ASHTON HOUSE AND THE ENGINEER WHO BUILT IT

Marshall McKusick

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Iowa
State Historical Department

East 12th and Grand Avenue, Des Moines, Iowa 50319
(515) 281-5111

March 6, 1987

Dr. Marshall McKusick
820 Park Road
Iowa City, IA 52240

Dear Marshall:

The final nomination materials for the Ned Ashton National Register of Historic Places nomination are received. I have passed the final textual portion and the bibliography to the typing pool. The photos are excellent, however, you will perhaps note by reading the nomination instructions, that we will need two views of each print, one for our records, one for the National Park Service. Since you were so lavish with the number of photos, I would ask only for duplicates of Nos. 9, 11, 12, 13, 17, 18, 19, 21, 22, 23, 24, 25, 26 and 29. Perhaps you have already prepared these, if so then ignore these instructions! I would also like to have at least one color slide for the office records and for use at the Committee meeting.

We are all set. The property will be scheduled for the May 5 State Nominations Review Committee. I will officially advise you of this fact in mid-April.

Thanks for all the fine work, still on time as far as I'm concerned.

Yours truly,

James E. Jacobsen
National Register Coordinator

Nick notes

2627 Middle Road
Davenport, Iowa
March 8,1987

Joye and Mac
820 Park Road
Iowa City, Iowa

Re: Ashton House Epistle

Dear Joye and Mac,

1. Saturday, June 26,1948 Iowa City Press Citicizen - two large pictures - one of the house with roof - no windows - but siding one with Jane and Mother sawing, Dad supervising and Ruth trying to hit thumb with hammer. Story under pictures *add to page eight*

2. Page 47 - Minta Sterling death ~~1947~~
   Ruth Johnson Birth - 1933 *incorrectly stated 1934*

3. Page 48 -"Six Ashton Boys"-- Crapser is left out *Both "5" & "6" variations of story*

4. Page 56 - Description of the Neches River Bridge - Dad did design it at least made major contributions toward it's design - this is the bridge that he "turned upside down" somewhere in the middle of the design process as a unique solution to the problems of clearance for the bridge.

Typo errors that I found- or believe that I found

X 1. Page 4 5th paragraph - last word of 2nd line "s̲e̲tting*****? Setting ? *sitting correct*

X 2. Page 11 middle of 4th line down a̲n̲ error? *an correct*

3. Page 14 middle of 4th line from the bottom The<u>re</u>?

4. Page 19 middle of 5th line from the bottom where the<u>y</u>?

5. Page 24 - first line of last paragraph - ei~~ther one area~~ or one of the areas
   4th line of last paragraph wooden_plates *plates correct term*

6. Page 40 Last paragraph - 2nd line tor<u>e</u>

? 7. George was also the city engineer for the city of Milwaukee I think (page 50) 3rd line from bottom - and <u>it's</u> National
   And I am not at all sure that Dad was the First All American - I think it may have been Shepherd or Daniels - but it most certainly was not Irving Weber. Look at the dates and pictures on the back of the Field House Pool - Any that placed in the top three in National Competitior
   Dad told me he was first All American Swimmer at U.I.

8. Page ~~63~~ 52 - Last word of first paragraph - lessons
   " ~~63~~ 54 - first word of 16th line - federal
   61 - 16 lines from bottom - first word exercise
   63 - 7 lines from top - it <u>was</u> shortly
   64 - line 9 from top Ashton was ~~was~~
   66 - I thought that it was Edge<u>wood</u> twice on this page *Edgewater correct*
   69 - 8 lines from top - st<u>eel</u> (please??)

You mentioned on page 7 that there were no cracks in the Ashton House - and that this was a tribute to his engineering expertise. He was extremely proud of the City Park Pool for that very reason also. His design method and use of the prestressed concrete - and also the quality of the concrete. This technique is one of his major knowledges that have not been accepted and used today as it should. This was a continual source of irratation to him as he drove over every highway built. Cracks and the constant replacement and deterioation DO NOT NEED TO BE - Speaking to Air Entraining would not be wrong in this text - we spent hours removing the air in our concrete.

His unique ability to use the material most appropriate to the particular construction whether it be welded steel, aluminum or concrete caused him particular professional difficulty. Most engineers - and most construction companies used one OR the other - Dad often used BOTH in the same construction - note the 140 ft telescope. There was great competition between the various companies pushing for the use of their favorite material - and Dad set himself at odds against both groups instead of sidding with one of the groups.

The book was really fun for me to read - I shall share it with my boys. Thank you so much for doing the meticulous research that this work of art has had to be. It truely appears to have been a labor of Love.

Love ya,

Ruth

P.S. In reference to the foundation - footings - I remember several rains before the pouring of the foundations. I was just the right size to crawl down into the forms + scoop out the mud so that they would be on as firm a setting as was possible.

If you need a xerox of the newspaper I will take my scrap book apart - however my scrap book is really comming apart as it is + I really don't wish to destroy it totally at this time -

ASHTON HOUSE AND THE ENGINEER WHO BUILT IT

Marshall McKusick*

1. THE NATIONAL REGISTER OF HISTORIC PLACES.

This narrative provides background information for preparing the nomination of Ashton House to the National Register. It also may have some value as a preliminary introduction to published and unpublished sources of information.

2. SIGNIFICANCE OF ASHTON HOUSE

The family's preferred designation is Ashton House without E. L. Ashton's initials. A convenient date for the house is the inscription "Ashtons 1947;" it was impressed with rope during the pouring of the huge reinforced concrete lintel beam above the garage on the east facade. This date is ten years shy of the usual minimum age required of properties nominated to the National Register under the proceedural fifty-year rule. This issue has been considered by others during initial screening of materials in the Office of Historic Preservation, State Department of History, Des Moines, where it was suggested that the nomination process be continued under special exceptions. The basis for the exception lies in the singular importance of Edward (Ned) Lowell Ashton (1903-1985) in the history of large scale engineering projects, the significant gift by his heirs of his extensive professional papers to the State Department of History, Historical Society Division, and the importance of Ashton House in his professional and personal life as his engineering headquarters and workshop in Iowa City.

Because of the fifty-year rule exception, this narrative goes beyond a detailed discussion of Ashton House and considers the engineering career of its builder since that information must be summarized in the nomination. However, it may be emphasized, Ashton House is likely to survive as one of Ned Ashton's most unique engineering achievements. Already locally considered as a landmark, the great stone house with its cantilevered turret and outside stairways reflects

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*Completed December 1986. Author's background: Ph.D. Yale 1960, State Archaeologist of Iowa 1960-1975, associate professor of anthropology 1975-present, University of Iowa. Married Joye Ashton McKusick 1982.

the bridge designs of its builder. Overlooking the Iowa River, the house incorporates Ashton's engineering skills combined with his aesthetic sense of setting and use of native materials.

3. PROFESSOR JAMES C. HIPPEN'S REVIEW

Because of its importance to the nomination review process, the recommendation by Professor Hippen of Luther College, Decorah, is cited here in its entirety:

> "The Edward L. Ashton house in Iowa City seems to be a very good candidate for nomination to the Register. The house is intimately bound up with the career of Ned Ashton, who, in all likelihood was the most distinguished bridge engineer in the history of Iowa. Since the house was designed by Ashton, it embodies in a meaningful way his career and his Iowa esthetic.
>
> His career as a bridge and structural engineer shows through in the reinforced concrete beam construction of the frame which incorporates such sophisticated elements as spiral concrete stairs and a cantilevered bay window. The very siting of the house, with a river view, was a constant reminder of one of his chief professional concerns; the bridging of great rivers. The lower floor of the house was designed for and served as his workroom.
>
> Ashton's embodiement of the Iowa esthetic can be seen in the use of local Stone City rock for wall facing, in the siting already mentioned, and in what could be called "Prairie School" elements in the design.
>
> On both counts I feel that the house is of great significance. Ned Ashton was not only a great engineer, but he had a strong sense of history. His historical plaque on the 12th Ave. bridge in Cedar Rapids is a testimony to this. Both his brothers were also engineers, and the family has made a highly significant donation of his papers to the Historical Society. It is rare that person, house, career all come so neatly together. The additional circumstance that the present owner is supporting the nomination is an opportunity that should not be missed.
>
> (November 8, 1986 letter from James Campbell Hippen to Dr. Lowell Soike, Iowa State Historical Department)

4. PRELIMINARY DOCUMENTATION OF THE REVIEW

Published and unpublished sources of information support Professor Hippen's review. Among Ned Ashton's accomplishments were designs or engineering supervision for 20 huge river spans including the bridges from Natchez, Mississippi, north to Dubuque, Iowa. The bridges frequently employed innovative solutions to unique problems. Elsewhere his Benton Street bridge, Iowa City, employed fabrication by all-steel-welded construction, among the first known uses of this technique which subsequently became an industrial standard. His experimental Clive Street bridge, Des Moines, was heralded as the world's first example of welded aluminum girder bridge construction: it marked the transition from the exclusive use of steel in bridge construction. Ashton's antenna designs for the Office of Naval Research and the National Science Foundation took many forms. His most famous example is the 140 foot radio telescope at the National Observatory, Green Bank, West Virginia, where he is listed as the conceptual engineer. This telescope employed advances in structural engineering which were subsequently followed in large, equatorially mounted instruments. Elsewhere he salvaged older bridges with aesthetic value, examples exemplified by his award winning and nationally publicized reconstruction of the Cedar Rapids concrete spandrel bridges which set a precedent still followed by engineers, most recently 1985-6 with the reconstruction of Iowa City spandrel bridges.

These accomplishments by Ned Ashton in structural engineering are completely documented by plans, specifications, calculations, correspondence, photographs, and engineering publications which comprise the Ashton Papers at the State Historical Society. Coroboration of these achievements in independently documented in publications written by others about Ashton's engineering career and projects.

5. ASHTON HOUSE SOURCES OF INFORMATION

The primary and most important source on Ashton House consists of unpublished plans and drawings by Ned Ashton. These have been brought together and photocopied at original scale by <u>Technigraphics</u> of Iowa City in the fall of 1986. This folio, <u>Ashton House Survey and Plans 1945-1986</u> accompanies this narrative and is an integral part of it. Each of these sheets is discussed individually in subsequent sections and the index (Table 5.1) is presented here for convenience of reference.

1. Stan Haring watercolor sketch of the west facade 1986
2. Ashton Tract plat and title descriptions 1986
3. Ashton Tract plan 1986
4. Ground floor plan 1986

Original Ned L. Ashton Drawings

5. Ashton Tract original survey 1945
6. Survey blueprint copy, F.H.A. 1946
7. Survey of Tract additions 1952
8. Foundation blueprint copy, F.H.A. 1946
9. Foundation plan with notes 1946-7
10. Concrete framing blueprint copy, F.H.A. 1946
11. Main floor blueprint copy, F.H.A. 1946
12. Concrete framing combining main floor plan with notes 1946-7
13. Concrete framing combining main floor plan as corrected 1947-8
14. Cross section, medial ca. 1948
15. Roof rafter plan ca. 1948
16. Preliminary floor plan ca. 1945
17. Preliminary SE elevation ca. 1945-6
18. Advanced preliminary SE elevation ca. 1945-6
19. Preliminary final SE and SW elevations blueprint copy F.H.A. 1946

TABLE 5.1 ASHTON HOUSE SURVEY AND PLANS 1945 to 1986. Index of folio drawings accompanying narrative report.

In addition to the plans there are other sources of information. Ashton House presented a very considerable engineering challenge because of the softness of the flood plain site and the great weight of the structure. Not only was the structure heavy, but it was complex; it was bound together with a web of reinforced concrete footings, columns, and main floor support beams. Additionally, the exterior stone veneer faced over interior block masonry added immense weight and stresses to the perimeter footings laid out in sandy soil which did not provide uniform resistence. The design required complex calculations and these survive on 73 pages of calculation sheets and notes and include drawings. Each of the beams carried a different load and this was calculated individually (Ashton 1945-6 Ms. house calculations). As one example of the factors to be considered, Ashton projected the weight of the chimney column to be 65 tons, illustrating the unique and non-residential type of construction. It may be added that these calculations were eminently successful as is illustrated by the uniform distribution of stresses -- there is not a single crack seen today in any of the foundations, walls, beams, or masonry.

Ashton also kept a strict accounting of material and labor costs throughout the construction period, treating his house as another engineering project. He later stated his conclusion that the entire house together with the original Ashton Tract cost only $16,000. (personal communication). His file of paid bills on the house seems incomplete (Ashton Ms. 1946-50 house receipts), but there is no reason to doubt the low cost of the huge project. Except for later interior finishing work and installation of utilities, Ashton did most of labor himself aided by his wife Gladys, his two older daughers, and students. The concrete was made in a small electric mixer using water from a hand pump west of the house. Much of the lumber was war surplus packing crates and he bought Stone City quarry rock in bulk which he hand split over a railroad rail and then faced with a rock hammer. He laid out the electrical conduit in the forms before his concrete pours of a wheelbarrow at a time. The construction of his house was a private saga of personal strength combined with engineering skill; an undergraduate champion swimmer, Ashton maintained his personal fitness and had enormous endurance and physical strength during his forties when he created Ashton House out of bulk materials, second-hand lumber, and reused nails.

Other unpublished documentary material is the very incomplete photographic file taken during construction (Ashton House photographs and negatives 1946-1955). His later professional engineering projects documented each set of reinforcing rods and individual concrete pours to demonstrate that contractual specifications were followed; this procedure was followed because in his professional life he had frequently encountered inferior construction due to inadequate project supervision. His detailed project photographs accompany his engineering records (Ashton Papers, Historical Society). Building Ashton House himself, he saw no need for a continuous photographic record, although his set of annotated plans note all contstruction deviations from the working drawings. The result was that the house construction photographs are merely snapshots and often of poor quality. It is hoped that additional photographs will be found when the Ashton Papers are organized at the Historical Society.

Ashton House was locally considered a seven-day wonder during initial construction because of the unusual concrete framework. For this reason it is surprising that little was published about the house. The first article to appear was in the Iowa City Press Citizen, 1949, where the society editor wrote a quaint fable which told of the Ashton womenfolk building the house while the engineer performed the necessary slide rule calculations and installed the Clinton marble fireplace. A more complete and accurate story was published in the 1955 University of Iowa Staff Magazine. Some information also appears in the Alumni Review 1958, which is the most significant source on Ashton's career. All three publications are reproduced at the end of this narrative. Since the house was not a professional project, nothing about it is known to have appeared in any engineering journal. Finally, the Curtis Woodwork Style Book, 1946, provides descriptions of all of the catalogue birch millwork, framing, windows, and interior doors used in Ashton House. The three sets of exterior french doors and their storm doors were also Curtis millwork, but the source of the four single outside doors was a local yard.

In summary of sources, published descriptions and photographs by themeselves are inadequate, but there is a very complete and unique unpublished record including calculations, receipts, house plans, annotated design changes, and construction notes, all providing a wealth of detail. Not considered here are the family anecdotes of the epic house construction. In 1946 the oldest daughter Joye was 17 years old who became skilled in laying reinforcement rods, although she spent her summers in Colorado because of asthma attacks. Both she and her younger sister Ruth, then aged 12, made concrete to Ned's specifications in the mixer. Joye remembers that the girls were set to work pulling out crate nails which their father straightened for reuse in construction.* Ned's wife Gladys put in long hours, but the youngest daughter Jane was 8 in 1946 and too young to be of assistance. By the time she was 11 years old, she too was helping lay the garage cement floor, and put her name and the July 1949 date in the wet concrete near the west wall.

6. ARTIST DRAWINGS OF ASHTON HOUSE

The cantilevered circular stairway was completed in December of 1954 despite difficulties with freezing weather and this was the last major addition to the house facade. Shortly after this addition, a family friend, Mildred Pelzer, gave the Ashtons a present, her pen and ink sketch of the house. This drawing was transfered to a copper plate and used to print family note stationary. Mildred Pelzer, wife of a long-time history professor, painted the murals during the 1930s in the Hotel Jefferson lobby in downtown Iowa City among other local work. Her sketch of the Ashton House west facade has artistic merit and attempts to portray the unique river setting with the canoe on the bank, but it is not an accurate perspective view (page 10).

Sheet 1. Stan Haring watercolor sketch of the west facade. Turning now to plan folio, Stan Haring is a well known contemporary Iowa City artist who specializes in local landscapes and buildings; he achieves realism and perspective accuracy by working from projected colored slides. In the fall of 1986 we commissioned him to draw the west facade of Ashton House, reproduced here in black and white. This reproduction does not do justice to the colors and detail of the original, but is included to suppliment the perspective views drawn by Ned Ashton of the southeast and southwest facades (Sheet 19 folio).

7. ASHTON TRACT SURVEYS

The term Ashton Tract is used for convenience because it does not appear in the deed or other courthouse records. Its only written occurrence is on the 1945 survey title "Description of the Edward (Ned) Lowell Ashton and Gladys Brooker Ashton Tract" (Sheets 5 and 6 folio). Prior land use history is contained in the Title Abstract to this Ashton property. Other information comes from surveys and family observations.

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*The girls used wrecking bars and nail pullers to dismantle the crates used for the house lumber (Sect. 9 p. 14), but also salvaged the bent nails for reuse.

FIGURE 6.1. ASHTON HOUSE WEST FACADE BY MILDRED PELZER, CA. 1955.

Sheet 2.Ashton Tract Plat and Title Descriptions 1986 shows the location of the tract in relation to surrounding subdivisions. The plat reproduced from copies in the University of Iowa Map Collection is not strictly up to date and in error locates the section line in the center of Park Road. This section line forms the south boundary of the Ashton Tract and is actually a line parallel to Park Road lying 16 feet north of the Park Road curb. The section corner from which the title description to the Ashton Tract is measured is located on the east sidwalk of Normandy Drive. It is an iron stake showing in the sidewalk and situated some 17 feet north of the Park Road curb. The Ashton Tract boundaries described in Exhibet A accompanied the Court Officer's Deed transfering the property to Joye Ashton McKusick from the Executor of Ned Ashton's Estate and is the complete legal description. The 1985 survey shown on this sheet pertains to the contract sale of the north acre of the tract to a granddaughter and her husband, Deborah and Keith Germann, a title transfer which took place shortly before Ned Ashton's death in December 1985.

Sheet 3. Ashton Tract Plan 1986 shows modern boundaries of the tract following the 1986 estate transfer of title. It is not a new survey but is based upon older survey information. On this plan a lot is designated to accompany Ashton House should the tract be subdivided in future years.

Because of the length and complexity of the title description of the property the nomination should use an abbreviated form, and the following description is suggested:

> The Ashton House and designated lot of 0.91 acres as shown on the map, and situated in the presently unsubdivided Ashton Tract which is irregular in shape and bounded in part by Park Road, Normandy Drive, the Iowa River, and four residential lots belonging to other owners, and situated within the northwest part of Iowa City in Johnson County, Iowa.

It should be noted that current ordinances require all lots to have minimum frontage access upon a paved street, and depending upon interpretation this regulation would require either a 35 foot or 60 foot wide access lane to the house lot. In event of subdivision this access would run 200 feet adding either 7,000 or 12,000 square feet to the designated lot. Zoning regulations also would require a Large Scale Subdivision to break up the Ashton Tract and this process involves considerable expense. The present owner of the Ashton Tract has no plans for the sale of the property. Nevertheless, eventual sale and subdivision seems to be fairly certain and requires planning in the nomination process. The reason for eventual sale of property can be explained by the real estate appraisal which formed the basis of title transfer valuation in 1986. Specifically, the Ashton House as located on an unspecified riverfront lot was appraised at $90,000. and the value of "excess land" was appraised at $90,000., a net figure after expenses of subdivision. With the rising value of river frontage accompanied by rising property taxes, it may reach a point where either the current owner or a subsequent one is no longer able to hold the tract together.*

8. THE ORIGINAL ASHTON TRACT

Sheet 5. Ashton Tract Original Survey 1945. This blueprint has the impressed seal of B.J. Lambert, although it was drawn and co-signed by Ned Ashton. In explanation, Ashton taught various civil engineering courses including surveying in his first years as a faculty member. It was therefore a sore point with him for the rest of his life that his application to become a registered surveyor was rejected by the Board of Surveyors. He explained it as a restriction of membership to keep business among those employed. To make his survey of the Ashton Tract official, he had his mentor and colleague, Professor Lambert, sign and stamp several blueprint copies, and two stamped copies have survived.

The Ashton family settled in Iowa City in the late summer of 1943 and soon decided to plan a permanent home on the Iowa River to be built after the war. In this context it is interesting to see the hand-written marginal note on Sheet 5 that on January 14, 1944 Ashton spiked four trees to measure the river level at a stage of 13.4 feet. There was not very much river frontage for residential construction in Iowa City and all of it lay upstream from City Park on the low flood plain on both sides of the Iowa River. He was obviously measuring the site prior to bidding for its purchase, making certain is would be a suitable place for a home.

As a hyraulic engineer, Ashton knew that the U.S. Corps of Engineers had planned Coralville Reservoir in the 1930s and when built after the war it would stabilize the Iowa River. The Reservoir was common knowledge. He obtained specific information

*Since the above was written, a decision has been made to sell the Park Road frontage except for the driveway, leaving approximately 50 feet between the house and south lot line. The survey is not yet available (March 1 1987), but the lot size with Ashton House is larger than planned (Sheet 3), and needs to be redrawn.

from his younger brother, Bill Ashton, with the Army Corps of Engineers at Rock Island. But he took his own measurements using the footbridge level: while in graduate school he worked part time checking local guage stations.

Ashton used this particular blueprint to plan landscaping, adding 100 and 200 foot squares to plot existing trees which he identified by species. Although classified as farmland just outside the then existing city limits, the land had been out of production for some years evidenced by tree growth. In 1945 Ashton had not yet finalized the shape or exact location of the house as is indicated by his penciled trial positions of rectangular shape. There is another copy of the blueprint with Lambert's stamp which he subsequently used to plot the final house form and location; it is not included in the folio.

Sheet 6. Survey Blueprint Copy F.H.A. 1946 is from the original survey velum master now lost. He added the final house plan as shown, deriving its shape and location from the intermediate copy described above. The Federal Housing Administration was in Des Moines according to a memorandum in Ashton's notes, and agency approval for new construction was apparently required immediately after the war. Five blueprints bound together as a set were sent and stamped "Received July 1, 1946" before being returned. This set appears as Sheets 6,8,10,11,19 and are separated in the folio for purposes of discussion. This set of F.H.A. plans is significant because it represents the only unaltered group and illustrates the house prior to alterations in design made during construction. On this plan the house is titled "1 St.Stone House" indicating to the F.H.A that it was a single story of conventional design, although a perceptive plan reader whould have wondered about the immense concrete footings and beams beneath the main floor. No immediate plans were made for the ground floor level and no windows for it are shown on the elevation views (Sheets 17,18,19). The Ashtons sold their Kansas City home in 1946 on contract, receiving $6,000. in payment and this money together with savings from income bought the land and materials for the house and there was no loan from the F.H.A. or local bank. The house sale receipt is with the paid bills.

Sheet 7. Survey of Tract Additions 1952 drawn by Ned Ashton on velum for blueprint reproduction. It shows the final additions to the Normandy Drive frontage giving the tract its maximum extent of 330 feet along that street and continuing west to the Iowa River. The lot roughly outlined in ink on Normandy Drive is part of the tract. The proposed subdivision and Gould Street extension shown east of Normandy Drive never occurred. Instead, another developer laid out Park View Terrace with a different street pattern and isolated the first developer's land, making it worthless. There is some correspondence and many family stories about Ashton's repeated protests over grade changes and other matters during the later development, but none of it is relevant here.

9. FOUNDATIONS AND COLUMNS

Foundation construction began immediately after the war, in the summer of 1946, perhaps even before the F.H.A. gave its building consent. The Ashtons already had put down a sand point for a hand pump which provided water for the Victory Garden. This pump is on the bank just west of the house: it provided the water for concrete. An electrical line was set up to run a small mixer. One problem was obtaining boards for concrete forms and general construction and the following story describes Ashton's solution:

> "The Ashtons started their home in 1946 when lumber was harder to get than University parking lot permits, but through an engineer friend Ashton heard of a company which was disposing of surplus wooden crates in which tanks were packed during World War II. Ashton had several of the giant 27-foot wooden crates hauled to his four-acre plot along the Iowa River, then pulled them off the trucks by chaining the crates to a tree and driving the trucks forward. From this lumber he first built the forms to pour concrete for the foundation and main floor of the house, and later the Ashtons used the lumber to build the wooden portions of the house itself. (University of Iowa Staff Magazine 1955: 9-10)

The story Ned himself told was better. He estimated that he would require a great deal of lumber and his engineering friend had successfully bid on hundreds of thousands of board feet nailed together in army tank shipping crates. Ashton bought a share and the crates were flattened in Rock Island and it required two railroad flat cars to bring them to the train yards in Iowa City. They were transfered by truck to his building site and hauled off by a chain as described. Almost immediately his engineer friend phoned to say that the army had recalled the crates to sell to another bidder, but by then the lumber was secure in Ned's yard. The was so much lumber brought in on the two flat cars that it was used liberally. A few interior walls of Ashton House have diagonal boards nailed to the studding in the same way as the outside walls. This is shown by the sketches drawn by Ashton of the interior framing (pages 27 & 31), and I encountered diagonal siding under the plaster when cutting through the interior north bathroom wall while helping to lay new copper pipe in 1986. The packing crates were boards of high quality and well seasoned and were repeated reused during construction. However, studding was also needed and the house receipts show that this was purchased for framing in the main floor and laying up the roof rafters.

There seems to have been no earth moving equipment used to excavate the footing trenches, but some bills indicate he may have contracted to have the ground floor level excavated into the south bank. Joye remembers her father working with shovel and wheelbarrow, dumping the fill over the west bank to extend the pateo area.

Sheet 8. Foundation Blueprint Copy, F.H.A. 1946 shows the three distinct parts of the foundation; footings, foundation walls, and support columns for the main floor beams. All of this was calculated in terms of stresses and weights.

Sheet 9. Foundation Plan with Notes illustrates some of the problems with the original plan. Ashton told the story that when the footing trench was laid out around the northwest corner he was very disappointed to find that the ground was soft and he doubted that the footings would be strong enough to hold the cantilevered turret. His solution was driving rock into the soft ground until it stabilized and no more could be driven in with his maul. Comparing Sheets 8 and 9 shows that he also enlarged the reinforced concrete footings at this corner. He also found soft ground where the footing supported the pillar for the huge lintel beam over the garage door, the only area in the foundation where the perimeter footing is not continuous. This footing is also shown as enlarged on his plan. The soil pipe leading to the septic tank was laid as shown. The reinforcement rods laid in the foundation and footings are shown in this drawing. As seen in more detail in his calculations this was 3/4 and 7/8th inch rod.

Reinforcing rod was used wherever Ashton poured concrete, a carryover from engineering practice. As one example, reinforcing rod was laid on the ground floor before the concrete was poured, and the positioning of this looped rod is partially shown; it appears more clearly on the original than on this copy. As another example, a picture shows reinforcing rod laid before the driveway was poured.

The perimeter footing plan shows variations in width from one wall to the next, reflecting structural calculations of load distribution. Lack of internal house supports put all the weight on the perimeter footings. This design seemingly was conceived to eliminate a problem if central supports settled. In a traditional house central supports can be jacked without much damage; in a concrete house central support weakness through subsidence would flaw and crack the main floor, causing problems difficult to remedy. For this reason Ashton designed huge beams to carry the loads to perimeter columns and their footings.

The design required accurate calculations because all foundations settle to some extent and the problem was to ensure even settling throughout the perimeter. "Design of Footings" from Ashton's 1946 Ms. house calculations file is one of a group of sheets and illustrated on page 17 by way of example. From this single page one notes that Ashton calculated such factors as roof load and truss reactions, earth pressure, as well as dead load weight of stone, masonry, main floor columns, and footings. These factors all entered into the final design. As another example, his calculation page "Reinforcing steel continued" is shown on page 18 because it illustrates the calculations required to design the columns, here reinforced with four 3/4th inch vertical rods. These and other calculations were needed to build the concrete structure on soft ground and the problem was not unlike that encountered when building small bridge footings which he commonly did in his professional practice. It is not necessary to say that this is not residential construction where lighter loads seldom require a structural engineer. These representative calculations and others correctly predicted the loads and it should be emphasized that the integral footing-wall-column-beam system Ashton designed has remained solid and undamaged after 40 years.

The footings, although continuous, varied in depth according to location. On the south bank side they did not need to be deep since they were already well below frost line, but where the outside ground level is equal to the floor, particularly on the north around the garage, the footings are deeper. The differential in footing depth from west to east is indicated on the medial cross section (Sheet 14). The footing design called for 12 inch footings, but the medial cross section suggests they were built somewhat thicker, some 16 to 18 inches thick because of ground conditions softer than originally estimated in the calculations. The base walls of reinforced concrete were built wide at 16 inches to carry the outer masonry and its facing inner block wall. These base walls, made integral with the footings, provided horizontal

E.I—25M—4-42—IND. PTG. CO.

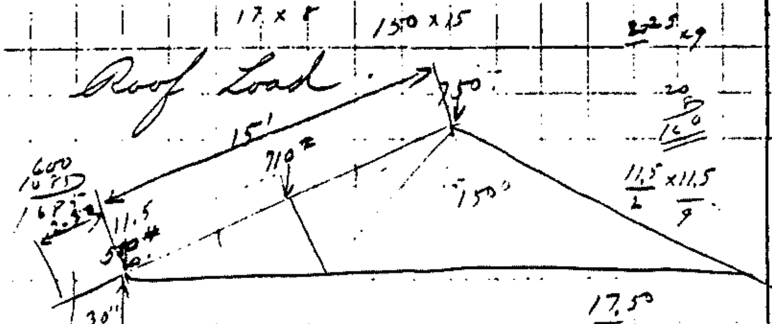
COMPUTATION SHEET

ENGINEERS — **THE AUSTIN COMPANY** — BUILDERS

THE AUSTIN METHOD

Listed by	Owner N. L. Alton	Est. No.
Checked by	Location Design of Footings.	Sheet 9-G of
Cont. No.		Date

Roof Load



Roof truss Reactions — 8'-9" c to c.

	D.L.	15# Wind	25# L.L.
Roof.	1700#	2300	3800
Wall, 8.5' x 8.75'			
74.5 sf. x 82# =	6100#	—	—
Wall @ 10#	750#	—	—
Above 1st fl.	8,550#		
1st fl. =	9,130#		11400#
	17,680#		15200
Col. = .75 x 1 x 8.5 x 150 =	950#		
Wall = 1.33 x 9.5 x 8.75 = 111 cf x 165 =	18 250#		
	36,880#		

	R1 High side	R2 Low side
D.L. Moment	+ 17500 '#	+ 17500 '#
Earth Press. =	− 10600 '#	+ 3825 '#
	+ 6900 '#	+ 21,325 '#

$fd = \frac{43\,000\#}{2.33 \times 8.75} = 2100\ \#/\square' = 15\ \#/\square''$ (144)

ecc. $= \frac{6900}{45000} = .15' = 1.84'' = 2''$

$\frac{21{,}325}{43\,000} = .495' = 5.9'' = 6''$

C.G. of Dead load from outside face of 16 inch wall.

6" Stone	6100# x 3.5" =		21 300
Wall & Roof	2450# x 9.5 =		23 300
1st floor	9130 x 13.5" =		123,200
Col.	950 x 13.5 =		12,800
Wall	18 250 x 8" =		146,000
	36,880		326 600

cg = 8.85"

Earth.

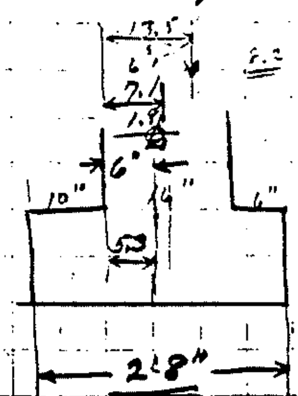
6.5 x .8 x 8.75 @ 110# = 5000# x −5 = 25000

41,880# — 301,600

Footing 2.67 x 8.75 = 23.4 x 150 = 3500# x +6 = 21 000

45,370 — 322,600 "#

cg = 7.1"



D.L. = $fd = \frac{45400}{23.4} = 1940$

2590
1370
1220

L.L. $fd = \frac{15200}{23.4} = 650\ \#/\square$

$fb = \frac{14200\ '\# \times 6}{8.75 \times 2.67^2} = \pm 1370\ \#/\square$

+ 22000 '#.

$+11{,}400 \times \frac{8.2}{12} = -7800$

14,200

+ 3960 #/□

+ 1220 #/□

27 #/□" pressure

E-1—25M—4-42—ING. PTG. CO.

THE AUSTIN METHOD

COMPUTATION SHEET

THE AUSTIN COMPANY

ENGINEERS — BUILDERS

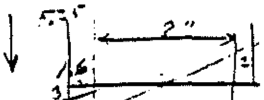
Listed by	Owner: N. L. Ashton Residence	Est. No.
Checked by		Sheet: 9-H of
Cont. No.	Location: Reinf. Steel Continued.	Date: May 9, 1946.

Reinf. for vertical Col.
South end under Front Porch.

At top of footing.

	Direct Load.	Moment.
Wall & Roof.	2450	
1st. Fl.	9130	+ 17500'#
Col.	950	
	+ 12530	31700
Earth P.	− 154 #	− 10600'#
Live Load.	15200 #	+ 14200'#
	27576 #	21100'#

e = .77' = 9.25"
½ d = 6.50
3.25



F = 27576 × 4.8 / 8 = 16600 + 27576 = 44,110

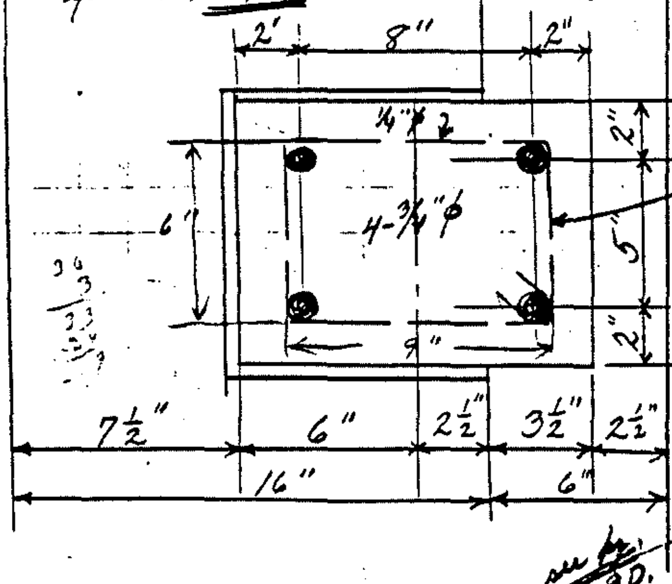
$f_c = \frac{2 \times 44100}{9 \times 5} = 1960$ #/□"

1960 − 2440 = 3730

18700; 2-¾"φ = .88; 18,900#/□"

$Rd = \frac{1960}{4090} \times 10 = 4.4"$

Use 4 - ¾"φ vertical Column bars

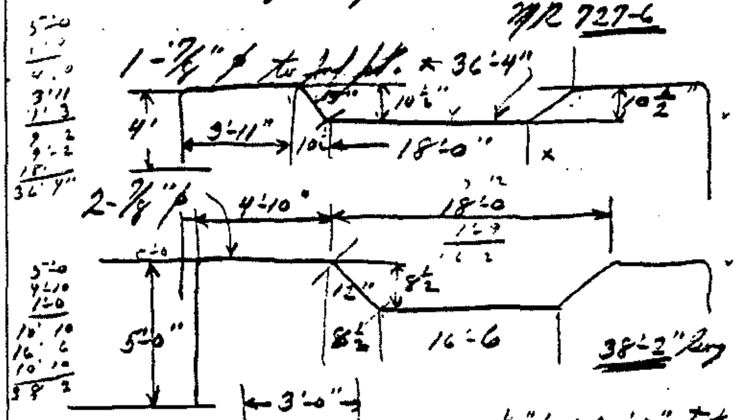


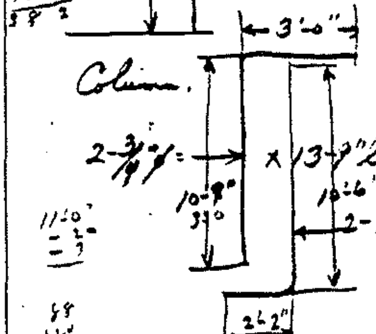
Details of Reinf. bars for beam under Porch + Living Room.

Length. Beam. 29'-3"
−2 × 7½" = − 1'-3"
28'-0" o. to o. ✓

Use 2-⅞"φ full length bottom × 27'-6" str't.

N/R 727-6





Wt. of Steel.

1 Column:	2-¾"φ × 12'-8" × 1.5# =	38 #
	2-¾"φ × 13'-9" × 1.5 =	41 #
	Stirrups 10 ¼"φ × 2'-9" @ .16#	5 #
		84 #

.46 #6.30/col

Beam Steel.

✓ 2-⅞"φ × 27'-6	@ 2.04 # =	112 #
✓ 2- " × 38'-2"	" =	156
✓ 1 " × 36-4"	" =	74
2-½"φ × 20-	.67 # =	27 #
⅜" Stirrups: ⅜"φ × 3'-4"	@ .38 # =	29 #
20" × 1.5		30
		428 #

@ 7½¢ = $32/beam

see pg. 90.

stiffening. When one looks closely at the foundation the line of this support wall and the beginning of the masonry is seen where the outside dirt has settled. It is also seen by the east entry to the ground floor.

10. MAIN FLOOR CONCRETE BEAMS

Large beams tied the columns together. One set paralleled the perimeter footings and supported the concrete floor and wooden framing above it on the main floor. Since the exterior masonry continues from the ground floor without a break upwards to the eave line, its entire weight is separate from the beam structure as well as non-supporting to the floor. The entire masonry wall, two storys on the west facade, is carried on the foundation wall-footings unit. This same foundation unit, on the inside, carries the column, beam, and concrete structure. In the calculations Ashton considered the masonry weight on the footings as "outward pressure" and I presume that he was concerned that the walls might tend to settle outwards or inwards depending upon placement of foundation loads. The beam design seems to have tied the structure together sufficiently to keep the walls true and no sign of wall tilt is evident. The upright columns were made integral with the reinforced concrete beams which support the main floor and roof loads. It is shown in Ashtons calculations for one beam, the diagonal one underlying the division between the living room and dining areas on the main floor. This diagonal beam example is shown on the next two pages (20,21) which calculates loads and earth pressure for the integral beam-column unit. The drawing of this beam on page 21 shows the factors considered in the calculations.

It may be said that Ashton did not just figure the loads on one beam and use it for an estimate of loads for all of the others. The diagonal beam shown is presented as an example. The calculations were made individually for each beam in the notes, and the beams carried different loads because of the complexity of house design although he cast them to a uniform shape.* The beam design represents a complex form, thickened on the outside where more load occurs, and the columns too are thickened where the meet the beams. The aesthetic effect is striking when viewing the brown painted beams from the ground floor. Cast in wood forms, the beams retain a wood texture and look like old Tudor woodwork. It takes a close look to see that these beams are in fact concrete.

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*On close inspection main beams carrying less weight are an inch or two thinner than those calculated to bear heavier loads; all have the same shape.

COMPUTATION SHEET

ENGINEERS — THE AUSTIN COMPANY — BUILDERS

Listed by
Checked by
Cont. No.
Owner: N. L. Ashton Residence.
Location
Est. No.
Sheet of
Date: May 30, 1946.

Diagonal Beam.

D.L. Moments. Due to load of Chimney $\frac{Wl}{2}$

35000 × 1.87' = +65500 1#s × 37.5 = +2,460,000

$\frac{P}{A} = \frac{2460000}{311} = -7900$ 1#s.

$H = -\frac{+2460000 \times -2.85}{3460} = +2020$ #

$V = -\frac{+2460000 \times +16.0}{31600} = \downarrow 1250$ # ↑ R_2

R, base	Cor.	4'-6'	℄	Bm.	Cor.	R_2 Base
0	0	0	0	0	+65.5	+65.5
-7.9	-7.9	-7.9	-7.9	-7.9	-7.9	-7.9
-15.4	+4.9	+4.9	+4.9	+4.9	+4.9	-15.4
+13.8	+13.8	+8.1	-3.1	-14.3	-20.0	-20.0
-9.5	+10.8	+5.1	-6.1	-17.3	-23.0 bm. +42.5 cl.	+22.2

→ 35000# Stone Chimney ↗

+19.0	-27.0	-4.1	+19.7	+.3	-40.0	+6.0
9.5	-16.2	+1.0	+13.6	-17.	-63.0 b. +2.5 cl.	+28.2

	R_1	H	R_2 L	R_2	R_2 R.
D.L.	6030#	4600	8500	9000	
Chimney	1730	2020	1730	35000	35,000
L.	-480		+480	1730	
Chim.	-1250		+1250		
L.	↑ 4300	→2580	10230	45,730#	35,000#
75#LL	9240	→7650	14900	↑15,800	
	13,540	10230	25,130	61,530	

L.L. Moments + 1844 / 9400

+31.6	-45.0	-6.8	+32.7	+.5	-66.6	+10.0
+41.1	-61.2	-5.8	+46.3	-16.5	-129.6	
					-64.1	+38.2
-5.3	+1.9		-1.2		-4.3	+7.0
					-133.9	+45.2
					∠ 68.4	

75#/□' Live Load.

R_1 = 10'270#

-900			
9370	× 4.5'	=	42 200
-1810			
7560	× .92	=	6960
1150			49,160
6410	× 5.08	=	32 600
1540			81,760 1#s
4870	× 1.38 =		6730
5200			+88,490 1#s
-330	× 3.39 =		1410
-1360			+87,380 1#s
-1690	× 1.23 =		-2080
-1810			+85,300 1#s.
-3500	× -6.0 =		-21 000
9800			+64,300
13300	× 4.5 =		-60,000

Use $\frac{88500}{53230}$ × D.L. = 1.66 ×

Earth Pressure.

$\frac{P}{A} = \frac{658500}{311} = +2120$ 1#s.

$H = \frac{3927000 \times}{3460} = 1130$ # @ R_2 ← (1970, 840)

$V = \frac{658500 \times 11}{31600} = 230$ # ↑ R_2

R, base	Cor.	℄	Cor.	R_2 base
-18,500	0	0	0	0
+2,120	+2.1	+2.1	+2.1	+2.1
H_y +8.6	-2.7	-2.7	-2.7	+8.6
V_x = +2.5	+2.5	-.6	-3.7	-3.7
-5.3	+1.9	-1.2	-4.3	+7.0

Other notes in the calculations series consider concrete yardage and reinforcing rods, and Ashton kept a running estimate of yardage and pour dates on his working plans (Sheets 9, 13). There are numerous small plan sections for various purposes. Most of this calculation series date from late spring, May and early June of 1946 when the plans were already completed. This whole series of notes suggests he was making mathematical tests of each part of the structure for soundness before the pours.

Sheet 10. Concrete framing blueprint copy, F.H.A. 1946 shows the the beam support structural pattern supporting the main floor and roof. The main beams had four reinforcement rods of thick 7/8th inch steel tied with 1/2 inch rod and stirups. Joye laid some of this rod and states two parallel rods were set near the bottom and two by the upper edge of the beams. In the summer of 1986 I spent hours drilling holes through the center of one beam when laying new copper plumbing and missed the reinforcing rods by following Joye's directions. The workmen with me commented that the beams and columns were made of the densest concrete they had ever encountered. It is a drill breaker. One calculation sheet estimates the steel weight in one main concrete beam at 428 pounds and at 7.5 cents a pound costing about $32.50. The concrete floor poured over the beams was reinforced with wire mesh. Where holes have been cut through the floor for utilities , the thickness can be seen and it is only 3 inches thick or less. While not thick is has been adequate and nowhere has cracked or broken away. While of good quality, the floor concrete is fairly easy to drill and lacks the extreme density of the beams and columns.

The concrete work became quite a trial for both Ned Ashton and for his family who helned him with it. He originally contracted with the Horrabin Concrete Co. to have mixed concrete delivered for continuous pours. He told me the family story that the deliveries were made and the north footings were set up in his forms. The huge chimney column with both a downstairs and main floor fireplace was an important place to have a continuous pour. Unexpectedly, in the middle of the work trucks stopped coming. After waiting around he checked with Readymix and learned that union had deliberately blocked the project at a most inconvenient time because Ashton was building his own house without union labor. From that point he ordered his sand, aggregate, and cement delivered in bulk from an independent contractor and finished the job himself. For the columns and beams he made continuous pours by having his family mix up the concrete while he wheelbarrowed it to the forms; everyone worked it into the forms. In other places he mixed a batch and allowed it to set before adding another adjacent load. Where this occurred one can still see the boundaries between mixes, particularly on the ground floor, main floor, and three concrete stairways. Ashton always left the aggregate rough on the leading edge to the next pour and the bind between pours is sometimes visible but always solid.

Another story explains how the forms were set. By the spring of 1947 the footings, poured lower walls, and some of the columns were complete. Spring weather brought on one of the last of the great floods which occurred before Coralville Reservoid was built to control the Iowa River. Pictures of this flood (see photographs) show the water level rose above the lower flood plain and covered the building site and drained across what is now Park View Terrace in a channel through City Park. Ashton built a log boom fastened together was a chain to keep some of his tank crate lumber from washing away into the channel and the boom appears in one of the photographs. The rest of the lumber was probably piled on the higher, flood free ground south of the house site. Ashton probably knew the flood was coming from talking to his brother Bill with the Corps of Engineers at Rock Island. Ned Ashton was also personally knowledgeable about the local Iowa River water stages. One of his college jobs as an engineering student had been as checker of the guaging stations in this part of the Iowa River watershed.

The flood did not stop work, but in fact was used to advantage. Looking at the concrete framing plan one sees a waffle pattern formed by the main beams jointed at regular intervals by smaller tie beams. The main beams were poured first. The floor and tie beams were cast by forms. This grid pattern was specifically designed to save work. There are only two sizes of rectangular squares and two wooden forms cast them all. Ashton told how he used the flood water to move the heavy wooden forms into position, jacked them up to the ceiling for the pours, jacked them down, and floated them to the adjacent position. The flood simplified the work because he knew how to make use of it. The main floor support plan shows various triangular corners and each of them is different in size requiring a hand-built form for casting. He also used the flood line as a level. When the waters receeded they left a mark on the walls which he followed the next year to pour the ground floor cement, and in 1949 to pour the garage floor. By setting up the forms himself Ashton built the main floor of reinforced concrete in a piecemeal fashion.

The foundation footings were enlarged during construction, but the upper concrete work needed no modification. As seen in the framing plan (Sheet 10), the major change made involved turning the internal stairway well 90 degrees. According to Joye, this change resulted from family discussion. As originally planned the stairway ran upstairs from the west side of the ground floor, an awkward arrangement. The blocked doorway with wooden lintel in place seen in the garage wall behind what is now the downstairs kitchen seems to be a remnant of this original plan; entering the ground floor from the back of the garage. A east entry beside the garage provides direct outside access. The garage entry is now by this east outside door where it is more convenient. The stairway well through the concrete floor was rotated 90 degrees from its position on Sheet 10 and it is correctly shown on Sheet 13.

Not shown on the original concrete framing plan, the electrical system had to be installed before the concrete was poured to avoid major drilling later. The service access was brought in on the east side of the house by the garage and down from the eaves on the inside to the ground floor entry service box. It was planned before the columns were poured and two-wire, BX flexible conduit was laid in the columns and their electrical box outlets and also in the ceiling. The position of the ceiling conduit boxes is shown on Sheet 13 with other notes. Not shown is the position of the conduit itself. This was laid out in rectangular patterns so that most of the boxes,opening from the ceiling side, have four leads running into the box. The purpose was to provide a flexible system because the four leads can be wired together in various ways or bypassed to provide access to different circuit combinations. This proved useful in later years when the ground floor was turned into an engineering shop with more electrical needs and the fixed circuitry was altered by merely changes in outlet box splices to provide more circuits.

11. MAIN FLOOR ROOM DESIGN

The main floor plan is one of areas of design that was the most substantially altered during construction. The upper area of the house was not masonry block inside as was done on the ground floor. Instead woodenplates were bolted to the concrete floor and the framing was built up and boarded diagonally over the studs for strength. The outside was not changed except for modifications in the porch walls which now required an offset with a concrete sill. Inside the house the walls were modified from their planned location. Because the the concrete floor and beam structure was so strong it made no difference where the inside walls were placed and they show no particular orientation to the great concrete beams in either their initial planned placement or their actual constructed positions.

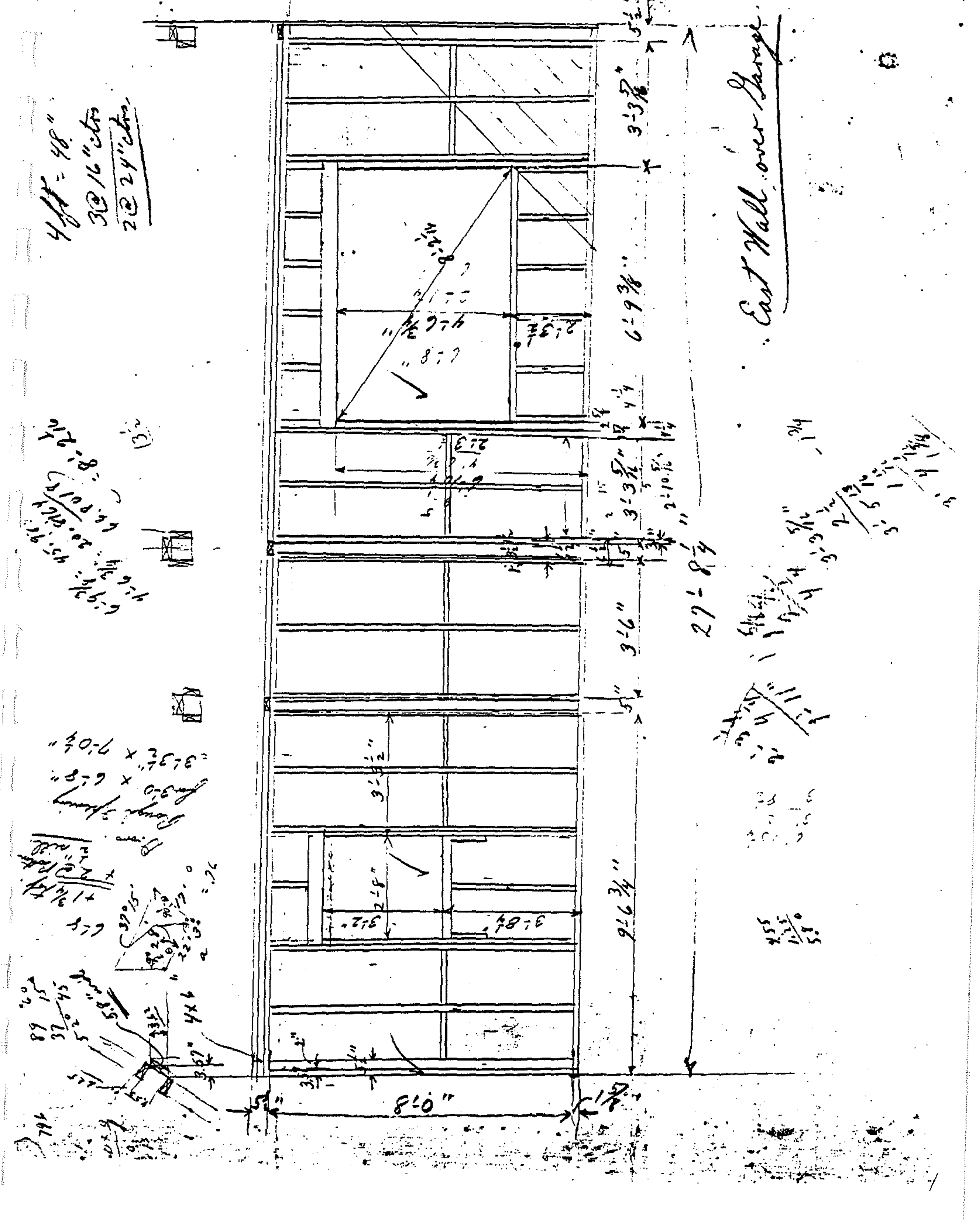
Sheet 11. Main floor blueprint copy, F.H.A. 1946 shows the original design plan.

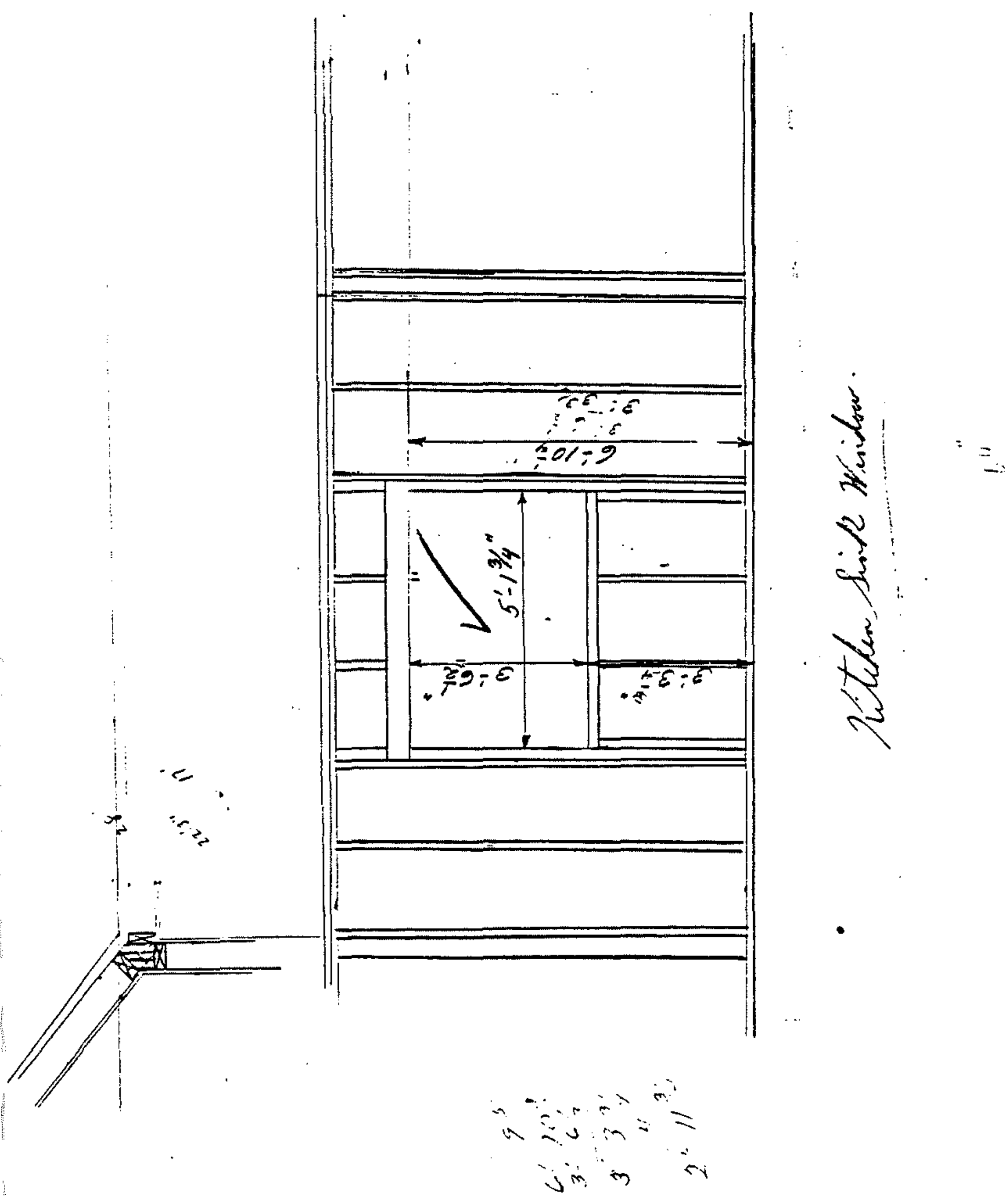
Sheet 12. Concrete framing combining main floor plan with notes 1946-7 is an obvious composite of designs already shown as Sheets 10 and 11. When framing in the main floor, holes had to be drilled through the floor for utilities, primarily plumbing and heating ducts. Ashton had not planned either in detail before the floor was poured. The two plans were combined so the floor could be drilled without continually measureing to avoid the underlying beams. This plan adds notes primarily relating to utilities.

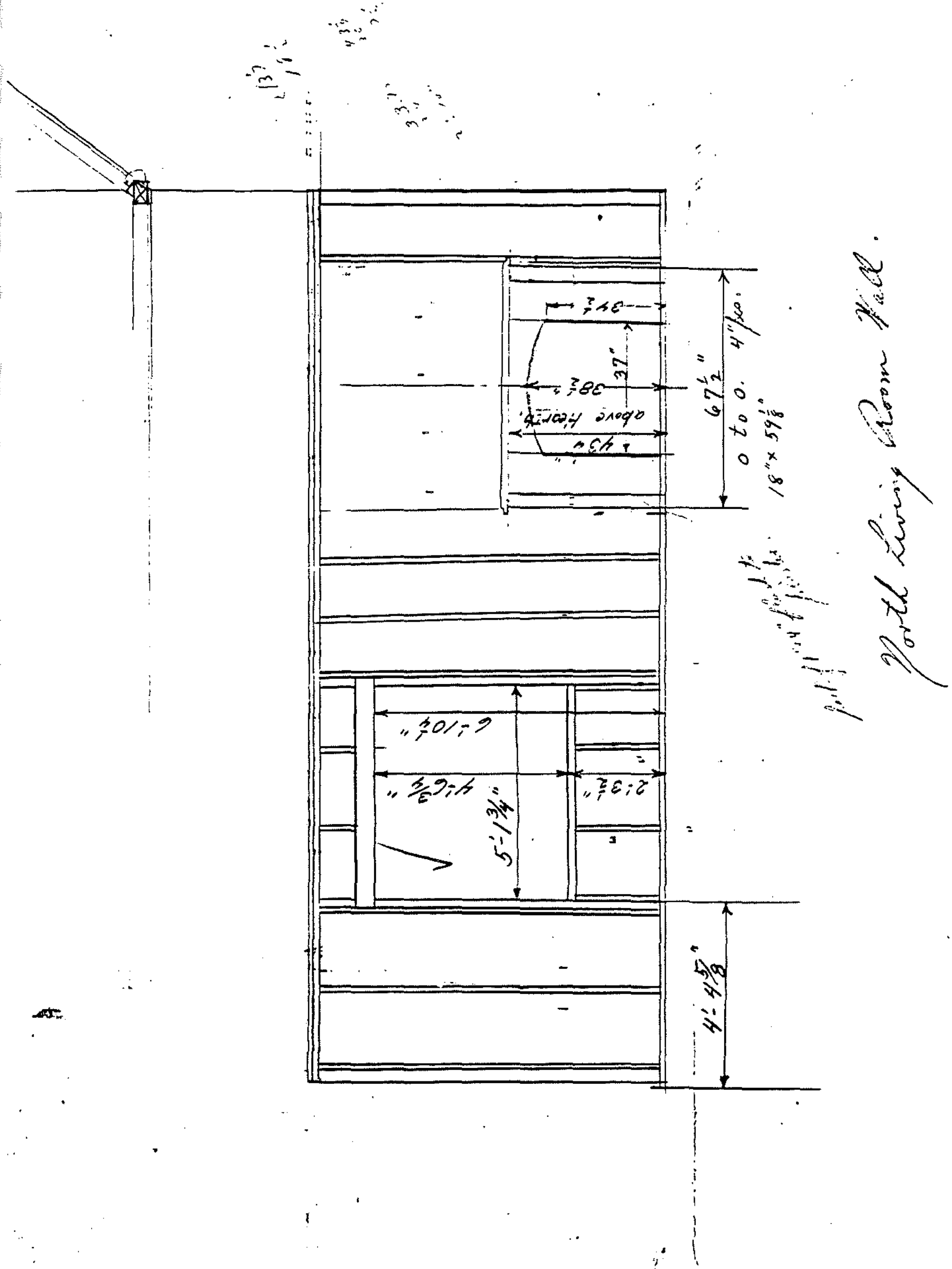
Sheet 13. Concrete framing plan combining main floor plan with notes, corrected later version 1947-1948. Although messy in appearance because it is filled with information about construction, this plan is the most useful in working with the house today. It shows the basic design changes made during construction. Comparing the room plans shown in Sheets 11 and 13 shows that much was built as originally planned. The kitchen was altered. It was built narrower, a more useful arrangement, removing a half wall between kitchen and breakfast room, and adding a broom closet in the different entry to the dining room area. With a narrower kitchen the north bedroom had room for a sliding door closet on the west wall; the closet on the south wall was expanded to a half bath although the stool was never installed. The full north bathroom was rearranged into a narrower but more efficient design and the full south bathroom was rearranged to allow for a large square tub rather than a smaller shower stall. The closets were changed; living room, south bedroom, center bedroom, master bedroom and of course the north bedroom as described. The porch now became a more permanent structure with the ground floor now extended completely beneath it. Originally designed with full length screening, it was decided to bring the masonry up to window height. Since there was to be facing masonry both outside and inside the porch, this width would be wider than the masonry below it and this change required a poured concrete sill projecting the porch masonry out from the wall line. Finally, a full flight of stairs, shut off by a door, now opened off the hallway and led to the attic storage area. These changes, individually minor, were well thought out and made the house more convenient and liveable.

12. MAIN FLOOR WALL FRAMING

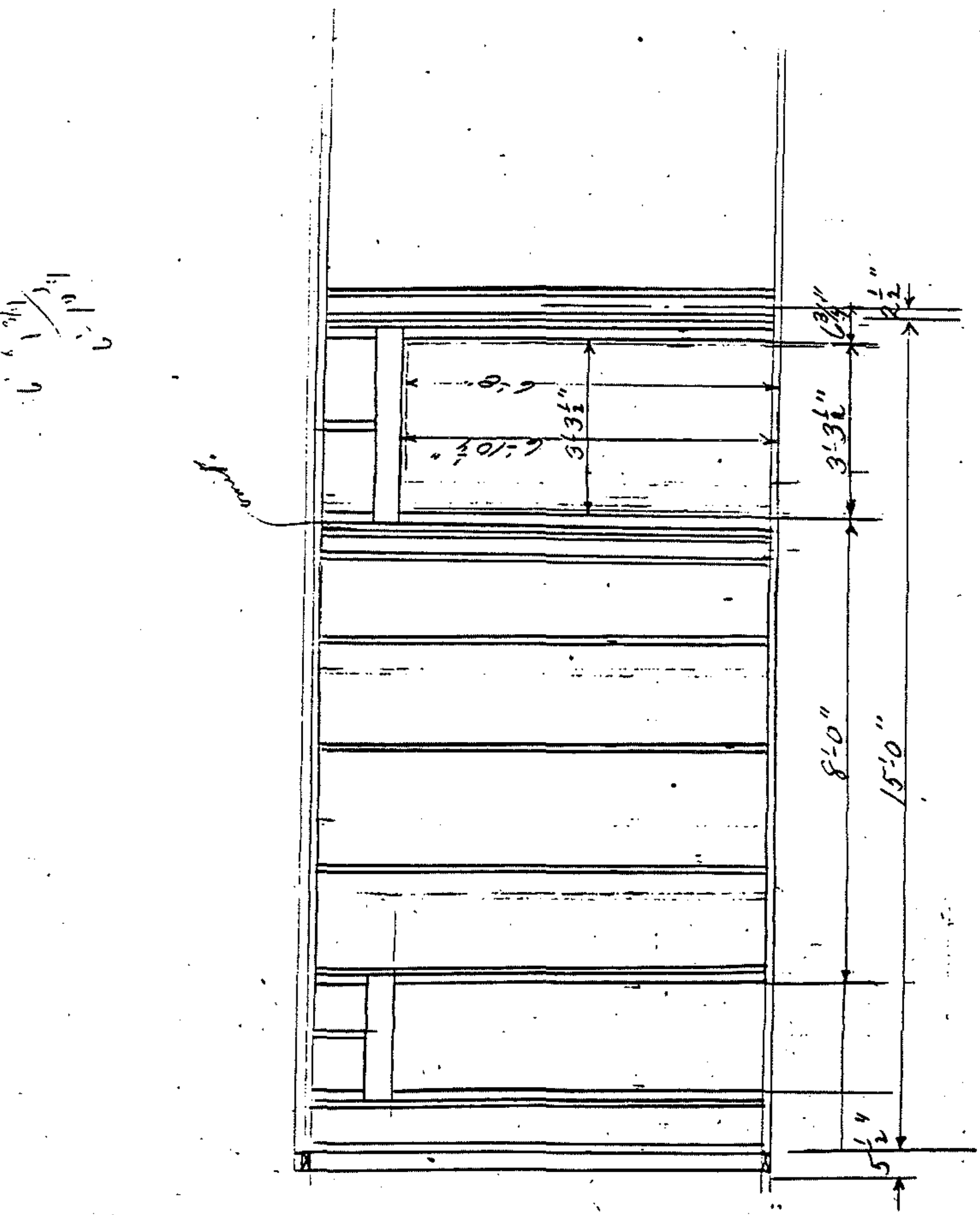
No single set of plans was prepared for the main floor framing; when this stage was reached Ashton used sheets of cheap theme paper ruled on one side with a blank reverse and made a series of separate drawings to serve as a guide and calculate studding purchases (pages 26 to 32).


East Wall over Garage
27'-8 1/4"
4 ft = 48"
3@16" ctrs
2@24" ctrs
8'-0"
3'-6"
6'-9 3/8"
9'-6 3/4"


Kitchen Sink Window
5'-1 3/4"


North Living Room Wall
67½"
0 to 0. 4" pcs.
18" x 59⅛"
34½"
37"
38½"
above hearth
43"
6'-10½"
4'-6¾"
2'3½"
5'-1¾"
4'-4⅝"

(page 32 -- unlabeled section)



13. ROOF DESIGN

The relatively complex outline of the house made roof design a problem and the final form was reached after a number of drawing revisions. The original plan seen in the SE elevation (Sheet 17) shows an additional half story was planned with a fairly high pitched roof and a large dormer window on the east side and probably on the west side as well. The roof became more complex in shape in the next design with windows added to the half story both north and south (Sheet 18). As the final planning was done the roof was lowered in pitch, had wider eaves, and the idea of a dormer was dropped because the roof line was too low for a full half story (Sheet 19). However this 1946 plan was modified further when the porch was partly enclosed and its area was included within the ground floor.

Sheet 14. Cross section, medial ca. 1948. By the time this section of the ground floor, main floor, and attic was drawn, the roof rafters had been planned. On this drawing the front balcony was intended to be screened, a plan modified in construction because the deck was narrow for sitting. In the construction version the porch was railed and left open.

Sheet 15. Roof rafter plan ca. 1948 was drawn to estimate the rafter lengths needed for purchase and represents the final solution to the roof design. It seems that the last of the packing crates provided most of the boards over the rafters.

14. STONE VENEER

The well known Stone City Quarry northeast of Iowa City was the source of the bulk stone. Ashton had selected the strata he wanted and it was delivered in large chunks which he split on a steel railroad rail and hand faced with a large rock hammer. Although in appearance Stone City rock looks like limestone, it is a dolomite bonded with magnesium. When fresh it is easily worked and one of its characteristics is hardening upon exposure to air. Ned Ashton said that he split as much as he had time for as soon as it arrived because when it hardened it became more difficult to work. One of the photographs shows a large pile of shaped stone in the vicinity of the north living room wall. The family moved into the incompleted house in late summer of 1948 when the outside framing and boarding had been finished and the windows installed. The ground floor was still open. During the late summer and fall the ground floor was largely enclosed with masonry and workmen came in to finish the kitchen and utilities. The stonework was largely completed over the main floor boarding in 1949.

The numerous windows were finished by pouring a reinforced concrete sill for each. Windows on the ground floor also required a reinforced concrete cap or lintel above the window frame. The windows on the main floor were all deliberately placed with the top frame at eave level regardless of window size. They required poured concrete sills but no caps of concrete. According to Joye, Ned Ashton took particular care in the casting of the sills, removing the forms in time to rework the surface curves for proper density and drainage. This cement work is among the highest quality seen at the house and the sills have never been a problem. The roof design was deliberately chosen to bring the windows up to the eaves and avoid casting cement lintels over them. This was done by having the inside main floor walls continue a foot above the window line into the attic. It would have looked odd to have the windows meet the ceiling. Viewed from inside, the walls continue above the windows, but the eave comes in to the upper window line. The problem with this design is twofold: (1) the low wide eaves restrict light coming into the rooms to some extent despite being painted white, and (2) by carrying the wall height a foot into the eave line, the roof over the eaves is poorly insulated. As a consequence winter snow on the roof melts only to refreeze on the roof and in the gutters where it accumulates as masses of ice. Over the years rain guttering has been a considerable problem. Ned Ashton in 1983 finally decided it would be better to remove some of the gutters entirely because ice in them forced its way under the shingles, breaking them off and causing eventual leakage. During our 1986 restoration of the house all of the guttering was finally removed and the ground drip line was enlarged to carry water away from the foundation.

The stone veneer is nowhere set beneath ground level because mortared stone would not weather well as a foundation material. Structurally, the stone facade is a freestanding veneer with the immense weight carried down by masonry walls and spread through the footings. However, a completely freestanding wall unattached to the concrete beaming and interior framing would tend to separate away from the house over the years. For this reason the wall was tied to the house structure, although this does not affect weight distribution. Where the stone wall is outside the ground floor, the stone and interior block wall were mortared together. I presume that bolts and scrap iron set in the block mortar improved the bond. Joye states that the stonework is also tied to the framing on the main floor. The inner frame wall was built of studding nailed to a wooden board termed a plate which was bolted to the concrete floor; the exterior side of the frame was covered by diagonal boards finished with tar paper (see page 26). As the stonework was laid up against the framing, large nails were driven into the studding where they were incorporated into the stonework mortar. Since the wall weight is completely transferred to the footings, it does not require much reinforcement to tie house frame and stonework together. No ties are visible.

When stone masonry becomes wet, expansion by freezing breaks out the mortar and weakens the joints. The wide eaves have successfully kept the exterior protected and the masonry is very well preserved.

15. THE GROUND FLOOR

In some ways the ground floor was an afterthought and Ashton did not prepare a plan for it. Structurally it is a clear span enclosure with the garage area separated by a non-bearing wall of 4-inch thick concrete block masonry. Joye remembers that the ground floor was not completely enclosed during the winter of 1948-9 when the family was camping on the main floor. A photograph shows plastic sheeting over incompleted areas. The lower exterior seems to have been completed in the spring of 1949 because Press-Citizen article of April describes the huge ground floor as a recreational area and study filled with family possessions including their aluminum boat. The main floor plan identifies the north bedroom as a study although that was Ruth's bedroom when the house was first built. Ned Ashton set his desk by the huge picture window downstairs and continued to use that area during his consulting period. An air register with ductwork removed immediately above his desk and in the livingroom floor was used by Ned and Gladys to talk to each other for she was also his secretary.

The ground floor of some 1600 square feet was primarily intended as an occasional recreational area. Double french doors lead to the pateo and there is a massive stone fireplace. Carrying out the recreational theme, the light fixtures were glass globes set against a ship wheel motif. The girls, Ruth and Jane, found it a wonderful room for dances and parties, and the central area had a ping pong table and other games. During the early 1950s Ned's private consulting practice was growing and he worked on these projects at home "on his own time" he said, a remark quoted in the 1958 Alumni Review, for he had defended his consulting practice as not taking time from his work as a professor. During the mid-1950s he took out the ship lights and installed florescent lights for his draftsmen and the recreational area increasingly became smaller and by 1955 he was on leave from his professorship and a full-time consulting engineer with the ground floor as his headquarters.

Additional wiring was laid and the ground floor was partitioned off with various concrete block walls. The entryway room was crowded with washer, dryer, clothes chute, shower, and sink counter. A large wooden storage closet was built along the garage wall side, which Gladys nicknamed "the path to peace" because it was intended to store all of the possessions Ned Ashton kept in the entryway.

The furnace was never completely walled off from the workroom area, but a wall partly obscured it and formed a storage room lined with shelves for canned vegetables. A somewhat primitive bathroom served the employees of the engineering shop, and eventually the security room was built into the southeast corner for the safe files of classified naval radar plans. After Ashton's retirement, Joye and her daughter Deborah built an apartment in the basement by enclosing off part of the workroom for drafting equipment and file storage, added a bathtub to the washroom, put in a kitchen, and walled off the last of the open stairwell.

The main problem with the ground floor as a living area and workroom was humidity condensation. The massive walls and ceiling kept the ground floor cool in the summer, but any effort at outside ventilation brought in humid warm air and its water vapor condensed everywhere; the floor was frequent wet. During the period when it was a drafting office air conditioning had been added to the house and by keeping this vented downstairs, the humity was reduced.

As an engineer who had specialized in hydraulics, Ned Ashton was well aware of the potential for another great flood in the Iowa River Valley which would be beyond the capacity of Coralville Reservoir to control. The ground floor is designed to minimize the damage of a major flood. Opening the french doors equalizes the pressure and entering water will flow through into the garage unhindered by a threshold or sill, and from there runs out at ground level into the yard. The furnace and utilities are set up on a concrete platform out of harms way.

16. CHRONOLOGY OF CONSTRUCTION

It may be useful to briefly review the chronology of construction as a unit, although various dates have already been mentioned. The land of the Ashton Tract was seriously under consideration by January 1944 when trees were spiked to measure river levels, and this was within five months of the arrival of the Ashton family in Iowa City. The land was purchased and initially used as a victory garden while plans were made for construction after the war. During 1945, following the

Ashton-Lambert survey of the original tract, house plans were drawn up and the final plans prepared in the spring of 1946. Stresses and loads upon the concrete framing were calculated in late May and early June; the plans were submitted to the F.H.A. for approval and received by them in June. Ashton commented that when he took the plans into the university architect's office to have an extra set made, the architect Horner told him that he would never be able to get a contractor to build such a complicated house for him. Ned Ashton's reply, he was going to build it himself, was scoffed at.

During the summer of 1946 and well into the fall, the site was excavated largely by hand and the footings and lower foundation walls were poured. In addition some of the columns and their horizontal, connecting beams were constructed. By the time of the spring flood of 1947 enough of the supporting structure was built to start the piecemeal construction of main concrete floor using flood water to position the forms. A November 1947 picture indicates all of the concrete framework and floor had been completed.

The main floor framing and roof rafters were planned out in the winter of 1947-8 and in the spring the studding and exterior boarding was begun. The main floor was closed in during the summer of 1948 and windows installed. This coincided with sale of their rented house and the family precipitously moved into the incomplete house in late summer. The fall season was aparently hectic. The utilities were mainly in or completed and Ashton began to wall in the ground floor. Upstairs was a bit like camping out. The kitchen cabinets were installed by Brisky Cabinet Co. and a date of January 1949 on the breakfast room table probably marks the completion of that project. Ashton was contracting for services at this stage; he had nailed on metal lath mesh, but now hired a plasterer. Curtains still hung in place of doors not yet installed. By the spring of 1949 the house was habitable and the ground floor outside walls were finished, according to the April 1949 newspaper account. Gradually other projects were completed as time allowed. The outside north stairway and west circular stairs were poured. The masonry stone was completed on the main floor was finished. By 1955 when the house is described in the University of Iowa Staff Magazine everything was finished, even the driveway and sidewalk around the house. The Ashtons said it took them ten years to build the house, and while this was true for the time it took to finish everything inside and out, they had moved in two years after the footings were laid and by the third year the house had essentially reached the form we see today.

17. WINDOWS AND INTERIOR TRIM

The Curtis company of Clinton was the natural choice for the millwork at Ashton House because the family that owned the company lived in the mansion next to the Ashton family home. The company is now no longer in business, but in the late 1940s manufactured quality lines of woodwork. The Curtis Woodwork Style Book of 1946 is a large sales catalogue which illustrates most of the woodwork chosen for Ashton House.

TABLE 18.1 ASHTON HOUSE WINDOWS AND DOORS (* means non-Curtis origin)

MAIN FLOOR WINDOWS AND DOORS	
window style	
vertical casements, side opening	25
double-hung sash type windows	10
picture windows	5
porch windows	7*
	47 windows
door style	
french doors, glase panes (2 pairs)	4
outside doors	2*
interior flush, hollow core, hinged	18
interior flush, hollow core, sliding	4*
interior flush, 1-inch plywood, hinged	2*
	30 doors
GROUND FLOOR WINDOWS AND DOORS	
window style	
horizontal casements, bottom opening	7
double hung sash type windows	2
picture window	1
glass block non-opening	12*
	22 windows
door style	
french doors, glass panes (1 pair)	2
outside doors	2*
steel security door	1*
interior flush, solid core door	1
(doors removed in 1986 remodeling)	(5)*
	11 doors

The Curtis catalogue also illustrates the birch trim around all of the windows and doors on the main floor and also surrounding the large picture window with side sash windows on the ground floor. The trim has jointed corners which the Curtis Company named "mitertite," and there are adjustable door jambs made of fir stained to closely match the birch woodwork and door veneer. The calalogue identifies the grooved woodwork pattern as its "Regency" style.

The siting of the house takes advantage of the relative isolation and views of the woods and river; views enhanced by the large amount of glass. There are 47 windows on the main floor in addition to two fully paned sets of french doors and glass panels in both entry doors. This represents a great deal of millwork as well as a maintenance problem because every window has both storm windows and screens; and there are storm doors outside the entry doors and the balcony french doors and the storm doors also have storm windows and screens. The ground floor is less of a problem because because 11 windows are of glass block which require no cleaning or storm windows. There are nine other windows with storms to change and other glass in the french doors, entry doors, and storm doors to change and keep clean. The numerous windows and glass paned doors provide views, but they also reflect house design before residential air conditioning became common. The house window design provides cross ventilation in every room.

18. THE 1986 RESTORATION OF ASHTON HOUSE

In 1963 while Ned and Gladys were out of town, Joye and her very young daughters stopped by to check the house. The water main was shut off temporarily because of construction next door. One of the girls turned on a bathroom faucet, and when no water came, left it on and unluckily the stopper was in the sink. This is the family story of the "great flood of 1963" for when water service was restored the sink overflowed and flooded the main floor and flowed through the cold air returns and dripped on Ned's desk and files until the Ashtons return from Green Bank. Main floor carpets, drapes, lower plasterwork and some woodwork was ruined. The house was renovated, but 1963 is the last date there was interior redecoration. During the 1970s the roof was beginning to leak through the original shingles which had never been replaced. After Gladys died in January 1976, Ned was content to let things slide a bit around the house, dividing his time between his Mississippi River cabin and feeding the ducks and doing yard work on the Iowa River. He finally decided that remedial measures were required and in 1983 at the age of 80 he spent the summer reroofing Ashton House, replacing rotten boards, putting on tarpaper, and nailing new shingles, working on one area at a time. Unfortunately, water seepage in previous years severely damaged the plaster.

The interior with long deferred redecoration, deteriorated plaster and peeling paint obviously required renewal. The 1986 property appraisal by Greg Downes of Smith Realty provided a professional assessment mentioned here because it explains the scope of our subsequent 1986 restoration of the house. In summary, the appraiser estimated it would cost $35,000 or more to completely renovate Ashton House with hired workmen. Among items mentioned was the complete replacement of some utilities and upgrading plumbing and electrical service, complete replacement of the kitchen and both bathrooms, plastering, paint, new carpets, installation of a sewer lift station, and some exterior work. He made no mention of ground floor renovation or the extensive yardwork and landscaping which was required.

We expected to spend money before moving into the house, but planned to bring it back to original condition rather than turn it into a contemporary 1980s home. This goal guided our restoration. Having more time than money we also decided to carry on the family tradition and do as much work as possible ourselves during the late winter and spring as well as the summer when we could both work full time.

On the main floor plaster repairs, two coats of prime and two coats of wall and ceiling paint transformed the appearance. The white tint chosen sets off the birch woodwork which was in excellent condition. Sills required refinishing, but cleaning and wax restored the luster to the birch trim. The bathroom pumbing was repaired but the fixtures with one exception were sound and regrouting restored the original tile. Light fixtures were cleaned and left except in the north bedroom and kitchen where replacements were needed. New carpeting throughout completed the renovation. The porch was cleaned up and repainted; it was restored to its original purpose as a sitting room off the living room for summer use.

After considerable discussion the 40-year old kitchen was judged to be a hopeless case and we torn it out back to the bare walls. The replacement oak cabinets match the existing birch woodwork in tone, and the built-in round, pedestal table in the breakfast room was recovered. The kitchen north entry was enlarged by moving the washer and dryer to a new utility area in a rebuilt half bath off the north bedroom. An unexpectedly difficult job was the restoration of the old family marble fireplace in the living room which had been badly smoke stained.

The impact of the main floor restoration has been to bring the house back and let its original design show through after years of semi-neglect. It is not a new house; it is a unique older one.

The ground floor required most of the work and expense. Beginning with the utilities, the entire water system has been replaced with new copper lines running in a more efficient pattern to avoid freezing pipes which were a problem for years. To this has been added a new high-efficiency Amana system including furnace, air conditioner, and furnace water heater reducing utility bills in half. The great problem with the ground floor is what to do will all of the space.

The remodeling concentrated on restoring its purpose as a sort of great hall type of recreational and party area. To this end every partition wall was removed and it has become a huge expanse some sixty feet long with great brown beams against white ceilings and walls. The area as it currently exists is shown on Sheet 4. The restoration is not complete. The apartment was removed, but its open kitchen, reduced, has been left. Fan light fixtures improve the air circulation. The security room is now used for storage.

19. THE PRAIRIE SCHOOL PROBLEM

I never talked with Ned Ashton about the design of the house, but Joye remembers her father saying that he liked Frank Lloyd Wright's early work but not his later designs. Since Ashton House has some characteristics of the "Prairie School" architecture associated with Wright's name, my purpose here is to consider various elements that entered into the house.

Like most American residences, Ashton House does not represent a single motif style, and it has eclectic elements. The question of Wrightian influences has no easy answers. One issue is the definition of "Prairie School" and here I follow the discussion by Robert C. Twombly from his book Frank Lloyd Wright: An Interpretive Biography (1973: 51-89). Wright innovated Prairie School design as a strong reaction to the mixed and cluttered residential styles of the 1880s and 1890s. Wright himself strove towards greater simplicity in style and a more meaningful integration of interior space. In practice, his houses designed from 1901 to 1908 show a diversity of forms. Although he was to urge the use of "native materials" most of his houses had exterior stucco. His emphasis upon rectilineal shapes became modified in later designs but his earlier "prairie" homes influenced other architects who copied some features and created a style referred to as the Chicago School.

A number of Ashton House characteristics suggest general Wrightian influences if one ignores the Chicago area urban houses and centers attention on Wright-designed homes in eastern Wisconsin and elsewhere built to take advantage of valley elevations and water views. Among seeming Wrightian parallels, (1) the house is partly set into a bank to lower its profile, (2) the house frontage is two story and curved inward to give each room a different water view, (3) there is no basement or cellar, and the lower level is useful space with window views and direct outside access at ground level, (4) the living room, dining room, and kitchen are on the upper level to provide views and privacy, (5) there is an emphasis upon a great deal of window area with picture windows and casement windows, (6) and there is use of native materials, in this case Stone City dolomite. Here one notices that the irregular-sized ashlar masonry at Ashton House closely resembles the limestone facade of Wright's own workshop and home complex in Wisconsin. Other possible Wrightian parallels include, (7) the lowered roof line without dormer windows or useable half-story living space, and (8) wide eaves built to protect the exterior walls from weathering, lower the house profile, and painted white below to reflect indirect light into the numerous windows. The interior ceilings of the main floor are carried above the exterior eave line, emphasizing the effort made to lower the roof profile.

Finally, there appears to be a parallel in the fundamental concept so important in some of Wright's designs, specifically (8) reserving the prime area for common family use which places the bedrooms in secondary space. Here it is noted that the 90-foot house frontage is family space -- porch, living room, dining room, balcony, kitchen, and breakfast room; the bedrooms are set back out of the way. Another Wrightian design concept, taken from Wright's early architectual mentor Sullivan, was to let "form follow function." Within this context, (9) the function of front living areas seemingly determined the form of both the secondary bedroom area and the complex outline of the exterior house walls. Angularities along the frontage created back areas with odd but charming corners, a twisted hallway, trianguloid closets, and an irregular-shaped north bathroom. As a result of the crucial frontage design, the rear house wall did not follow a line, but angled and bent to enclose the space within.

Ashton House is not taken from the plan of any Prairie School or Chicago School house. However, the fact that Ashton himself held a high opinion of Wright's early work suggests that the parallels are not coincidental. The rebellion against late Victorian clutter occurred nearly half a century before foundations were poured beside the Iowa River, and the house built above them also bore the imprint of evolutionary changes in American domestic architecture.

Much of the distinctive architecture of Ashton House has nothing to do with traditional styles or Wrightian influences. Ashton brought his knowledge as a bridge designer and structural engineer to the house plan chosing reinforced concrete and masonry as major materials since he was expert in their use. In summary of previous discussion, some distinctive engineering features of the house include (1) professionally designed footings to carry the immense weight of stone and masonry on a soft flood plain, (2) the professionally designed concrete pillar and beam system of support at the house core, (3) the reinforced concrete floor poured in place over the clear span of the ground floor, (4) the offset exterior walls of the porch resting on a concrete sill designed to balance the weight of interior stone masonry, and (5) the interior ground level stairway, a reinforced concrete monolith supported only by a ceiling beam and a floor footing. The lateral stress against the bearing ceiling beam is of course distributed through secondary beams to the next adjacent main beam and to the entire ceiling support system.

In addition to these enumerated engineering characteristics, a group of others relate to cantilever construction, here defined as weight balance upon the pillars by extending main interior beams outside the wall line. As examples, (6) the front concrete balcony is cantilevered upon two integral beam extensions from the interior, (7) the monolithic circular stairway of reinforced concrete is tied diagonally into the cantilevered balcony where it gets all of its upper support; it rests below on a large footing disguised as the two lowest stairs. The most spectacular example of cantilever support is (8) the round breakfast room where three-fourths of this small room rest upon the cantilever system of beams carried beyond the pillar in the house corner below it. The breakfast room support system continues along and outside the north wall of the house facade where (9) the north upstairs entry deck floor is cantilevered on concrete beams and structurally continues the level of the kitchen and breakfast room floor. From this outside entry deck, (10) the north exterior stairway, a reinforced concrete monolith, lead to the ground. This stairway, only three inches from the masonry facade, is not supported by it, but bears entirely upon the cantilevered entry deck system above and upon a ground footing below.

The porch offset was an afterthought during construction, but there is a rough sketch showing the sill and reinforcement ties. The cantilevered balcony, breakfast room, and north entry deck support systems are shown as they were built on the original 1946 concrete framing plans (Folio Sheet 10). The circular stairway was also an afterthought, the original design leading down along the garage wall (Folio Sheet 11). No sketch seems to have survived of the interior stairway, the circular stairway, or the north exterior stairway designs, and the porch entry stairs were built differently than the plan originally shown (Folio Sheet 11).

We may summarize the issue of architectual influences upon the design of Ashton House by noting that a number of parallels exist in a general way with homes designed by Frank Lloyd Wright. Structurally, and in detail, the house is an extension of Ned Ashton's professional work and contains features rarely if ever found in architectually designed residences because the cost to hire it done would be prohibitive.

20. ENGINEERING AND PERSONAL SOURCES ABOUT NED ASHTON

The nomination of Ashton House to the National Register must include evaluative and documentary information about Ned Ashton (see Sections 2,3,4 of this narrative). Prime sources on the consulting practice associated with the house as a workshop are the Ashton Papers which are his professional engineering files on major and minor projects. As mentioned previously, these papers are at the State Historical Society. The Index to the Ashton Papers dates from the 1960s and was a working guide used in the office for information retrieval, but it does not include the last projects in the files. The Index is a useful document although now obsolete because the papers themselves have been reorganized but not yet catalogued. Sources on individual projects vary; some were published in professional engineering journals, others as pamphlets, and a few newspaper clippings provide some insights. Much of what Ashton designed during his early years as a professional (1926-1943) has not survived in any retrievable form. A few bridge study plans are in the Ashton Papers from his years with Harrington, Howard and Ash Engineering Company, but I do not even know of a complete list of projects which he designed or worked on in a supervisory capacity. The original company became Howard, Needles, Tammen and Bergendoff and it is still a prominent Kansas City firm; I have not contacted them. Engineering companies do not keep extensive files for long periods of time because of the costs of storage. Similarly, I know nothing of the Austin Company which employed Ashton as design engineer to build the huge Douglas aircraft factory in Oklahoma. A short published note is the only record reported for the project. His work with Hooke and Associates in St. Louis was to supervise the project, and with the death of Hooke, Ashton kept all of the plans which are available. They were in fact stored for many years in the Ashton House attic. These plans show that Ashton was not the designer of the subway. His work with the U.S. Department of Interior, Bureau of Reclamation should be somewhere in federal archives.

Ashton's record as a professor of civil engineering(1943-1955) is part of University of Iowa archives, and I am unfamiliar with it. It is likely to be of little value in understanding his conceptual work as a designer. The Ashton Papers start with his consulting on projects during the immediate post-war period when there was money for both civilian and military projects. One may suppose, that although a contractor and consultant, Ashton appears in project archives of the U.S. Navy, Office of Naval Research, the U.S. Air Force, and perhaps the U.S. Army. There is also Associated Universities Inc. and the National Science Foundation. However, these projects are fully covered in the Ashton Papers themselves as far as I know.

As Ashton established himself as a consulting engineer there were a number of publications and these are listed and briefly annotated in Section 27. Into the 1950s the two best general sources on Ashton's career are his own 1955 professional vita and the subsequent article "Bridges are His Business" in the 1958 Alumni Review which clearly draws upon the vita for some source material, even to a few phrases.

There is a wealth of unpublished and unwritten family anecdotal information, together with geneological records. His University of Iowa athletic prowess and that of Gladys who was equally proficient, is documented by Hawkeyes of the mid-1920s. Taken together, there is enough background information and specific project documentation to provide a fuller sketch than is summarized here.

21. FAMILY AND UNIVERSITY BACKGROUND 1903-1926

The Ashtons settled in Clinton after the Civil War and Ned Ashton himself mentioned his background as "fourth generation American" in his 1955 professional vita, a somewhat unusual entry for this kind of academic record but emphasizing the importance to him of family ties which was a strong characteristic of his personality. In explanation of the simplified geneology summarized from family records (Table 21.3), William Ashton was the first generation and he emmigrated to the United States in the 1840s when the midwestern frontier east of the Mississippi was being settled after the removal of the native Americans. Register pages from the family Bible lists the wedding of William S. Ashton (1819-1885) to Sarah Ann Mills (1821-?) in 1843 and the birth of their first child in 1844, a daughter Mariah who died, aged 11 months. The couple had nine children, five surviving childhood, and their oldest was a son, George Washington Ashton (1844-1925), Ned Ashton's grandfather. The father, William, followed the trade of master carpenter and I have been told by Joye's cousin, William Ashton of Davenport, that a master carpenter of that period combined a practical knowledge of architecture and engineering in the days before professional specialization. Later, in Clinton, Iowa, the master carpenter designed wooden trusses for some of the early buildings and I have been told some of these trusses still survive.

There are various family stories about his oldest son, George W., among them a persistent tale that he briefly worked for a pony express line while in Racine, Wisconsin. This seemed to be substantiated when Joye refinished a stationary rocker that had once belonged to him in later years and found a cloth pony express bag used as padding; it is stenciled U.S. Ex. Co. and still retains red wax seals stamped as closures each time the bag was used. Both rocker and bag are now owned by Joye at Ashton House. In explanation of differences of opinion over the tale, the Sterling Geneology Vol. 1, p. 619, 1909 states "As a young man Mr. [George W.] Ashton engaged in the express business first in Racine, Wisconsin, later in Levenworth, Kansas." In the copy before me his wife Minta crossed out Levenworth, Kansas. The issue is whether U.S. National Express was a railroad or pony business. Joye's cousin, Bill Ashton, Davenport, doubts the pony connection.

1st generation

William S. Ashton -------	married --------	Sarah Ann Mills
1819-1885	1843	1821-?

five adult children

2nd generation

George Washington Ashton--	married----------	Minta M. Sterling
1845-1925	1873	1852-1936

two adult children

3rd generation

George Sterling Ashton----	married----------	Blanch Crapser
1876-1960	1900	1875-1935

George Crapser Ashton 1901-1982
(Edward Lowell Ashton 1903-1985)
Frank William Ashton 1908-1973

4th generation

Edward Lowell Ashton------	married----------	Gladys May Brooker
1903-1985	1928	1903-1976

5th generation

Joye Annette Ashton (Davis; McKusick) 1929-
Ruth Beverly Ashton (Johnson) 1934-
Jane Blanch Ashton (Nelson) 1938-1973

6th generation

nine grandchildren

7th generation

six great-grandchildren (to date 1987)

Table 21.1 Abbreviated Geneology of Edward (Ned) Lowell Ashton.

In 1870 according to the Sterling Geneology, George W. Ashton moved to Lyons, a small community subsequently the north side of Clinton, where he opened a dry goods business. There he met and in 1873 married Minta Maria Sterling (1852-1936). The couple had two children, Jane (1874-1895) who died of pneumonia, and George Sterling Ashton (1874-1960), Ned Ashton's father.

Ned's grandfather, George W., had no interest in following his father's trade of master carpenter and opened a general store in Lyons which for a time became a very prosperous enterprise. As one of his speculations he bought a mansion occupying a third of a block of land on the bluff overlooking the Mississippi and this became the family home for the next sixty years. He was involved in various early enterprises, none of them particularly remunerative, and subsequently lost heavily in mining stock in the west while trying to recoup his early prosperity.

There were other Ashtons in the vicinity and the family Bible notes that George W. Ashton's sister Maria married in Clinton in 1876 and his youngest brother married a girl in Lyons in 1893.

The son of Minta and George W. Ashton, George Sterling Ashton, married Blanch Crapser (1875-1935) in 1900; and they had three sons who became engineers -- George Crapser Ashton (1901-1982), Edward Lowell Ashton called Ned (1903-1985), and Frank William Ashton called Bill (1908-1973). Because the nicknames became permanent, a wag said there were five Ashton boys -- George, Edward, Ned, Frank, and Bill. Growing up in Lyons after the turn of the century strongly influenced the development and subsequent career interests of the three boys, and in the order of discussion these influences were: the family mansion, the extended family living together, the river cottage "Swiftwater," and its later replacement in Bülger Hollow, growing family financial problems, and the leadership which the oldest brother George had upon his two younger brothers Ned and Bill.

The grandfather, George W., bought the family mansion in 1892, a somewhat surprising move because his two children where almost grown and he did not have the family resources to keep it up in style. There were two other mansions nearby and together they shared the whole block -- the other two were owned by families which had become wealthy in the flourishing lumber and milling industry of Clinton. Ashton's house was a local landmark built in the Steamboat Gothic style in 1853 and in 1892 Ashton paid the then considerable sum of $6,500. for it, buying it from a previous owner, Sumner I. Smith. The Gothic Revival came into the Midwest about 1850 (see Margaret Keyes Nineteenth Century Architecture in Iowa City 1966, page 48) which places this 1853 home among the earliest surviving examples of this style in Iowa. Family tradition gives the origin of the home in a jingle:

> The owner was Phillip Deeds, Who after sailing the seven seas,
> Built the stately old mansion in 1853, To please his wife to be.

As a note on sources, this jingle and some other information used here comes from two newspaper stories about its eventual restoration, the Clinton Hearld 26 February 1970 and the Sunday Times Democrat of Davenport 24 May 1970, and family stories.

Located at what is now 316 18th Ave North, Clinton, the Steamboat Gothic house had 10 marble fireplaces with differently designed facades made of white marble originally shipped from Italy to New Orleans and brought up to Lyons by steamboat; it has a ground floor ballroom with a fourteen foot high ceiling heated originally by two of the marble fireplaces one of them later dismantled and moved by Ned Ashton for reinstallation in Ashton House in Iowa City. There is a large carriage house and originally a barn and other outbuildings. There were huge rooms with nooks and crannies everywhere, a spendid place to later raise the three active Ashton boys -- but of course the home was a complete white elephant. George W. Ashton, the boys grandfather, was the eighth owner in 1892, only 39 years after it was built -- it was a spendid house to look at but had previously passed through the succession of owners on the average of once every five years. By the 1890s it was plainly obsolete and expensive to heat with all the fireplaces and high ceilings. During the winter the Ashtons closed off much of the house.

When the boys' father had married in 1900, he and his wife Blanch lived in the house with George's parents rather than establishing a home of their own, and the young wife found it sometimes difficult living with in-laws without much of a say in running the household. The three generation extended family emphasized the closeness and continuity of kinship. When the boys' father died in 1960 the two older sons, George and Ned, could not bear to see their childhood home pass into other hands, and buying out younger brother Bill's share, they kept the house closed up and empty until teenage vandals repeatedly broke in -- they sold it in 1968 to the family which restored it for only $16,000 because of its poor condition. By then most of the land had long since been sold off as building lots, roof fire damage years earlier had made it neccesary to replace the entire roof and it had been done cheaply, lowering the original lines of the house, and it had lost some of its original elegance.

The boys grew up on the Mississippi hunting and fishing and while still young lived by themselves for weeks at a time during the summer in the family cottage, "Swiftwater," built on piles over the flood plain upstream, but within long rowing distance of home. Marquis Childs, a Lyons classmate of Ned Ashton, provides some of the background of this period in Clinton (see "Marquis Childs -- Interpreter of the Mississippi River," by Raphael Erler, The Palimpsest Vol 67, No. 6, pages 174-193, 1986; see particularly Child's 1932 essay "River Town.). Money was short in the family as the boys were growing up and Ned and his brothers sold fish for spending money. The remains of a childhood wooden wagon at Ashton House were kept by Ned as a lifelong souvenir when he sold fish from it to Clinton residents as a boy. Later, working their way through college, the older boys returned to Clinton each summer where they set themselves up as commercial fishermen selling to the wholesale fishmarket; one summer Ned made $1,000 which paid his expenses all year in engineering school.

The outdoor Mississippi River life left its mark in various ways; the two older boys became outstanding athletes at the University. Ned remarked to me once that all of the rowing they did in the days before outboard motors strengthened his arms and later made him a backstroke champion. Even after college they returned to "Swiftwater" and when the cabin was condemned for construction of the lock and dam flood pool, their father bought a few acres on the side of the bluff in Bulger Hollow in the 1930s and built a new cabin with help from the boys. In later years the boys continued to meet in the new cabin, showing each other bridge plans and commenting on the work when not out fishing and hunting. After their father died in 1960 the cabin land was divided three ways and Ned took the home place and built a limestone addition on bridge-like piers; Bill built a wooden cabin on the south, while George visited them not having the time to build. The cabin continued to be important to Ned to the end of his life and he commuted to the cabin summer and winter for a few days almost every week even in his last year of retirement. All three boys later became structural engineers concerned professionally with Mississippi River bridges and dams -- George becoming chief engineer for the Burlington Railroad and responsible for all of its bridges, Ned designing some twenty river spans many of them across the Mississippi and working on dam design as well, and Bill becoming chief engineer for the Corps of Engineers at Rock Island and involved with the Mississippi and its drainage basins.

Money was harder to earn in Lyon and Clinton during the 1910s and thereafter. The boys' father took over the family store and little rental property that went with it; he had the first R.C.A. phonograph franchise west of the Mississippi in the early 1920s and increasingly turned his trade in that direction and in later years it became a music store. Changing patterns of retail trade made his financial position a difficult one and even in the 1920s the three boys seem to have been on their own after high school. At this juncture the oldest brother George chose to work his way through the University of Iowa Engineering College, and also excelled in track setting temporary records in the mile run. Ned followed him two years later, beginning college in 1921 where he ran on the track team as a freshman but found his niche on the swim team and was the A.A.U Midwestern backstroke champion from 1921-1926, for in those days one could continue competition as a graduate student.* As a senior in 1925 he won All American honors, the first University of Iowa swimmer to win this award, and that year was captain of the swim team, president of the Dolphins Fraternity (1924-5) and it National Vice President. He was also elected to Sigma Xi, Tau Beta Pi, and Chi Epsilon honorary fraternities.

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* His vita reference of A.A. U. Midwestern championshipes for five years is correct and mention of 1926 while a graduate student is found in the 1927 <u>Hawkeye Yearbook</u> page 282; see also earlier volumes.

Ned remarked to me once that he did not know what engineering was until he enrolled, and so it appears that he had no specific teen-age plans about his future, simply following George who had found the program interesting. With his numerous campus activities and summer work as a self-employed commercial fisherman one would think he would have little time for academic studies but in fact he did very well because he was very quick to learn and perceptive. While on campus as an undergraduate he met his future wife, Gladys Brooker, who was also working her way through college; she waited table. Majoring in physical education, Gladys also took time to play on just about every competitive women's sport. The Hawkeyes of 1925, '26, '27 mention her as president of the Seals swimming team in 1926 and a playing member in different years in basketball, Seals swimming, tennis, field and track, volleyball, baseball, field hockey, and of course a member of the "I" Club. Ned graduated in 1925 but decided to stay another year to be near Gladys and took a one year Masters with a double major in hydraulic and structural engineering.*

22. THE PROFESSIONAL ENGINEER 1926-1943

While on campus Gladys and Ned decided to become married, but in those conservative days the wedding had to be put off until the couple could afford it. For Gladys this meant finishing college in 1926 and teaching 2 years in physical education to pay off loans for her education. Meanwhile, Ned was to make his start in engineering where pay was very low at the bottom rung, giving him two years to work his way up enough to earn a salary large enough to support a family. They held to this plan and were married in Dallas, Texas, June 3, 1928.

Ned Ashton's first job was with Harrington, Howard and Ash, a prominent firm of consulting engineers headquartered in Kansas City, Missouri. He began in the lowly position of engineering tracer of plans in July 1926, and as his abilities were apparent he was rapidly promoted to detailer design, full designer, and bridge checker. In his later years he remarked in print that he chose the firm despite the low initial pay because of the reputation of one of the partners, Ash.

> "When I was in graduate school, I was so taken up with a book I read, that I went to take my first job with the firm with which the author had long been associated before his death." ("Bridges are His Business" Alumni Review 1958, page 14.)

Ned went on to explain that the book by Ash was excellent and the structural design was still followed. In conversation with me several years ago Ned talked about those early years with the firm as having a very strong influence

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* The University Hawkeye Yearbook series is dated ahead one year; thus 1927 describes 1926.

upon his career, mentioning that there was upon occasion surprisingly little original design work in bridge construction. A poorly designed bridge would be built and there might be a hundred copies made before the weaknesses became apparent. He spent some of his time as bridge checker computing stresses in the spans and said he gained an invaluable series of lessions.

In November of 1928, shortly after his marriage, he was given the chance to be Resident Engineer at the age of 25 on one of the firm's biggest contracts, construction of a $7,500,000 combined railway and highway bridge crossing the Mississippi River at Vicksburg, Mississippi.

> "It was there that Ash, senior member of the Kansas City firm, exerted a profound influence upon the young man's education. At work on the Vicksburg bridge, Ash had commented, 'If we could only extend one plate through another -- welded together, how much better it would be." Ned had already realized how wasteful the riveting and bolting process appeared. But he stood almost alone among structural engineers in advocating the idea of welding. As one associate put it, "There's no point in being a leader if no one is following." Yet Ned never gave up his interest, and used the welding process in bridge construction whenever he was free to do so. It was not until around 1950 that welding became accepted as by far the best modern method of joining metals. The combination of magnesium and aluminum, so easily welded without special treatment, was to reach one historic pinnacle with the erection of the first welded aluminum girder bridge"[designed and supervised by Ashton in 1956-1958]. Alumni Review 1958, page 14.

With the construction supervision of the Vicksburg bridge complete, a design which Ashton may have worked on in Kansas City but did create, it seemed that faster promotion might lie elsewhere.

> "In 1929, Ashton joined James A. Hooke of St. Louis as associate engineer, for the first time with his name on the firm letterhead. His first real opportunity came when Ned was asked to design and personally carry the complete responsibility for the $20 million St. Louis Electric Terminal Railway Co. project, four years in construction. He was 26." Alumni Review 1958, page 15.

His vita of 1955 indicates he worked at the Hooke firm from July 1929 to October 1933 and the electric railway extended under North 12th Blvd. from Washington Avenue to the McKinley Bridge. His vita adds "at the termination of this employment, I inherited Mr. Hooke's office equipment."

Some comments about his project explains Ashton's professional development at this stage of his carreer. The St. Louis Subway Project was not intended as a people mover as far I can tell: it was a railway freight transfer system, comparable to successful operations of the same sort built in Baltimore, New York City, and probably elsewhere after the turn of the century when electric railroad locomotives were developed for freight car transit in urban areas. Such a system was still feasible in the late 1920s in St. Louis, but with hindsight we know that subway freight lines became obsolete in the 1930s with the rise of trucks in competition with railways for short haul transfers. It seems that the railway was paying for the subway line for its freight and it seems likely that some passenger railroad service may have been intended. By 1933 the Depression effectively terminated many such projects in the private sector of the economy: the project was never revived in later years because finishing the project would no longer pay the costs of further construction. As far as I know, the half-finished subway branch is still abandoned beneath the streets of St. Louis.

Ned Ashton, while only an Associate with Hooke, was senior man in the firm when Hooke was killed. He took the plans and even the plat books because of the advantage it would confer in bidding should the project ever be revived. These materials were in the attic of Ashton House at the time of his death and are now in the Iowa State Historical Society.

The previously quoted statement in the Alumni Review article of 1958 (p.15) that Ashton "was asked to design and personally carry the complete personal responsibility for the $20,000,000. project" appears to represent a problem of interpretation. Ned Ashton's nephew, Bill Ashton, has sorted through these Subway Project plans as is of the opinion that Ashton worked on the plans under the immediate supervision of Hooke himself. Ashton's name as draftsman or checker appears on a number of plans along with the names of other employees of the firm. From his own stories about the job, we know he also served in the role of resident engineer during construction.

Among family stories, most concern corrupt contractors and politics in St. Louis. While digging next to an office building Ashton discovered that tagged reinforcing rods had been dumped beside the original foundation. A contractor had saved labor costs by not putting them in the building which permanently weakened the structure. Ashton later used a slide of these rods to alert his students about the need for rigorous inspection. Another story told of a contractor using the form lumber from the subway to build a small suburb of houses. Finally, James Hooke was found dead on the job, an unsolved mystery; Ashton felt that Hooke had been assasinated because of his honesty which others found inconvenient. With his death the firm, a one man show, dissolved.

Until the end of his life, Ashton told tales of corrupt politicians and contractors in Iowa City, Washington, and elsewhere. He estimated that many projects cost a third more than they needed to because of such practices, and in some cases the cost to the public was much higher than that. Another source of inflated costs was the design of a more costly structure over a simpler but equally effective plan -- chosen upon occasion because the designer's fees were a percentage of the project budget. Ashton told me he charged by the hour and not as a percentage, which added to the cost effectiveness of his designs. At one point in the 1960s he denounced the Iowa City firm of Powers and Willis and he said he was censured for his remarks by the state engineers association. He had a long list of projects that he had lost because he refused to go along with unprofessional practices on the city, county, state, and fenderal levels of government. To no small degree the sort of solutions he chose to make on various bridge designs reflected his integrity. He would have made far more money on the MacArthur Bridge project in Burlington by designing a new bridge rather than restoring the old one effectively. Similarly, the Cedar Rapids concrete spandrel bridge project would have been far more costly had he chosen to design new bridges instead of restoring the old ones. The restoration of the College Street Bridge in Iowa City is a third example of cost savings.

With the death of Hooke and the end of the still incomplete St. Louis subway project, Ashton looked to new employment at a time when private engineering firms did not need new men. He wound up matters in St. Louis and had arranged to join the Bureau of Reclamation, U.S. Department of Interior, which had become a major employer because of public works during the Depression. He was stationed in the Customs House, Denver,Colorado, with the title Assistant Engineer, Department of Dams. One of the projects was Boulder Dam where he said that he designed the dam lip structures, and if I remember correctly, he also mentioned helping in the design of the powerhouse. His vita lists his principal projects during government service as Boulder Dam, Wheeler Dam of the Tennessee Valley Authority, Grand Coulee Dam on the Columbia River -- three of the most important engineering projects of those years in the country. He was also associated with lesser projects indicated by the "etc." in the summary of his employment record with the government during October 1933 to August 1935. His role during those two years was a detailer on projects designed by others.

One of Ashton's stories explains why he stayed in federal service such a short time. Before the Depression the Bureau of Reclamation was a relatively small department without much of an engineering staff in either numbers or quality. With the great boom in federal dams construction, this small staff found themselves senior to every engineer hired after them, irregardless of qualifications. Ashton held a low opinion of the engineering knowledge of these senior men. For this reason, finding his advancement blocked for years to come, he corresponded with his old firm to resume employment in the private sector; the Depression had somewhat eased, opening opportunities for structural engineers again. He maintained some unpaid connection with the federal service because his vita of 1955 lists a title "Senior Structural Engineer, U.S. Civil Service Commission, 1940."

The firm of Harrington, Howard, and Ash which employed Ashton from 1926 to 1929 had become Ash, Howard, Needles and Tammen, the partners listed in a Kansas City Star newspaper clipping about the firm's 1938 Neches River, Texas, bridge at Port Arthur and a structure described in considerable detail in Construction Methods and Equipment, May 1938, pages 36-41 and cover photograph, a monthly magazine published by McGraw-Hill. Ashton worked for the firm from August 1935 to April 1942 and noted on his vita that his position was Chief Designer and Associate Engineer with his name on the firm's letterhead beginning in December, 1939. It appears that his promotion to Associate corresponded with the firm's reorganization after the death of the senior partner, Ash. It became Howard, Needles, Tammen, and Bergendoff continuing in the same offices it had since the 1920s. I suppose that Ashton's years away from the firm from 1929 to 1935 had left him out of a full partnership in 1939. This firm under the same partnership names continues to be prestigious today.

Although he was not paid what he felt he was worth to the firm, these were among Ashton's most creative years because the partners obtained major contracts and Ashton designed them. In the Alumni Review article of 1958, page 16, Ashton stated that as Chief Designer for the firm he "designed about twenty bridges of which the main spans and piers at Dubuque, Iowa, Rock Island, Illinois, and Greenville, Mississippi [were] his crowning achievements." Unfortunately, he never listed the full set of bridge designs of this period, and it was not the custom for engineers in private practice to publish the design details. In fact, firms were likely to discourage technical publications by their staff as this would tell too much to rival firms and also encourage them to hire away knowlegeable employees. As his later publications show, it was not until Ashton entered academic life that he began to publish about his work and this began in the 1940s. Nevertheless, a few projects suggest Ashton's structural ideas during 1935 to 1942.

Ashton and his mentor Ash both foresaw in the 1920s the potential of welding girders rather than the less efficient method of riveting structural members together, discussions dating back to 1928 at the Vicksburg Bridge which Ash had designed (Alumni Review 1958, page 15). In 1938 Ashton contributed a prize-winning paper in an engineering contest sponsored by the James F. Lincoln Arc Welding Foundation.* This Foundation was an

*Ashton was the Foundation's medalist in 1964, see page 66.

extension of Lincoln Electric Company, the major industrial supplier of electrical and arc welding equipment, and Ashton's later consulting with the firm appears subsequently in this discussion.

The use of aluminum in construction also seemed possible in the 1930s to Ashton, an interest which ultimately resulted in his design of the world's first girder bridge of aluminum in 1958. As evidence of this interest, Ashton built himself an aluminum scull boat of his own design in the early 1930s for use during vacations at his father's cabin "Swiftwater," and subsequently used at the Bulger Hollow replacement cabin. It is still there, now property of his daughter Ruth Johnson. It is riveted rather than welded, but was a very novel use of material at that time.

The Centennial Bridge crossing the Mississippi at Rock Island was completed in 1940 and it has such simple, massive spans that it is not always recognized as an old a bridge as it is; it has a modern look to it. Other than a later published photograph taken during construction, there was never any publication describing it. The Julian Dubuque Bridge across the Mississippi at Dubuque, looks more its age because it has some elaboration of ornament. Ashton told his family that he was disappointed because he proposed two designs and the one chosen was not his favorite. He had hoped to build a cleaner, simpler span there. Fortunately, he later published a complete description of his calculations and design of the Dubuque Bridge; written for his students in structural engineering, it took up the entire issue of the the University of Iowa's Engineering College publication Transit (April 1944 Vol. 47, No. 7) and the cover and article show two views of his Centennial Rock Island as another example.

Ashton's daughter Joye states that he designed the Neches River Bridge, completed during 1938 and referenced earlier in this section; Ash was no longer designing bridges himself but approved the designs which came from the drafting room under her father's direction. At the time it was built, the Neches bridge was the tallest bridge in the south: it connected Port Arthur with Houston, Texas on the coast road link. There was a twofold problem. The bridge had to be high enough to allow ocean freighters to pass underneath it, necessitating a vertical clear span of 176 feet equal to a twenty story office building.and a horizontal clearance of 600 feet, approximately two city blooks. The other structural requirement was a very long series of spans a mile and a half long (7,815 feet) to cross marsh and give no greater grade than 5 percent. Because of the threat of hurricanes, it was designed to withstand winds of up to 130 miles an hour. The marsh extending for a considerable distance almost at river level was a layer of soft muck some 35 to 40 feet thick making it impossible to bring in land transport and too solid for barges to work on the superstructure. Ashton solved the problem by having canals dredged parallel to the approaches

March 1940, pages 48-52 and January 1, 1942. Although the Greenville, Mississippi Bridge was a remarkable span for its time and contained some innovative features, it was not discussed as far as I know in contemporary engineering publications of this kind. However, it is illustrated and briefly mentioned in Ashton's Transit publication(1944 ibid page 8).

While in Oklahoma City for a year Ashton applied for a commission in the U.S. Navy where he could put his talents to work directly for the fighting forces. As a Senior Structural Engineer in the Civil Service hierarchy no one anticipated any difficulty. Expecting to receive his commission and assignment in Washington D.C., he left Oklahoma City with his family and had all his possessions moved to his father's carriage house behind the family home in Clinton. Meanwhile, Ashton, his wife and their three daughters camped out in his father's family cabin at Bulger Hollow north of Clinton. Ned Ashton was now unemployed for the first time in his adult life and the cabin lengthened from an expected few weeks to months, from May until August while waiting for his assignment and commission from the Navy. Money became very short. Joye remembers the heavy emphasis upon fresh-caught catfish and later in the summer blackberries prepared in every conceivable way. It became a frustrating interlude. Ashton finally received the unexpected news that his Naval Commission had been rejected because he was one inch too short to meet minimum requirements.

23. THE CONSULTING PROFESSOR 1943-1955

With that news in hand, the rejection by the Navy, Ashton contacted his former professor, B.J. Lambert, Head of Civil Engineering and former Acting Dean of the College. He was offered a possition as Assistant Professor, at the bottom of the academic hierarchy, teaching graduate and advanced engineers in the Army Specialized Training Program. He was by now forty years old. Working with his mentor, Ashton rose rapidly, a tenured Associate Professor in 1947, Full Professor three years later in 1952. He fully enjoyed academic life and teaching but as soon as the war was over became submerged in incredible activity of various kinds -- teaching, campus affairs, some research and publication, personally constructing his complex and very large Ashton House with hand-split and laid masonry, and at the same time developing a large and successful consulting practice.

The Army training program effectively ended with the war and he developed courses in his specialities listed in his vita -- steel structures, structural design, stresses, masonry structures, and mechanics.

He was well regarded by his students and they found him full of entertaining anecdotes from his years as a practicing, professional engineer. He in turn found his classroom activities to be stimulating and he enjoyed the company of students. He and Gladys frequently entertained graduate students and they respected him as a man whose outside consulting enabled him to employ them on their first professional jobs. By 1958 he correctly noted that he had already employed 40 to 50 students at one time or another and in later years he employed others (Alumni Review 1958 ibid p. 15). He also organized the student program with the help of his wife at the Congregational Church on the edge of campus.

From 1946 to 1949 his personal involvement in building Ashton House became a primary drain on his time and energy. After the exterior was finished he let interior finishing slide, hiring some of it done and putting off other jobs to the sometime dismay of his wife Gladys.

By the 1950s he was sufficiently clear of the house construction to undertake some campus activity and here his primary contribution was as a member of the faculty committee on athletics, and he was also active in the faculty Triangle Club.

Meanwhile his growing consulting practice was becoming remunerative financially and he began to obtain prestigious contracts with the Navy and the National Science Foundation. His consulting practice was handled outside the University and he always maintained it was carried out "on his own time" and in his own workshop at home and not on University premises. For various reasons Ned Ashton and the Dean of Engineering did not get on well. According to Ashton, Dean Dawson was more interested in making money in real estate than he was in engineering, but the engineering he was interested in was "academic" and he took it amiss that Professor Ned Ashton did not have a Ph.D. In fact at least one other engineering faculty member was persuaded to take a leave of absence and get a Ph.D. Dawson also took the position that professional experience was not the equivalent of advanced education. Ashton had an independent and stuborn streak which led him to be very blunt and outspoken and he and Dawson were soon at sword points.

Part of the problem was Ashton's increasingly large practice: there can be no question that his outside income and time spent aroused jealousy among some of his colleagues on the faculty. Dawson retaliated by effectively stopping further routine raises in salary. Meanwhile Ashton had acquired a national reputation.

A review of the Ashton Papers (see Section 25) shows that many of the projects were fairly routine in scope. However, he gained wide recognition for his farsighted emphasis upon welding structural members to avoid the structural weakness, heavy reinforcing plates, and expense of riveting. This subject was discussed at length by Ashton in sections he wrote in the Proceedure Handbook of Arc Welding Design and Practice which was widely used by engineers, fabrication designers, and others in industry. Issued and published by the leading manufacturer of commercial welding equipment, Lincoln Electric, this Handbook had a enviable record of editions and reprintings. Ashton made major contributions to the ninth edition of 1950, reprinted in 1951 and 1952, the tenth edition of 1955 reprinted in 1956, and the eleventh edition of 1957. I have the 1957 edition in front of me while I write and Chapter 6 in part written by Ashton is 470 pages long in small print. I do not know the subsequent publication history of the Handbook, but in the eleventh edition Ashton is the first mentioned in the list of contributors and consultants and the list is not in alphabetical order. Ashton also published two articles in Civil Engineering during his early academic career, the premier academic journal in his field; articles on his laboratory research on steel and reinforcement rod materials strength testing.

Some shipyards had experimented with welding rather than rivets prior to World War II, particularly to lighten and strengthen warships, but it was not until World War II itself that welding became commonplace on cargo ships because of its strength and efficiency in construction. Following the war one of the first all welded truss bridges to be built in the United States was the Benton Street Bridge in Iowa City designed in 1947 by Ned Ashton and built in 1949. This bridge had clean lines for paint maintenance, provided a considerable cost savings in fabrication and steel weight over a comparable riveted structure, and was erected in far less time because sections were fabricated prior to erection. The Benton Street Bridge, now doomed for destruction and replacement despite its historical interest, was an industrial landmark. It attracted a great deal of professional interest among professional engineers. Lincoln Electric loved the bridge because it sold commercial welding equipment and years later was still giving out reprints of Ashton's article published in the Welding Journal. Although welding was probably inevitable given the great success of shipyards, and Ashton's bridge may not have been the first of its kind worldwide, it was an extremely important example which as much as any single structure made riveted girder bridges a largely obsolete technology within a very few years. In view of bridge construction techniques in use in the 1940s, the Benton Street Bridge represented a conceptual breakthrough in design, theory, practice, and of equal importance actually persuading the City fathers to finance its construction. I do not believe Ashton fully informed them of its singularity and uniqueness. Ashton failed, unfortunately, to convince the Iowa City Council to make Benton Street Bridge a four lane bridge and that is the reason for its obsolescence; it is but a two lane bridge.

Meanwhile, the concept of welded bridges spread throughout the United States and into Europe. A representative list of dated articles from the 1957 Proceedural Handbook (Eleventh Edition page 6-466) illustrates how the idea took hold. Articles were published in the prestigious journal Civil Engineering such as "California's All-Welded Viaduct Points Way to Improved Design" 1952; "Sequence and Continuity Mark Modern Welding Practice" 1952; "Are We Ready for All-Welded Railroad Bridges?" 1952; "Welded Railroad Bridges -- Why Not?"; all three years after the Benton Street Bridge experiment and Ashtons publication of 1949 in the industrial Welding Journal. The Engineering News-Record (McGraw-Hill) which kept readers up to date on contemporary advanced construction began publishing on examples of the new break-through such as "Welded Bridges of the Future -- Less Steel" 1951; "New Plate Girder Span Record, 676 feet, Is Set By Germans on Rhine Crossing" 1952; "New Span Record Set for Welded Girders" 1954; New York State's First All-Welded Railroad Bridge" 1955. Meanwhile other journals were reporting firsts in the 1950s such as the Pennsylvania Railroad in 1955, Switzerland 1952, the French Seine Bridge in Paris, 1953 and elsewhere.

At this time, Ashton turned his attention briefly to welded steel frameworks for forming the core of high rise commercial buildings, publishing an article on the proper use of tab supports to avoid stressing the welds. He did not pursue this theme because he had no contracts to design these structures (Ashton "Arc-Welded Beam and Column Framing," Progressive Architecture September 1949).

Meanwhile the City of Burlington, Iowa, employed him to study a number of their structures, including the MacArthur Bridge across the Mississippi. As described in his publications in The American City "The Bridge is Better Than New," November 1954 and in more detail in the Welding Journal "The Reconstruction of the MacArthur Bridge," April 1954, the structure had been erected in 1916 by a private company until it paid for itself in 1923 when it reverted to the City of Burlington. Ashton wrote:

> "The construction of this bridge could well serve as a good exercise for the structural engineer. Its 2,460-foot high span contains beam spans, six varieties of girder spans, and three lengths of deck-truss spans, in addition to 1,000 feet of main cantilever spans." (American City 1954 ibid.).

Ashton estimated the most cost-effective approach was reconstruction which finally cost $806,200 compared with the price of a new bridge in excess of $3,500,000. Since the details of the work were published it is enough to say here that the bridge, condemned for heavy traffic and shaking under lighter traffic was restored far in excess of its original specifications and was given another thirty years of useful life.

Ashton's work in radio and radar antenna towers aparently began in 1951 when he designed a 50 foot radar antenna on top of Naval Research Laboratory in Washington D.C. It needed to rotate. Ashton's solution used a surplus naval gun mount which he redesigned as the most cost-effective solution and it has worked very well ever since. The admirals were delighted with this nautical solution. The Director of the Naval Research Laboratory, Dr. John P. Hagen, next asked Ashton if he would be interested in working on a much larger project, and the result was that he began work on a 600-foot wide dish and mount for a radio telescope, receiving a two-year leave of absence from the University beginning in 1955. This project, like all others during his employment at the University, was designed in Ashton's ground floor workshop at home in Iowa City. The fifth design was accepted and classified, but he was greatly disappointed when the completion of the project was taken out of his hands and given to a traditional defense contractor, Rockwell. According to later newspaper clippings, Ashton bitterly complained that Rockwell wasted $15,000,000. in half-completed construction at Sugar Grove, West Virginia, on an alternative design which could not be built because of flaws (later comment by Ashton in Cedar Rapids Gazette Sunday November 1964 Section B.).

At the same time Ashton was asked to design the 140-foot radio telescope for the National Observatory at Green Bank, West Virginia. Associated Universities, a non-profit consortium of universities contracted with the National Science Foundation to operate major facilities which include the National Radio Telescope Observatory at Green Bank; they also run the Brookhaven National Laboratory at Upton, Long Island. Associated Universities represented major northeastern Ivy League universities -- Columbia, Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, Pennsylvania, Princeton, Rochester, and Yale. They contracted for Ashton's services on a consulting basis for conceptual plans and for every stage of construction through completion. This arragnement was made to avoid Rockwell's disaster with the 600-foot dish for the Air Force. He meanwhile designed a 300-foot radio telescope for the Navy. Unfortunately, it was never built.

In the midst of this recognition, Ashton was asked by the president of Yale if he was interested in becoming head of the department of Civil Engineering. Dean Dawson was delighted to hear the news, had earlier offered to buy his house, and limited his yearly raise to $50. Ashton, however, declined the offer from Yale because he wished to continue living in the home he had built on the river and continue his consulting practice. He publicly resigned from the University of Iowa and opened a full time office in his workshop. Ned Ashton told me that the mistake Dawson made was thinking that when he quit, he would leave town. Instead, with a financially successful and distinguished practice, Ashton continued to hire engineering students, entertain his colleagues in engineering, and talk about the dean. On another occasion I asked Ned Ashton if he planned to give his library to the Engineering College and he retorted "I hate the University."

24. INDEPENDENT CONSULTING PRACTICE 1955-1973

Ashton emotionally left the Engineering College in the mid-1950s, with his leave of absence from 1955-1957 to work on the 600-foot telescope. Joye has said he also took the leave to confirm that indeed he could support himself solely by consulting. I have chosen 1955 as the effective cut-off date although the record shows his termination occurred in 1957 and it shortly before that year that he received the offer from Yale.

The ground floor workroom was crowded with as many as twelve draftmen working out details on the 140-foot telescope and numerous other projects. In his interview recorded in the Alumni Review (1958 ibid pp.13-14) the flurry of activity was described:

> "The first glimpse I had of Ned Ashton, he was cetainly in his element. He stood in the presence of several men in shirt sleeves, all of them standing around a table on which were spread many drawings of one of Ned's present projects. Handing over a stack of background materials he had promised me, he returned to conclude his conference in the next room after committing me temporarily to the care of Mrs. Ashton... At present, Ashton is consulting engineer on thirty-three projects from bridges and radio telescopes to radio towers and a swimming pool."

These projects are described in the Ashton Papers (Section 26) and I limit this discussion to four of the best examples of his structural engineering activity.

The first example is the aluminum bridge. The major journal Civil Engineering published his article (October 1958, vol.p.761, pages 79-80). The title "First welded aluminum girder bridge spans Interstate Highway in Iowa" is expanded in the opening sentence to correctly state that it is "the world's first welded aluminum girder highway bridge." The pioneering structure was built as research and extra costs were paid for by the Alcoa, Kaiser Aluminum and Reynolds Metal Co., the three largest producers. Ashton was the conceptual engineer and supervised every stage of construction. The major advantage in using magnesium aluminum alloys is they will last a lifetime without maintenance or painting and do not rust or corrode as ferrous metals do. Ashton also emphasized that these alloys are as strong as steel but much easier to handle and he predicted that aluminum would be cheaper than steel bridges if mass produced. This Clive Street Bridge near Des Moines is described in other articles and for details see "Iowa Tries a Welded Aluminum Bridge," Engineering News-Record, February 20, 1958; and locally, The Central Constructor October 1958 vol 36, No. 4, "Dedicate Welded Aluminum Girder Bridge" (page 14) and "Experimental Structural Behavior of Iowa's Aluminum Bridge" (page 15) by E. G. Prentzas, Project Engineer for the State Highway Commission.

The second major project was the giant 140-foot telescope at the National Observatory at Green Bank. During the late 1950s and early 1960s Ashton made repeated visits to iron out problems which came up during construction. He and Gladys always drove to West Virginia since Ashton was uneasy on airplanes. In describing the problem of design, Ashton was was faced with complex stress calculations involving the mounting of the huge dish on a structure seven storys high. Ashton himself did not publish a discussion of this project, but a very complete article appeared with photographs illustrating the stages of construction and providing some technical detail. This article is "The New 140-foot Radio Telescope," by Maxwell M. Small, National Radio Astonomy Observatory, Sky and Telescope November 1965, Vol. 30, no. 5, pages 267-274. This journal is published for the serious amateur and until recently was a public service of Harvard College Observatory, Cambridge (It is now independent). To provide one aspect of the engineering design problems, Maxwell Small wrote:

> "The mass moment of inertia of the instrument about the polar axis results in a [gear] tooth loading of 37,800 pounds in 35 mile-per-hour winds and 124,900 pounds in 80 mile-per-hour winds." (ibid 274).

The design allows operation in winds up to 15 miles. There are larger radio telescopes, but these are fixed, transit types. Ashton's 140-foot design was the largest equatorially mounted, moveable radio telescope in the world at the time it was designed, has proven to be a very useful research instrument, accurate, and I think not equalled for its type. Dedicated in February 1965, it was of course operated by Associated Universites as previously described. In more recent astronomical research, the Very Large Array system for directional antenna replaces single large instruments with a series of spaced smaller instruments with a combined greater theoretical amplification, and so the earlier emphasis in the 1950s on instruments such as Ashton designed has been shifted. Nevertheless, it was a striking achievement in structural engineering. Ashton said in the 1958 Alumni Review article that one of the major concerns was the effect of movements on the huge yoke and pole shats as the instrument was shifted from one position to another. Every change in direction sets up a new stress complex, tending to pull it apart. Ashton proved here that size makes no difference if the stresses are plotted correctly.

The third major project which won wide recognition during his years in private practice was far removed from the two tour de force breakthroughs in structural engineering represented by his famous aluminum bridge and giant radio telescope. It was equally typical of his work, however, because it emphasized the concept of cost effectiveness. The project concerned the deteriorating concrete spandrel bridges in Cedar Rapids which had reached the state of being condemned for heavy traffic because of the crumbling concrete which had not been carefully supervised during the initial pours. The spans were hollow and filled with clay upon which the roadway was laid, a construction technique dating back to the time when brick roads were laid on sand over clay. His analysis showed that the spandrel bridges could be saved through reconstruction and the public expense would be far less that tearing down the old bridges and building completely new ones in their place. This entire project rebuilding the downtown bridges was accomplished rapidly and efficiently. At the end, the old bridges were far stronger than the original designs. This was accomplished by removing the clay fill and building open supports tied to an integrated reinforced concrete deck. The load on the spans was considerably lightened and the roadway directly contributed to the integral strength of the other braces and arches instead of merely resting upon them as was the original design. The project was featured on the cover of Civil Engineering, American Society of Civil Engineers, November 1968, Vol. 38, No. 11, with Ashton's article "New Bridges Founded on Old" on pages 44-48. The technical details are discussed in the article and it is only noted here that Ashton estimated he had extended the life of the bridges another 40 or 50 years, provided 17 lanes of traffic where only 12 had existed before, substantially improved the river channel as a floodway, Not only were these bridges interesting to view, but in saving them Ashton estimated he saved the City $2,000,000 over the cost of new bridges.

The Civil Engineering article concludes with a boxed editorial noting "This project received an honorable mention in the U.S. Consulting Engineers Council's competion for the 1968 Award for Engineering Excellence."

The Cedar Rapids bridge reconstruction led other cities to reconsider rebuilding rather than simply tearing down and replacing the period piece concrete spandrel bridges. One example it the reconstruction of the spandrel bridges on Iowa Ave and Burlington in Iowa City carried out over the past two years by an associate of Ashton connected with the original Cedar Rapids project, Robert Lenther.

The last project which represents Ashton's approach to structural engineering is the redesign of the College Street Bridge in Iowa City. This replaced a less well designed, narrower bridge of the late 1920s which was flawed by poor quality control of concrete pours. By the late 1960s the bridge was closed to traffic. Ashton had previously inspected the bridge in 1965 and recommended reconstruction or rebuilding, and five years later, in 1970 he won the contract for design. This led to an acrimonious public debate in the Iowa City Press-Citizen (August 21, 1970) with the story "Ethics Question in Bridge Study," with complaints by the firm of Shive-Hattery because they had expected to be awarded the contract as a matter of course. The firm did not appreciate Ashton's published comment that it was "not worth fighting over such a little job" since he had both won the contract and made Shive-Hattery look small at the same time. Ashton's conceptual design published in the Iowa City Press-Citizen (December 8, 1970 page 5A) used the old abutments at both ends spanned by a concrete flat arch resembling his late 1960s design of Hancher footbridge; it removed the central supports of the old bridge, opening up the area below and reducing floodwater backup from adjacent Ralston Creek. He estimated the cost at only $350,000. and his his replacement had widened the traffic lanes four feet, brovided parking on both sides to allow for more traffic in future, and eliminated the four foot crown in the bridge center while having a higher clearance below. Seen today, the College Street Bridge revitalized the immediate area below it in conjunction with Project Green's successful plan for a civic plaza. The area opened up by the long, flat arch is a popular area when the farmer's market is held.

There were other Ashton designs in his late years, among them Edgeware Bridge of 1968 in Cedar Rapids which won a national award and Hancher Footbridge of 1969 on the University of Iowa campus which should have won an award and did not; it is a delight and my favorite Ashton design which I cross every fair day on my bicycle going to work.

During the 1960s Ashton received national recognition for his designs. In 1964 he was the medalist for his contributions to industrial welding from the James F. Lincoln Arc Welding Foundation. The next year he was honored at the dedication of the 140-foot telescope at the National Observatory, Green Bank, as the project's "conceptual engineer." (see Dedication Program 1965). In 1968 he received honorable mention in the Award for Excellence from the U.S. Consulting Engineers Council for his Cedar Rapids spandrel bridge reconstructions. In 1970 he won the American Institute of Steel award, category medium span high clearance, for his Edgeware Road, Cedar Rapids, interstate highway bridge which crosses the Cedar River. In the Iowa City Press-Citizen interview about this last award (Thursday July 30, 1970 page 12A) Ashton was quoted as saying he had designed "well over 100" bridges in addition to his other projects.

25. RETIREMENT 1973-1985

Ned Ashton disregarded legal advice that he incorporate his business. Running his own show without named partners or associates gave the consulting practice a sequence of employees over the years. Ashton would not have worked for such a business in his younger years. One consequence was that the sometimes fiercely competitive rival firms expanded with partnerships while his own consulting contracts dwindled as he neared his seventies. While in his late sixties he began to wind up his engineering business and now had few employees. Gladys had always served as secretary and business manager and as her health began to fail a part time secretary was employed. There was no sudden break, but rather a tapering off of activity for a period of several years.

The lack of encorporation did have one interesting long term effect; the business reports and contract reports were kept intact instead of going with the firm or sold, and this made it possible after Ashton's death for his heirs to donate them to the State Historical Society.

For most of his life Ned Ashton had been favored with remarkable robust health. In the 1960s, about 1963, he suffered his first major heart attack, and the family thought it was brought on by the pressure of business and disappointment over the fate of his 600 foot telescope which was not being built. Some ten years later, as his business was winding down he suffered a second major heart attack in 1973. He was not visibly impaired by either one. Although overwieght, he maintained a high level of physical activity for a man his age, cutting timber on the Ashton Tract and at his cabin, digging, and doing yard work. In 1983, at the age of eighty, he spent the summer completely reroofing Ashton House, a project neglected for some years as evidenced by deterioration of inside plaster on the perimeter walls. This job was undertaken a section at a time, taking off shingles and tar paper down to the wood sheathing planks, replacing rotten boards as he found them. The same summer he also replaced the roof at his cabin. Late in the summer of 1983 he overstressed himself severely. While fishing in the Mississippi he jumped into the river to try and untangle and salvage his lines. He was by himself, in chest deep water, and as he later told the story on himself, he was surprised to find he could not muscle his way back over the gunnel of his boat. He was far out in the shallow, mud-bottomed flood pool and said he waded two miles, pulling his boat behind him, to get back to his mooring. The next day, deciding to lay up his boat for the fall, and trailered it from the Corps. of Engineering landing to his garage at the cabin. It was there that he lifted the trailer tongue to wheel the boat inside when it was heavy with boat water not completely drained out, and the strain brought on his third heart attack. He recovered sufficiently to get to the cabin where he spent the night and the next noon drove to Iowa City to consult his doctor -- he was immediately hospitalized. With his permission I arranged to have a crew finish the last roof section over the kitchen and he was no sooner out of the hospital than he climbed the two story ladder to check progress on the roof. Following this heart attack he continued his physical activity maintaining the yards at house and cabin, walking to the football stadium, and doing chores, but careful to pace himself. He also continued his fishing from his boat on the Mississippi.

The day he died, December 1, 1985, a heavy snow had fallen. A neighbor told me that he cleared his 300 foot driveway with his large snow blower and then set up a ladder and trimmed off some snow-broken dead branches on the driveway with his chain saw. He then decided to drive out to fill his car with gas and at the intersection of Rocky Shore Drive and Highway 6, about one-half mile from home, he realized that he was having a major heart attack. He stopped the car in the middle of the intersection, turned off the ignition, and minutes later was found in a coma by the police; he died quiety in University Hopital an hour later where efforts to revive him failed. He died about two months shy of his 83 birthday, having outlived both of his brothers. I mention these stories about his final years because his vigor and independence to the very end of his life became part of the legend about him among his family.

I have said far less about Gladys Ashton because I did not personally know her. Following her spectacular undergraduate participation in sports she taught physical education in Omaha, Nebraska and Port Arthur, Texas schools (1926-1928) and later part time in Kansas City and Denver. Upon the Ashton's arrival in Iowa City she was an Instructor on the faculty in Physical Education (1943-1948) and subsequently business manager and secretary of the consulting business. Born in 1903 in Omaha, she began having health problems in her late sixties, a combination of emphasema, arthritis, and weight problems which made it increasingly difficult for her to climb stairs. She suffered heart attacks in 1972 and 1975 and died in early January 1976. Her husband Ned nursed her through her last years of illness and then lived alone without help for the next nine years. [Ned Lowell Ashton January 30 1903 to December 1 1985; Gladys Brooker Ashton May 28 1903 to January 8 1976].

Ned Ashton maintained his interest in structural engineering through his last years of retirement. He often had uncomplementary remarks to make about modern projects based upon what he felt were design flaws and lack of knowledge about structural details. The design of the new Carver Haweye Arena came in for particular criticisms because he considered the exposed roof trusses to be far more expensive and heavy than were necessary -- moreover, the exposed trusses became a radiator, radiating out arena heat during the winter and absorbing heat during the summer and greatly inflating utility costs. He also criticized the cantilever design of the roof, predicting that winter contraction and summer expansion would soon break down the seals at the outer walls, and he provided a number of examples of the expansion of exposed bridge beams on the Mississippi which caused temporary flexing, most readily seen on swing bridges. The Rock Island swing bridge would not close properly if one side was in the sun and the other in shade and it had to be set for even expansion before closing upon occasion. He also studied the collapse of the Kansas City skyway from technical reports and was shocked to learn it had been supported by bolts and washers of too light a design to take the weight. His last consulting job, an informal one given him by a former student in practice in Cedar Rapids concerned whether or the new stadium scoreboard could take additional weight for advertising. His study of the plans convinced him that the scoreboard was improperly seated on the foundations and was a potential danger even without additional stress. This last plans review was in 1983. Among other stories he told during our twice a week dinners together in his last years concerned over-caution where it was not needed. In prior years he had studied the steal beam structure over the University Fieldhouse and felt closing it for replacement had been unnecessary as it was repairable. Similarly, the closing of the Mississippi bridge north of McGregor in the early 1980s due to a cracked plate had been an unneeded precaution, stating that such a flaw was repairable and the bridge was strong enough for one way traffic during repairs. Other stories could be mentioned, but a few have been told here to provide the context of a final disappointment. About 1983 Ashton's professional certification as a professional registered engineer in Iowa was removed because he had not taken University courses to keep up with his field. He still retained his Missouri certification. He protested the Iowa decision in vain.

26. CLIENTS AND THE ASHTON PAPERS

The Ashton Papers are in custody of the State Historical Society in Iowa City and the original organization by file drawers has been disrupted in the process of filing them permanently. With restricted state funding because of wider economic problems in Iowa, it is not clear when the Papers will be organized for reference and research. The original file index is available and it lists the projects, but it was originally planned merely for retrieval reference during the consulting practice. Rather than simply repeat the index here, or reorganize them serially by year, I have grouped them on a different arrangement, by client, which may be of assistance in showing the scope of the projects. As a note, I do not know if additional entries will be found among the papers, although this is likely as the projects became slightly disorganized during Ashton's later years and there was also duplication of materials as he tended to save everything. It comes as a surprise to learn that plans of public engineering works have often had an uncertain and short shelf life in years past because of the absence of a public archival program, and it is hoped that the Ashton Papers will provide a further impetus towards this necessary public program organized at the State Archives in Des Moines.

ASSOCIATED UNIVERSITIES: National Science Foundation. Design and construction supervision of 140-foot radio telescope, National Observatory, Green Bank, West Virginia. (1955-1965).

BURLINGTON, CITY OF: New Maintenance Building (1955), Burlington Garage (1955), Burlington Swimming Pool (1955), Cascade Bridge Reconstruction (1955), MacArthur Brige Redesign and Reconstruction (across Mississippi 1953-1954), Main Street Subway, Preliminary (1967), 6th and 7th Ave Viaduct, Preliminary (1967), Central Viaduct (1967-1969).

CEDAR RAPIDS, CITY OF: A Ave. Viaduct (1954), F. Ave. Bridge Inspection (1962), Parking, Mays Island Ramp, Parkade, and Memorial Coliseum (1963), 1st Ave Bridge Reconstruction (1961-1966), 2nd Ave Bridge Reconstruction (1961-1966), 3rd Ave. Bridge Reconstruction (1963-1965), 5th Ave. Bridge, Specifications (ND), Mays Island Retaining Walls (1965), Access N.W. Bell Manhole, 3rd Ave and 2nd St. (1965), F Ave. Dam and Freeway, Flood Control (1967), 8th Ave. Dam Estimate (1967).

CHICAGO BRIDGE AND IRON: Information of wave tank design, offshore structures [client relationship?] (1968).

CLINTON COUNTY: lyons-Fulton High Bridge [Mississippi River], Studied and Dismantled (1955).

COLLINS RADIO, CEDAR RAPIDS, Proposed Foundation, Collins Radio Antenna (ND), Steerable Beam Antenna (ND), 50-foot Radar Telescope (1955?), 20-foot biconical Horn (1955).

CORALVILLE, IOWA: Water Tank (ND), Clear Creek Bridge (1950), 1st Ave. Bridge (1968).

CRANDIC RAILROAD (acronym: CEDAR RAPID AND IOWA CITY): Consulting engineer on Bridge Repair and Design. Bridge at Iowa River and Coralville Reservoir (1955-1966), Prairie Creek Bridge (1957), Iowa River at Iowa City Bridge and Overpasses; Report Specifications (1957-1958), Chicago and Northwestern Overpass (1964), Rocky Shore Drive Overpass (1964-1965), Ralston Creek Bridge (1966), Interstate 518 (1968), North Riverside Drive, Iowa City (1968).

CULLEN AND SEHLITZ, IOWA: Trickling Filter Cover, Dyersville, Iowa (1966).

F.S. FEED SERVICES MILL, IOWA CITY: Report on Bin Failure (1964).

HIGHWAY COMMISSION, STATE OF IOWA, AMES: Reconstruction of Blue Earth Creek Bridge, Winnebago County (1954), Continuous Girder Bridge, Scott County (1956), Aluminum Bridge, Clive Road Overpass on Interstate 80, Des Moines (1957), Delmar Junction, C.M. St. Paul and Pacific R.R. over U.S. 61 (1958), Loveland Bridge, Ill. Cent. over Interstate 80 (1959), Edgeware Road Interstate over Cedar River, Cedar Rapids (1968).

IOWA CITY: Municipal Swimming Pool, City Park (1944-1948), Benton Street Welded Bridge, Specifications (1948) and Plans (1949). Wolf Ave. Bridge Specifications (1958), Ralston Creek Bridges including South Dodge, Glendale Road, Sheridan Road, Third Ave., and Center Street (1953-1959), New Park Bridge (1959) [contract not awarded to Ashton], College Street Viaduct Inspection (1965) and Rebuilding (1970).

IRONTON, OHIO [OHIO STATE HIGHWAY COMMISSION?]: Reconstruction of Ironton Bridge; Highway 52 (ND).

JOHNSON COUNTRY, IOWA: Kent Park Dam (1968).

JOHNSON, ROBERT. Repair Welds on Tainter Gate for Bob Johnson (1965).

KAHILL ENGINEERING: Hubinger Conveyer Structure, Keokuk, Iowa (ND).

KOPPERS COMPANY: Report and Recommendation, Urea Bulk Storage Building, Port Neal, Iowa (1967).

OTTUMWA, IOWA: Vine Street Bridge Inspection (1968), Market Street Bridge Inspection (1968-9).

PIONEER INDUSTRIES, SIOUX CITY: Designs for Diamond Truss Towers, Aluminum Garbage Trucks, Load King Trailers. (ND).

U.S. AIR FORCE: 300-foot Radio Telescope (1954), Air Force Towers (ND).

U.S. ARMY: Army-Navy Reserve Training Center, Iowa City (ND).

U.S. NAVY: 50-foot antenna, Naval Research Laboratory, Washington (1949), Erected (1951), Remounting Calculations (1959-60), 600-foot Radio Telescope (1956-1957),

UNIVERSITY OF IOWA, IOWA CITY: 60-foot Kennedy Disk, Physics Department, Macbride Field Campus (ND), Hancher Fine Arts Center Iowa River Footbridge (1968), Football Stadium Report (1970).

The foregoing List of Clients is reorganized from the Index to the Files since the Reports themselves are temporarily not available for reference. (ND) means the entry is not dated in the source index. These files date from 1944 to 1970 and later and represent Ashton's period as a consulting engineer. Work from his earlier professional career is more sparsely represented. The St. Louis Railroad Subway (1929-1933) is explained in the text (pages 52-54). Indexed plans from the late 1930s through the early 1940s are major bridges: Greenville, Mississippi, Natchez Mississippi, Centennial Bridge, Rock Island Illinois. Bill Ashton tells me that there are other bridge plans as well from his commercial designing period. There is another group of plans of railroad bridges: Milwaukee Lift Bridge, and two Milwaukee bascule bridges, one at South 1st St. and the other at Jureau. I presume these are Burlington Railroad bridges where Ned Ashton's older brother George was Chief Engineer: but it is unlikely that Ned Ashton designed them although he may have been consulted informally about them. We obviously await a more complete listing of the Ashton Papers from the State Historical Society.

27. ANNOTATED BIBLIOGRAPHY

Part A. Publications and Printed Materials

Ashton, Ned L.

1944 The design of a 1540-foot, three span continuous tied arch truss. The Transit University of Iowa College of Engineering Vol. 48, No. 7, cover and pp. 5-11, 14-17, 20, 22. Various calculation tables, 8 photos 3 drawings. Also available as University of Iowa College of Engineering Reprint paginated continuously. Technical review of conceptual design of Julian Dubuque Bridge with comparisons to other Ashton bridges and the designs of others.

1949 Prestretching increases strength of steel T-beams in University of Iowa tests. Civil Engineering American Society of Civil Engineers, Vol p. 182 pages 42-3, March Reprint.

1949 Welded deck girder highway bridge. Welding Journal September. Reprint University of Iowa Reprints in Engineering No. 80, pp.1-9. Three tables, 23 construction photographs. Subject is Benton Street Bridge, Iowa City.

Ashton, Ned L. (continued)

1949 Arc welded beam and column framing. Progressive Architecture September, pp. 86-89, 11 drawings, 2 tables, 1 photograph. Reprint with no Vol. or No. given.

1950 A modern steel deck girder highway bridge. Studies in Structural Arc Welding File No. 13c2, Plate 119. pp. 1-6, 7 photographs, 7 drawings, 1 table. Subject is Benton Street Bridge, Iowa City.

Note: these studies were punched for adding to a ring book: they were sent to commercial customers of Lincoln Electric. Each of the reprints was termed a plate in confusing terminology. Ned Ashton, Vita 1955, states he wrote 45 of these studies and names 14 by title. These were subsequently encorporated in Chapter six, Proceedure Handbook of Arc Welding Design and Practice (see Ashton, Editor) and only one specimen copy is with his reprints.

1954 The reconstruction of the MacArthur bridge. The Welding Journal April 1954 pp. 1-12, 9 photographs, 2 drawings, 2 tables. Reprint with no Vol. or No. and probably paginated differently.

1954 This bridge is better than new. American City November 1954, 1 page, 1 photograph. Reprint, no author, no Vol. or No, or page. Subject MacArthur bridge, and attributed to Ashton.

1954 Reinforced concrete bridge economy. Journal, American Concrete Institution, Proceedings Vol. 25, No. 7, May, page 804, 1 table. Subject: Ralston Creek Bridge, Iowa City, comparing costs with more expensive pre-stressed concrete. Published in Letters from Readers. Reprint.

1958 First welded aluminum girder bridge spans interstate highway in Iowa. Civil Engineering American Society of Civil Engineers, Vol. p.762 pp. 78-80, 5 photographs, 1 table, 1 drawing. Reprint. Subject: Clive Road bridge.

1958 Iowa tries a welded aluminum bridge: Subtitle: Design of first structure of this type required special considerations; state considers the project as research. Engineering News-Record February 20, 2 pages, McGraw-Hill Publishing. Reprint with no Vol. or No. or pp. given,

1958 Cars will soon cross new aluminum bridge. Welding Engineer August, 1 page, 3 photos. Reprint: no Vol. or No. or page; attributed to Ashton.

Ashton, Ned. L. (continued)

1968 New bridges founded on old. Civil Engineering American Society of Civil Engineers, Vol. 38, No. 11, pp.44-48, 6 photos, 2 diagrams, cover photo feature. Subject: Cedar Rapids bridge reconstructions.

Ashton, Ned L. (Editor)

1957 Proceedure Handbook of Arc Welding Design and Practice, Lincoln Electric Corp., Cleveland. Editor and author, Chapter 6, pp. 6-1 to 6-470. Note: earlier editions including Ninth July 1951, reprinted January 1951, December 1952, Tenth October 1955, reprinted June 1956.

Lambert, B. J. and Ned L. Ashton

1945 Pre-stretched reinforcing bars show high strengths in University of Iowa tests. Civil Engineering American Society of Civil Engineers. Reprint: December page 564.

Associated Universities, National Science Foundation

1959 The National Radio Astronomy Observatory 36 page pamphlet. Pages 25-6 discuss 140-foot telescope in progress, 2 photographs, Ned L. Ashton listed as designer.

1965 National Radio Astronomy Observatory 22 page pamphlet in larger format. The completed 140-foot telescope is briefly summarized page 14, illustrated on the inside back cover.

Construction News

[1960] Listed as a section of Iowa Business and Industry Magazine. Cover photograph of Ned L. Ashton with brief summary of his career.

FitzGerald, Richard

1958 Bridges are his business Iowa Alumni Review, University of Iowa, Vol. 12, No. 1, December, pp. 12-17, 9 photographs of Ashton and his projects. Note: major interview.

Prentza, E. G.

1958 Experimental structural behavior of Iowa's aluminum bridge. Central Contractor Vol. 36, No. 4, p. 15. Author was project engineer, Iowa State Highway Commission. Associated General Contractors of Iowa publishers. Note: Dedicate welded aluminum bridge, p. 14, no author. Cover photograph of designer, Ned L. Ashton with others.

Raskopf, Jack (Editor)

1956 Professors with hammers and nails. Staff Magazine, University of Iowa, Vol. 6, No. 6, pp. 2-15. Note: pages 9-11 describe Ashton House with 2 photos showing one exterior and one interior view.

Small, Maxwell

1965 The new 140-foot radio telescope. Sky and Telescope, Sky Publishing Corp., Harvard College Observatory, Vol. 30, No. 5, pp. 267-274, 19 photographs with cover feature illustrating various stages of construction. Note: author is elsewhere listed as project director, staff of National Observatory.

[1965] National Radio Astronomy Observatory, Green Bank, West Virginia. Pamphlet handed out during 1965 dedication of 140 foot telescope giving technical specifications and photographs of construction which are somewhat different than those published in Sky and Telescope the same year.

Woumell, Kent W. (Attorney)

1964 Large aperture steerable trunnion-mounted paraboloidal antenna. October 20, 1964, Inventor Edward L. Ashton, filed June 7, 1957, 19 pages with drawings and descriptions. Issued patent 3,153,789. Note: seven year delay because patent design had restricted government classification. Patents obtained to prevent major defense contractors from stealing designs.

1964 Steerable trunnion mounted parabloidal antenna. U.S. patent 3,141,168 July 14, 1968, inventor Ned L. Ashton. Filed February 5, 1962, 13 pages with drawings and descriptions. See note above.

Part B. Manuscript and Other Sources

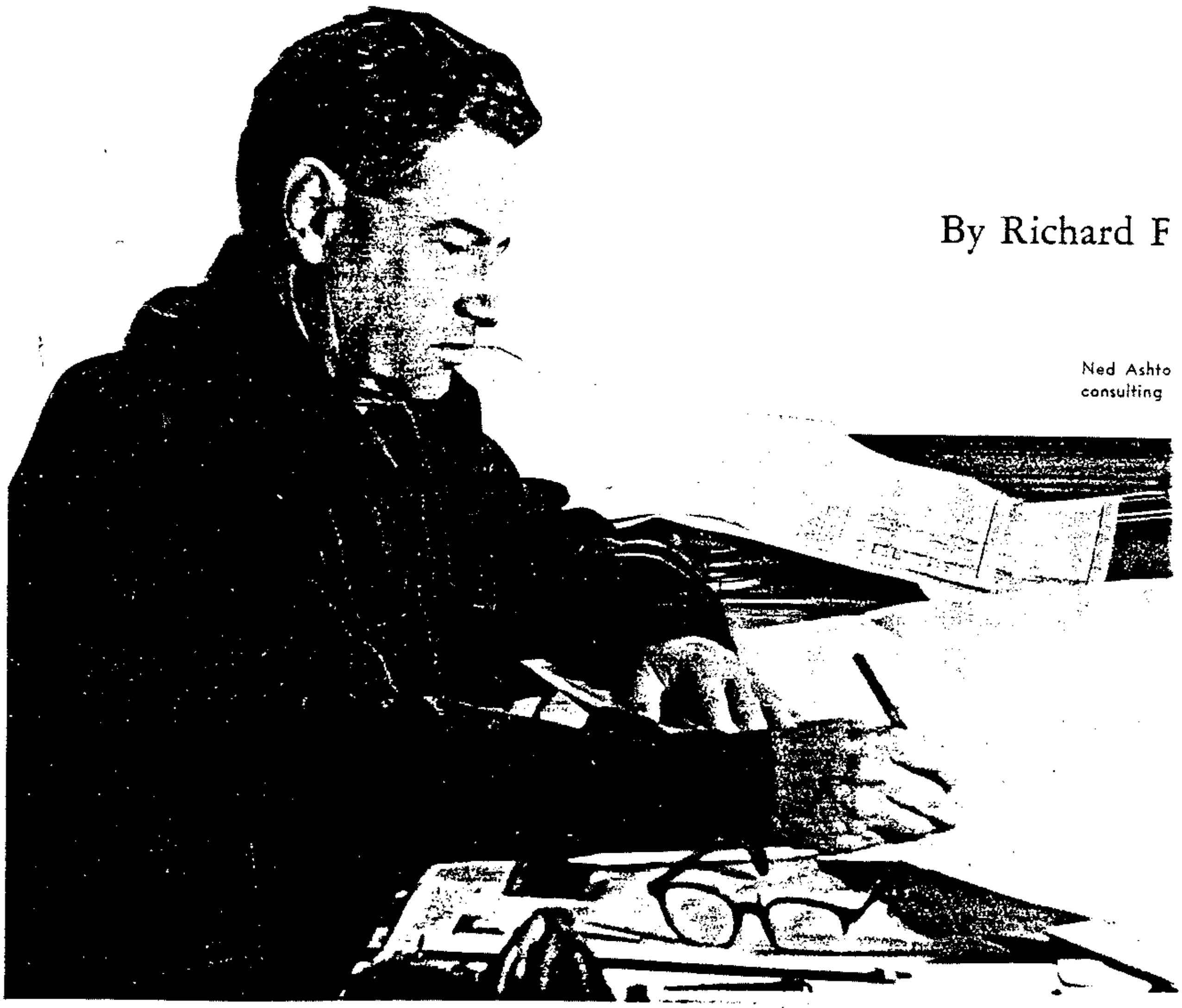
Avoiding repetition here, the reader is referred to Section 5. Ashton House Sources of Information (pp. 5-9), Section 20. Engineering and Personal Sources about Ned Ashton (pp. 44-46), and Section 26. Clients and the Ashton Papers (pp. 69-72). All sources included in this review are presently at the State Historical Society or will be donated to complete the collection.

28. REPRINTS

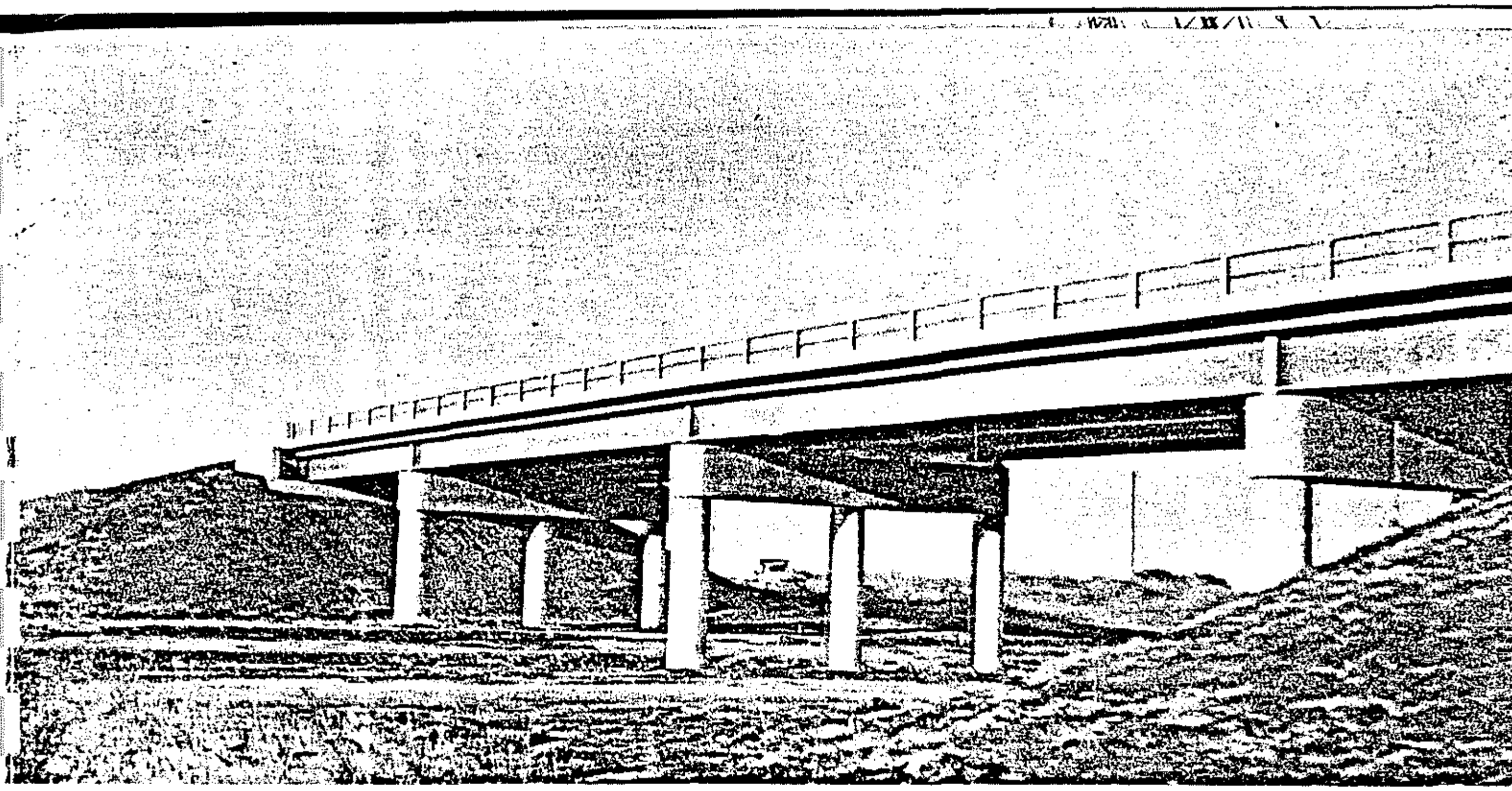
The Alumni Review "Bridges are his business" 1958 is the single most valuable summary of Ned Ashton's engineering development, although it was not intended as a professional assessment. It is reprinted completely. The remainder of the reprints are limited to a selection of reprint and journal covers which provide illustrations of his work. The full citation and contents of each of these covers is provided in the Annotated Bibliography, Section 27, preceeding pages.

Bridges are his Business

By Richard F



Ned Ashto
consulting

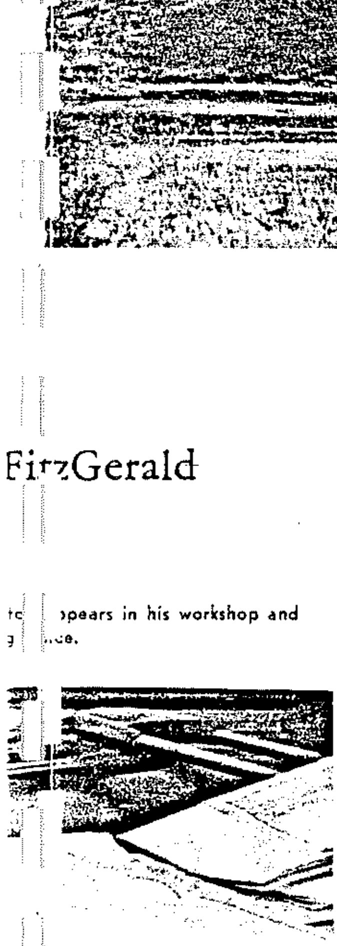


Ned Ashton's latest engineering triumph, the first aluminum girder-type highway bridge, erected in Des Moines in 1958.

'58

FitzGerald

...pears in his workshop and ...ce.



On September 24 in Des Moines, Ned L. Ashton dedicated the world's first aluminum girder-type highway bridge with this encomium: "The bridge is of the best modern tradition in workmanship and material and is expected to endure almost indefinitely with a minimum of roadway maintenance and without painting."

There was every reason for Ashton's warmth and enthusiasm when he referred to the aluminum bridge for it was born in his own imagination, designed at his own workbench, and supervised by him through fabrication in Chicago and erection near Des Moines. And he had been chosen to deliver an address at the dedication ceremony.

But for all it is, the aluminum bridge is only the latest creation in a long list of unique achievements by one of Iowa's leading structural engineers.

Ned Ashton readily agreed to an interview by the ALUMNI REVIEW, expressing pride in his long association with Iowa, both as student and, later, professor.

The first glimpse I had of Ned Ashton he was certainly in his element. He stood in the presence of several men in shirt sleeves, all of them standing around a table on which were spread many drawings of one of Ned's present projects. Handing over a stack of background materials he had promised me, he returned to conclude his conference in the next room after committing me temporarily to the care of Mrs. Ashton.

While we sat in the kitchen over coffee, Mrs. Ashton told me Ned and she had met at the university while he was Dolphin captain and she, president of the Seals. Our conversation turned to Ned and his undergraduate days at SUI where he had been a member of the All-American swimming team in 1925, captain of the SUI swimming team the same year, and mid-western AAU backstroke champion, 1921-26.

Mrs. Ashton spoke about a few of her husband's present projects, among them the famous aluminum bridge and the radio telescope going up at Green Bank, W. Va. Then, excusing herself, she left me to the bulk of background material stacked on the table.

Edward Lowell (Ned) Ashton was born in Clinton, Iowa, in 1903. He married Gladys Brooker in 1928. Ned is a registered professional engineer in Missouri as well as Iowa. He appears in three editions of "Who's Who in Engineering" and twice in "America's Young Men." He was author of a prize paper in 1938, and is author of "Studies in Structural Arc Welding."

Ned was professor of Civil Engineering at the University of Iowa, 1943-57, and since 1956 has been Structural Consultant of Associated Universities, Inc., for the National Science Foundation. He belongs to a large list of professional societies, including the Iowa Academy of Science and the American Welding Society. At present, Ashton is consulting engineer on thirty-three projects from bridges and radio telescopes to radio towers and a swimming pool. Examples of completed projects (on which he worked with other firms) are an aircraft assembly plant, and Boulder, Wheeler, and Grand Coulee dams, seventeen assignments in all, located in nine states.

When Ned's conference had adjourned, he promptly came over and sat down at the table. He began by sketching in some recent personal history, but only a few minutes had passed when Mrs. Ashton reminded him of his "Rotary" luncheon in town.

While we were walking from the car to the Jefferson Hotel, Ned told frankly how he happened to become so interested in bridges.

"When I was in graduate school, I was so taken up with a book I read, that I went to Kansas City to take my first job with the firm with which the author had long been associated before his death."

The firm was Harrington, Howard and Ash.

Ned laughed when asked how good the techniques of the book really were.

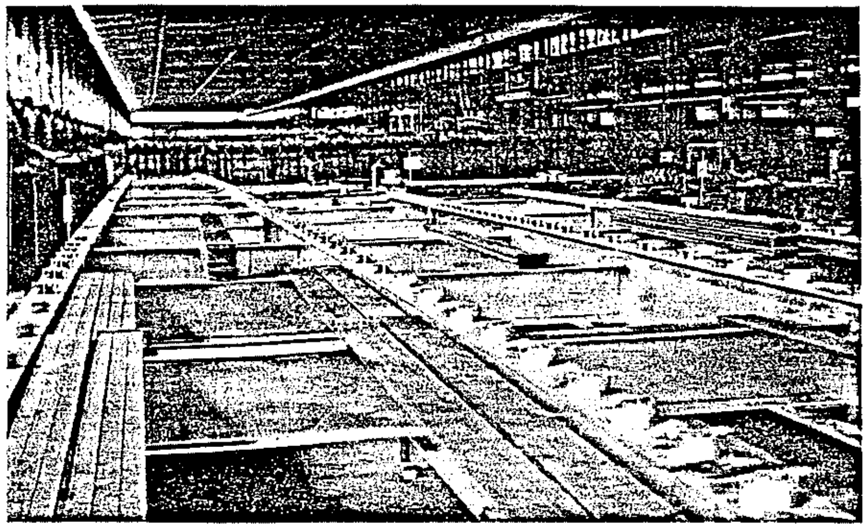
"They're still used today," he said.

I asked my host what a "bridge" meant to him. Ned said that it was a strong, durable body perfectly planned and balanced. He admitted he built every bridge with an eye for the visible beauty of the structure.

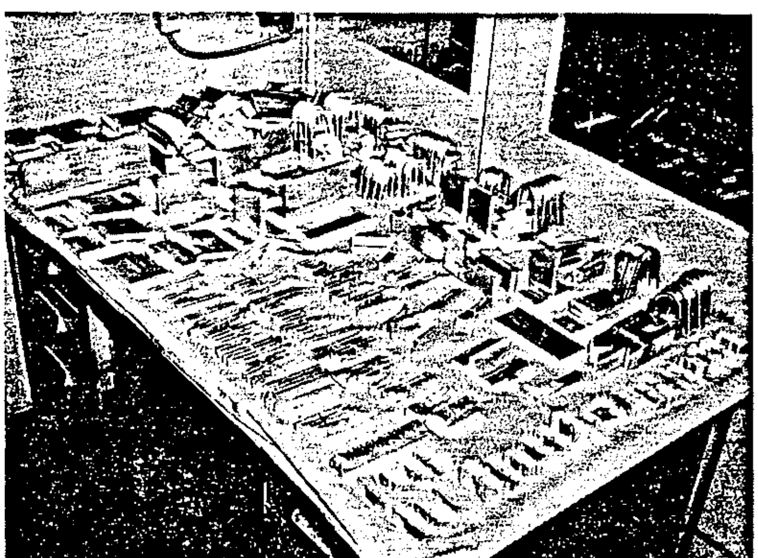
At lunch, the subject of Ned's participation in college athletics came up.

"You know," he said, "in athletic competition, I learned a deep and humble understanding of how our success depends upon the mutual help of others, and that only as the whole team wins can we all win the great game of survival. One of my best friends today, right here in Iowa City, is Irving Weber. Irving had the swimming record at the University until I took it away from him. And he spent his college days trying to recover it—and he never did." (Ned Ashton's backstroke record for 150 yards was 1:56, set in 1924.)

After lunch, as we drove back to the Ashton place, Ned surveyed the damage a tornado of the night before had left behind it. He felt bad that some of his neighbors, too, had suffered loss. Fortunately, the wake had been extremely limited, hitting many trees but leaving homes unharmed.



The aluminum bridge assembly is shown in the shop at the Pullman Standard Plant in Chicago, where it was prepared for shipment to Des Moines in sections.



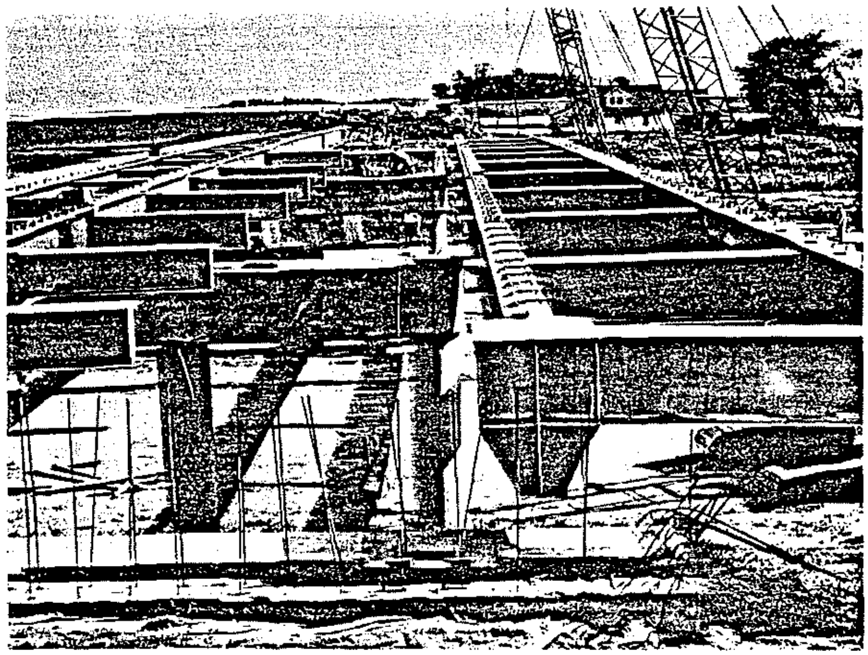
Shown here are first samples made to determine proper welding periods and qualified men who would do the welding of the world's first aluminum girder type highway bridge. Tension, bend and sheer tests, and chemical and physical analyses demonstrated beyond doubt the adequate strength of the welded metal.

On the way in, I expressed my admiration for the Ashton house Ned had designed for his family. Begun as a family project in 1945, the house took ten years to build. Ned explained he had designed it to fit the layout of the land. He chipped the rocks himself which became the walls of the structure. During the war when good lumber was hard come by, the Ashtons cut theirs from cast-off Army gun and machinery crates. Ned pointed proudly to a balcony set back in a depression, facing the woods and Iowa River beyond, with stone steps ascending to it on one side and descending from the other.

Once inside, Ned began sketching his story.

Ashton took his Master of Science degree in both hydraulics and structural engineering at SUI in 1926.

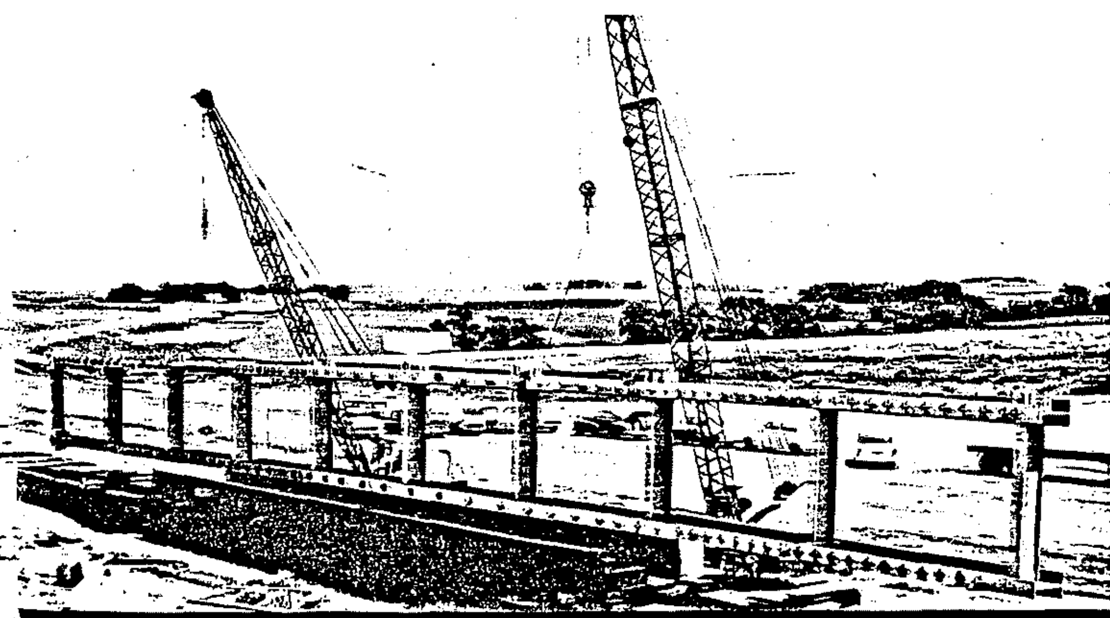
In 1928, Ned jumped at the opportunity for field experience and went as Resident Engineer on the $7,500,000 combined railway and highway bridge over the Mississippi River at Vicksburg, Miss. It was there that Ash, senior member of the Kansas City firm, exerted a profound influence on the young man's education. At work on the Vicksburg bridge, Ash had commented, "If we could only extend one plate through another—welded together, how much better it would be." Ned had already realized how wasteful the riveting and bolting process appeared. But he stood almost alone among structural engineers in advocating the idea of welding. As one associate put it, "There's no point in being a leader if no one is following." Yet Ned never gave up his interest, and used the welding process in bridge construction whenever he was free to do so. It was not until around 1950 that welding became accepted as by far the best modern method of joining metals. The combination of magnesium and aluminum, so easily welded without special treatment, was to reach one historic pinnacle with the erection of the first welded aluminum girder bridge.



Going into position is the third of four huge sub-assemblies of the aluminum bridge. Central diaphragms protruding from the left are ready for bolting when this section is in position.

In 1929, Ashton joined James A. Hooke of St. Louis as associate engineer, for the first time with his name on the firm letterhead. His first real opportunity came when Ned was asked to design and personally carry the complete responsibility for the $20 million St. Louis Electric Terminal Railway Co. project, four years in construction. He was 26. The opportunities had come to strain Ned's ability and imagination and he had been able to keep up with them.

Finally, Ned had money enough to stay out of debt. Mrs. Ashton worked in Kansas City, and later became principal of a high school. They were married in June, 1928. To this day, Ned looks on that period as one which gave him a chance to get his feet on the ground in his profession, and then to take on the burden of a family. Today, he hires graduate engineering students to help him in the workshop (he estimates he has employed 40-50 to date) to give them a similar chance



A 126 foot aluminum subassembly is unloaded from freight cars. Four such pieces make up the whole framework after they are spliced together end to end and held together laterally with diaphragms.

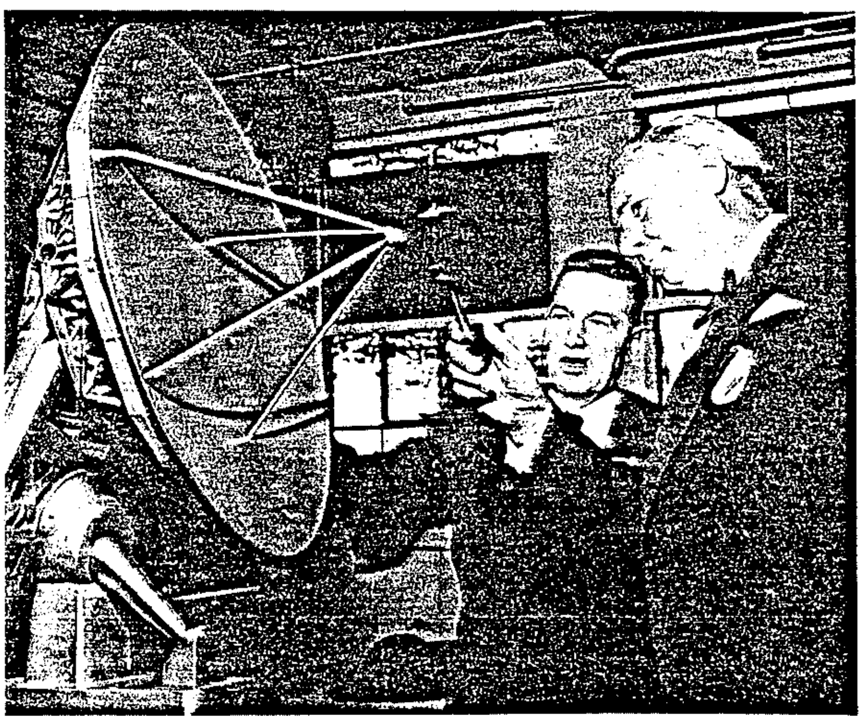
to background themselves while still studying at the University.

In 1933, Ned joined the Bureau of Reclamations (Dept. of Interior) in Denver, Colo., as assistant engineer in the Division of Dams where he worked on big projects, such as Boulder, Wheeler, and Grand Coulee dams. These broadened his experience immensely. From August 1935 until the war he was Chief Designer for Howard, Needles, Tammen, and Bergendoff of Kansas City. There, Ned designed about twenty bridges of which the main spans and piers of the Mississippi River bridges at Dubuque, Iowa, Rock Island, Ill., and Greenville, Miss., are his crowning achievements. And then in 1942, he joined the Austin Company in Oklahoma City, Okla., as their Chief Structural Engineer and there designed the $28 million Douglas Air Cargo, Oklahoma Aircraft Assembly Plant.

In 1943, Ashton joined the State University of Iowa faculty, first as assistant professor, and then, in 1952, he became a full professor of Civil Engineering.

His reputation spread from projects taken on his own time while still teaching at the university, until in 1955, Dr. John P. Hagen, Director of Naval Research Laboratories (NRL) asked Ned if he would be interested in working on a bigger radio telescope, after the success of his previous design, a 50-foot radar telescope, erected at NRL, Washington, D. C., in 1951. (This earlier telescope was the beginning of Ned's real interest in structural aluminum.) After receiving a two-year leave of absence from the University, he began work on a 600-foot antenna, the fifth design of which was accepted and classified. Ned was greatly disappointed when the completion of the project was taken out of his hands and construction begun at Sugar Grove, West Virginia.

It was later that Associated Universities, Inc. (AUI), asked Dr. R. M. Emberson, senior member of the Institute of Radio Engineers, to get Ned to work on the 140-foot radio telescope in Green Bank, W. Va., as part of the National Radio Astronomy Observatory facilities there.



Examining a model of his design of 140-foot telescope being erected at Green Bank, W. Va., Ned Ashton is shown with Dr. Lloyd V. Berkner of Yale University, president of Associated Universities, Inc., which will build and operate the National Radio Observatory Center there.

"My design was the ninth submitted to AUI and it was immediately accepted. (One previous design by England's Husband Co., designer of the 250-foot dish near Manchester, England, had been refused.) A contract was drawn up which engaged my services on a consulting basis through every stage of construction until completion."

Describing the telescope's accuracy, Ned said, "It will have a total of 1/4 inch (possibly 1/8 inch) error over its 140-foot surface."

Ned made an enlightening comparison of the limited visual and audio vibration ranges with the infinitely wider band accessible to the "eye" of the telescope. Thus the radio telescope's ear will be tuned in one hundred times farther in space to explore the universe than the largest visual telescope at Mount Palomar. For the optical wave lengths are extremely short, while radio waves are very long.

Ned explained that the telescope is basically research to improve communication systems. Guided missiles to stop and start need communications. Where there are space ships, communications *must* work. The telescope is highly sensitive since signals from outer space are very weak, requiring a tremendous gain on a signal to make it audible. This radio telescope can be used for any purpose radar is used for today but is more sensitive and powerful.

He continued, "These experiments are very important in different ways to different people. For example, instead of television towers every 25 miles across the country, radio telescope relay towers might be put 400 miles apart."

"We're not so far behind the Russians," Ned ventured. "Probably much of what they have has come out of the U. S. by sabotage."

One unique feature of the telescope is its extreme mobility. Mobility increases the problem of the structural engineer, however. On a stationary object, the stresses are always exerted in the same directions. Men of science did not think, because of the equatorial movement,

The Rock Island Centennial Bridge over the Mississippi River as it looked during construction in 1940.

big yoke, and polar shaft of the 140-foot telescope, that such movement was possible on such a big instrument, for every change in direction sets up a new stress complex, tending to pull it apart. Ned proved here that size makes no difference if the stresses are plotted correctly.

This telescope is one of Ned Ashton's unique achievements. But most of his productions are original designs. Some examples (to name a few: are: the Natchez (Miss.) River Bridge (1936), the Centennial Bridge over the Mississippi River at Rock Island, Ill. (1940), the Benton Street Bridge, Iowa City (1949), and his latest, the Aluminum Girder Highway Bridge, Des Moines (1958).

The conversation had reverted to bridges. Ned asserted he found his occupation interesting and challenging.

"Bridges are built in places where I enjoy working." And he laughed.

Asked what exactly he called his varied profession, Ned answered, "Civil engineering, specializing in hydraulics and structural work."

He continued. "The big structures combine structural, mechanical, and electrical engineering all together." He explained how his outstanding undergraduate engineering education pivoted upon just such a combination of engineering interests.

"Besides," he acknowledged, "for a task such as a bridge where a variety of specialists is needed, a coordinator who understands all phases of the work is necessary."

Asked about the difficulty of calculating stresses and arriving at perfect balance in bridge construction when such great weights are in use, Ned pointed to a picture of his Mississippi Bridge at Dubuque before completion in which two giant cranes were shown aloft on the still unconnected arching span, and said, "That crane weighs 50 tons. Every bit of weight must be taken into consideration or the sections when completed will not fit properly."

Ned describes the most difficult phase of creation as the visualization of the whole structure in the mind before any of it goes down on paper, before any stress analysis and proportioning of parts can be made.

"You must be able to visualize how you will arrange the members," Ned asserted, "and how loads will be carried from originating point to the foundation, for gravity and wind loads."

The interview would not have been complete without a visit to Ned's workshop, a large circular room in the downstairs of Ned's home. It is equipped with several drafting tables. There is a telephone at Ned's desk and several stacks of important work,—waiting. Overhead, a small rectangular sign reminds him daily to "Work 8 hours, sleep 8 hours. But make sure they are not the same 8 hours."

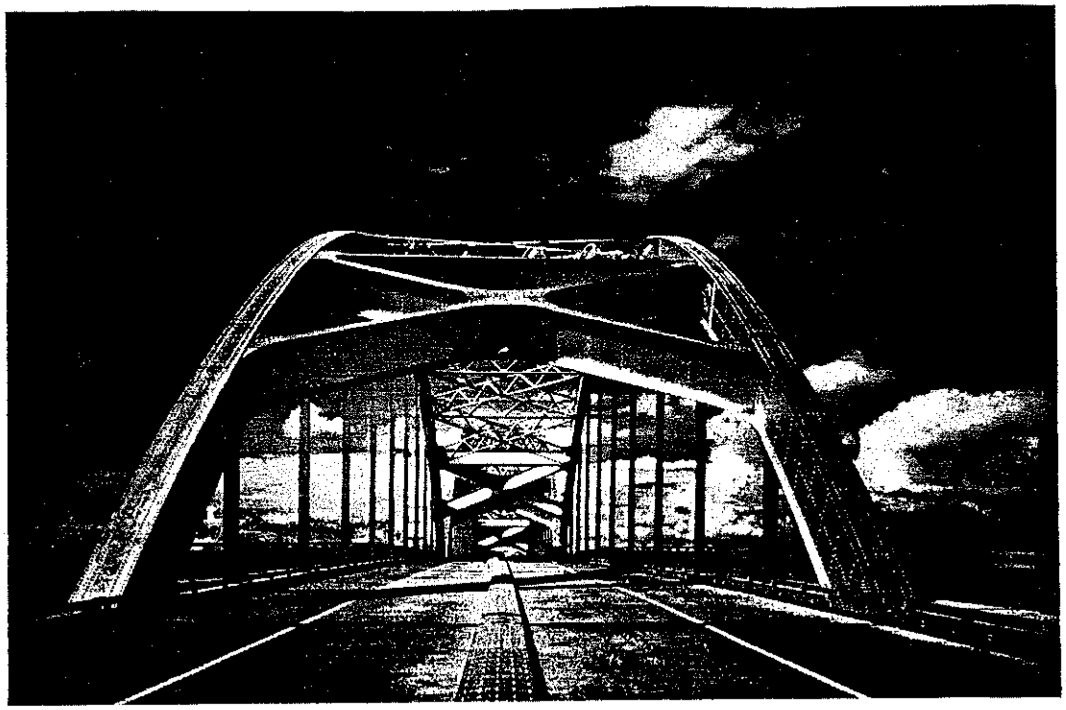
While teaching at SUI, Ashton was chairman of the committee which founded the "B. J. Lambert Scholarship Fund" in the college of civil engineering. Then in 1957, it was Ned again as a member of a small committee, rounding up former swimmers of Dave Armbruster, SUI swimming coach 1924-57, to salute Armbruster on his retirement at a big party, and to present him with an automobile.

Ned had concluded his dedicatory remarks of the aluminum bridge with these words:

"I hope that I may soon have the opportunity to design the first long span aluminum bridge across the Mississippi River for Iowa . . . a new, all welded, Centennial Interstate Bridge out of aluminum alloy with an aluminum deck. . . ."

And as we said goodbye, it was with the thought that perhaps the secret of Ned Ashton's success is the fact that he always has one eye open on the future.

The Ashton home. Ned designed the house, the building of which was a family project, begun in 1945 and taking 10 years to complete.



A MODERN FOUR
LANE HIGHWAY BRIDGE

Iowa

April, 1944

Prestretching Increases Strength of Steel T-Beams in University of Iowa Tests

NED L. ASHTON, M. ASCE

Professor of Civil Engineering, State University of Iowa, Iowa City

TESTS MADE at the research laboratory of the State University of Iowa indicate that increased strength in steel T-beams is secured by prestretching. These tests are an extension of previous studies conducted at the laboratory on prestretched reinforcement for concrete beams and on prestretched reinforced concrete beams under impact loading. Some of the tests have previously been reported in CIVIL ENGINEERING ("Prestretched Reinforcing Bars Show High Strength in University of Iowa Tests," by B. J. Lambert and Ned L. Ashton, Members ASCE, December 1945, page 564).

In the tests on structural steel here reported, all seven beams were of balanced design, designed for about 40,000 psi in the compression flange, combined with about 85,000 to 90,000 psi in tension.

A comparison of beams Nos. 5 and 7 is especially interesting. Beam No. 7 was fabricated by welding an ordinary structural steel plate to an ordinary tee, the plate forming the top flange while the tee made up the web and bottom flange. When loaded at the one-third span points in a testing machine, this beam began to yield under a load of 14,250 lb and failed as shown in Figs. 1, 2 and 3, at an ultimate load of 22,545 lb.

Beam No. 5 was made from exactly the same material and in exactly the same way as No. 7 except that both the plate and the T-section were prestretched 7 percent longer than the "as rolled" condition before they were fabricated into the welded beam. In the testing machine the beam was first subjected to a 25,265-lb load. This load was released and the beam reloaded with a 28,720-lb load. The beam was then taken out of the testing machine to be photographed with beam No. 7 (Fig. 2). The two unloading points for beam No. 5 are shown in Fig. 2 as points A and B. When returned to the testing machine, this beam was subjected to an ultimate load of 33,770 lb before final failure, represented in Fig. 3 by a dotted line.

Another comparison of interest is that between beams Nos. 2 and 3 and beams Nos. 6 and 7, in which the first pair of beams show an average improvement over the second pair of 78 percent (Table I). Beam No. 6 was fabricated exactly like No. 7, previously described. Beams Nos. 2 and 3 were of the same material and fabricated in the same way except that the T-section was prestretched 10 percent before fabrication. The plate was not prestretched in any of these four beams.

The tests here described were carried out under the writer's direction as a joint thesis project by two

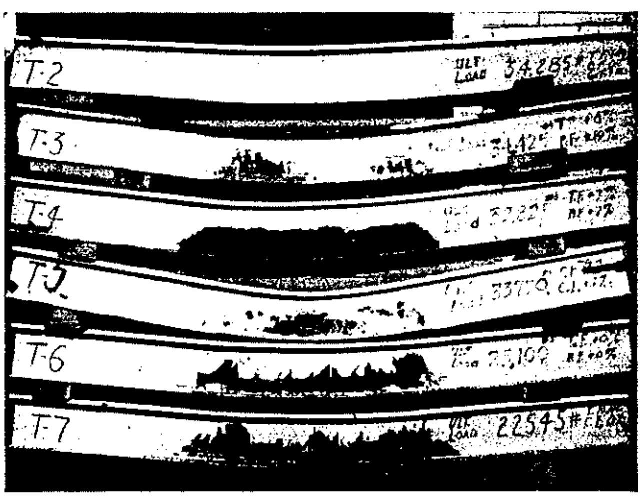


FIG. 1. TESTS ON SEVEN T-BEAMS with and without prestretching show increased strength in beams subjected to prestretching of T-section or of both T-section and plate. Details of test procedure are given in Table I, below.

TYPICAL T-SECTION is stretched in machine before being assembled into beam for test program. Two graduate students in civil engineering conduct tests for joint thesis at State University of Iowa. Richard L. Buchwalter measures stretch in T-section while Yan Chang Shiu operates controls.

TABLE I. RESULTS OF TESTS ON SEVEN T-BEAMS WITH AND WITHOUT PRESTRETCHING

Beam No.	"T" Prestretched, Percent	Plate Prestretched, Percent	f_s from Prestretching, psi	Yield Point, f_s from Beam Test, psi	Yield Point, f_c from Beam Test, psi	Yield Point Load, Lb	Ultimate Load, Lb
1	7	0	66,300	62,000	32,800	....	....
2	10	0	79,500	78,000	40,200	26,200	34,285
3	10	0	72,000	73,000	38,000	25,000	34,425
4	7	7	63,900	65,500	32,800	22,600	32,825
5	7	7	68,200	71,500	38,700	23,750	33,770
6	0	0	42,000	38,750	17,300	14,500	25,100
7	0	0	43,000	35,800	16,100	14,250	22,545

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September, 1949

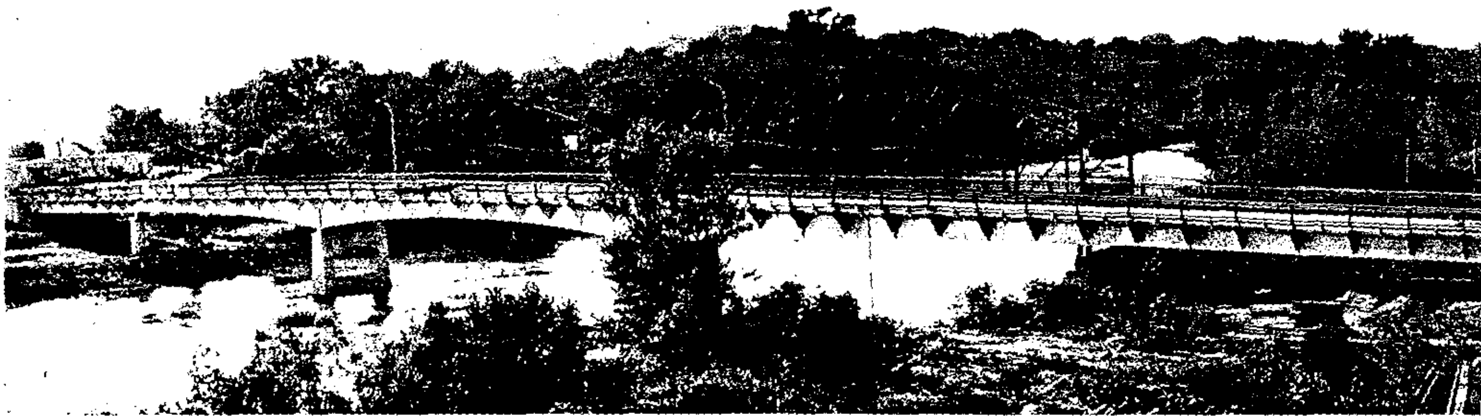

Fig. 1 Elevation of the bridge

Welded Deck Girder Highway Bridge

Design and construction of a modern welded deck girder highway bridge results in considerable savings. Prefabrication of parts resulted in further savings

by Ned L. Ashton

THE bridge described in this paper is the new Benton Street Bridge across the Iowa River in Iowa City, Iowa, as shown in Fig. 1.

It is a symmetrical five-span continuous steel deck girder highway bridge of welded design, 480 ft. long between abutments and supported on four intermediate concrete piers. The span ratios are 78–100–120–100–78 ft. dictated by both economy and the fact that the western bank pier is located straddle of a twin 14-in. cast-iron sewer siphon running across the river at such an angle as to clear the base of the next pier 100 ft. away, while the 78-ft. end span just clears a sewer manhole at the western terminus of the siphon.

Since this arrangement also located the central 120-ft. span in the middle of the river these requirements determined the final symmetrical five-span layout for the bridge.

The project replaces the old truss bridge which is shown in the background of Fig. 1. The old bridge was located just upstream from the new. It was built originally in 1902 and was finally condemned as unsafe for traffic in 1944.

The new bridge was financed entirely as a special bond issue by the City of Iowa City, Iowa, under the leadership of Mayor Preston Koser and the City Council. The total project cost, including the right of way and both approaches, was $276,000.

The new project began with the election of the new Mayor and City Council in the spring of 1947 and with a formal application for a loan of planning funds, from the Federal Bureau for advancing funds and facilities for planning community improvements. The loan was granted immediately, final surveys were made and then several alternative locations and span arrangements were studied, including both the replacement of the existing bridge on the same site and a third alter-

Fig. 2 Cross section of the bridge

Ned L. Ashton is with the State University of [illegible] City, Iowa.

[illegible] Thir-

ARC-WELDED BEAM AND COLUMN FRAMING

By NED L. ASHTON

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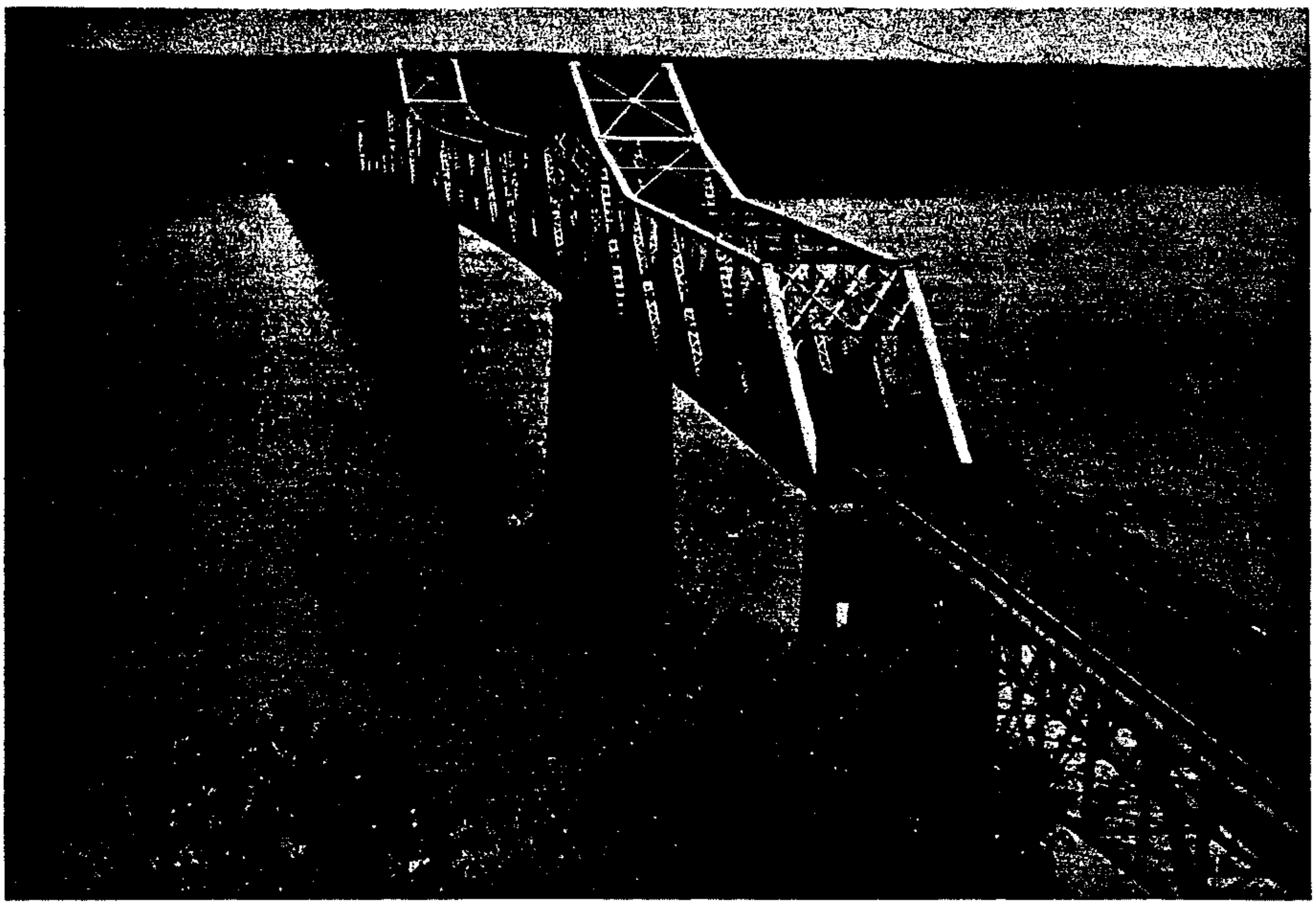
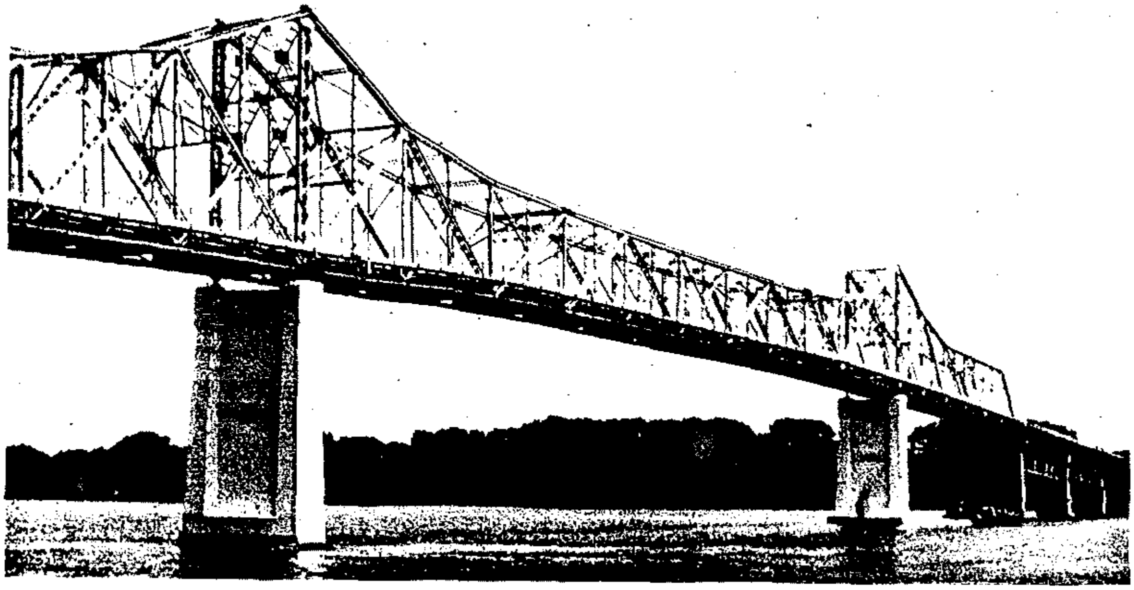
THE RECONSTRUCTION OF THE MACARTHUR BRIDGE



The MacArthur Bridge over the Mississippi River at Burlington, Iowa

by NED L. ASHTON
Consulting Engineer
Iowa City, Iowa



Burlington's 35-year-old MacArthur Bridge will give better-than-new service now that it has been remodeled.

The Bridge Is Better Than New

Burlington takes the obsolescence out of an overworked trans-Mississippi Bridge

MACARTHUR BRIDGE, crossing the Mississippi River at Burlington, Iowa, appeared to be in trouble last year. This was in no way a fault of the bridge itself. It was completed in 1917, built to standards that today are obsolete but represented good standard practice of that time. It represents the vision of J. A. MacArthur, a public-spirited Burlington citizen who organized a bridge company that did the building.

By 1923, bridge tolls had retired both bonds and common stock. Under the terms of the company's founding, the bridge then became the property of the city. Since that time, tolls have produced a revenue of over $4,500,000.

The original bridge was built with a timber deck, curbs, and 4-foot sidewalk. The roadway spanned 19½ feet. The designers, anticipating the traffic load, strengthened one side of the bridge to carry street cars. Neither the materials nor the construction remained suitable after some 35 years of use.

Moreover, the concrete masonry piers and structural steel reinforcing that supported the bridge were in bad shape. The absorption of water followed by alternate freezing and thawing had chipped the concrete so badly that it looked as though beavers with carborundum teeth had been chewing on it. The structural steel also had rusted enough to look dangerous.

Bridge Rehabilitation

To rehabilitate the overworked MacArthur Bridge, the city retained Ned L. Ashton, Iowa City consulting engineer. His assignment was to reconstruct the bridge so that it would be able to carry today's heavy, fast-moving traffic without load restrictions.

The restoration of the piers was turned over to Western Waterproofing Company, of St. Louis, Mo. Western's first step was to cut away all disintegrated concrete. Part of the pier caps which were in exceptionally poor condition were removed and rebuilt. All affected areas were then cleaned, reinforced, and refilled with gunite; all the new pier caps were constructed of poured concrete.

Finally, all exposed areas were protected with two coats of Western Resto-Crete, a concrete mix able to withstand alternate wetting and drying. Today, the piers look like new, and Burlington is convinced that they will give better service than the old ones did when they were new.

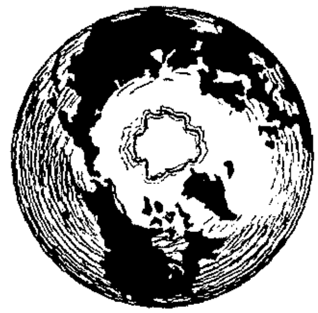
Other Strengthened Features

Strengthening of the balance of the bridge was equally interesting. The construction of this bridge could well serve as a good exercise for a structural engineer. Its 2,460-foot length contains beam spans, six varieties of girder spans, and three lengths of deck-truss spans, in addition to 1,000 feet of main cantilever spans.

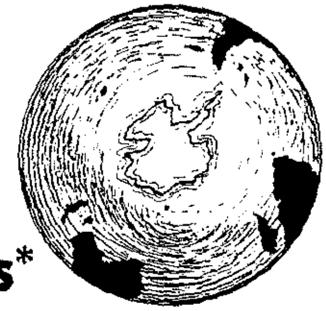
In the redesigned structure, Mr. Ashton provided 22 feet of roadway by cantilevering the sidewalk outside the structure itself. He replaced the wooden floor with a 5-inch, I-beam Lok steel decking, and then systematically strengthened all members so that it would accommodate an H-20 loading.

By restricting traffic to one side of the bridge at a time, the flow was not interrupted while reconstruction work proceeded. A system of lights permitted traffic to continue in one direction for 7½ minutes before allowing the reverse flow to proceed. Traffic across the bridge remained high throughout the reconstruction period.

Reprinted from THE AMERICAN CITY *for November,* 1954



Letters from Readers*



Reinforced Concrete Bridge Economy (LR 50-19)

Since we seem to be in an era of prepacked and prestressed concrete, the writer would like to call attention to the fact that conventional methods of reinforced concrete design, when applied to well-conceived structures, are still quite economical.

A 50-ft clear span reinforced concrete rigid frame bridge, designed by the writer, was recently completed over Ralston Creek in Iowa City, Iowa. Since this bridge cost only $8.30 per sq ft and a recent widely-publicized 30-ft span prestressed concrete bridge in Iowa cost about $15.00 per sq ft for only a H-15 design and a 20-ft roadway on timber abutments, the writer thinks that a description of this bridge is worthy of attention.

The bridge has a 30-ft roadway and two 5-ft 2-in. sidewalks. It is 42 ft 9 in. wide, out to out of sidewalk slabs, and is supported on a 32 ft wide two-hinged, rigid frame solid concrete slab. The slab varies in thickness from 1 ft 9 in. at the center of the span to 3 ft 6 in. at the face of the abutments. Abutment wing walls are cantilevered from the sides of the vertical legs of the rigid frame and have no foundations of their own. They extend as far as 18 ft from the sides of the frame and support concrete pylons at the ends of the handrails. Sidewalks also cantilever from the sides of the concrete frame and are made as solid slabs with a curved soffit.

The bridge is designed for three full lanes of H20-S16 traffic plus the sidewalk loads, and replaces an old 20 ft wide, three-span, steel beam bridge with a timber deck that was 75 ft long from face to face of the old abutments. The old bridge was completely rusted out and had been condemned and closed to traffic before the new bridge was started.

The project was 110 ft long from breakout to breakout of the pavement for the removal of the old bridge, and 12 in. thick heavily reinforced concrete slabs were provided to span over the newly filled in portions of both approaches.

On the basis of the width of roadway plus one sidewalk for 110 ft, this project cost only $7.70 per sq ft; on the basis of the bridge only, which is 83 ft 8 in. x 42 ft 9 in. and covers 3570 sq ft, cost is only $8.30 per sq ft.

Below is a summary of the actual cost of the 50-ft clear span reinforced concrete rigid frame bridge.

NED L. ASHTON, Consulting Engineer, Iowa City, Iowa

Item	Quantity	Unit cost, dollars	Total item cost, dollars
Removal of old bridge			1195.00
Excavation, cu yd	293	5.25	1538.25
Treated foundation piles, lin ft	727.5	1.90	1382.25
Concrete in rigid frame, cu yd	355.6	40.60	14,437.36
Embankments and backfill, cu yd	325	2.10	682.50
Concrete approach pavement, cu yd	58	25.00	1450.00
Reinforcing steel, lb	46,000	0.15	6900.00
Metal handrails, lb	5268	0.40	2107.20
Total contract cost			$29,692.56

Authorized reprint from copyrighted JOURNAL OF THE AMERICAN CONCRETE INSTITUTE, V. 25, No. 7, May 1954, *Proceedings*, V. 50, p. 804, published by American Concrete Institute, 18263 W. McNichols Rd., Detroit 19, Mich.

First welded aluminum girder bridge spans Interstate Highway in Iowa

NED L. ASHTON, M.ASCE, Consulting Engineer, Iowa City, Iowa

(*Reprinted from October 1958 issue of* CIVIL ENGINEERING, *published and copyrighted by the American Society of Civil E*

Iowa Tries a Welded Aluminum Bridge

Design of first structure of this type required special considerations; state considers the project as research

Ned L. Ashton
Consulting Engineer
Iowa, City, Iowa

A welded aluminum highway bridge, believed to be the first yet attempted, will be completed next July in Iowa. To be located in Des Moines, the four-span continuous structure was put under construction the latter part of December with the award of a contract to Jensen Construction Co.-United Contractors, of that city, on its low bid of $124,682.73 (ENR Dec. 19, 1957, p. 17).

The bridge will contain about 75,000 lb of structural aluminum and 4,300 lb of aluminum handrail. The aluminum components were included in the bid at $1.00 per lb erected, and will be fabricated by the Pullman Standard Co., Chicago.

The 220 ft long structure will carry an existing two-lane road over a new section of four-lane divided interstate route. The project was initiated by the Iowa State Highway Commission and later adopted as a research project by the Commission's Research Board. Development of the project is under the supervision of Mark B. Morris, director, highway research, and Neil Welden, bridge engineer. Design and detail plans of the bridge were prepared by the author.

This particular type of bridge was selected for aluminum studies because it is typical of thousands of other grade-separation projects that will be built all over the country as part of the new federal program to improve our existing highway networks. It has a 30 ft wide reinforced concrete deck slab and 2 ft concrete walks. It is designed for H20-S16 (AASHO) live load.

• Four-span continuous—Span lengths are 41.25 ft, 68.75 ft, 68.75 ft, and 41.25 ft. There are four lines of welded aluminum girders spaced 9.5 ft c-c beneath an 8 in. reinforced concrete roadway slab. The girders are connected together with continuous transverse aluminum beam diaphragms at the piers and abutments and at 13 ft 9 in. intervals in between to equalize deflections.

The girders are fixed to Pier No. 2 at the center of the bridge and have sliding aluminum sole-plate expansion bearings on steel plates at Piers 1 and 3, and at both abutments.

• Design stresses—Differential thermal stresses that originate between the continuous concrete deck and the aluminum girders are absorbed as calculated stresses, which are deducted from the allowable working stresses on the aluminum section. In this way, the combination of dead-load, live-load and impact stresses, plus the provision for temperature changes ranging from 100F below to 50F above an average temperature of +60F, will not exceed a calculated working stress of 15,000 psi in the aluminum beams.

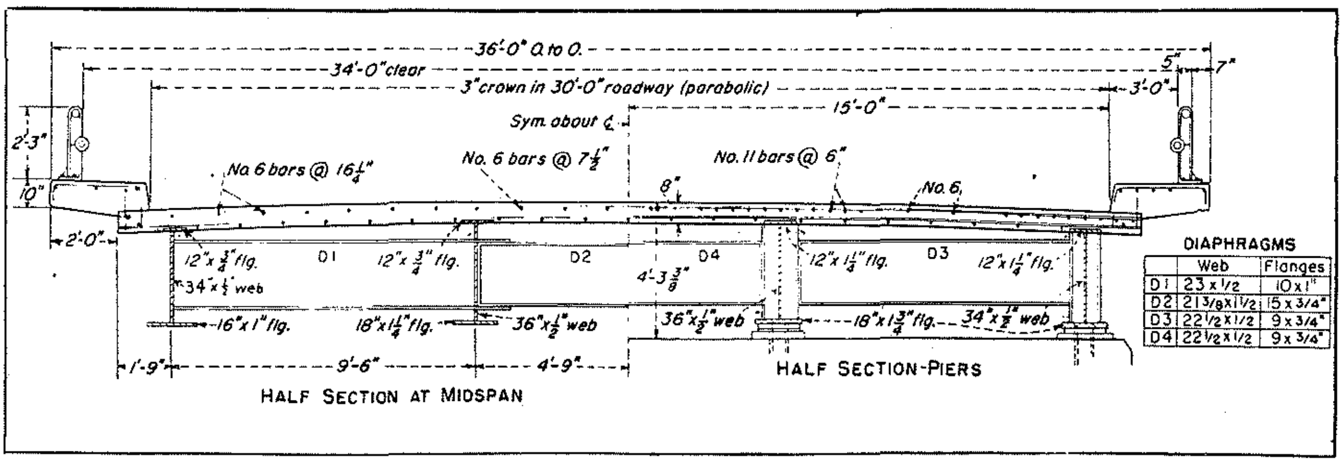
Strong connections are provided between the expansion dams and the ends of the girders at both ends of the bridge so that temperature stresses will not cause any relative displacements at the free ends of the girders. Moreover, a sufficient minimum amount of longitudinal reinforcing steel is provided for the full length of the concrete slab to prevent the girders from pulling the slab in two when the temperature rises.

This steel, in combination with other heavy longitudinal steel reinforcing bars in the top of the slab over the piers, is also designed for composite action with the aluminum girders over the piers, to help carry the live load and the thermal stresses in the normal negative-moment areas. The 8 in. concrete deck slab is also designed to be composite with the aluminum girders for the live loads in the normal positive-moment areas. It is connected to the girders by means of aluminum shear lugs that are welded to the top flanges.

• Continuous composite design—In addition to composite behavior, which has been definitely established by thousands of tests as existing in all bridges, it is also desirable to have smooth deflected profiles, free from cusps over the piers and sagging midspans and free of as many additional expansion breaks in the paving as possible. Therefore, the design should also provide for continuity, which is economical as well.

The composite action of a concrete deck slab with an aluminum beam is more favorable than the corresponding action of concrete with steel, because the value of E (modulus of elasticity) for aluminum is more nearly compatible with the E for concrete than concrete is with steel. Therefore, with aluminum we can use about one-third of the concrete in the transformation into an equivalent aluminum section, whereas with steel we can only use about one-tenth of the concrete area. This fact tends to compensate partly for the thermal differences.

• Typical stresses—As shown in the ac-



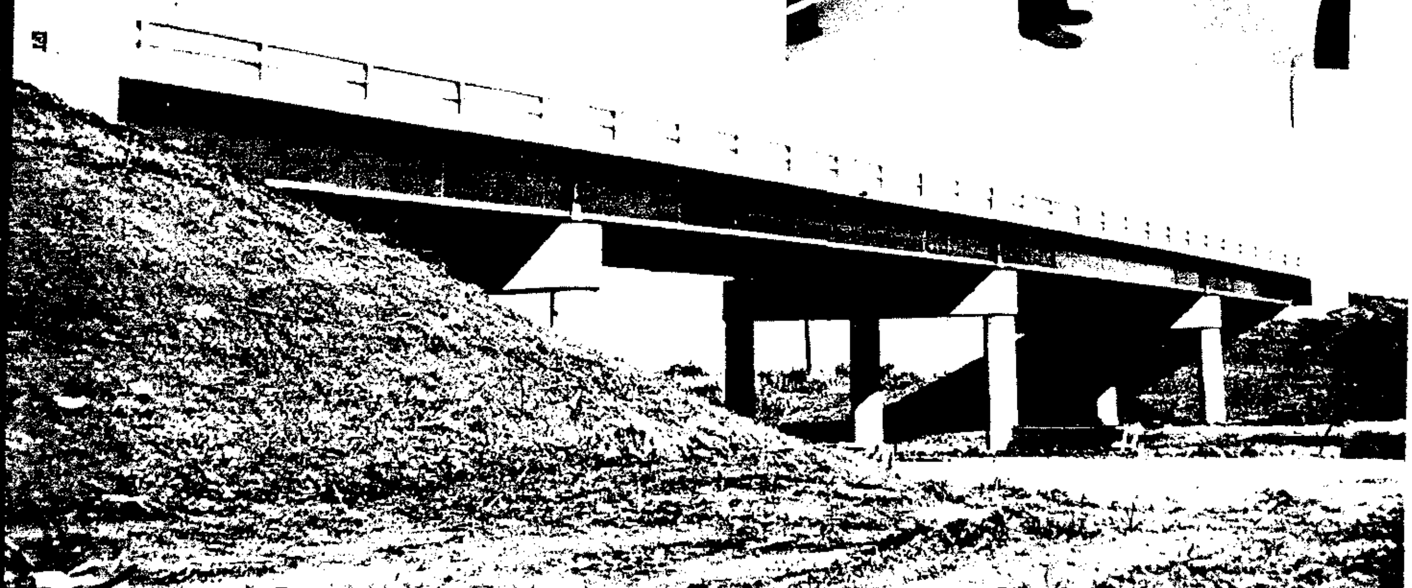
ALUMINUM BRIDGE will be of continuous girder type, all welded. Composite action between its concrete deck and aluminum girders will be promoted by aluminum lugs welded to the top flanges and embedded in the concrete deck.

REPRINTED FROM ENGINEERING NEWS-RECORD, February 20, 1958

The CENTRAL CONSTRUCTOR

Vol. 36 OCTOBER, 1958 No. 4

Dedication Ceremonies nation's first aluminum girder type highway bridge



SKILL RESPONSIBILITY INTEGRITY

THE ASSOCIATED GENERAL CONTRACTORS

Official Publication of

Associated General Contractors of Iowa

Construction News

Ned L. Ashton

A list of accomplishments and projects many pages long marks the career of Ned L. Ashton, Consulting Engineer, Iowa City. One of the better known projects in Iowa is the 220 x 30 foot aluminum girder highway bridge built near Des Moines, on which Mr. Ashton was engineer. One of the more intriguing projects is the huge radio telescope being built for the Associated Universities Inc. for the National Science Foundation at Greenbank, W. Va. It will pick up radio waves transmitted naturally by objects in space.

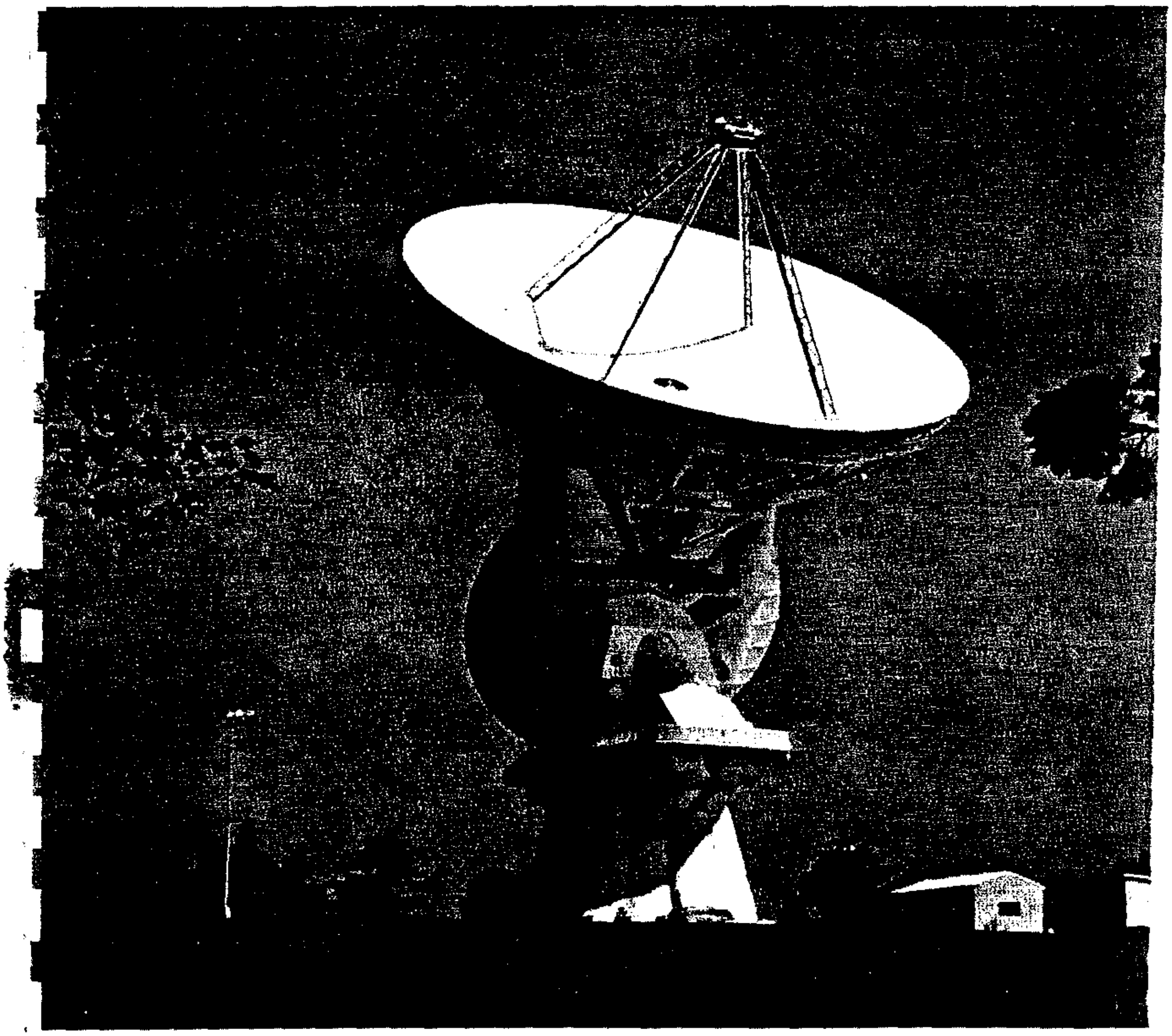
These and many other projects testify to the ability of Ned Ashton, who was born at Clinton, Ia., January 30, 1903. Educated at the State University of Iowa, he holds Master of Science degree in both hydraulics and structural engineering, and a bachelor of engineering. He was professor in the department of civil enigneering at SUI from 1943-57.

He is a registered professional engineer in Iowa and Missouri. He is a senior structural engineer, U. S. Civil Service Commission. He belongs to Iowa Academy of Sciences, American Society of Civil Engineers, American Welding Society, Society of American Military Engineers, American Association of University Professors, American Concrete Institute, American Society for Metals.

In addition to all other accomplishments, he was a member of the All American swimming team in 1925.

Ned L. Ashton, Consulting Engineer, Iowa City, Iowa

Sky and TELESCOPE



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Vol. XXX, No. 5

NOVEMBER, 1965

60 cents

In This Issue:

Civil Engineering

NOVEMBER 1968

ASCE

ISSUE EMPHASIS: PUBLIC WORKS.
Underground sewage treatment plant.
Pipeline ties island water system.
Citizen participation in urban renewal.

▼ Cedar Rapids bridges rebuilt

ASHTON HOUSE PHOTOGRAPHIC LOG

1946-1986

ASHTON HOUSE: PHOTOGRAPHIC INVENTORY

Photo 1. Attributed to Fred Kent, August 1946, copy of print.

Description Ned L. Ashton removing boards from footing wall in southeast corner which subsequently became the Security Room.

Photo 2. Attributed to Fred Kent, August 1946, copy of print.

Description Close-up of Ned. L. Ashton working on footing wall shown in Photo 1. Facing east in what became the ground floor bathroom area.

Photo 3. Attributed to Fred Kent, June 16, 1947, copy of print.

Note Before Coralville Dam was completed in 1958, the Iowa River flooded severely. The group of photos 3 to 8 shows the flood crest. Ned Ashton noted the date and stage at 18.3 feet at University footbridge. This group provides an excellent review of early Ashton House construction.

Description Looking northeast across Mosquito Flats to the trees of City Park shows the flood plain totally submerged by a runoff flood channel. Twenty years later this flood plain was renamed Park View Terrace, subdivided, and totally built up with houses. Foreground, the northeast corner of the house above the garage shows rods and wire mesh used to reinforce the floor which continued to be poured by Ashton during the high water. In the immediate background the fence line is the original east boundary of the Ashton Tract. The partly submerged plank structure was one of the war surplus packing crates which Ashton set up as a tool shed for storage during construction. Four flat cars of these flattened crates provided almost all of the lumber used for concrete forms and reused in later construction.

Photo 4. Attributed to Fred Kent, June 16, 1947, copy of print.

Description Perspective view of the later garage door area, northeast house side, facing northwest. The ground floor entry doorway is left of the ladder. Note the chained log boom to prevent loose lumber from washing away in the flood. The messy wood scraps were saved to wedge and level concrete form supports for the upper poured floor.

Photo 5. Attributed to Fred Kent, June 16, 1947, copy of print.

Description Closeup of garage area shown in Photo 4, facing northwest. It shows the reinforcing rods laid up at the house corner for the concrete pillar. Behind, the temporary flood channel along the north side of the house has become a raging torrent.

Photo 6. Attributed to Fred Kent, June 16, 1947, copy of print.

Description Closeup of Ned L. Ashton beside south support of garage door area and designed to support the huge lintel shown in Photo 27.

Photo 7. Attributed to Fred Kent, June 16, 1947, copy of print.

Description North side of house, facing south, viewed across the temporary flood channel. Apparently photographed from the levee which was breached during the flood.

Photo 8. Attributed to Fred Kent, about June 18-20, 1947, copy of print.

Description After the flood crest of 16 June, the water receeded. The photographer returned several days later and climbed a tree west of the house construction to take this view. It shows the northwest wall line of the house and supporting columns of what later became the kitchen area above the garage. Foreground shows a temporary electrical service pole with a tangle of dangerous-looking wire. Just beyond it eight heavy reinforcing rods await the column pour which was designed to support the cantilevered breakfast room. A similar column of rods is seen in the background set up to support the northeast house corner and garage lintel (shown in Photo 5). The tool shed packing crate shows the previous flood crest and some of Mosquito flats is now above water. The wading girl is the daughter, Ruth Ashton (Johnson), then age 12.

Photo 9. Ned Ashton photograph, circa August 1948, copy of print.

Description In late summer of 1948, the Ashtons lost their lease and moved into their new house before it was ready. While camped out on the main floor, the rush was on to weatherproof the living area for the coming winter. The roof shingling is finished but much remains undone.

Photo 10. Ned Ashton photograph, circa December 1948, poor negative.

Description Diagonal packing crate siding was not covered by tar paper in time for the winter. View of livingroom area. Plastic sheeting stretched over the borch area was not weathertight. The concrete framework is visible where the masonry was left unfinished at this time.

Photo 11. Ned Ashton photograph, circa December 1948, copy of print.

Description East side of house, looking west. Tarpaper was nailed over the diagonal sheathing but little masonry was laid up as yet. The prewar Mercury was the family car.

Photo 12. Ned Ashton photograph circa June 1949, copy of print.

Description East side of house, looking west, and a comparable view to Photo 11 but showing spring progress in house construction. Masonry was now completed around south and half of the east side. The porch masonry balastrade is finished but the concrete sill cap is not yet poured and the faming and screening has not yet been installed.

Photo 13. Fred Kent photograph, circa February, 1956, copy of print.

Description View of west facade facing northeast. The exterior masonry was completed by Ashton about 1950 and the circular stairway was poured in December shortly before this photograph was taken. This photograph was first published in the 1956 S.U.I. Staff Magazine Vol. 6, No. 6, page 9 in an unsigned article "Professors with Hammers and Nails" describing various "home-built" houses. Later, this same photograph was published in the Iowa Alumni Review Vol. 12, No. 1. p. 17 in an article about Ashton "Bridges are His Business" (pages 12-17) by Richard Fitzgerald.

Photo 14. Fred Kent photograph, circa February, 1956, copy of print.

Description View from the livingroom into the dining room showing Ned and Gladys Ashton with oldest grandchild, Karen Davis. The first floor covering over the masonry concrete floor was asbestos tile in a woodgrain pattern. Money was still a bit short and the carpeting shown was purchased second-hand salvaged from another house. Photograph published in the S.U.I Staff Magazine, 1956, page 10 (reference with Photo 13).

Photo 15. Fred Kent photograph circa September 1957, copy of print.

Description Ned. L. Ashton at work at his desk by the picture window in his ground floor workroom. This photograph was published in a cropped form in the Iowa Alumni Review, 1958, page 12 (reference with Photo 13).

Photo 16. Ned Ashton photograph, May 1, 1959, copy of print.

Description View of breakfast room showing Joye's daughter, Karen Davis.

Photo 17. Black/White copy of watercolor, January 1987.

Description Stan Haring watercolor of Ashton House, west facade, September 1986.

Photo 18. M.McKusick photograph Dec. 1986, 35mm print.

Description Parallel view of Harings watercolor of west facade of Ashton House.

Photo 19. M. McKusick photograph, Dec. 1986, 35mm print.

Description View of Southwest facade, comparing it with 1958 photo 13.

Photo 20 M. McKusick photograph Dec. 1986, 35mm print.

Description Closeup of southwest porch balastrade offset over poured sill to balance the weight of interior and exterior stone masonry over the footings.

Photo 21. M. McKusick photograph Dec. 1986, 35mm print.

Description Closeup of breakfast room turret showing full extent of cantilever construction.

Photo 22. M. McKusick photograph Dec. 1986, 35mm print.

Description Closeup of unified cantilever concrete support beam system supporting turret, north entry platform, and exterior stairs leading up to kitchen. The stairway is not supported by the adjacent wall and the entire upper weight rests upon the cantilever system.

Photo 23. M. McKusick photograph Dec. 1986 35mm print.

Description Close-up of west balcony cantilever beams. Not shown in this photograph, the beam ends shown here are structural continuations of main support beams for the main floor.

Photo 24. M. McKusick photograph Dec. 1986 35mm print.

Description Close-up of west facade circular stairway and balcony. Note that the concrete stairway pour rests upon a huge footing disguised as the lowest two stairs.

Photo 25. M. McKusick photograph Dec. 1986 35mm print.

Description View of the Iowa River from the west balcony outside the dining room and showing the breakfast room in right foreground. Looking northwest across the Ashton Tract.

Photo 26. M. McKusick photograph Dec. 1986 35mm print.

Description View of Northeast facade showing garage lintel beam with its cast inscription "Ashtons 1947". Facing west.

Photo 27. M. McKusick photograph Dec. 1986 35mm print

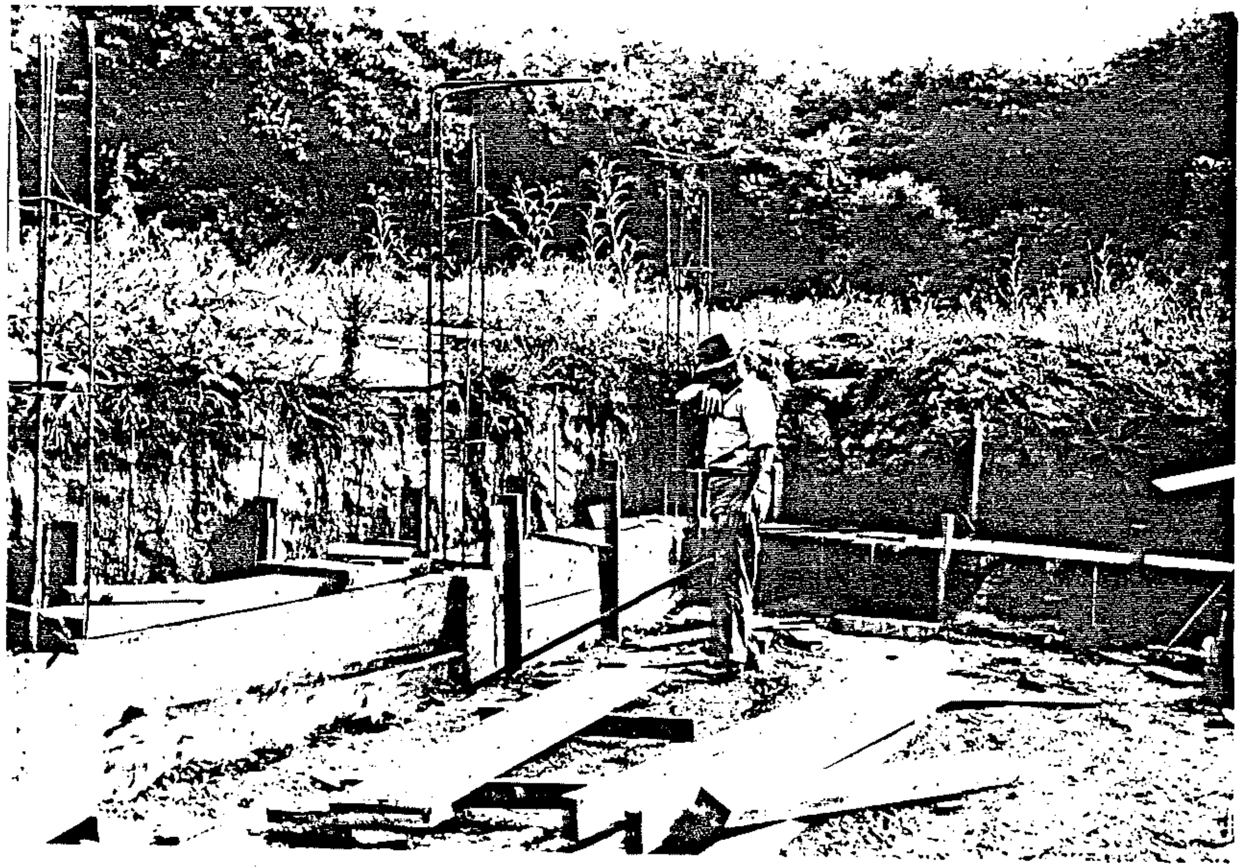
Description Ashton made the first three casement windows as a four-sided castings framing the window as shown here on the east facade. Subsequently Ashton simplified the design by casting just a sill and lintel, bringing the masonry over to form an edge as is shown in the basement casement in photo 20.

Photo 28. M. McKusick photograph Dec. 1986 35mm print

Description Close-up of ground floor entry door and its masonry facade. During 1986 renovation the original storm door was identified and refitted as shown.

Photo 29. M. McKusick photograph Dec. 1986 35mm print

Description North facade of Ashton House looking south. The view is from the north boundary of the original Ashton Tract.



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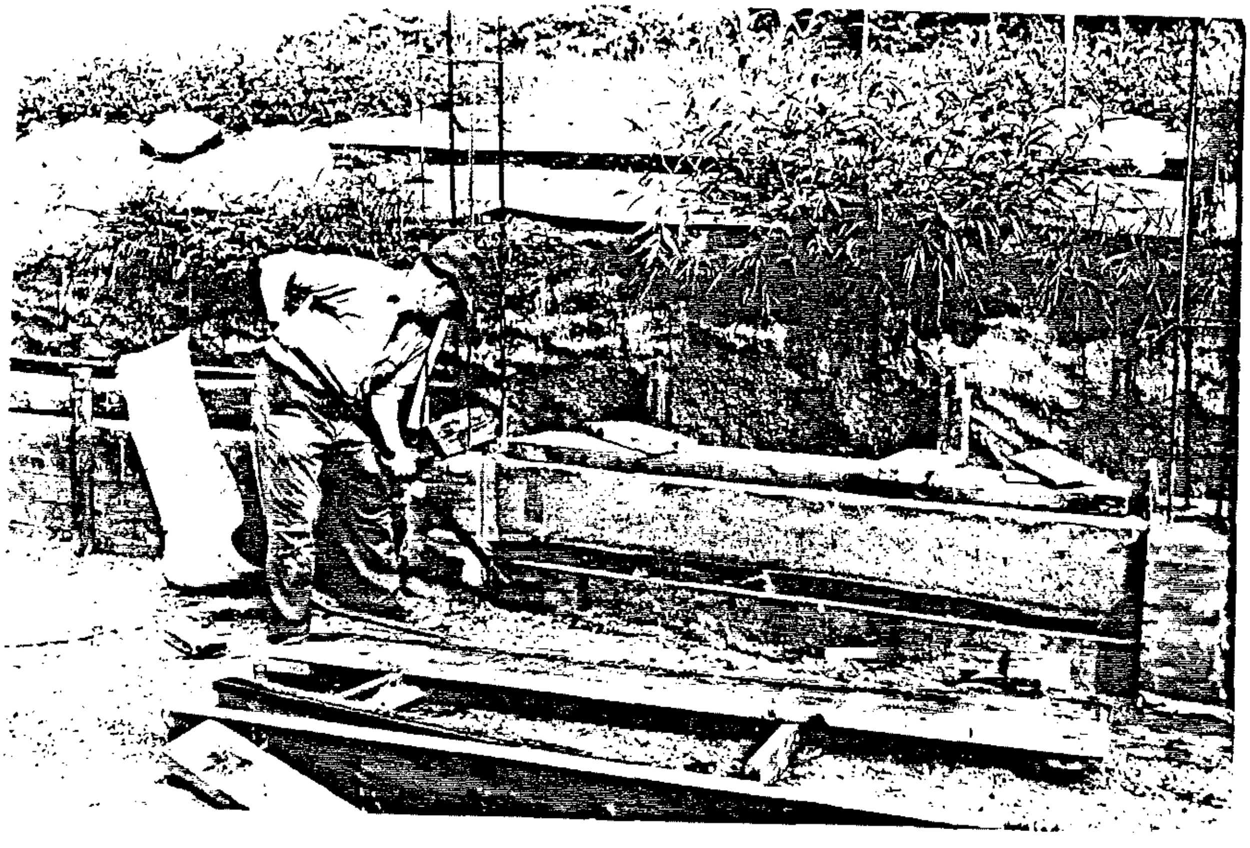

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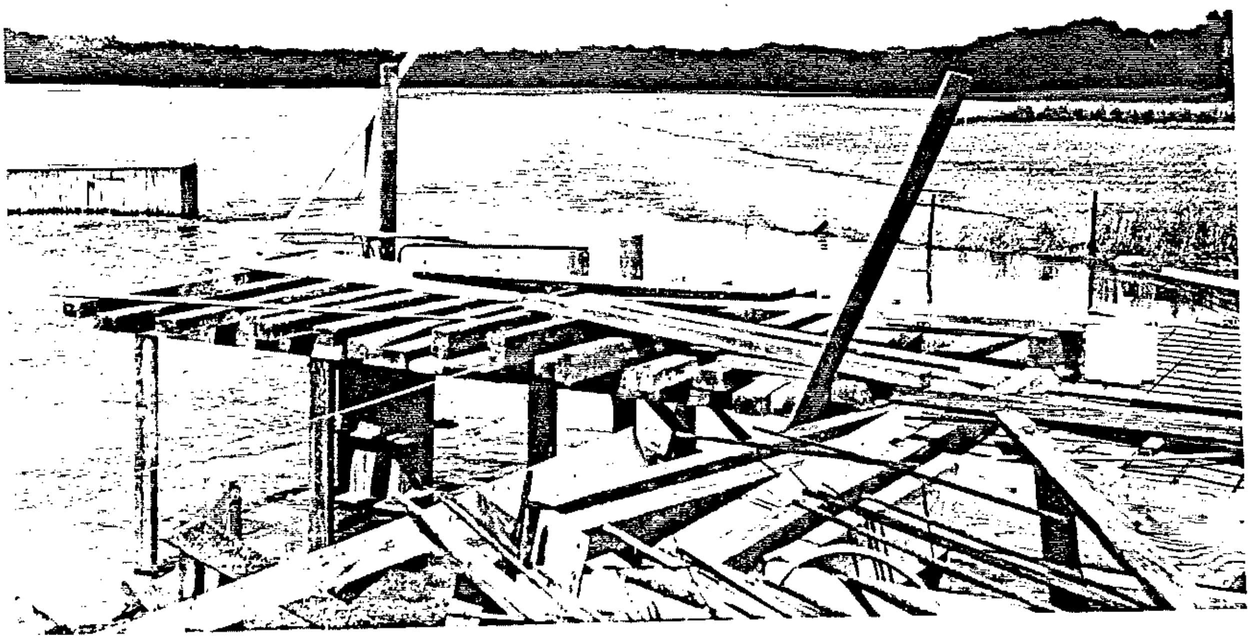

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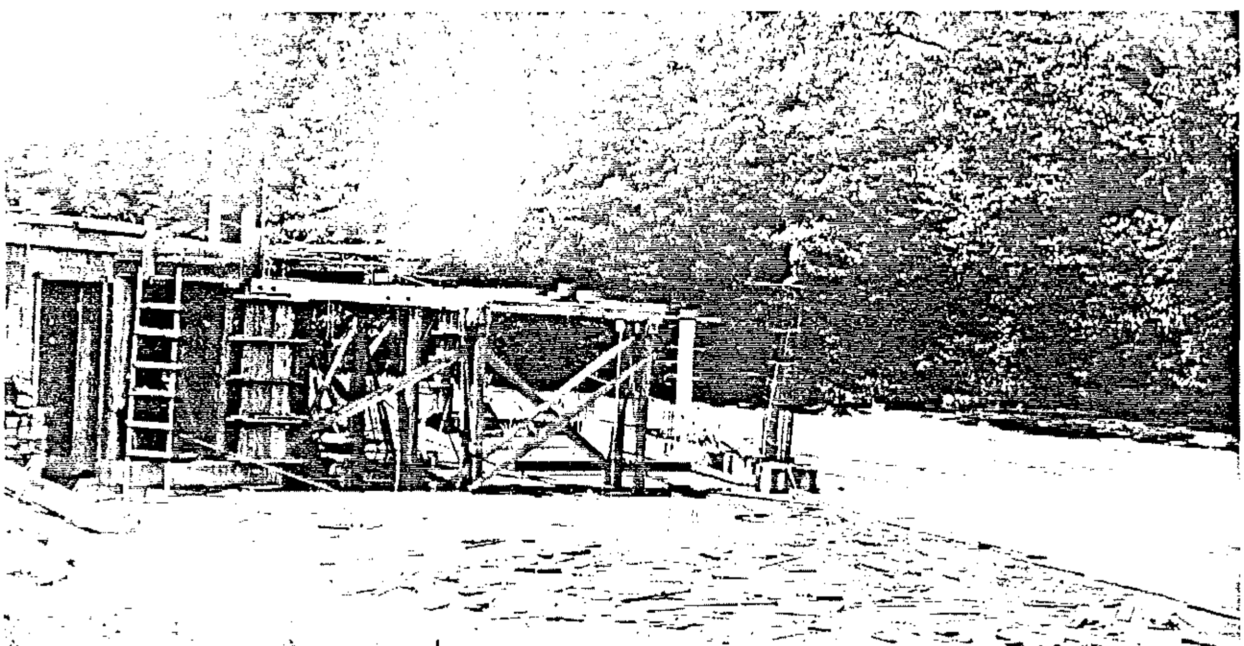

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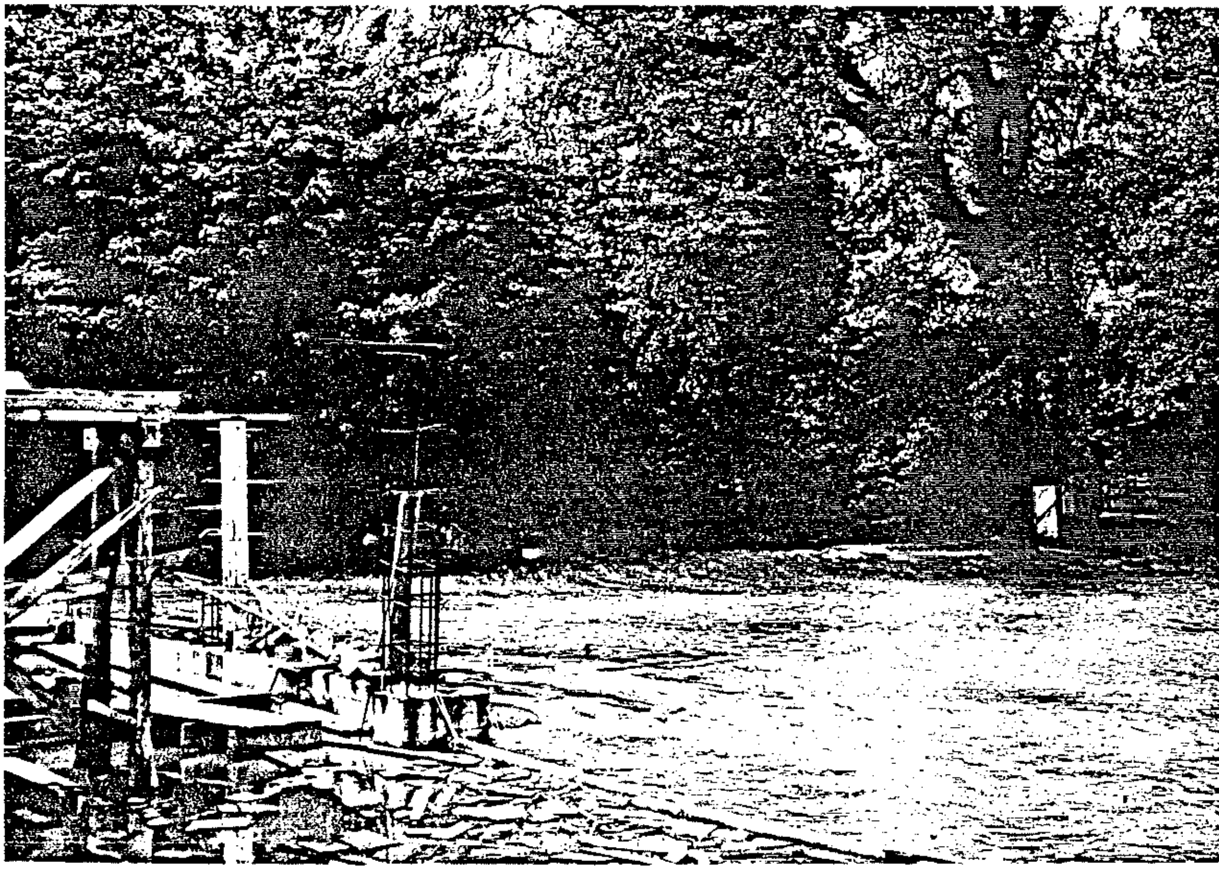

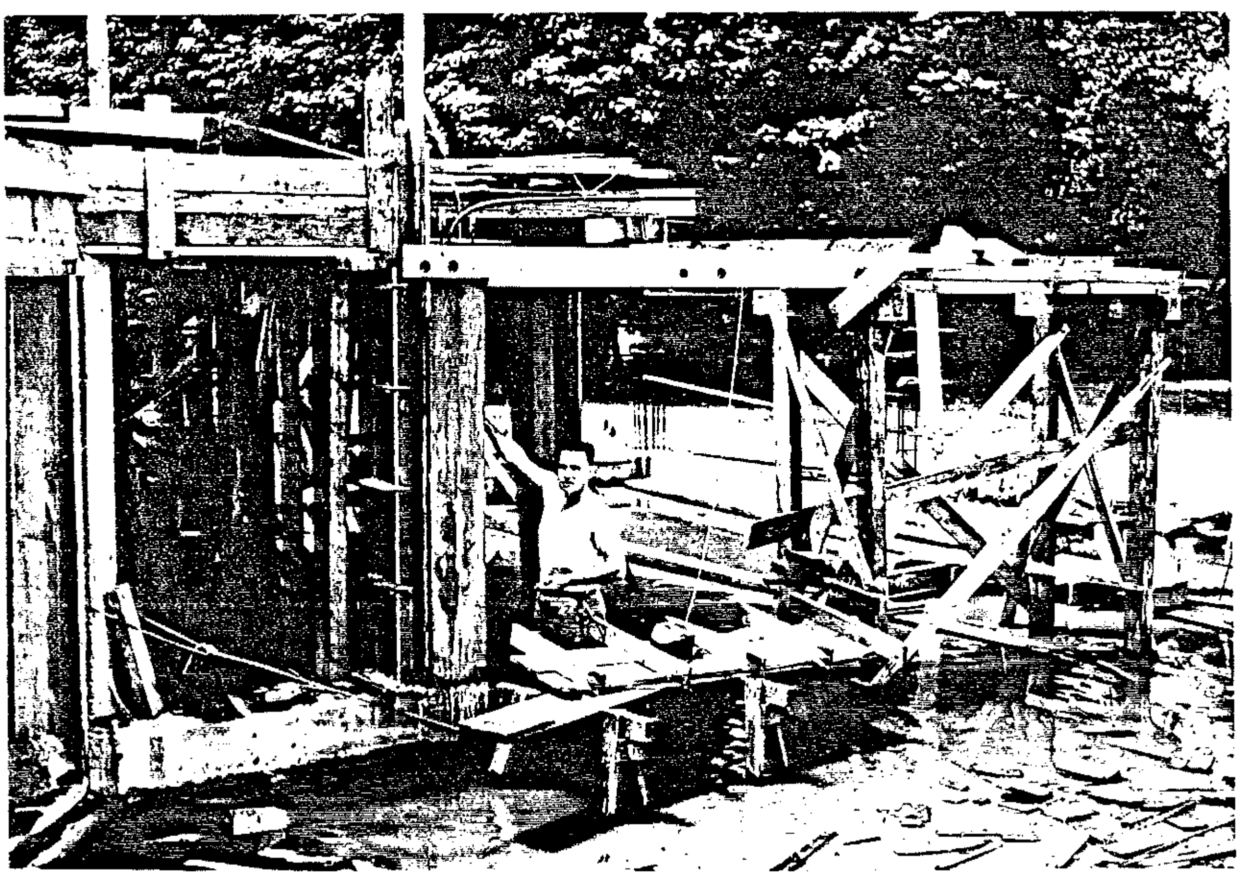

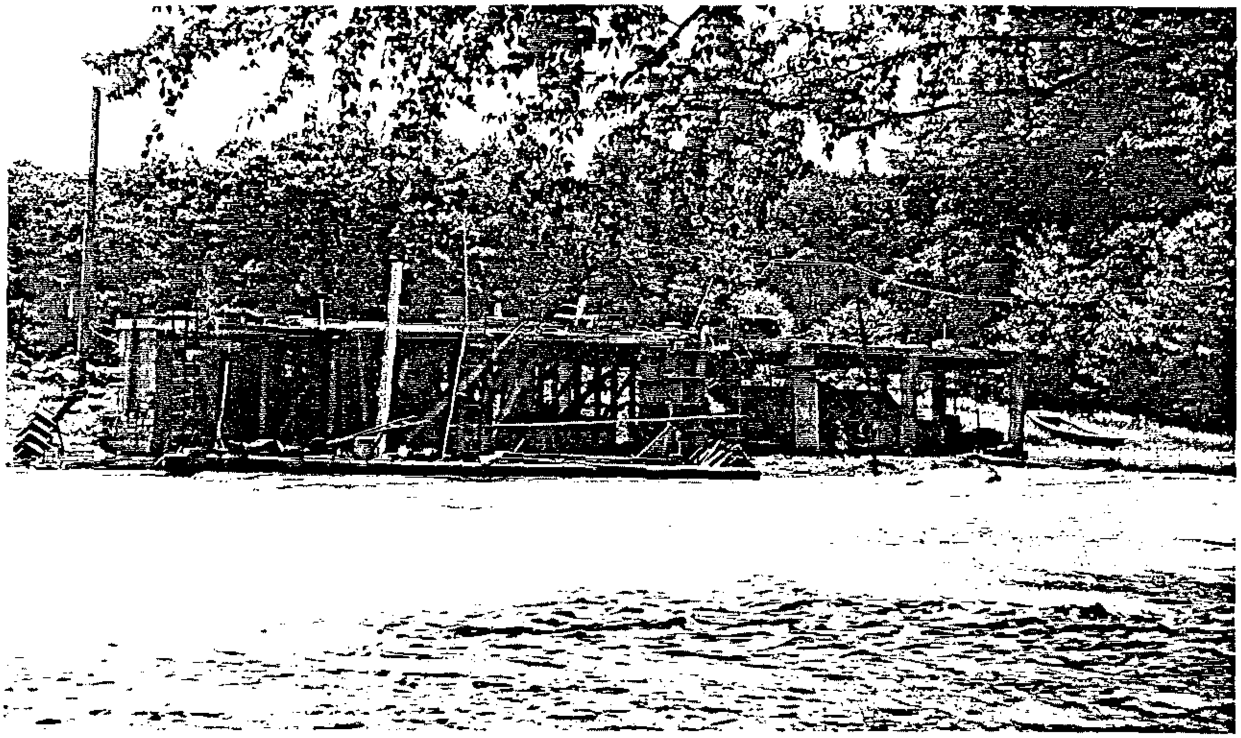

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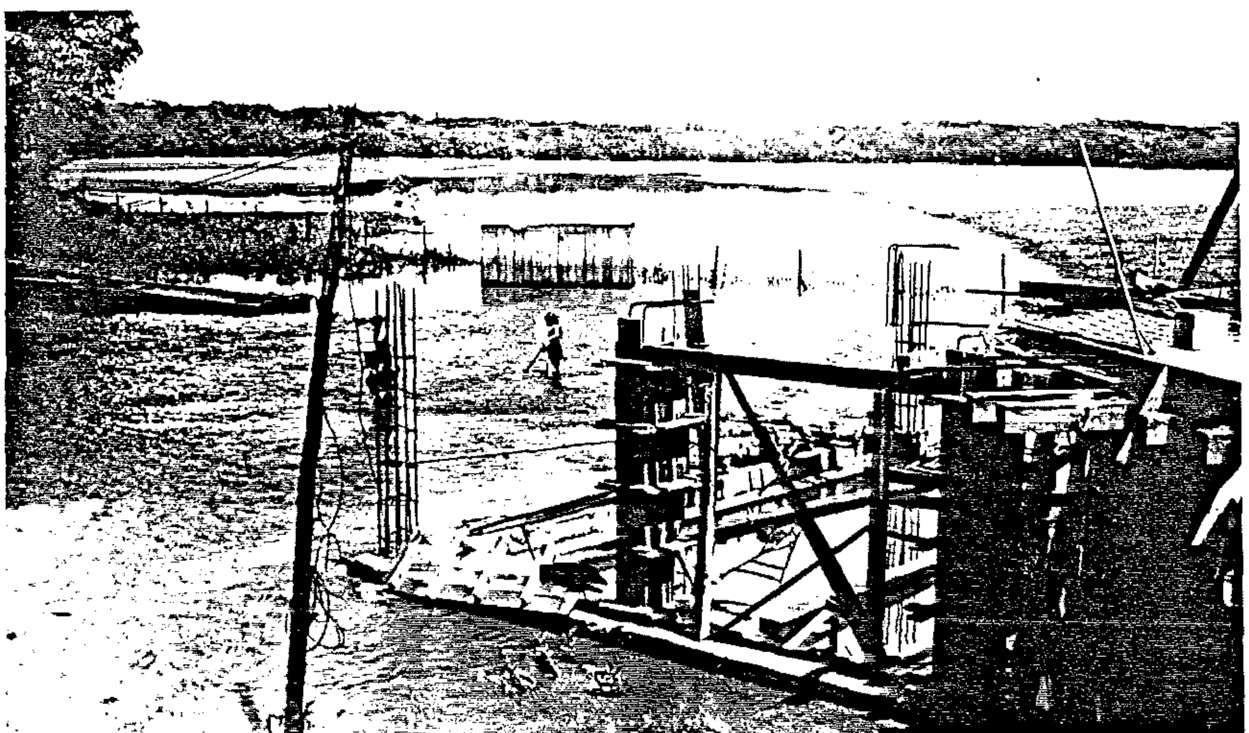

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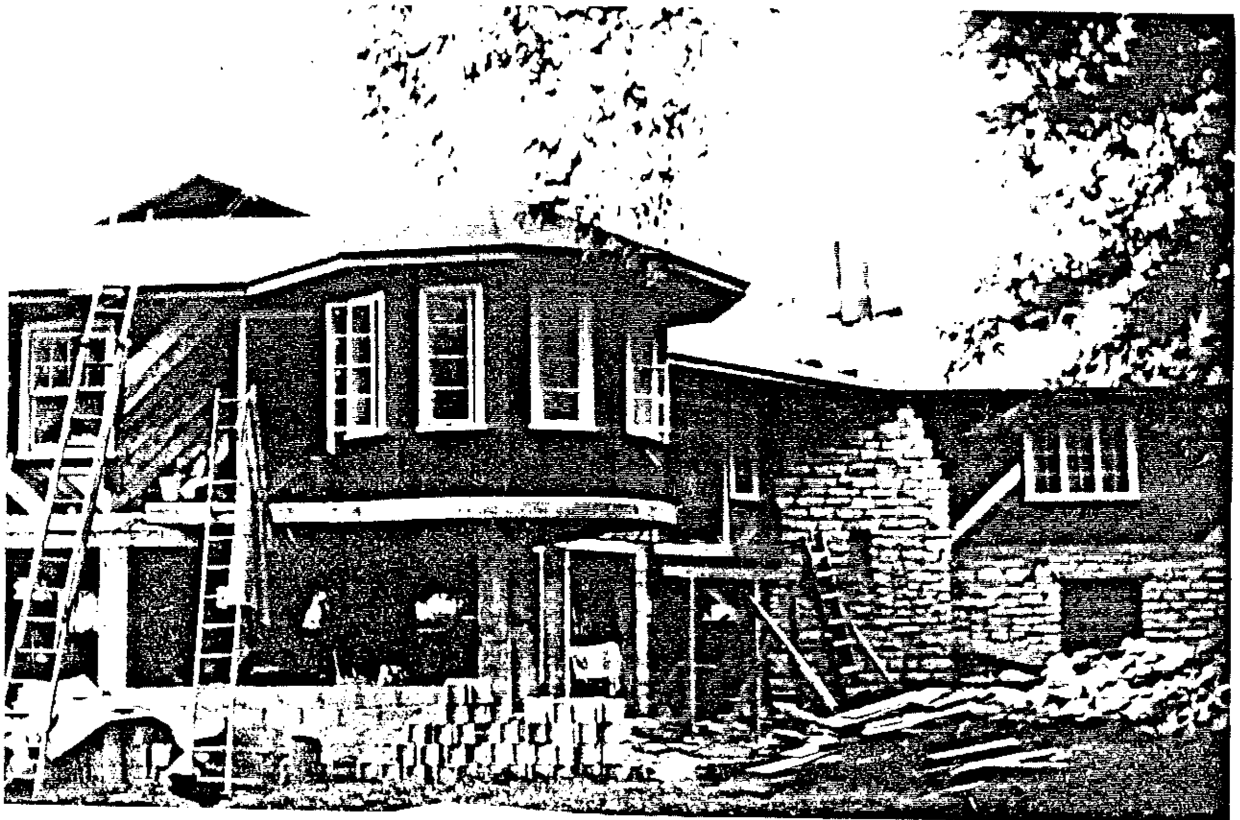

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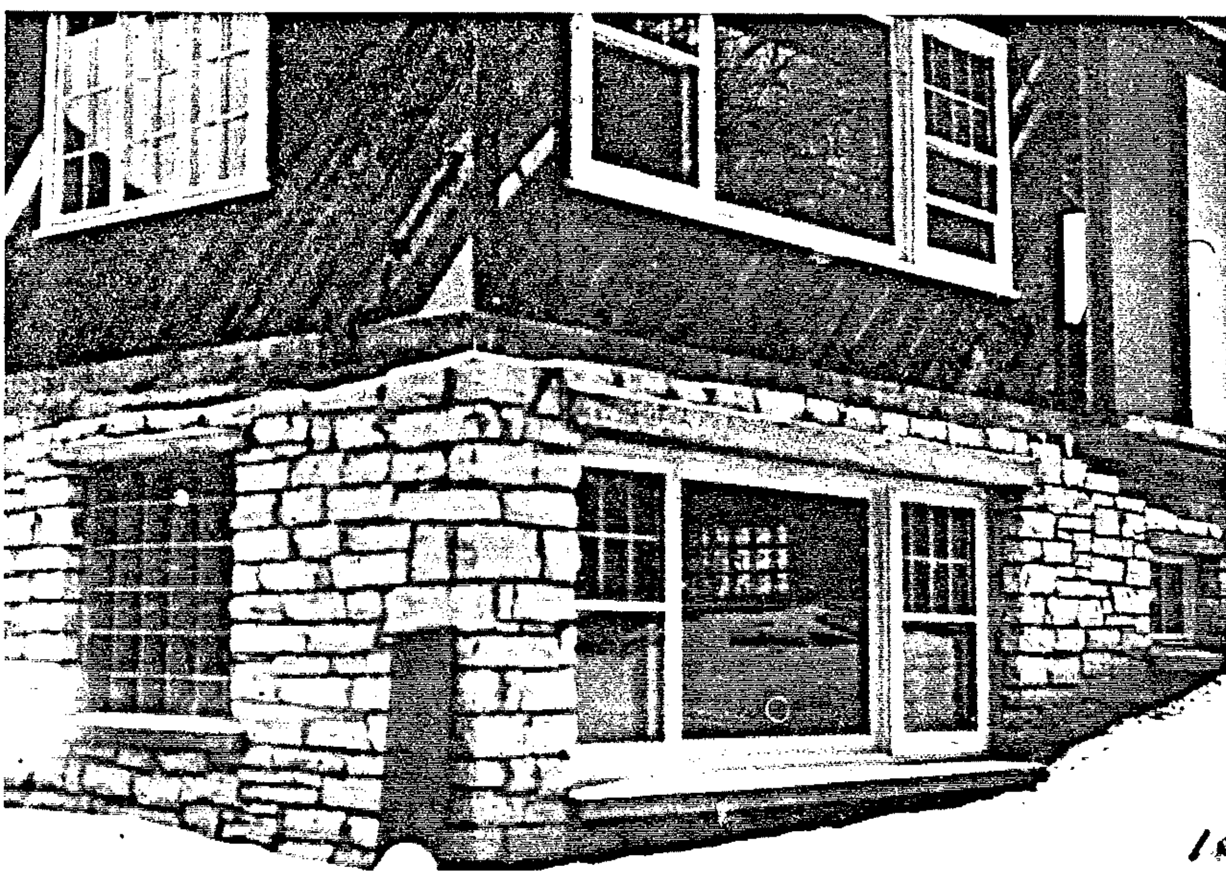

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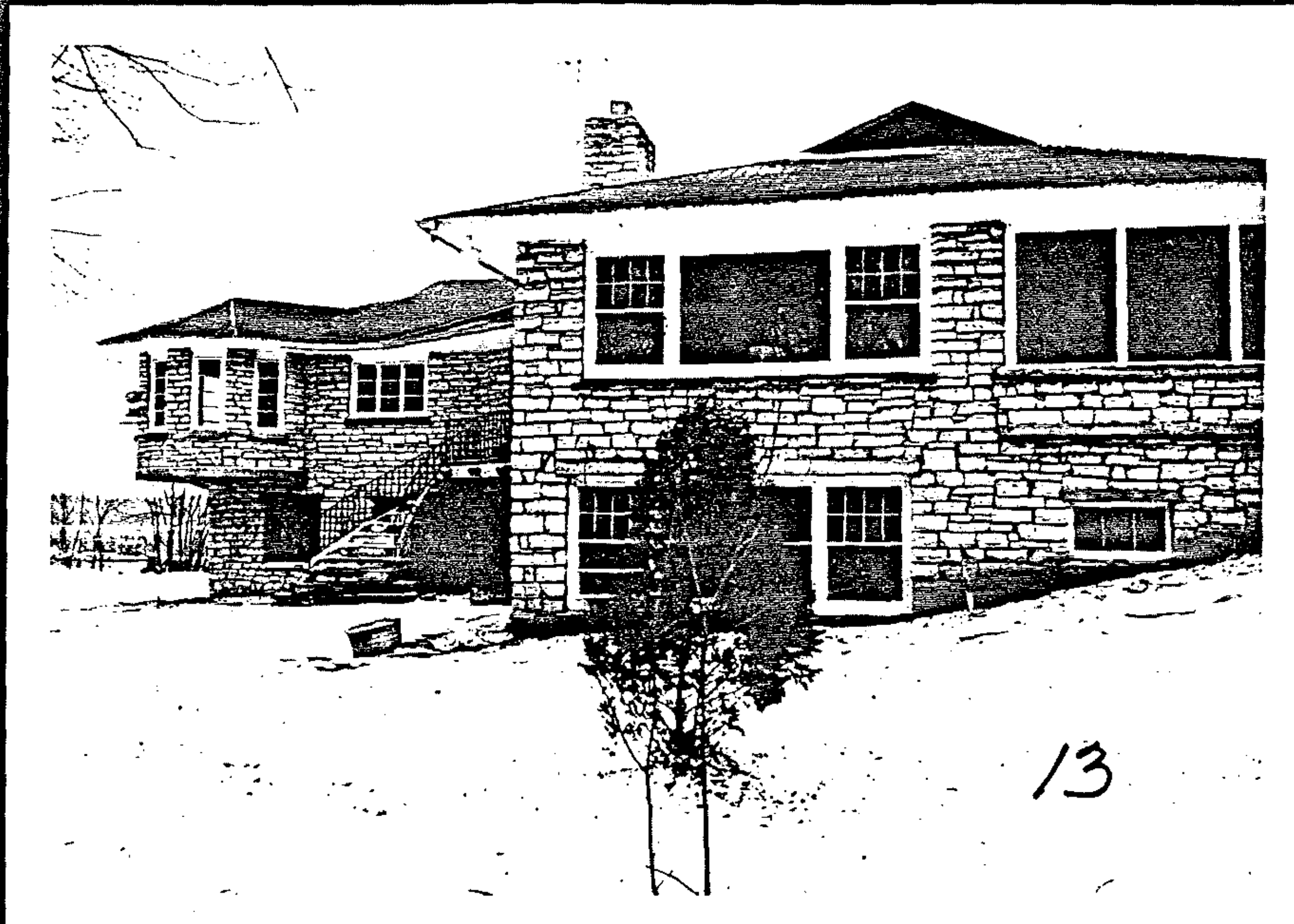

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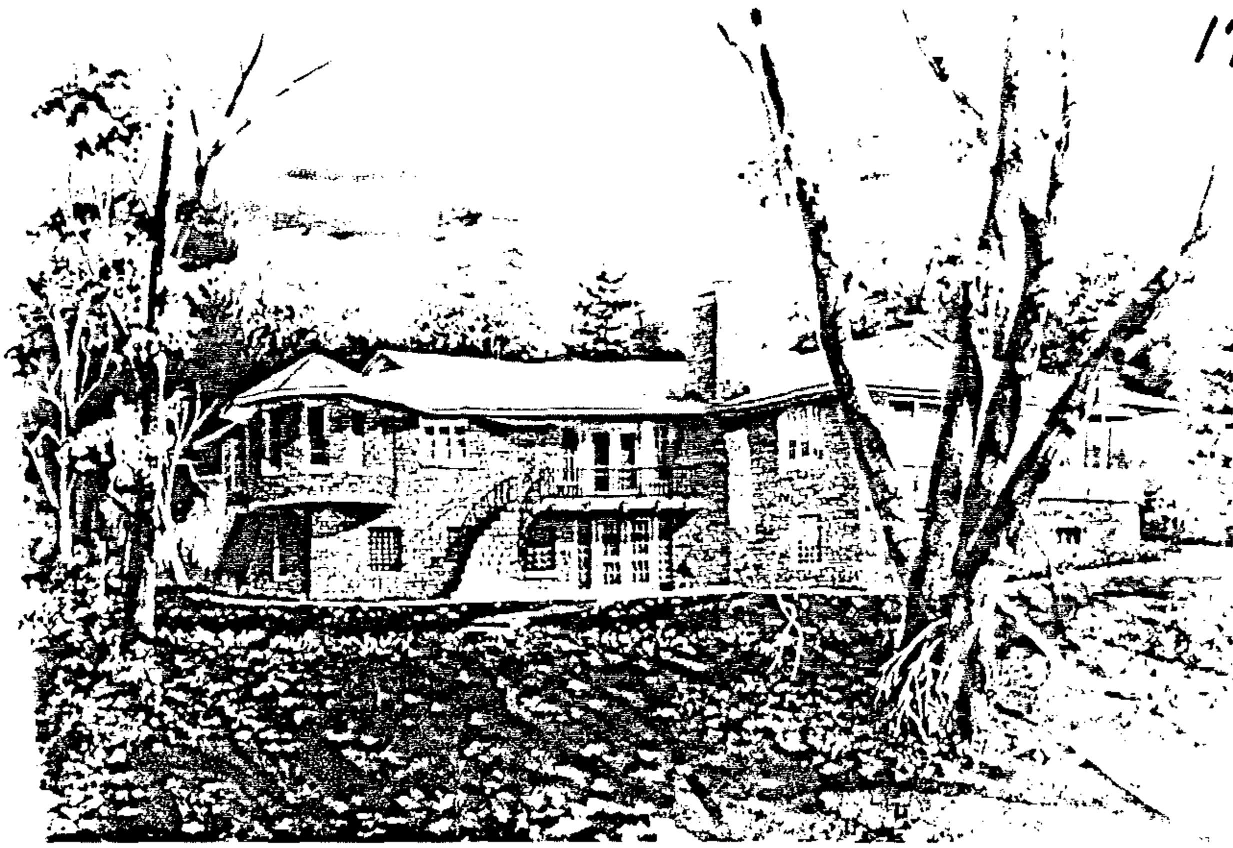

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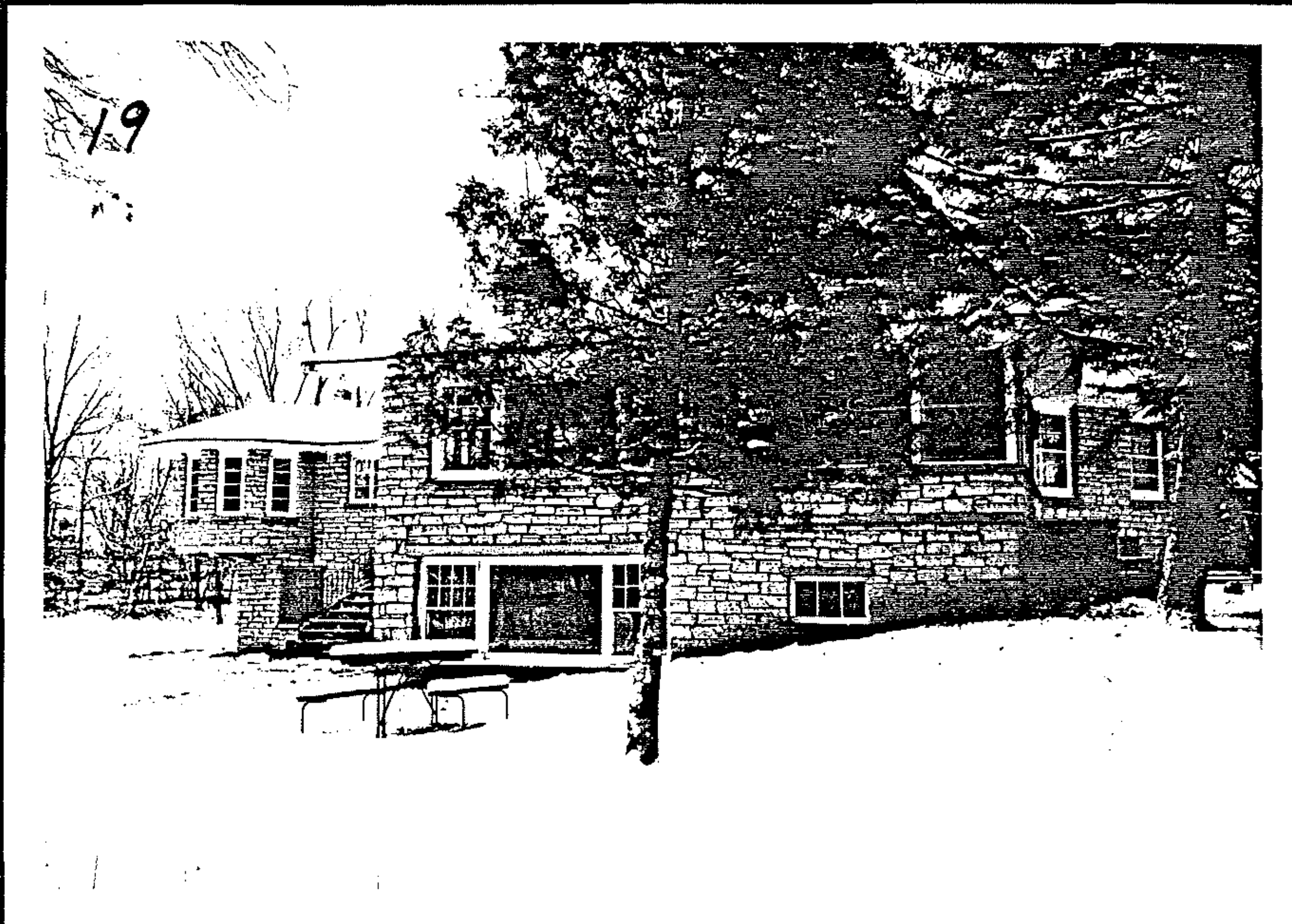
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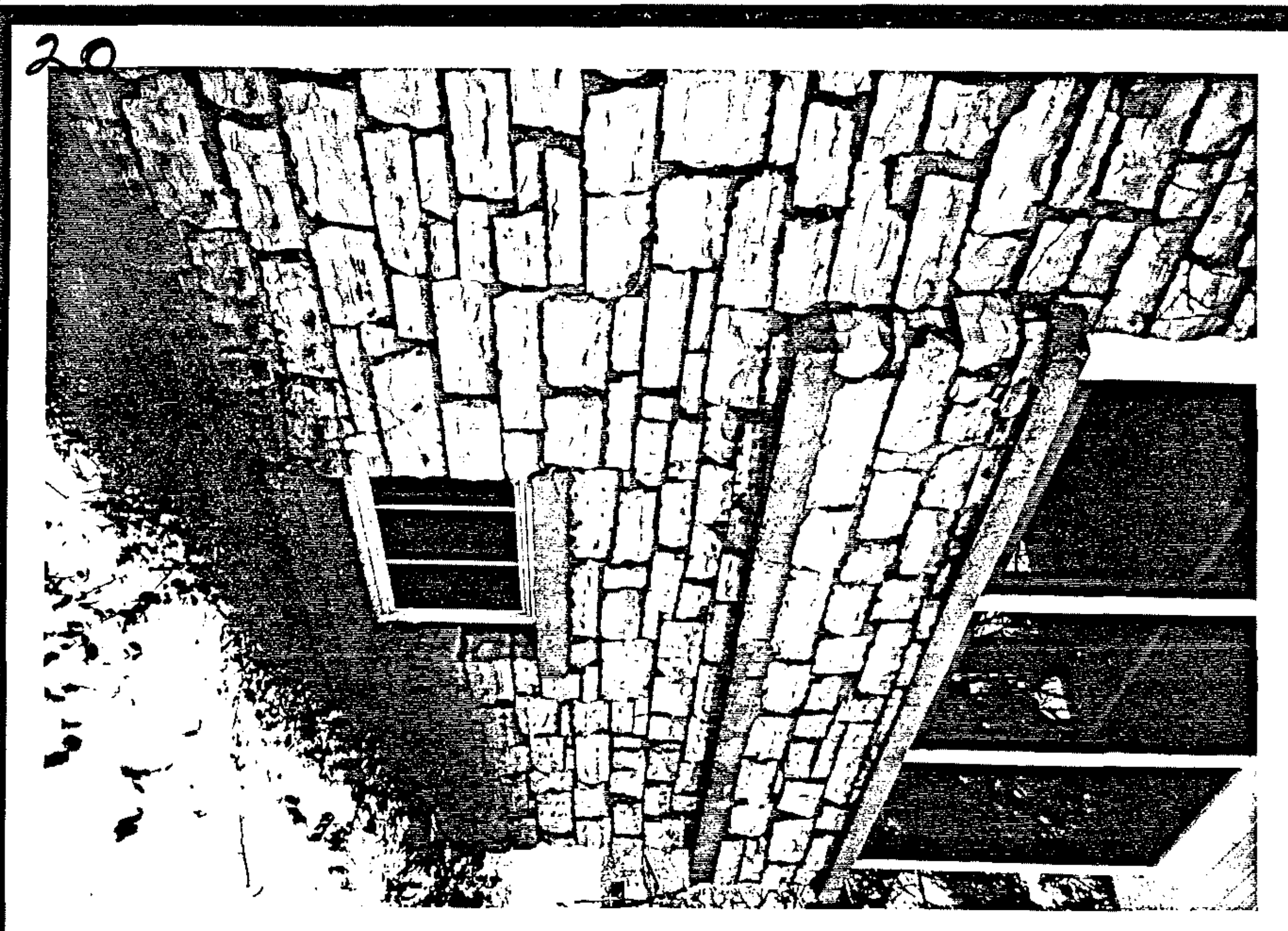
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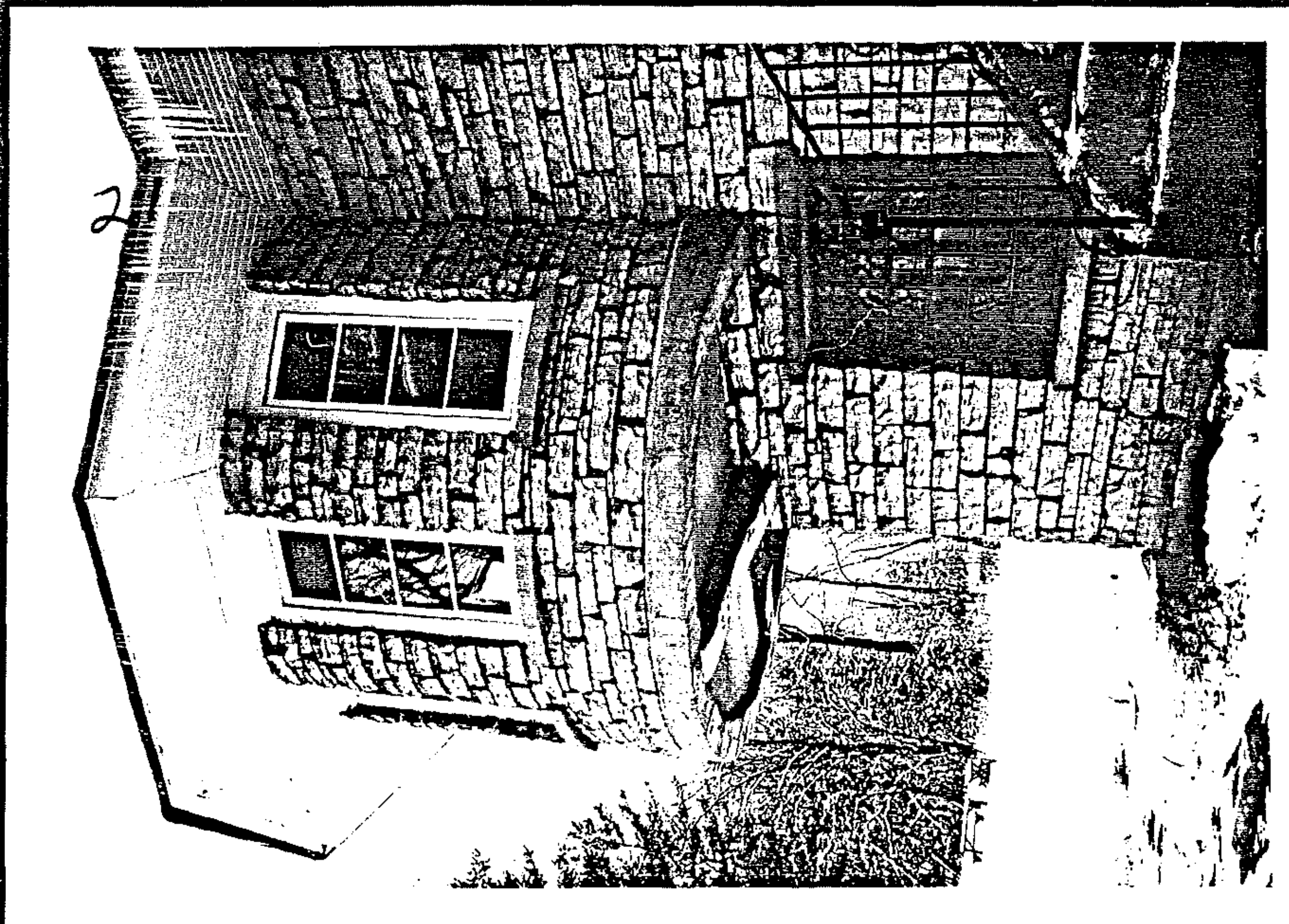
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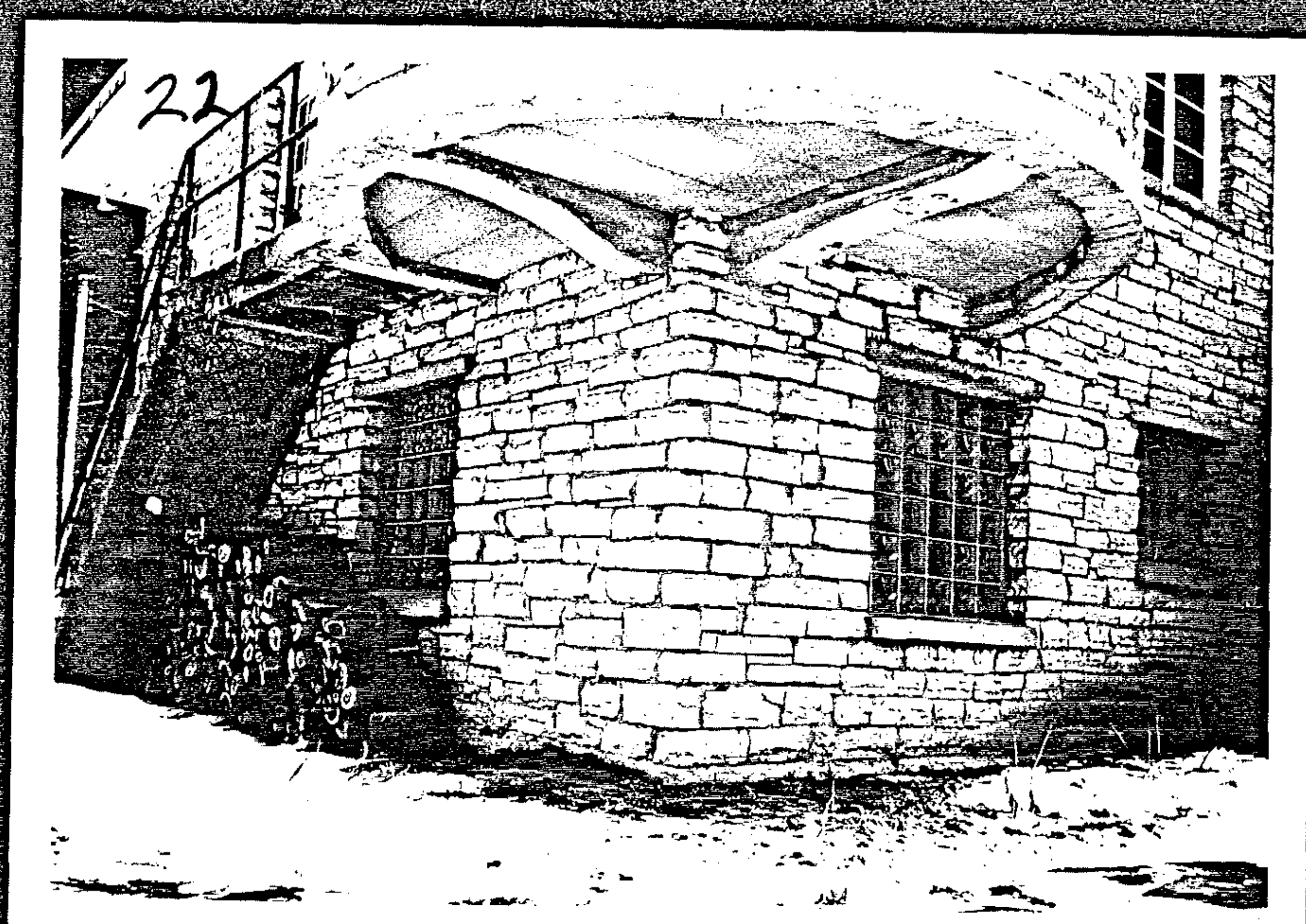
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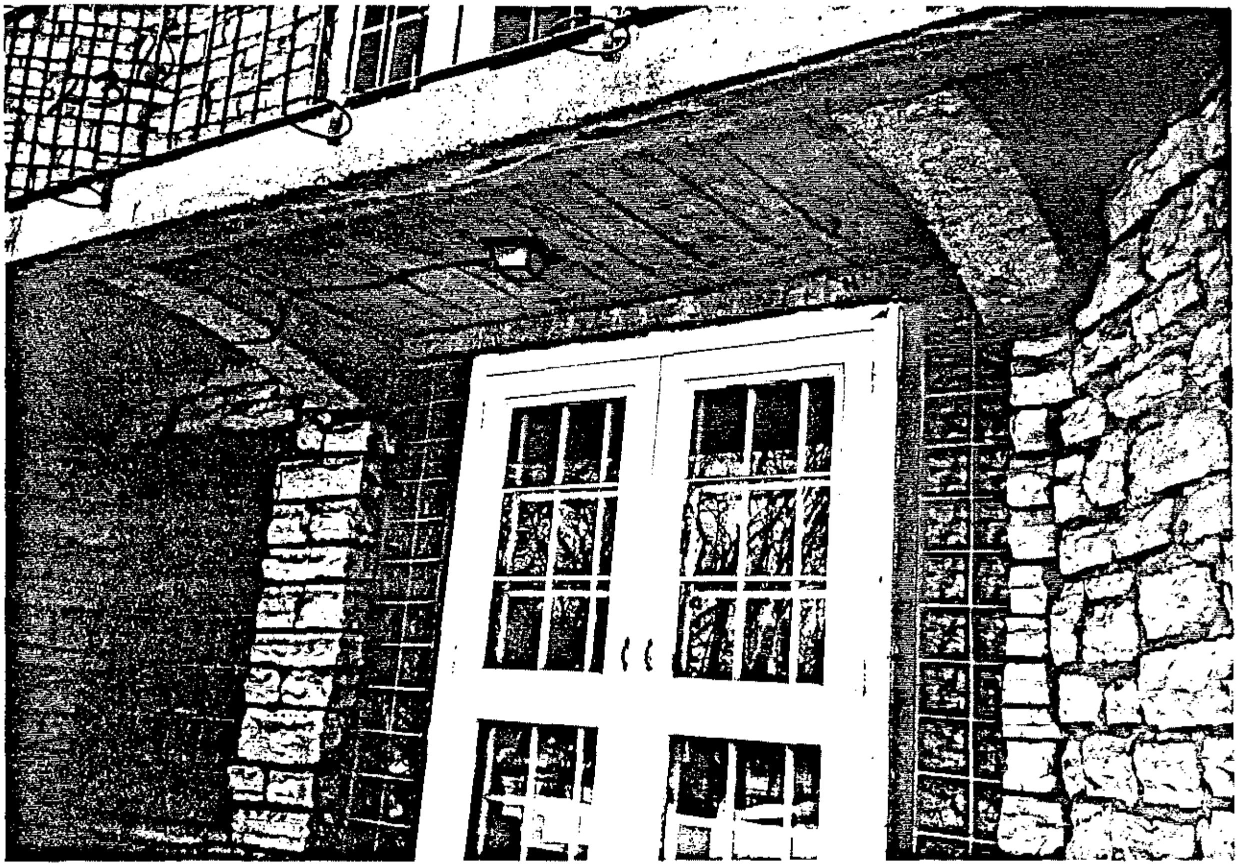

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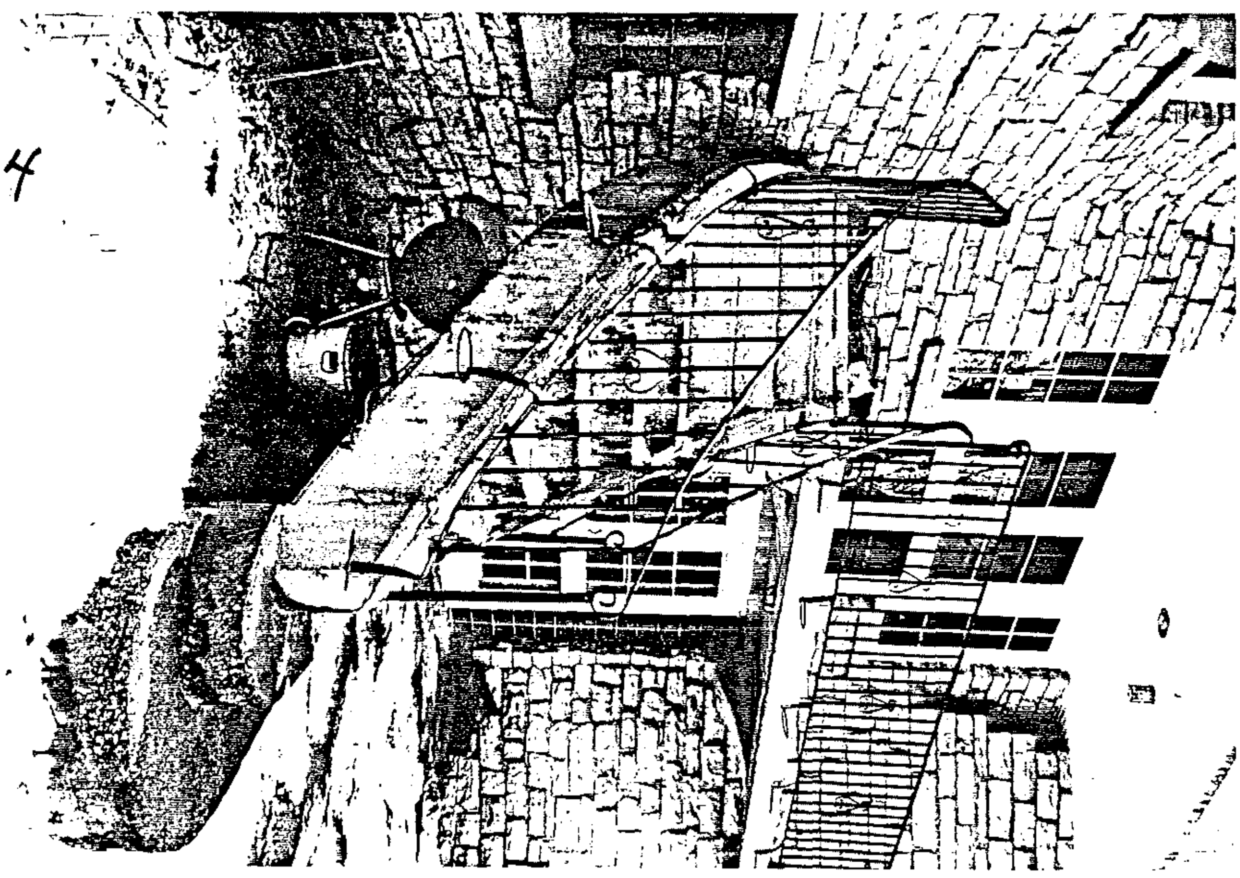

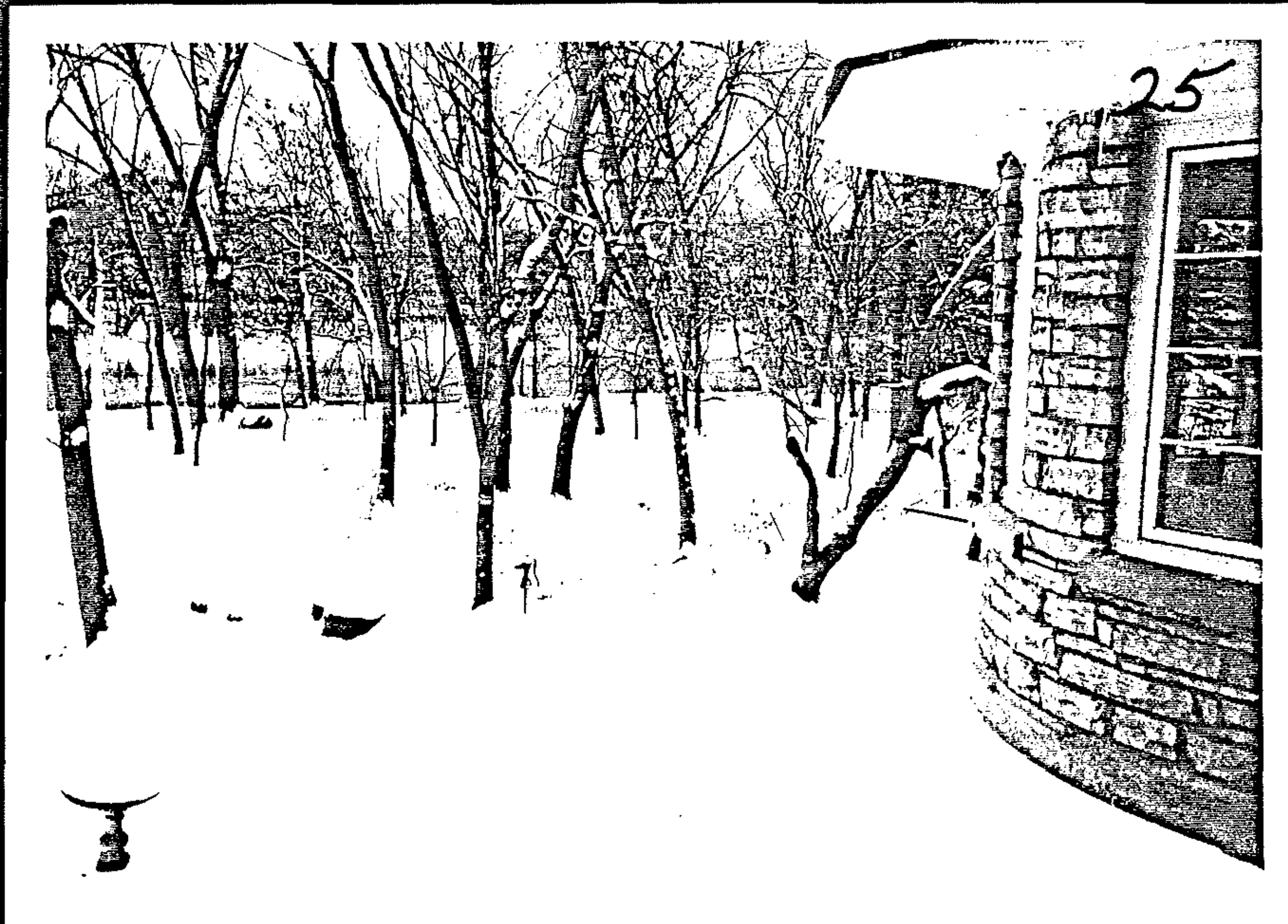
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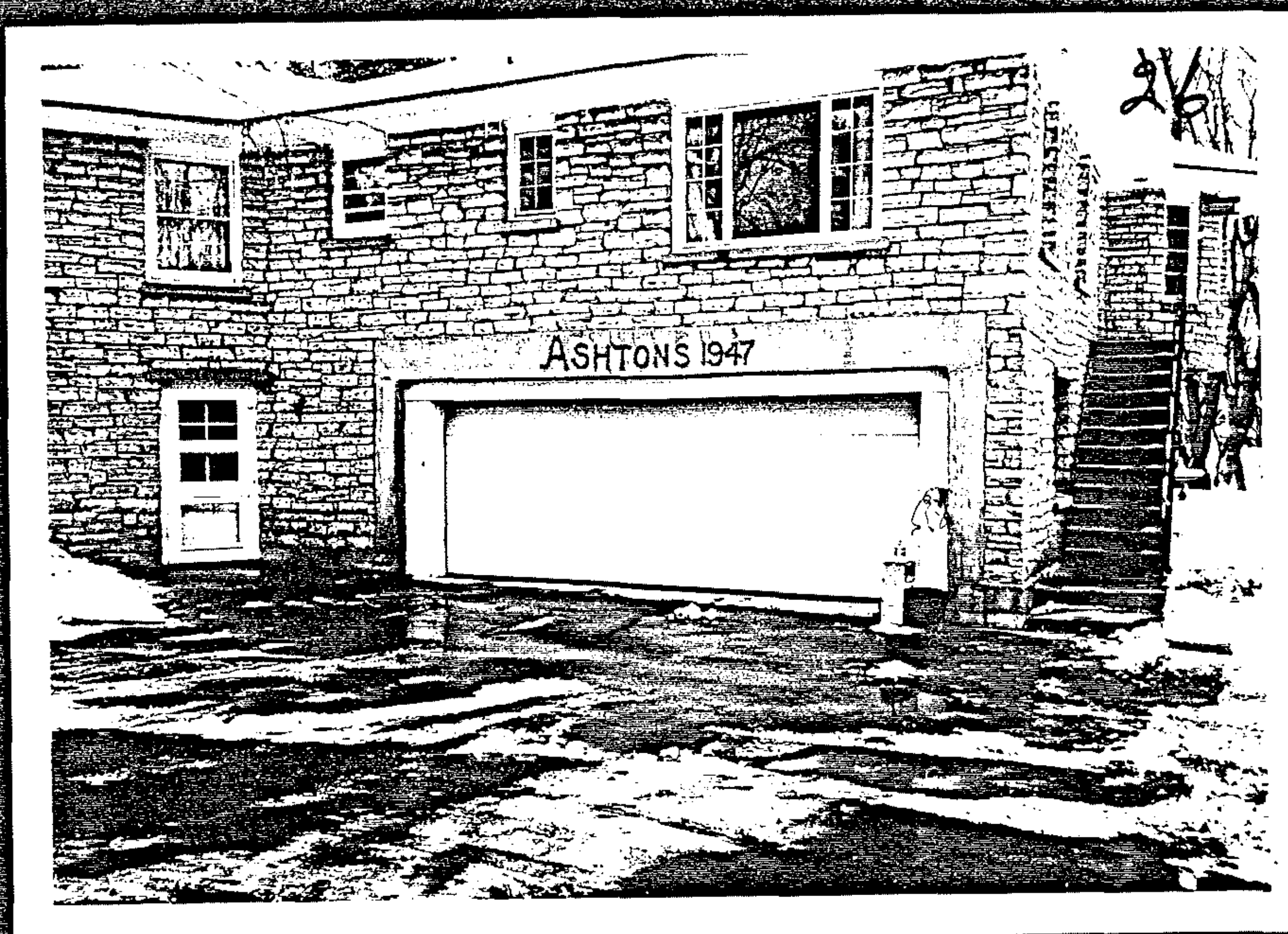
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ASHTONS 1947


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