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Monolithic Concrete Construction for Variable Climates

The subject of reinforced concrete buildings in Southern California and their desirability as a type of construction for the extremes of climate is often raised. A certain variation in construction methods is called for to meet either extreme heat or a freezing temperature, but a concrete job that is really good in a moderate climate is good in any climate. My recent experience has been mostly in Southern California and this article deals more directly with my observations of the work there with which I have been most intimately connected. In Michigan, Montana, and other northern states, where I have done work from time to time, I have found that the same principles are applicable.

However, it is not necessarily true that a good concrete job in some other sections would be adequate for California. In spite of the mild climate, Old Mother Nature does a little shivering out there now and then and throws things around a bit. To quote the Chamber of Commerce, this is "very unusual," but when it has occurred it has done things to some of the poorer construction that caused the inhabitants to shake in sympathy with Mother Nature.

The consequence of the 1933 Long Beach earthquake has been that California, and particularly Southern California, passed laws requiring that buildings be designed to withstand sideways forces as well as the up and down forces. This radical move has produced the slogan "come to California and enjoy the earthquakes."

Both design technique and the quality of construction have improved remarkably since these laws were passed. Engineers found that of necessity they must consider the effects produced by continuity of members, and constructors have had to keep pace with the improved design. Reinforced concrete building construction advanced more rapidly, perhaps, than other types, for the reason that concrete lends itself readily to the solution of the problem of continuity in design. Architects were sympathetic with the modern trend toward displaying structural work where it had natural beauty of mass and line, instead of covering it up with ornamentation, plaster, or other artificial dressing. All these factors have led to the reputation which Southern California contractors have of building excellent concrete work. The improvement has been due largely to the aftereffects of the 1933 earthquake.

Gutenberg and other Early Printers • Our Appreciation

What makes a good concrete building in any climate? Neglecting the architectural planning and other phases not directly related to the engineering structure, the following definition, I believe, covers the ground pretty thoroughly. A good concrete building is one which will withstand the live loads and other forces to which it is subjected without damaging deflections or cracks and with an exceedingly slow rate of deterioration. Cost should also be considered in this definition. Of two structures, identical in size and function, which perform equally well according to the foregoing definition, the one with the lower cost is the better. Any money spent on the engineering structure of a building in excess of that necessity to conform with this definition, assuming that all architectural requirements are fulfilled, is money thrown away. In a laudable endeavor to provide for absolute safety, the requirements of some building laws and building officials cause an unjustifiable structural expense. They disregard the fact that the refinements of modern engineering design and the advance in quality of materials, make it entirely possible to design safely but at less cost. The ultra-conservatives are gradually leaning to the viewpoint of the moderns, and as the superconservative regulations are modified, more new building will be done at less cost to both public and private capital as well as with a considerable saving of our natural resources.

The next question to ask is how can a good concrete building be produced. The answer to this is not as simple as that to the first question. My view is that to achieve the desired result, one should have something like the following:

An adequate footing design so settlements will be equal over the entire area of the building.

A structural engineering design which takes into account the quality of materials, the loads to be carried, and the continuity and deflection of each member in the structure.

A design and construction procedure that minimizes the formation of shrinkage cracks.

A mixture, mixing, placing, and curing of the concrete so as to produce the maximum of impermeability.

The approach to the footing problem is first to make a careful study and analysis of the soil or foundation underlying the site. In the case of important structures, it is probably best to have the study made by a soil mechanics expert. The structural engineer should compute the actual load carried by each column, bearing wall, and pier. These loads are usually mostly dead loads, although in the case of heavy warehouses, a portion of the live load should be included. The soil mechanics expert should advise the engineer regarding the effect of the area loading of the entire building, the settlement probabilities of small footings versus large footings, continuous footings versus independent footings, and the effects of underlying soft strata, plastic flow of the soil, seasonal change of water plane, fundamental unit safe bearing values, and any other pertinent data. The engineer should evaluate all this and determine from this the type of footings to use to do a satisfactory job most economically.

A great many volumes have been written on the subject of structural engineering design and it is outside the scope of this article to do more than touch on a few highlights. One important point is that engineers are seldom paid enough for their work to afford to produce the best and most economical design for the owner. The two elements, economy and excellence, almost always go hand in hand. Experience has convinced the structural engineering profession that the preparation of several framing schemes, their cost analysis, and the use of modern design methods, instead of using moment coefficients and neglecting carry-overs into adjacent vertical and horizontal members, will save many times the extra design cost in the construction work. The same theme carries straight through the preparation of the structural engineering drawings and specifications, the foundation analysis, the use of high strength, high quality materials, and expert, competent engineering supervision of the construction work.

All these have a very direct bearing on the ultimate quality, cost, and permanence of the work. The design of a good modern concrete structure calls for a great deal more study, and consequent expense, on the part of the structural engineer than the production of a good looking set of drawings designed by the old-fashioned,

simple methods. It seems to me that the architects might benefit their own status by helping to educate the owners to the ultimate savings to be accomplished by thorough, modern, engineering service. The engineer wants to do a good job provided the material consideration will permit it.

Probably the most difficult problem of all in the design and construction of any concrete structure is the minimizing of the ultimate formation of cracks. There are a few fundamentals which should be noted. In general, the greater the cement content, the finer the aggregate, and the more mixing water used, the greater will be the volume change. Many other elements enter into the problem. Without professing to be an expert on this subject, I am giving you the results of my observations over a period of years. The fineness of grinding of the cement seems to have quite an influence. The coarser grinds, say from a specific surface of 1400 to 1600, seem to produce fewer cracks than cement ground to a fineness of from 2000 to 2200.

Length of time and completeness of curing has its importance. The more thoroughly concrete is cured, the fewer cracks there should be. Alternate wetting and drying seems to shorten the long dimension of a concrete specimen. Therefore, the exposed surfaces should be protected against the infiltration of moisture and the concrete made as dense and impermeable as possible. Thinner members crack more frequently than the thicker ones. Make each pour on the work as small as is practicable to permit the margins to contract without restraint. The addition of reinforcing steel does not modify the volume change ratio in the least. It may, however, make the cracks closer together and smaller. Sharp re-entrant angles cause points of high stress, as will be noticed at window corners. Wherever possible put a small fillet at re-entrant corners.

Speed of placing concrete makes a difference. Jobs in which the contractor takes a great pride in his speed record usually show more cracks than those constructed at a more leisurely pace. This is probably due to the fact that in the speed jobs the pour margins are farther apart and have less time to shrink than in the slower jobs.

Heat of hydration plays an important part where sections are heavy. In this case it might be well to use the lower heat cements. For information on this refer to the "Concrete Manual" published by the Bureau of Reclamation.

Disintegration of concrete which is subjected to salt air, sea water, or damaging soil waters has been a subject of great controversy. Some claim the disintegration is due to faulty aggregate and others to the lack of resistance of the cement used. Frankly, I do not know. In such cases it would be well to use sulphate resisting cement and the hardest, most durable aggregate obtainable.

The effect of climatic temperature change is to widen the cracks formed by contraction due to setting. One help for this is to insulate the roof above the concrete. It is my opinion that if cracks from contraction due to setting can be prevented, that, except in severe instances, all cracks will be prevented.

How is the most impermeable concrete produced? The answer is to get the concrete in the forms with a minimum of air and water voids. This subject ties up intimately with workability and with the characteristics of the aggregate. From the available aggregates select the one having the lowest absorption from heat, dried to saturated. Since the aggregate occupies most of the volume in the concrete this is important. Consider the sharpness or angularity of the particles. The aggregate particles most nearly approaching a spherical shape will slide and roll on each other with the least friction. Therefore, it is evident that such an aggregate may be mixed with a minimum of the lubricant water-cement paste.

The grading of the aggregates comes next. Much has been written on this subject and not all authorities agree. Graphs showing particle size, plotted against percent of total aggregate, are available from many sources and space does not permit of a discussion here. In general, the more angular and flattened the particles, the greater sand to total aggregate ratio should be used for workability. The greater this ratio, the more cement must be used, both to lubricate the mass and to fill the voids and coat the grains. Here in Los Angeles where we have some hard rounded aggregates, I use about a 40% sand-total aggregate ratio. If a durable, impermeable concrete is to be obtained, a 28-day cylinder strength of not less than 3000 lb. a square inch should be used. This requires a maximum of about six gallons of water to a sack of cement. The amount of this cement-water paste should vary with the kind of work being done and as stated before, with the character of the aggregate.

If the work is large and massive, I think larger maximum size aggregate should be used, the slump kept down from one inch to three inches, and the concrete placed with a vibrator. If the work is thin and heavily reinforced, smaller aggregate should be used for the top size and the concrete placed with not over a six-inch slump.

The way to proportion a concrete mix is to assemble the aggregates with proper grading and proportions and then add water-cement paste of predetermined water-cement ratio for strength, until the desired workability is achieved.

For a long time I have felt that a system should be devised whereby each ingredient, factor, and characteristic entering into the making, mixing, and placing of concrete would be given a value so that we could add, subtract, multiply, or divide in accordance with a formula and come out with a numerical answer which would mean the quality of concrete in place. All these factors being variable to a great degree, such a formula leaves the discoverer a worthwhile target at which to shoot.

—Oliver G. Bowen, Consulting Engineer

Of about four billion board feet cut down by the New England hurricane, about 810 million feet was salvaged by the United States Forest Service under the direction of a man named Bean who used 32 thousand men — most of them WPA workers and CCC boys. The average man cannot imagine the details involved. For instance, 98% of the land was privately owned by 30 thousand people who had to be located and persuaded to sign agreements. Six hundred million feet of that lumber, incidentally, was purchased by a new non-profit, non-competitive group of lumber wholesalers who jumped into the emergency.

—Michigan Society of Architects' Bulletin

Although the island of Crete is seen by some archaeologists as an ancient center of empire, ruling wide areas of the Mediterranean mainland, yet no Cretan artist apparently thought it worth while to portray historic events.

Sea level is not absolutely level. A geologist explains that along a mountainous coast, for example, gravitation attraction of the high masses pulls sea level a good deal higher than along a lowland coast.

Cleopatra's Gardens

What is left of Julius Caesar's gardens and the palace where he established fastidious Queen Cleopatra during her three-year stay in Rome has been coming to light during excavations in Rome. Little has been known in modern times of the famed gardens of Caesar, from which doubtless Cleopatra gathered some of the roses which she used in profusion for their sweetness. Her banqueting floors, it was said, were sometimes strewn knee-deep in petals.

The gardens, which Caesar willed to the Romans for a park at his death, are now believed to be definitely located by the finding of walls, frescoes, and works of art.

—Science News Letter

The 72nd Convention of the American Institute of Architects will be held in Louisville, Kentucky, during the week beginning May 19. Probable but not final is Tuesday, May 21, for the opening, continuing May 22, 23, and 24, concluding with a dinner on May 24. Important in the discussion will be the question of unification of the profession. A cordial invitation is extended to all architects, A. I. A. members, state society and association members, to attend.

The January "Federal Architect" discusses editorially the novel subject of the proper height of W. C. bowls (casseroles for elegance). The Mechanical Engineering Section of the Supervising Architects Office is disturbed lest the health, comfort, and happiness of users be undermined through improper height. They charged that manufacturers simply follow rule of thumb arrangements without proper research and study. So that Section instituted a test, a vitreous Gallup poll, as it were.

To overcome any thought of favoritism or unfairness, one jury of twenty men and another of twenty women were selected to offer expert opinions. The twenty men, under the supervision of a mechanical engineer, carried out the first day's test. On the second day the twenty women, under the guidance of a woman versed in plumbing fixture design, functioned. Three dummies (unconnected fixtures) of varying heights were erected and voters invited to sit on each.

After sitting on each, the jurymen and jurywomen cast a ballot on which seat was preferred. The result of this vote is interesting in that only 5% of the voters cast their ballot for the standard height of fixture.

Time was, and that in the easy memory of many still active in the business world, when the heart of downtown Chicago was frequently spoken of as the most high priced real estate in the world. This was perhaps thirty years ago. How times have changed!

On February 17 the Chicago Tribune presented to its readers an article enumerating great structures in downtown Chicago that had been wrecked or are to be wrecked now, covering the period 1934-1940. The names and locations were given and the present use of the site indicated. While the list may be correct for the time specified, there are many other instances in downtown Chicago where important structures have been razed in the years previous to 1934, where the owner of the land has found no better use for his real estate than open parking spaces or one and two story taxpayers.

A visitor to the heart of Chicago must wonder what has happened to the metropolis of the Middle West to find so many open holes in the landscape. Has Sir Raymond Unwin's preachment for decentralization in big cities had such disastrous effect upon Chicago? Is Chicago losing its place as a great commercial center and headquarters for industries' offices? Or has, perhaps, the folly of overbuilding with higher structures than economic soundness warrants, taken its toll? Has misconception of business requirements in the matter of Chicago Zoning Law caused an exodus from the heart of the city? Have one merchandise mart and one great office building, erected within the last ten years, acted as a monopoly in their particular appeal to tenants?

There will be many answers and diagnoses will vary. In the meantime, architects and engineers, who have devoted their lives to the design and construction of such buildings, sit by and find little to do in their professions.

The Bulletin presents herewith a list of vanished buildings in this downtown area with date of erection, date of disappearance, and present use of the land. The list is incomplete, but it will serve to give a picture of the present state of the heart of the metropolis which once hummed with activity throughout its area.

Name of Building	Stories	Built	Wrecked	New Use
Capitol	20	1890	1939	2 story building
Great Northern Hotel	14	1891	1940	1 " "
Bedford (Owings)	16	1890	1940	parking lot or 1 story
Temple Court	9	1885	1940	" " " " "
Medinah	10	1893	1934	2 story building
Guardian Bank	8	1880	1934	" " "
Adams Express	11	1884	1934	" " "
Atlas Block	5	1873	1940	" " "
Central Trust Bank		1900	1938	garage
Union Bank (Grannis Bl.)	7	1880	1934	1 story building
Labrador (Stevens)	8	1897	1937	2 " "
Portland Block	7	1873	1934	" " "
Wexford	5	1873	1936	1 story & roof garage
Old Lyon & Healy (Adams & Wabash)		1873	1937	3 story building
Illinois Theater		1900	1934	parking lot
Herald	6	1893	1936	" "
Ceylon	5	1874	1937	" "
Cort Theater		1912	1934	" "
N. W. Cor. Lake-Dearborn		1873	1936	" "
Tremont House (Hotel)		1874	1930	" "
Evening Post, Market St.	6	1885	1934	" "
Albert Pick, Randolph St.	5	1875	1934	" "
Daily News Buildings		1875	1930	" "
Madison-Wells		1886	1930	" "
N E. Cor. Market and Monroe, ¼ block	5 & 6	1875	1932	" "
Marshall Field Wholesale Adams St.		1885	1930	" "
S. E. Cor. Madison and Franklin	5	1876	1934	" "
S. W. Cor. Madison and Franklin	5	1874	1925	" "

Of the real estate holdings of the late James A. Patten, the Tribune enumerates twelve parcels, not included in the above list but in or immediately adjoining the area, all improved with buildings ranging from three to eight stories in height that have disappeared under the wrecker's hands in the years between 1934 and 1940.

Illinois Society February Meeting

On February 27 the Illinois Society of Architects held its monthly meeting in Mather Hall, Art Institute, Chicago, with an attendance of fifty at dinner and ten more who came after dinner to take in the program. Chicago Chapter, A. I. A. having planned no meeting for its members in February, all were individually cordially invited to attend the Society's meeting. They made up about fifteen of the sixty.

Knighthood is still in flower, for, since both organizations wished to hold short business meetings before entering on the program, the Chapter was given precedence and Jerrold Loebl, Chapter vice-president and only officer present, acted as chairman. In the absence of Secretary Senseney, Victor Matteson read the minutes of the last Chapter meeting. There being no new business, Mr. Loebl adjourned the meeting on the motion of Richard E. Schmidt.

The Illinois Society business meeting followed. Secretary Fairclough having appeared and disappeared, Leo Weissenborn, as acting secretary, read the minutes. President Gerhardt reported that, acting on the request of James Rezny at the January meeting to have all Society members notified of proposed amendments to the Chicago Building Code, the Board of Directors would keep the membership advised of proposed changes through the Bulletin. This ended the Society's business meeting.

The program featured a lecture by Vice-President Ralph C. Harris, Highways Architect, State of Illinois, titled "An Architect and 1000 Engineers." His address covered the architectural activities of the Division of Highways apropos bridges and buildings, description of the state's police radio system and its construction, and Mr. Harris' experiences working with one thousand engineers.

It all began with the state's program for constructing a system of state hard roads after the World War. Before the War, the work done by the Division was of small importance. With the coming of the automobile, there were built in Illinois (1921-1931) approximately 13,000 miles of hard roads by the state. Since then the Division of Highways has had to assume much besides road building. There are today in the Division 3000 employees and it expends about $50,000,000 annually, owns and operates 600 automobiles, 1500 trucks, road maintenance equipment, and its police department has 375 motorcycles.

The state is divided into ten highway districts of about ten counties each, and thirteen police districts. Each district has its district engineer with offices, garages, maintenance buildings, and each police district has its own headquarters. It costs about $6,000,000 a year just to maintain the highways. All materials used in the construction of buildings and roads are carefully tested at a special laboratory building.

An architect for this Division was first employed in 1933. Since then he has designed and supervised the construction of about thirty building projects, some of them costing as much as $250,000. The Highways architect is always made responsible for architectural values in bridges, grade separations, maintenance of buildings, handling of leases where the Division has rented quarters.

The Highways architect has had charge of the construction of the state police radio system instituted in 1934. Six months for general study of requirements was put in and today there is a complete and efficient statewide system that ranks first in this country and, perhaps, in the world, in making it possible to signal police and guards anywhere in the territory covered. Radio engineers were, of course, important. The map of Illinois displayed at the meeting showed circles of 70 mile radii overlapping, for fading is expected beyond that radius. Police motorcycles are equipped with receiving sets on the handle bars.

There are seven radio stations covering the state. Each station is provided with a triangular steel tower, 20 feet on a leg, 300 feet in height, built of half-inch round sections and angles. The concrete foundation block is carried up 8 feet above the ground. The tower is, of course, anchored into the concrete. The buildings, other than the towers, are low one-story buildings of a good quality of buff brick, trimmed with Indiana limestone, modern in design. There is a family resemblance among them. Construction is fireproof. Insulation, air-conditioning, automatic heating plants are provided and the roofs are designed to withstand the impact of the tower in case of collapse. Attack by bandits is foreseen. Auxiliary electric generators are provided in the event that electric service fails. There are nine police headquarters buildings.

The architect's cooperation in the design of bridges focuses his attention on many details, such as hand rails to make the traveler conscious of the beauty of the stream being crossed, smoothing out trusses to overcome the old jagged, sawtooth appearance, location of lamp posts out of the way of curbs where automobiles might strike, flaring of approaches to bridges, etc. The new bridge over the Illinois River at Peoria, one and a half miles long, not yet completed, should be a demonstration of the value of the architect working in cooperation with the bridge engineer.

There were questions and answers punctuating the course of the address.

Chicago Chapter March Meeting

The Chicago Chapter, A. I. A. chose the 26th for its March meeting with dinner and business meeting in Hotel St. Clair followed by a program in Underwriters' Laboratories across the street. The 26th fell on the fourth Tuesday of the month, the regular meeting time of the Illinois Society. I. S. A. members were all invited to be guests of the Chapter. Though the Society's notices to their own meeting were out and ready for mailing, these notices were suppressed, the Chapter's invitation accepted, and many came. *Noblesse oblige.*

President Roberts began the business meeting during the dinner to save time. Victor Matteson briefed minutes of the February meeting. The next Chapter meeting on April 10 will be on housing, with Newton Farr, prominent in real estate, leading the discussion, closing with the film "The City." President Roberts announced a questionnaire to be circulated, whose answers on Chicago's building troubles will be the subject for the May meeting.

Delegates were elected to the A. I. A. Convention in Louisville in May. They are: Paul Gerhardt, Jr., Henry K. Holsman, Jerrold Loebl, Philip Maher, V. A. Matteson, John O. Merrill, Lawrence Perkins, George Senseney, Alfred Shaw, Carl Heimbrodt, Elmer Roberts.

Secretary Senseney, as sponsor, explained the program to be undertaken after the dinner at Underwriters' Laboratories, and introduced B. P. Caldwell of the Laboratories, who spoke of the founding in 1893 and work of the Laboratories in Chicago and branches in New York and San Francisco. Seven more technicians from the Laboratories attended the dinner. Fifty-seven men attended the dinner, supplemented by forty more who came direct to the Laboratories.

The company was welcomed by a large staff who had come back in the evening to give demonstrations to the architects. These were many and varied, from fire and loading tests with various building materials, tests of mechanical and electrical equipment, protection against burglary, safe gas and gasoline stove constructions, glass blocks under fire, acoustical materials, and much more—all of which held the visitors deeply interested for over two hours.

The lesson at the Laboratories ended with foaming glasses of beer, where taste was the only test.

Successor to Emery Stanford Hall, deceased, as member of the Examining Committee of Architects, State of Illinois, is John J. Fox of Fox and Fox, Architects, 549 West Randolph Street, Chicago.

Successor to Mr. Hall as secretary-treasurer of the National Council of Architectural Registration Boards is William L. Perkins of Chariton, Iowa. The office of the secretary-treasurer has been moved from Chicago to Chariton, Iowa.

When Holbein lived, China had isolated herself from the rest of the world, although Marco Polo and a cosmopolitan intercourse had brought to Western eyes superb examples of Chinese art in all fields. A similarity suggests itself between Holbein's art — "the line without shadows showeth to all good advantage" — and the Chinese.

Pisanello, born in 1395, rescued Italian sculpture of the Quattrocento from a generally debilitated practice with the strength of his stylistic sense. After Pisanello, Leonardo da Vinci offers, in one drawing at least, further intimation of a knowledge of Chinese means on the part of a Western master.

—Daniel J. Kern in "The China Monthly"

Chicago Building Congress Dinner-Conference

February 13 marked the annual dinner-conference of the Chicago Building Congress. It was held this year in the Grand Ballroom of the Palmer House and by seven o'clock the room was comfortably filled and service began. During the dinner Leo Terry played the organ unceasingly. He played forte and fortissimo. Had he played piano and pianissimo, conversation among the diners could have proceeded painlessly. With the March of the Senegambians bearing fruit (the ices of the dessert course frozen into fruit and vegetable forms, a feature in Palmer House banquets), there came with the fruits with their individual illumination, three emblems in the form of clear ice block lettering about ten inches high reading "Build with Security." These were placed on the long speakers' table.

Paul D. Angell, Secretary and factotum of the Chicago Building Congress, pounded his gavel for silence and attention, and speech-making began. His address was surprisingly short. He introduced Elmer C. Jensen, President. Mr. Jensen in his Lincolnesque soft-roll, stand-up, turn-down collar, over a black stock, crowning an expanse of immaculate white bosom, looked every inch the President — of the Building Congress. Before reading his address, he introduced the guests at the speakers' table. His message was a review of the Congress' past year's work and accomplishments. Outstanding among these was the organization's effort in promoting a bill before the legislature for the Public Service Building Corporation. The bill in the end was withdrawn, but Mr. Jensen promised that efforts in its behalf would be renewed at the next legislature.

Leverett S. Lyon, economist, past Executive Vice-President of Brookings Institute, and now Chief Executive Officer of the Chicago Association of Commerce, was the next speaker. He was suave and appealing. He had no message. He recognized that many trials had been made to revive the building industry and stressed the thought that to get production started was the all-important thing at the moment.

Reuben Soderstrom, President, Illinois State Federation of Labor, spoke next. He has a strong voice. Forcing its sound into the loud speaker produced a reverberation comparable to the organ played during the dinner. It must have been heard by pedestrians passing the Palmer House on the Monroe St. side. Mr. Soderstrom recited the progress and accomplishments of organized labor. He said he was an honorary member of the carpenters' union. He pointed out the increase in sobriety among miners with the reduction of their hours of labor. To illustrate the influence of organized labor in the building industry, he credited their influence very largely with obtaining for Illinois from the Federal Government a 100 million dollar appropriation to be used by USHA for low-rental housing in Illinois.

The pièce de résistance of the evening was kept to the last in the address and demonstrations by charts and graphs of Roy Wenzlick of St. Louis. Mr. Wenzlick is President of Real Estate Analysts, Inc., whose function is the measurement and forecasting of real estate and construction trends. He is frequently consulted by the Federal Government and is consultant to the National Association of Real Estate Boards. With enlarged graphs on the wall, back of and the full length of the speakers' table, he moved along this wall before the charts, explaining the ups and downs in this country from 1790 to 1940. Always there was a comparison between general economic conditions and the status of the building industry and real estate. The cost of building invariably rose with prosperity and declined in the slumps. A parabolic curve platted over the entire period from 1790 to 1940 showed a surprising regularity in alternating prosperity and depressions, with time periods of little variation. Mr. Wenzlick dwelt on the efforts of the Federal Government in recent years in the matter of accelerating prosperity through pump priming and showed by his graphs that it had little effect indeed. But he believes that we are on the eve of an era of rising prices and prosperity, which will begin within the next six months.

Housewarming at Chicago Architectural Club

The housewarming party of the Chicago Architectural Club in its new quarters in the Merchandise Mart on February 2, with about 75 celebrants, marked the opening of the 60th year of the Club's existence. From the public corridor, one passes into a narthex, or vestibule, pleasantly equipped as a lounge with rugs, davenports, and comfortable chairs. There is a screen partition separating this lounge from the large atelier beyond. The atelier itself is decorated with many gay posters of railroads and other transportation lines in foreign lands.

After a general inspection, the company adjourned to a large room down the corridor to listen to talks and view a film. Ralph Gross spoke first on new aims of the Club, stating its principal function was the maintenance of the atelier. Memories of early members of the Club such as I. K. Pond, W. B. Mundie, Charlie Kessel, E. S. Hall, Tallmadge, and others, could not be eradicated. Older men are not now ignored on the Club's board. Arthur Adams is again patron of the atelier, assisted by Raoul Josset, and the Beaux Arts system will be followed, at least in fundamentals. Convincing developments in other schools might cause the streamlining of the Club's atelier policies.

The annual scholarship is to be reinstated and the Club has now available $1100 residue from the 1937 Architects' Ball (Mexican Ball), held under the auspices of the Chicago Architectural Club at the Drake Hotel. Prizes are to be offered for competitions in the atelier.

With Ralph Gross as commentator, a film was presented showing Chicago's traffic conditions. Mr. Gross introduced Otto Kopp Jelinek, Traffic Engineer for the Chicago Park District, who carried on the comments with the film. He maintained the work of the traffic engineer deals mostly with the human equation. The closing film feature was a showing of the recreational guidance and instruction in manual crafts supplied to the public free by the park districts.

Architects Ball Educational Fund Balance

The report of John R. Fugard, Chairman, Committee on Educational Fund of the Architects Ball Committee, Inc., incorporates an auditor's balance sheet showing the proceeds from program advertising of the Ball, which took place on January 12, 1940. The auditor's report follows:

INCOME:		
From sale of program advertising	$6,165.00	
Contributions and listings	740.00	
From sale of programs	10.00	
TOTAL INCOME		$6,915.00
EXPENSES:		
Printing of program	$1,974.20	
Salaries	1,401.80	
Letter and mailing service	419.41	
Postage	327.27	
Stationery and supplies	179.55	
Telephone	102.39	
Rent and light	55.00	
Miscellaneous	49.94	
TOTAL EXPENSES		$4,509.56
NET INCOME		$2,405.44

Carnegie Foundation Grant to School of Design

L. Moholy-Nagy, Director of the School of Design, 247 East Ontario Street, Chicago, announces receipt of a grant of $10,000 from the Carnegie Foundation. The grant was given "to encourage the pioneering work of the institute which has been done in the last few years and to encourage the growth and future expansion of the school."

Nearly 25,000 years ago the first Americans arrived. This is the verdict of Dr. Kirk Bryan and Louis L. Ray, Harvard geologists. A long scientific argument over antiquity of man in America is about over.

Figures of Buddha are made according to exact proportions, which the devout Buddhist regards as established by divine revelation.

Ictinus and Callicrates - Architects to the State

A nation's influence is not dependent upon its size. Its glory is not measured by square miles or territory. Although ancient Greece was one of the smallest countries in Europe, its fame and influence have continued down through the ages to our own time. The historical record of Greece indicates a rapid, cultural progress. Emerging from an archaic period, the Hellenic races, within a few centuries, developed into a brilliant civilization, reaching cultural heights far in advance of the rest of the world.

Of the several branches of the Hellenic races, the Athenians early became the acknowledged leaders, and by the fifth century B. C., their capital city, Athens, had become one of the most renowned cities of the ancient world. It was a city-state of the first rank, in an age when this was the highest form of social structure in existence. One of the things which set Athens apart from the other city-states of the time, was her form of government, dating from the sixth century B. C., when Solon, one of the sages of Greece, brought into being the Constitutional State of Athens," thus creating the world's first democracy.

Throughout the earlier period of their progress, from the time of Homer down to the fifth century B. C., the Greeks had brought to a high state of development all of the finer accomplishments of a civilized people: statesmanship, art and architecture, music and drama, natural science, philosophy, religion and all other phases of high human endeavor. It seems to have been the mission of Athens to gather up all of the finest qualities in Greek life and carry them to the ultimate goal of perfection.

Athens was richly endowed by her natural setting in the Plains of Attica, a few miles back from the sea. In the center stood the Acropolis, an out-cropping of rock scarcely 1000 feet in length and 400 feet in width, precipitous on three sides, and accessible only by a narrow incline at the west end. On top of this easily defended hill the chief rulers of the areas in early times built their palaces. It also contained the sanctuary of Athena, the patron goddess of the Athenians. From this time on, the Acropolis was destined to be the political, religious, and eventually the cultural, center of the Greek races. As Greece grew in culture and power, a greater city developed on the plain under the shadow of the Acropolis. By the fifth century B. C., Athens had become the recognized center of a powerful city-state, and to the Greeks and the world of their time the Acropolis became a symbol of political power.

One of the ways in which the greatness of the Athenians found expression was through their art and architecture. Walls were built, crowning the Acropolis, to protect the sacred area within. The old palace buildings were removed and the small shrines and other early structures were enlarged or replaced with finer temples. What was once a fortified hill palace had become a spacious sacred area with appropriate buildings. The city was protected by defensive walls and a garrison. The port-of-entry, The Piraeus, was a busy, thriving commercial seaport, carefully guarded by a strong merchant marine navy. Athens was not only great but aggressive, and aroused the suspicion of Sparta and other Greek cities, and soon a challenge was to come from abroad.

To the east an aggressive and powerful nation had arisen, and was gradually conquering all the neighboring countries. The Persians had already gained control of Asia Minor and were bringing pressure upon the Ionian cities on the coast. Athens came to their rescue, and drew the enmity of Darius, who sent his armies against Greece. Then came the Greek success at Marathon, the Persian success under Xerxes, and the Greek naval success at Salamis. Athens became dominant in Greece. The Delian League brought to Athens tribute from the other League members.

The culminating period came near the middle of the fifth century B. C. when, in 461, Pericles came into power as the leader of the Athenian Democracy. A natural born leader and organizer, he at first changed the political structure so that the city-state virtually became an Athenian Empire. He rebuilt and beautified the city of Athens to make her worthy of the power and influence she wielded.

The Acropolis, sanctuary of Athens, still largely in ruins, now claimed Pericles' attention. He became possessed of a great dream — to glorify Athens, and to make her, through the rebuilding of the Acropolis, the great political, religious and cultural center, not only in Greece, but in the world. He reflected the belief of the Athenians that they were the real protectors of all Greece, and that they were justified in transferring the Delian League Treasury to the Acropolis, to use a portion of the funds to rebuild the temples of the area, and make the Acropolis supreme in its architectural appointments. This was Pericles' public works program, unflinchingly prosecuted.

Pericles himself was a generous patron of all the arts and has been described as a gifted amateur architect. Above all, he possessed, in a marked way, the ability to select creative artists and to inspire them to execute great works. With a definite program in mind, he looked about for the greatest talent available. His personal friend, Phidias, had already proved himself to be a most talented sculptor, in a time when sculpture was a highly developed art and many talented artists were working in that field. Pericles appointed Phidias director of public works. The major part of the development of the Acropolis, however, was concerned with architecture. Again Pericles and his director looked about for the best talent, in what was already an old and honorable profession — architecture. There were many accomplished men known to them. They chose two: Ictinus, a talented designer, and Callicrates, a practical, experienced builder or engineer, skilled in the handling of construction work. Fine reputations had come to both architects after cooperating on public works through a number of years.

The selection of architects for public works was an established custom long before Pericles. The Greek term "Architeckton," is one of high antiquity and is usually interpreted to mean chief builder, master builder, or master-of-works. The Latin form "Architectus," used by the Romans, is borrowed from the Greek.

Vitruvius and other ancient writers refer often to the architect and cite the names of designers and builders of particular structures, but they fail to create any definite picture of the architect as a personality, or to tell us how he carried out his work as an individual. There are, however, numerous references as to what was expected of all architects in the way of general education, technical training, their responsibilities to the state, and some of the legal aspects pertaining to the execution of public building projects. Briefly, the architect was required to have a full technical training and working knowledge of all phases of the building industry, since he must supervise the work of all the different trades, and be competent to pass upon its final acceptance.

Records exist which give some information as to the legal aspect of the work of the architect and how he functioned on public projects. It was the custom of the Greeks to set up carved stele in public places, to give notice of public matters to the citizens. Magistrates charged with public works engraved upon the stele the acts of their offices. These, to the historian, are public documents which give authentic information on the manner in which public works were to be executed. Some have been found which set forth the methods followed in the construction of public buildings by the architects employed by the state.

A résumé of the duties of the Greek architect, as gathered from the inscriptions found on various stele, may be briefly stated as follows: (1) To serve as a member of the building committee, either permanently assigned, or attached to some particular construction. As such, he prepared the specifications and assisted in awarding the contracts. (2) To exercise continual and careful supervision over the work, presenting models or plans to supplement the specifications when necessary. (3) To impose penalties in the event of unsatisfactory work, and (4) To advise the building committee in the final acceptance of the project.

It is reasonable to assume that Ictinus and Callicrates, as Architects to the State, worked under similar conditions, although very little has been recorded referring directly to them. To Pausanias and other writers of the time such records, no doubt, were available, but they have left us little more than the bare fact that Ictinus and Callicrates were architects for certain structures. The Athenians, apparently, were not interested in the individual. The architect, sculptor, painter and craftsman, all worked together for the glory of the State, and above all for the glory of their patron goddess, Athena. To have worked to gain individual recognition or to be set above their fellow craftsmen, would have been considered sacrilegious.

Of the several buildings known to have been designed and con-

structed by Ictinus and Callicrates, the most noted was the Temple of Athena, or the Parthenon, on the Acropolis. This is generally considered the most perfect and also the most glorious temple in ancient Greece. We will confine our attention to this one structure and carefully examine it to see what we may learn about the men who created it.

At first it was the intention to build the new Parthenon on the old ruined temple platform, along the same lines as the old structure, the plan of which was long and narrow as was customary for temples of its period. Ictinus and Callicrates had been engaged for this purpose. After clearing away the ruins down to the platform, this was found to be sound in every respect and it was decided to preserve this part and build the new Parthenon upon it. From this point on, Ictinus was to be the master of the design.

After a long period of study, Ictinus determined upon new proportions for the entire temple. Instead of a long narrow structure having six columns at either end, his plan called for an octastyle peripteral type, with eight columns at either end and seventeen down each side. The overall outside dimensions were 100 feet in width and 228 feet in length. The scale of the superstructure was based upon a column height of approximately 34 feet, and a diameter of about 6 feet. The peristyle which surrounded the entire building numbered 46 columns. The material chosen for the temple and its sculptured decoration was the fine grained white Pentellic marble quarried a few miles distant from Athens. In weathering, this marble took on a slight rose color, which in the brilliant sunlight and clear air of Greece, produced a golden tinge. Much of the refinement found in the mouldings and carvings on the Parthenon is due to the unusually fine grained quality of this material.

The Parthenon was to occupy a commanding site on the highest part of the Acropolis rock, and was designed to stand alone and supreme, not modified in any way to form a part of a group. It was to be a state monument to a state religion. State and religion were closely allied; both were traditional with the Greeks and they also had a traditional type of architecture common to both. The simple rectangular, peripteral temple had long been a traditional type. Therefore, the task set for the Architect of State, Ictinus, was not that of creating a new type of design, or one based upon his own ideas, but rather to bring the traditional form to its highest state of perfection. Ictinus and Callicrates, working together, are accredited with making the Parthenon the most perfect structure of its type, as to beauty of design, soundness of construction, and appropriateness to its intended use. The immediate purpose of the temple was to serve as a shrine and to house the famous gold and ivory statue of Athena Parthenos, the patron goddess of the Athenians. This statue was one of the principal works of the great sculptor Phidias.

It would be especially interesting to know what methods Ictinus used in determining his design for the Parthenon. The fine proportions and refinements evidenced in the remains of the structure indicate that extensive study was given to the design. We have reason to believe that Greek architects were quite able to prepare small scale models of proposed structures, also that they were capable of preparing drawings to scale. It is not unlikely that Ictinus used either or both of these methods. The fine proportions and inter-relationships of the various parts of the Parthenon, down to the smallest details, could not be obtained unless each part had been fully determined and recorded, for reference, in advance of the actual construction. The Greeks were proficient in mathematics, especially in geometry. Architecture and architectural drawing are highly geometrical, and the logical, mathematical proportions found in the Parthenon are such that the entire design could have been worked out on paper.

The element of beauty in Greek architecture is proverbial and every means to obtain it was employed. Much can be and usually is said about this characteristic. Perhaps the word has been overworked. Briefly, the beauty of the Parthenon is largely due to its simplicity, fine proportion, logic of construction, delicate refinements, and over all a certain controlled restraint. In the design of the Parthenon, Ictinus resorted to the most subtle technique to obtain certain refinements of line. This consisted in adjustments of proportion and line to produce the desired optical effects, and also to offset certain undesirable optical illusions. It was not enough that the lines of the temple be correct, but they must also appear correct to the eye. Long horizontal lines of stylobate and entablature were curved upwards at the middle to counteract the sagging effect that the vertical lines of the columns seem to produce; entablatures and ridges were likewise curved upward at the center; repeated vertical lines, such as columns, were made slightly curved on their outer surfaces, to prevent a hollowed appearance; and columns and walls were inclined inward at the top to compensate for an outward overhang illusion. They were working for an easy flow of line; in modern phraseology, the Parthenon was streamlined.

For their time, Ictinus and Callicrates were thoroughly modern in their approach, working in the latest and most approved manner. The Parthenon was the last word in design. In fact, it was carried to such a high degree of perfection that, for its type, no one has ever been able to improve upon it, and although it has often been copied, it has never been surpassed.

When the modern test of functionalism is applied, the Parthenon is not found deficient. The plan was functional for its intended use. The walls and columns were highly functional, each part carrying its share of the superimposed load; not a single column could be removed without causing a collapse of that portion of the structure immediately above. Each element of the crowning entablature, pediment, and roof had a definite function.

Great skill is also shown in the handling of the architectural decoration of the Parthenon. Except for the sculpture, and a few applied ornaments, the decoration was largely an expression or outgrowth of structural elements, and therefore an integral part of the building. Mouldings were simple and refined in character, and used with great restraint.

The only decoration on the Parthenon which might be termed applied ornament was the sculpture, and even this was so skilfully handled that it, too, became almost an integral part of the structure. This consisted of the bas relief sculpture in the metopes and the frieze in the upper part of the cella wall, and the free-standing sculpture in the pediments.

The final touch of decoration and refinement was given the Parthenon through the use of applied colors to certain parts of the exterior, as well as upon the interior. This, at first, seems most illogical; however, the color was applied in such a manner as to emphasize the structural elements and to accent the decorative elements in the upper portions of the structure.

—Thomas E. O'Donnell
Associate Professor of Architecture
University of Illinois

New Light on Persian Art

Dr. Arthur Upham Pope, Director of the American Institute for Persian Art and Archaeology, speaking as a Scammon Fund lecturer at the Art Institute of Chicago on February 27, had much to say about the growing influence of Persian art on art education and historical studies. Fifteen years ago so little was known about the contributions of Persia to the world of art that the discoveries of an expedition sent out about that time by the Smithsonian Institute were greeted with skepticism. That expedition, said Dr. Pope, uncovered pieces of pottery of such prodigious antiquity that everyone was startled.

A noted archaeologist has said that the art of Persia exercised an influence on the world second only, if at all, to that of Greece. It has been definitely established, according to Dr. Pope, that the whole character of Dante's "Divine Comedy" comes from Persian sources, including not only the bulk of the material, but even the sequence of the plot.

The evidence, in fact, is strong that man as a biological animal first emerged on the Iranian plateau. Since 1930 expeditions to Tepe Gawra in northeastern Mesopotamia have discovered the oldest, provable habitation of man and have conservatively established the date of this civilization as 4000 B. C. They found, among other things, a clay flute and obsidian vessels of rare beauty.

Some of the first expeditions announced that the origins of Gothic architecture — ribbed vaulting, the flying buttress and pointed arch — were found in Persia (I. S. A. Monthly Bulletin, February-March 1935). To this claim Dr. Pope now adds that the Persians had solved the problem of roofing a square building with a dome, and that all of the ornament of Romanesque churches is

found on earlier buildings in Persia.

Dr. Pope has written "A Survey of Persian Art" (published 1939) which reviews the discoveries of the past fifteen years.

—Dorothy G. Wendt

Chicago Chapter Portrait Collection

The Editor: I wish to take this means of notifying Chicago Chapter members and others of the present whereabouts of the Chapter's collection of portraits and other paintings.

Last summer when it was necessary to vacate the premises at 1801 S. Prairie Avenue, in view of the fact that in accordance with the by-laws, I, as secretary, am responsible for the property of the Chapter, I ordered all of the old files and this collection of portraits stored in a fireproof vault in Werner Bros.-Kennelly's warehouse at 2815 Broadway. The paintings and sculptures are wrapped in heavy paper and labeled, and a complete inventory is in my possession. The collection is insured in the amount of $3,000 with the Commercial Union Assurance Co., Ltd.

While the collection of portraits is in safer keeping than it has been for many years, it has the disadvantage of not being on view. It is the desire of the Executive Committee and a large number of Chapter members to find suitable quarters for the Chapter in which this collection could be properly hung. However, there are no definite plans for such a desirable project at present.

The portrait of Mr. Dwight H. Perkins has been removed from the storage company's vaults by Mr. Lawrence B. Perkins, and is at present hanging in his home. In accordance with the written request of Mr. I. K. Pond, shortly before his death, filed with the Chicago Chapter, the portrait of the Pond Brothers was forwarded to the University of Michigan permanently. All of the other portraits and sculptures in the collection, as well as the Columbian Exposition paintings, are accounted for in the Chapter's vault.

—George T. Senseney, Secretary Chicago Chapter, A. I. A.

Secret Room in Palace Baffles Archaeologists

British archaeologists digging out the ruins of a 3,700-year-old palace in Syria have encountered a mystery room. To date, the archaeologists have not solved the mystery.

Discoverer of the baffling scene is Sir Leonard Woolley, famous for his explorations at Ur of the Chaldees, and more recently director of British Museum excavations in North Syria.

Exploring a royal palace buried 25 feet under the soil at Atchana, ancient Alalakh, Sir Leonard found a flight of stairs leading to a basement level and barred at the foot by a low stone door. The door, cracked and broken, still could be turned on its hinges. Behind it lay enough evidence to conjure up thoughts of strange macabre doings in palace life of an ancient, unknown king.

Only the most enduring remnants of the secret are visible. In an oblong wooden box, collapsed, were packed four skeletons. In a corner of the room is a heap of ashes from a wood fire, and with it, bones of animals and some stone and clay vases.

Alalakh, scene of this palace mystery, is otherwise proving very enlightening to archaeological science. From its buried palaces, temples, statues, and pottery, seven stages of ancient history are coming to light, including much information about the little-known Hittite era. Alalakh in Syria was no provincial place. It had contact with civilizations of Egypt, Asia Minor, Mesopotamia, Cyprus, and Crete.

—Science News Letter

The Skyscraper and Unstable Land Values

Skyscrapers and their future would be of little popular interest were it not that a structure towering into the air has some dramatic appeal. For the most part they are built for investment and in that capacity have turned out to be pretty sour. Almost every big little city in the country has its once proud but now busted skyscraper. . . .

. . . But this will not signify that the ambition to make a 100 foot lot do the work of a city block has not been one of the causes of economic chaos.

A skyscraper may house 5,000 employees where 200 worked before. Lower Fifth Avenue in New York was on the way out as a shopping street until the thousands of garment workers who filled the street during lunch time were moved to Eighth Avenue. But only a tyro would blame congestion in the streets upon skyscrapers.

The New York Height of Buildings Commission in 1913 reported on the lower Manhattan situation where buildings were squeezing each other up into the air to get light. Their stems are as pallid as celery stalks, but their tops burst forth in the sunlight and make a great skyline. But the whole business had to be stopped if any were to survive. Three years later an ordinance resulted, which seems to have confirmed a place in the sun for skyscrapers, with reduced bulk for the upper floors. It was a great job, the best that could be done by zoning, which after all is only a police power regulation of a negative sort. The new order is a vast improvement but, when it comes to light and air, Rockefeller Center is a dungeon as compared with the Williamsburg houses for the under-privileged. There is little wonder that we have M. LeCorbusier's "Urbanisme" and other fantastic schemes poked at us.

But the case against skyscrapers in addition to their being poor investments is that the land owner who doesn't want one is stuck.

If this sort of laissez faire building operation of those to whom income is an annoyance is to go on, the day of far more rigid control over the load on the land is drawing closer.

It is not likely that there will be any more Rockefeller Centers in Manhattan because this one has skimmed all the cream that there will be for a generation. And any town large or small that would toy with the "Center" idea would do well to avoid the tragic error of erecting a building to vie with the 1925 skyscraper hotel in the nearby town.

The invention and continued improvement of the elevator made skyscrapers feasible. And commercial skyscrapers have contributed largely to the instability of urban land values. The elevator's successor for large scale production may be the escalator.

—H. T. Frost in Architectural Forum (February 1940)

Harry I. Dalsey, Chicago architect, died in Michael Reese Hospital on March 19 after an illness of three months. He was 49 years old. Born in Chicago, his schooling was in that city, including his studies at Armour Institute of Technology, where he graduated. He was architect of many apartment buildings and apartment hotels. Mr. Dalsey was a member of the Illinois Society of Architects since March, 1915.

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Edgar M. Newman, retired architect, died at his home in Chicago on March 5 after a long illness, age 76. Mr. Newman was born in Richmond, Indiana, and came to Chicago in his 21st year. He was employed in the office of Adler and Sullivan, architects, where he remained a number of years. He was an assistant in that office in developing the plans of the Chicago Auditorium Building.

On leaving Adler and Sullivan, he established his own practice. In his early years falls his service to the Chinese Government in the erection of their buildings in the World's Columbian Exposition, and work for the Foster Shoe Company. The Kranz retail candy store in State Street, Chicago, remodeled in the 1890's, was Mr. Newman's work. In his later years his practice was mostly residences and schools.

Mr. Newman became a member of the Illinois Society of Architects in 1899 and was its president for the year 1903.

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John E. Oldaker Pridmore, Chicago architect, died at his home February 1, age 75. Mr. Pridmore was born at Edgbaston, England, July 18, 1864. He was educated at Soho Park School and Greenhill College, Birmingham, England. He came to the United States in 1880 and settled in Chicago in 1883.

His practice as an architect was general. Among his works are the Chapel of St. John the Divine, University of Illinois; Austin Hospital, Chicago. He designed a number of large apartment houses. His work included churches and theaters. He was architect of Dr. Preston Bradley's Peoples Church. Among his theaters in Chicago may be mentioned one in Halsted St. north of 63rd, and the Cort Theater, razed, which stood in Dearborn St. south of Randolph.

Mr. Pridmore's membership in the Illinois Society of Architects dates back to December 1913. He was a member of long standing in the Chicago Chapter, A. I. A.