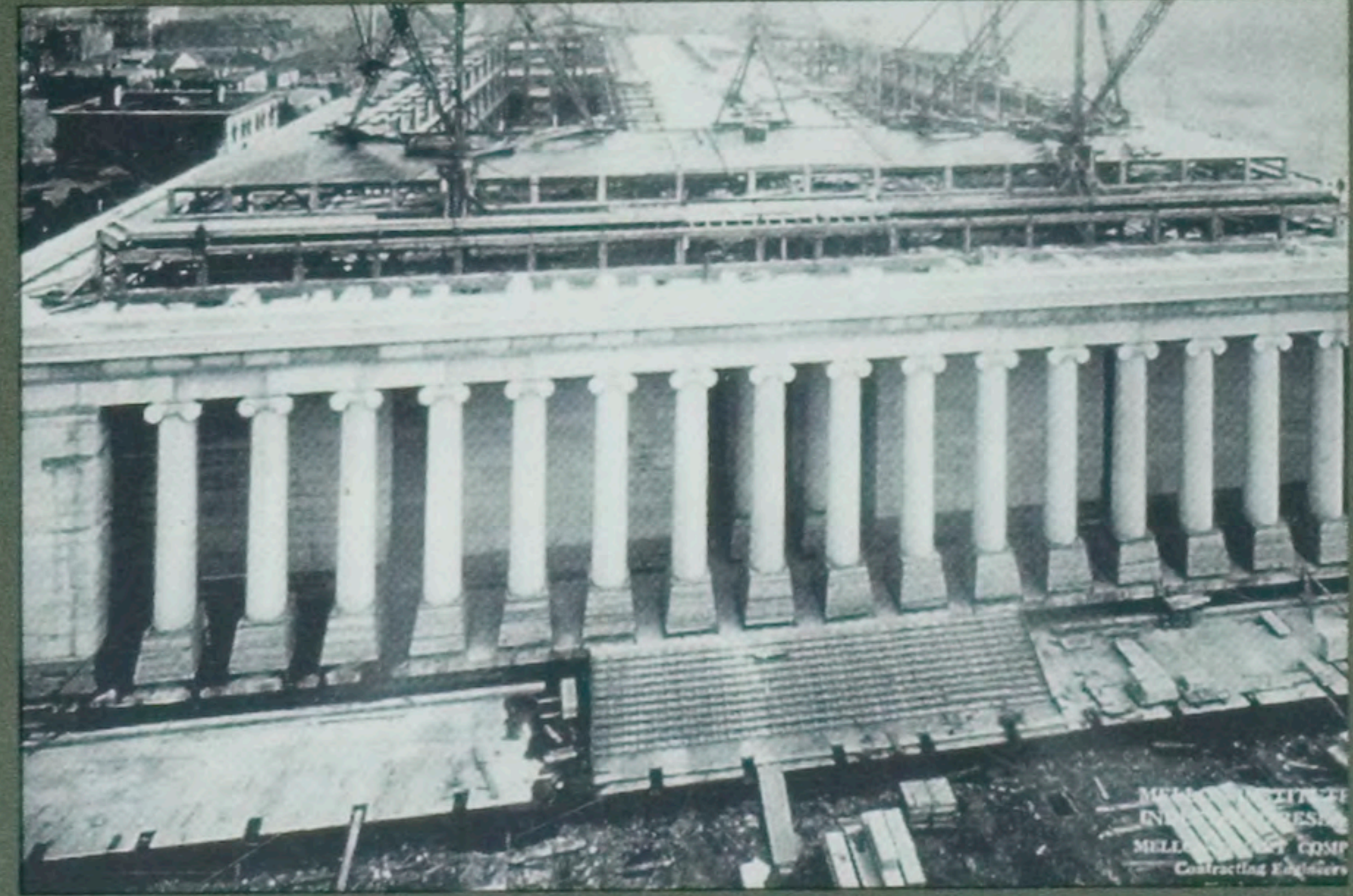
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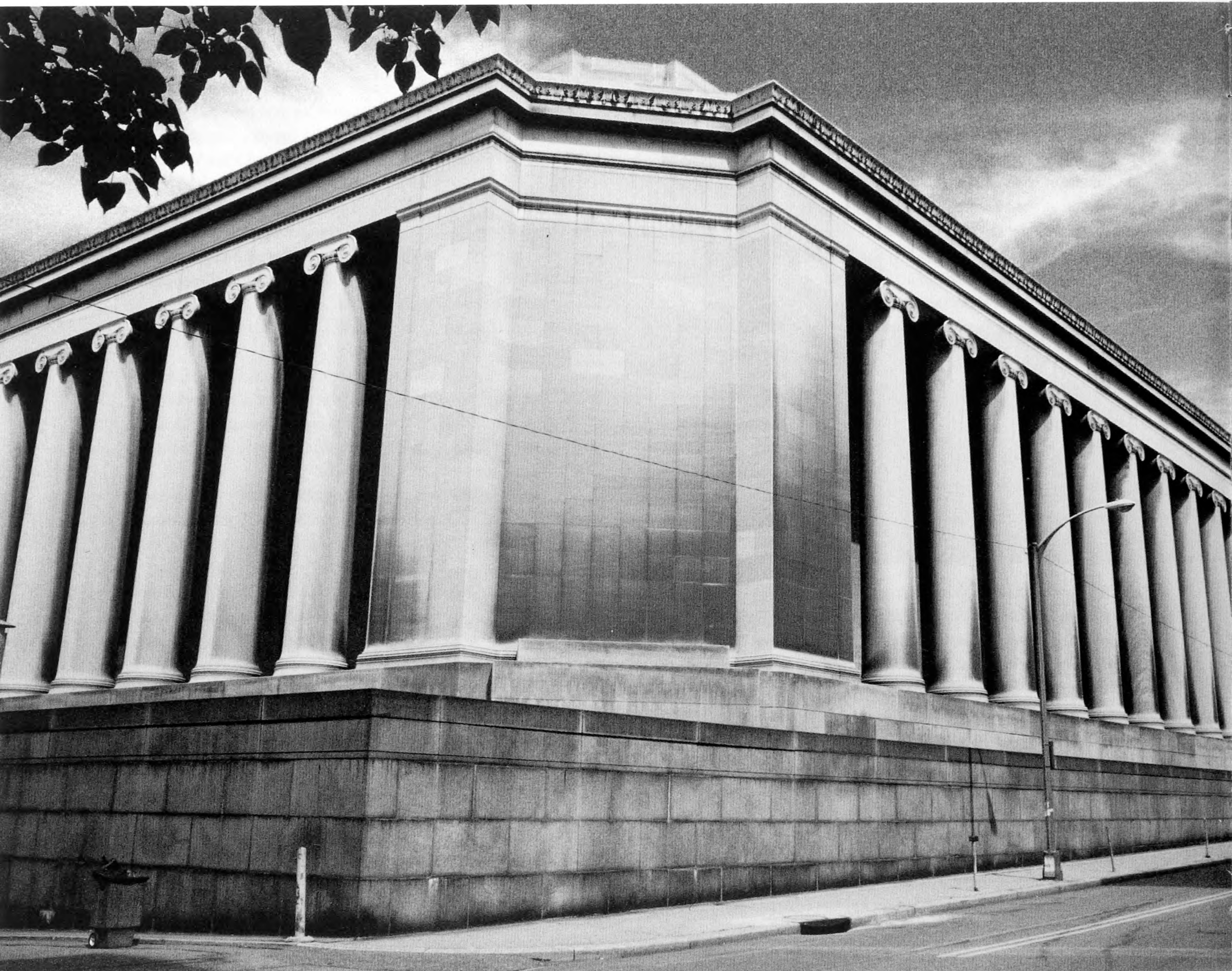
Winter, 1994/95



Temple of Technology

Building the Mellon Institute





The architecture of the institute, Bellefield and Fifth Avenue in Pittsburgh's Oakland District, was based on classical design, especially the Greek Parthenon.



BUILDING A TEMPLE OF SCIENCE: PITTSBURGH'S MELLON INSTITUTE

by Cathy A. Wilson

DO YOU wear leather shoes? Did your family have orange juice for breakfast this morning? Does your community add fluorine to its water supply in order to reduce tooth decay?¹ If you can answer “yes” to any of these questions, then you, your family, and your community are beneficiaries of Pittsburgh’s Mellon Institute.

Located in the Oakland section of Pittsburgh at the corner of Fifth and Bellefield avenues, the Mellon Institute is recognized not only for its ground-breaking role in the development of American industrial research, but also for its Neo-Classical Revival architecture. In fact, this combination of renowned research and monumental architecture prompted one local newspaper columnist to describe the facility as “quite unlike any other building in the world.”²

In 1909, however, a facility like the Mellon Institute was only a dream in the mind of Robert Kennedy Duncan, a professor of industrial chemistry at the University of Kansas. Having had the opportunity to study and travel in Europe, Duncan was able to observe the partnership between scientific research and industry abroad, and at the same time, to recognize the need for a similar link between research and industry in the United States. He disagreed with colleagues who felt that to bend pure science to technical research was to demean it. Instead, Duncan advocated a plan that would replace the traditional, and increasingly unreliable, rule-of-thumb production methods employed by American industry with scientific technology in order to create new and better consumer products.³

That very same year, Andrew W. Mellon, of Pittsburgh, one of the country’s premier financiers and later Secretary of the Treasury, decided to learn French. He arranged to have the Berlitz Language School send a young Frenchman to his home during the summer evenings. But instead of learning to speak fluent French from his foreign tutor, he was inadvertently introduced to Duncan’s newly published book, *The Chemistry of Commerce*. In this book, Duncan pointed out the confusion and waste in American manufacturing

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The three minds that brought Mellon Institute to fruition: Robert Kennedy Duncan, top, author of a book advocating the use of scientific technology in American industry; and brothers Richard Beatty Mellon and Andrew W. Mellon, who invited Duncan to Pittsburgh in 1910. Opposite: A much less grand Mellon Institute was at the University of Pittsburgh, Thackeray and O'Hara streets, from 1915 to 1937.

which he believed was due to industry's unfamiliarity with scientific advances. Nevertheless, he believed that with a combination of increased capital and better educated businessmen, manufacturing improvements would begin to appear and would continue to appear as the use of scientific research gained acceptance as the most effective way of solving industry's problems. Further, in his last chapter, Duncan described his plan for the establishment of industrial fellowships through which American industry could employ qualified scientists to investigate its problems.⁴

As he read Duncan's book, Andrew Mellon was favorably impressed by the ideas presented by this professor of industrial chemistry because they essentially reinforced his own personal views. That is, based upon his own reading and observations, Mellon firmly believed that the only way to improve humanity's common lot was not through governmental nor political actions but rather through new discoveries and inventions. New discoveries and inventions, he felt, increased production, lowered costs, raised wages, improved the standard of living, and thus would result in a greater participation of the average individual in these benefits. Consequently, Andrew and his brother, Richard Beatty Mellon, decided that an institution founded upon Duncan's ideas could assist in this advancement.⁵

The Mellons invited Duncan to Pittsburgh in 1910, and the following March, the three of them inaugurated the Industrial Fellowship Program through the Department of Industrial Research at the University of Pittsburgh. The principal thrust of the program, based upon Duncan's industrial fellowship plan, was to assist manufacturers (for a sum of money) to solve research problems.⁶

The Industrial Research Program was organized upon a contractual basis; thus, the research problem was initially defined by a firm interested in its solution. Next, the appropriate scientist was located and engaged by the program. Finally, in return for a stipulated fee, an Industrial Fellowship was assigned for a period of not less than one year. During this allotted time, each holder of a fellowship was given access to the broadest facilities for accomplishing the firm's objective, and all of the results obtained by the scientist became the exclusive property of the firm. Later, this program was expanded to provide a training center for scientists, a research station for pure science, and a clearinghouse on technical information for the public.⁷

Initially, the research was done in a temporary, frame laboratory at Thackeray and O'Hara Streets.⁸ But in 1913, satisfied with the practical value of Duncan's system, the Mellons authorized him to design and erect a permanent headquarters on adjoining property at the university.⁹ Although Robert Duncan never lived to see the completion of this facility, it was dedicated in 1915 to his memory and to that of Judge Thomas Mellon, the father of the Mellon brothers.¹⁰ The Mellon Institute had in five years become both a reality and a success.

In fact, by the late 1920s, the institute had become so successful that the Mellons purchased the Lloyd property situated on the corner of Fifth and Bellefield avenues.¹¹ Initially, the mansion on the grounds was converted to a laboratory facility. However, in

1927, after the Mellons incorporated the institute as a nonprofit, independent research center, they began to plan for the erection of a new and larger headquarters on this lot.¹²

Although other types of architecture were briefly considered for this new building, the Mellons' preference from the earliest planning stages was for a classical style of architecture. There were important reasons for this decision. First, the Mellons wanted to employ an architectural style which would harmonize with both the University of Pittsburgh's new Cathedral of Learning and the adjacent St. Paul's Roman Catholic Cathedral.¹³ More importantly, the Mellons wanted the architecture to be a tangible recognition of the link between the science of the past and the science of the present and future, as exemplified in their institute's purpose and work. Consequently, they felt that they had found in ancient Greece not only the beginnings of modern science but also an architecture that combined ageless, unadorned beauty with a simplicity that would be appropriate for a home of science.¹⁴

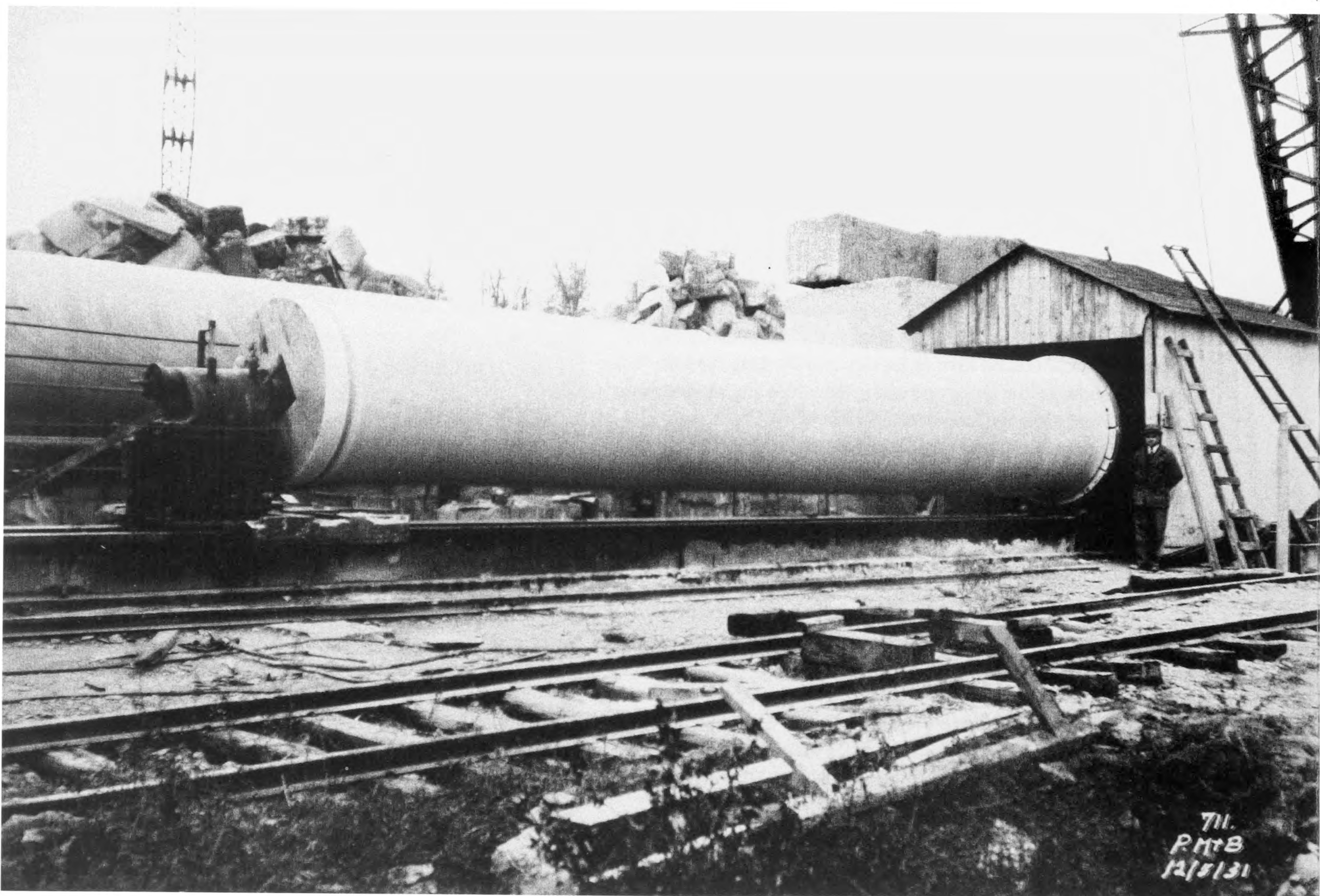
Dedicated in May of 1937, the new Mellon Institute, which covered a city block (2.443 acres), was a display of classical monumental grandeur whose purpose was to combine beauty with utility.¹⁵ Designed at an initial cost of roughly \$4 million in 1930¹⁶ by the local architectural firm of Janssen and Cocken, the low horizontal lines of the limestone and granite building replicated on each of its four sides the long lateral facade of the Parthenon. The exterior detail was primarily developed from the small temple of Nike Apteros on the Acropolis, although the proportion for the capitals was inspired by the Temple of Artemis Cybele at Sardis, in Asia Minor, and the large bed molding under the main cornice was developed from a Grecian fragment in the New York Metropolitan Museum.¹⁷

The exterior was not a true rectangle, but measured approximately 306 feet across the front, 334 feet from front to rear, and 227 feet across the rear. It was pierced at regular intervals by 2 1/2-story composite aluminum windows. The height from the sidewalk to the roof was an average of 85 feet.¹⁸ However, these dimensions are misleading, as the building actually encompassed nine stories. To retain the facility's classical form, three stories were constructed underground (which also helped minimize vibration in scientific experiments), as was a pit, which was designed to house unsightly roof top machinery.¹⁹

From an aerial perspective, the flat roof, designed to preserve the architectural beauty of the building, revealed a sloping perimeter lined with aluminum while the flat center sections were covered with quarry tiles so that the roof could also provide ample surface area for weathering and exposure tests.

The outline of the structure, following the property lines, appeared in the shape of a hollow trapezoid with center and connecting wings forming a cross. This arrangement provided four interior courts lined with 1,151 windows and glazed ivory terra cotta which provided a high coefficient of natural light to the interior laboratories. The center wing, which intersected the trapezoid from front to rear, was nine stories, but the cross wings were limited to four stories in order to provide space for future expansion.²⁰ In addition, behind the temple façade, unassigned space was reserved for future laboratories. Even within allocated





Each imposing limestone column was quarried as a whole at Bedford, Ind. The columns were shaped at the quarry so that upon arrival at Pittsburgh's East Liberty freight yards, its weight had already been halved to about 59 tons.



Mellon Institute's focus on experimentation was applied in the design of its own new building. In 1931, a full-scale model of a corner pier and two columns were erected in Fox Chapel, and studied for 19 months.

research areas, where pipes and ducts were concealed behind attractive wall panels, laboratory furniture was employed which provided interchangeability and utmost flexibility for spatial rearrangement at any time after its initial installation.²¹

Moreover, the creation of both the interior and exterior design of the building was not simply worked out on a series of blueprints or on small-scale models and then built. Instead, the idea of experimenting, the keystone of the institute's research work, was fully applied on a monumental scale in the systematic development of the new facility.²² Consequently, in addition to architectural drawings and several small plaster models, life-sized models were constructed to ensure dependable results. In the United States, only the Lincoln Memorial in Washington, D.C., had ever employed a full-scale model previous to this.²³

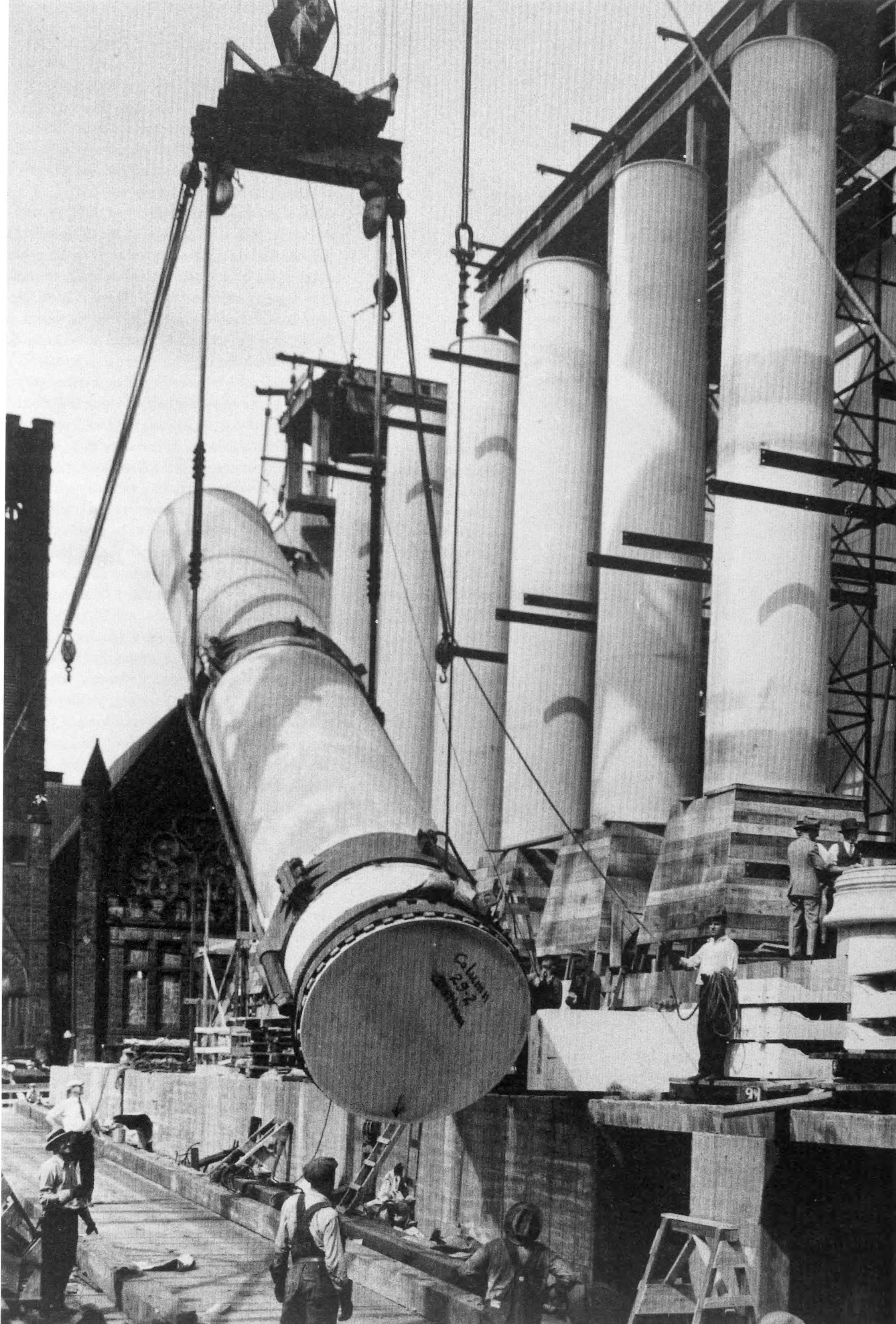
Among the full-sized replicas, a temporary attic wall was erected at the construction site along Bellefield. This \$300 wall of studding and wall board was used to determine the correct height for the final attic wall. At the same time, the subcontractors for the aluminum roofing built a full-scale sectional model of the portion of the roof work which they were to perform. This replica was designed to demonstrate the various roofing components and the manner in which they were to be attached to the roof's sloping perimeter. Even the contractor for the interior court windows built multiple, full-sized window models to show the hardware and to demonstrate the quality of the aluminum frame.²⁴

Another more extensive model, constructed for the institute on the northeast lawn of the Cathedral of Learning,²⁵ was devoted exclusively to the interior, especially the laboratories, of the new building. It was a temporary, wooden, one-story structure, 51 feet 11 1/4 inches by 46 feet 3 inches, which stood several feet off the ground on locust posts. The windows of this building replicated the windows in the court walls of the institute, while inside, two completely equipped laboratories of two different sizes were installed.²⁶ For two years, the institute's executive staff, with the assistance of the architects, studied and often redesigned spatial arrangements and details of laboratory equipment. For example, tables were developed without bolts or screws, multiple flooring materials were tested for durability and resiliency, and problems of electrical layout and lighting arrangements were solved.²⁷ In short, the primary purpose of this "proving house" was to ensure the utmost utility of the new laboratory rooms.

Then too, in the spring of 1931, a life-sized model, 77 feet high, 42 feet long, and 24 feet wide,²⁸ was erected in a cornfield on the Clouse farm along Dorseyville Road in Fox Chapel.²⁹ It was constructed of wood and plaster on a concrete foundation with dimensions which varied no more than 1/8 of an inch from established specifications.³⁰ The cost was approximately \$45,000.³¹ The replica consisted of a corner pier and two columns (including the stylobates), the porch, the entablature, and the attic. The purpose of this model was to ensure proper proportions for the exterior features so that no other element, particularly the piers, would overshadow the striking beauty of the colonnade.³² When the architects completed their 19 months of research,³³ the replica was demolished by Mr. Clouse for \$250.³⁴

Finally, the Ionic colonnade, embracing 62 monolithic

It took about two hours to hoist each column onto its leveled base. Only its weight holds the column in place.



limestone columns, represented a spectacular tribute to American craftsmanship. Normally, columns were and still are constructed by piling up drums of stone which leave horizontal joint lines on the shafts.³⁵ However, with this singular gesture, the Mellon Institute surpassed even the beauty of the Parthenon.

Only 63 limestone blocks had to be quarried by the Indiana Limestone Company of Bedford, Ind., in order to produce the 62 matched columns, the single rejection being caused by a defect in the stone. In the rough, each scabbed column measured about 7 by 7 by 45 feet³⁶ and was estimated to weigh from 90 to 125 tons³⁷. As the smooth, finished shaft was removed from the huge quarry lathe operated by two to three skilled craftsmen,³⁸ however, its weight was reduced to 58.8 tons. At the same time, each column became 36 feet 5 7/8 inches in height, and the average diameter measured 5 feet 9 1/4 inches at the base and 4 feet 11 1/2 inches at the neck.³⁹ Like the plaster and wood model, none of these diameter dimensions varied more than 1/8 of an inch from established measurements.⁴⁰ Once a column was ready for shipment, it was wrapped in heavy waterproof paper and enclosed in a wooden cradle on the back of a flatcar so that it could be safely sent by rail from Indiana to Pittsburgh.⁴¹

From the city's East Liberty freight yards, it took convoys of reinforced trucks with police escorts⁴² 40 minutes⁴³ to travel the approximately 2 1/4 miles over a reinforced Fifth Ave. to the construction site. At the site, it took about two hours to position a shaft upon its perfectly leveled base using an innovative system of steel hoists which had been worked out at the quarry to ensure that none of the columns was damaged during the erection process. Once a column was finished, it was held in place only by its own weight and the accuracy of the level to which it and its base had been turned.⁴⁴ When the entire colonnade was completed, each flawless column, including its base and capital, soared 40 feet 11 inches into the air, and the total combined weight of the four facades registered a staggering 4,433 tons.⁴⁵ Even today, this undertaking is still ranked as one of the largest, if not the largest, monolithic column installation in the world.

In 1935, when American architect Frank Lloyd Wright visited Pittsburgh on an architectural tour, he stood before the finished facade of the Mellon Institute and snorted: "This is what happens when rich men decide to bring Greece to Pittsburgh."⁴⁶ Nevertheless, if one pauses to consider the purpose of the building, the development of its design, and the craftsmanship in its construction, then this Neo-Classical Revival facility can still be characterized as a unique American example of architecture inspired by old world traditions. ⚙️

Notes

¹ An endless list of such commonplace items as beverage flavors, breakfast cereals, composition flooring, edible gelatin, fertilizers, flaked coffee, glue, inks, insecticides, plastics, razor-blades, and skinless wieners, shoe leather, frozen orange juice, and fluorine all share one thing in common — industrial research at the Mellon Institute in Pittsburgh discovered them, invented them, or improved them. For example, according to "The Activities of Mellon Institute during 1932-33," *Industrial and Engineering Chemistry: News Edition* 11 (April 20, 1933, reprint), 6, in 1930, Robert H. Foerderer, Inc., a Philadelphia shoe manufacturer, established the Shoe Fellowship at the Mellon Institute. In two years, the scientist in charge of the research, C. H. Geister, made a

A typical laboratory at Mellon Institute, c. 1940.



number of improvements in leather technology. He was particularly successful in modifying a method of tanning a shoe leather which increased its durability, its ability to withstand scuffing, and its resistance to water.

Beal, George D. and Ronald B. McKinnis, *Method of Preparing Fruit Juices*, Patent No. 2,047,935, 21 July 1936, United States Patent Office, 1-3, recorded that George Beal and Ronald McKinnis were assigned to a fellowship funded by the Continental Can Co., Inc. of New York, N.Y. The purpose of their research was to develop a canning process for fruit juices which would maintain both the flavor and the vitamin content of the juice. One result of their investigations was the invention of a canning process which could produce a frozen orange juice that was, in turn, a forerunner of today's frozen fruit juices.

Also, "Researches of Mellon Institute 1939-40," *American Chemical Society: News Edition* 18 (April 10, 1940, reprint), 298, reported that the nutrition fellowship, sponsored by the local Buhl Foundation, had discovered in a study of laboratory rats that the basic element, fluorine, provided a degree of protection against tooth decay. As the result of this discovery and those of similar studies, the director of the fellowship, G. J. Cox, concluded that serious consideration should be given to the idea of controlling the fluorine content in community water supplies in order to provide a large scale reduction in dental caries.

² Kenneth Speer, "Pittsburgh: Day by Day," Historical Society of Western Pennsylvania clipping file, no date.

³ *Behind These Columns* (Pittsburgh: 1937), 11-12.

⁴ "A.W. Mellon's Speech at Institute Fete," *Pittsburgh Post-Gazette*, 7 May 1937.

⁵ *Ibid.*

⁶ *Behind These Columns*, 13-14, 17.

⁷ *Ibid.*, 17-18.

⁸ Robert K. Duncan, "Harnessing Science to the Factory," *Popular Mechanics* (April 1914), 475; "Tenth Annual Exhibition, Pittsburgh Architectural Club," *The American Architect* CIX (February, 1916), 66.

⁹ Minutes of the Meeting of the Building Committee of the Mellon Institute of Industrial Research and School of Specific Industries of the University of Pittsburgh, 24 April 1913, 21 May 1913.

¹⁰ *Behind These Columns*, 14; Minutes of a Special Meeting of the Board of Trustees of the Mellon Institute of Industrial Research, 11 April 1939, recorded that after the Mellon Institute moved to its new location at Fifth and Bellefield, the Board of Trustees formally took action to deed the second facility at Thackeray and O'Hara to the University of Pittsburgh. Today, this "Old" Mellon Institute building is still used by the University, although it has been renamed the Alexander J. Allen Hall.

The massive institute was built in the shape of a hollow trapezoid with crossing wings forming four interior courts; this design allows plenty of light for laboratories.



¹¹ *The History of the Lloyd Property*, unpublished manuscript, no date, recounted that the property was initially “all that part of the farm called ‘Belle Field’ in Pitt and Peebles Townships, Allegheny County, Pennsylvania.” The mansion was reported to have been built during the 1850s by Edward Dithridge, a local glass manufacturer. However, it was not until after Henry Lloyd, a pioneer in the Pittsburgh iron industry, purchased the residence in 1861 that the house and grounds became a focal point of local social life; James F. Miller, *Commentary for the Film on “The New Building of the Mellon Institute”* (Pittsburgh 1959), 1, asserted that when the Mellons acquired the property, the mansion was immediately outfitted with laboratory facilities and was called Building No. 2. Even after the official ground-breaking began for the new Mellon Institute, the old Lloyd residence still continued to function as a research building, but the building had to be moved across Bellefield from its original location to a temporary site on the northeast corner of the lawn of the new Cathedral of Learning at the University of Pittsburgh. Once the new institute was completed, however, the mansion was torn down.

¹² Correspondence of Henry A. Phillips, Treasurer, Mellon Institute, 30 June 1927.

¹³ *Ibid.*

¹⁴ “Description of the New Building of Mellon Institute,” *The Crucible XXI* (May 1937), 112; “The Temple of Science,” Carnegie Library of Pittsburgh clipping file, 1937, reported that although Richard Beatty Mellon did not live to see the completion of the new Mellon Institute (he died in 1932), he was the first one to recognize that the older building had quickly become inadequate for its growing research work. Consequently, he strongly favored the construction of a new headquarters. Moreover, he was the one who urged the idea of clothing the structure in classical architectural simplicity, and he was the one who became involved with the day-to-day planning and the endless details which surrounded the construction of the new facility.

¹⁵ *Behind These Columns*, 37.

¹⁶ Correspondence of Edward R. Weidlein, Director, Mellon Institute, 15 Dec. 1932.

¹⁷ Janssen and Cocken, *General Description of New Building* (Pittsburgh: 1936), 7.

¹⁸ *A Trip Through the New Building of Mellon Institute* (Pittsburgh: 1937), 7-8.

¹⁹ “Description of the New Building of Mellon Institute,” 112, 117; Roy Clark, “The Material Mellon Institute,” *The Crucible XXI* (May 1937), 120, noted that the completed facility (6,332,039 cubic feet) contained essentially the same amount of space as the 34th floor Koppers Building, at 475 feet the eleventh tallest skyscraper in Pittsburgh.

²⁰ “Description of the New Building of Mellon Institute,” 116, 119.

²¹ Janssen and Cocken, 13-14; Waldemar Kaempffert, “This Week in Science: Industrial Research,” *New York Times*, 9 May 1937, reported that laboratory furniture of extreme flexibility included adjustable shelf brackets, boltless tables, and removable storage cabinets of uniform size.

²² *Behind These Columns*, 36.

²³ “Full-Size Model of End of New Institute Made to Avoid Mistake,” *Pittsburgh Sun-Telegraph*, 24 July 1931; “Progress at Mellon Institute During 1931-32,” a report by Edward R. Weidlein to the Board of Trustees, Mellon Institute of Industrial Research, 7 April 1932, 2, stated that the architects, Messrs. Janssen and Cocken, first made a model of the entire building to a scale of 5/32 inches to 1 foot. After study and many changes in details, a larger model of a portion of the building was constructed to a scale of 3/4 inches to 1 foot.

²⁴ “Information On the Construction of Mellon Institute,” *Mellon Institute Laboratory Notebook* of H.S. Coleman, assistant director, Mellon Institute, no date, sheet no. 64-66.

²⁵ Photograph by Frank E. Bingaman, Pittsburgh Photographic Library of Carnegie Library of Pittsburgh, 1932.

²⁶ “Information On the Construction of Mellon Institute,” sheet no. 65.

²⁷ “Progress at Mellon Institute During 1931-32,” 3.

²⁸ “Information On the Construction of Mellon Institute,” sheet no. 65.

²⁹ Correspondence of the Purchasing Agent, Mellon-Stuart Company, 21 Dec. 1932.

³⁰ Janssen and Cocken, 7.

³¹ Correspondence of Thomas A. Mellon, President, Mellon-Stuart Company, 13 Dec. 1932.

³² Janssen and Cocken, 2.

³³ “Information On the Construction of Mellon Institute,” sheet no. 65.

³⁴ Correspondence of the Purchasing Agent..., 21 Dec. 1932.

³⁵ Warren E. Roberts, professor, Indiana University, Bloomington, Ind., personal communication with author, 11 May 1992.

³⁶ Janssen and Cocken, 6.

³⁷ “Information On the Construction of Mellon Institute,” sheet no. 21.

³⁸ Janssen and Cocken, 6.

³⁹ “Information On the Construction of Mellon Institute,” sheet no. 21.

⁴⁰ Janssen and Cocken, 6. According to “Information On the Construction of Mellon Institute,” sheet no. 18, the large monolithic columns were cut to a 1/16th inch perfection. Unfortunately, an alternative primary source(s) which would support either the architects’ report or the assistant director’s account of the lathe operators’ precision has not yet been located.

⁴¹ “Information On the Construction of Mellon Institute,” sheet no. 18.

⁴² James F. Miller, 10.

⁴³ “World’s Largest Stone Column Being Put in Place at Mellon Institute,” *Pittsburgh Press*, 9 Sept. 1932. Initially, two truck cabs were required to haul a column to the construction site. Both cabs had armor plate placed over their tops while the second one had additional weight attached to its front end in order to keep its wheels on the ground. As the column installation progressed, however, these cabs were replaced with 100-ton trucks from Philadelphia.

⁴⁴ James F. Miller, 10-11, 13-14.

⁴⁵ “Information On the Construction of Mellon Institute,” sheet no. 20-21.

⁴⁶ “Mellon Institute,” *Bulletin Index*, 13 May 1937.