

D-212

REPORT ON STRUCTURAL REHABILITATION
OF CONGRESS HALL
Independence National Historical Park

by

Sheldon A. Keast, R.A.

July 20, 1959

SCANNED

7/13/00

July 20, 1959

National Park Service,
Eastern Office of Design and Construction,
Philadelphia, Pennsylvania

RE: Restoration of Congress Hall
31st and Chestnut Streets
Philadelphia, Pennsylvania

Gentlemen:

Having inspected the conditions at the subject building and
revising the plans showing the existing conditions, I submit herewith
the following report:

Attached hereto is a print of drawing S1 showing sketches of
proposed reinforcing referred to in the report.

ROOF

The roof is supported by seven (7) wooden trusses designated
as T1 to T7 starting from the front of the building. These trusses sup-
port purlins which in turn carry the rafters. In the year 1821 there was
a fire which damaged the roof. New trusses were built in the front but
the old truss and the roof framing in the rear remains. There have been
past repairs and in places gypsum roof plank was substituted for the
sheathing. Two (2) large plate girders were installed in the vicinity
of trusses T5 and T6 from which the second floor was hung.

The rear end of the roof is in a very poor condition. Truss T7
has failed and the walls have been pushed out at the top, in the vicinity
of the tower, by as much as six (6) inches. These walls which consist of

piers between windows are twenty two (22) inches thick. The pitch of the roof has dropped some eight (8) inches or so.

In repairing and strengthening the roof supports, it is recommended that the ceiling and attic floor be held in place but the roof from truss T/ to the rear should be replaced, as follows:

- (1) Install 18W60 grillage beam in wall at both sides supported on bearing plates, as shown on sketch, except at the east end where the beam is to be supported on a 6" ILS-1/2" column, chased into the wall to rest on a concrete pad just above the second floor level. The wall in this location is split and is in bad condition. The bearing grillage from the adjacent existing plate girders is too close to properly bear the new grillage on the wall of the "1759" section of the building which is in good condition. Therefore, it is proposed that this column be chased in the wall to minimize the amount of brickwork to be re-built in the pier supporting truss T/. To this column and beam and also to the second floor and balcony floor joists 3/4" diameter anchors should be placed in the wall running to within four (4) inches of the face of the brickwork, anchored back to the steel, or, in the case of the floors, back four (4) joists and connected just under the flooring. It may be necessary to shore the roof supports at this location from the temporary steel beams below, while the walls are chased for the beams.

The channels on the outside of the wall to be removed and the upper portion of the east wall re-built for several feet from the top. The inside of the wall should be grouted to make it as solid as possible and the column filled around with cement mortar, thus reinforcing the wall. The west wall should also be grouted if it is found necessary when opened up.

- (2) A temporary I beam should be placed over the ceiling rafters supported by temporary shores from the twenty-four (24) inch steel beams below from which the main ceiling rafters will be hung. These rafters should be cut off so as to permit the installation of the new steel truss. All work to be done and connections made so that no damage is done to the ceiling below.
- (3) A temporary roof to be built over the ceiling to drain water to the rear. This to be covered with roofing paper and supported directly by posts from the twenty-four (24) inch I shoring beams below, preferably, through the cove area.
- (4) Remove roof from rear to truss T7, care being taken to properly protect the interior from the weather and damage from demolition.
- (5) Install new steel roof truss which is to be belted in place with ~~new steel bolts~~.
- (6) Install new hip beams. Support present main ceiling rafters by roof hangers from steel hip beams (see sketch).

- (7) Install new steel purlins to support the roof rafters. Rafters to be bolted on purlins to receive rafters.
- (8) Hang present bottom chord of T1 from beams supported by new steel truss and present plate girder. Install new purlins or support old ones from beams below. Remove upper part of old truss T1.
- (9) Build new roof to proper level and remove enough of roof of bay adjacent to T1 to bring it to proper level.
- (10) Re-build rear corner ridge of bay leading in at the present angle.
- (11) Level-up and repair ceiling.
- (12) Remove temporary shoring.

**THE REMAINING PART OF THE ROOF
IS REPAIRED, AS FOLLOWS:**

- (1) Truss T1 supports the main load from the hip roof in the front. It is badly checked in places, has no proper top chord and is over-stressed. It is recommended that it be reinforced with two (2) ten (10) inch channels and web members as indicated on sketch showing truss T1.
- (2) Trusses T2, T3 and T4 (see sketch). There is evidence of bending and crushing in the top chord. These trusses, as they are spaced only seven (7) or eight (8) feet apart, are not highly stressed.

but are badly designed. It is proposed that a new $6\frac{3}{4} \times 9\frac{1}{2}$ top chord be inserted to be wedged between the existing posts and be bolted to the present chord (see sketch). Install two (2) $4 \times 3/8$ " flats diagonally up to the peak to resist the upward push of the two (2) top chords. Place $1\frac{1}{2}$ " to 2" diameter extra heavy pipe dowels, depending on the width of opening between roof rafters and top chord, and bolt to the wall and together. Place two (2) 10" channels, one on each side, fastened with through bolts. The top chord is most cases are twisted; some as much as 3". By placing these channels and bolting together they should straighten up this chord and make the roof rafter and chord act as one unit. Rep the bottom chord so as to transfer some of the horizontal component of the stress in the channels to the bottom chord.

The supports for the Organs resting on these trusses seems to be in good condition.

- (2) Some of the existing purlins, particularly at trusses T5 and T6, are very poorly supported. The heavy plate girders supporting the second floor are adjacent to these trusses. It is recommended that the present purlins and rafters be properly supported by posts from the top of these girders and new purlins installed, where necessary, to make a workmanlike job.
- (4) All bolts should be tightened and all open joints wedged tight with oak wedges. All rafters and purlins should be inspected to see that they are properly supported and hangers or lodger

strip installed where required.

The possibility of installing a true roof having the appearance of wood, in place of wood, was considered. While the trusses will carry the added load, the purlins in many places are not. The additional load would increase the stress on the purlins. Particularly, at the hip end of front where the purlins are not designed or braced to carry the load; it is therefore not recommended without additional reinforcing.

At a number of places where the main carrying wall piers have holes cut in them for various reasons. Wherever possible, these holes should be filled and properly repaired. All walls, wherever possible, should be pointed on the inside so as to strengthen these walls.

SECOND FLOOR

The girder supporting the second floor (2) is the steel girder in the center of the building. It is proposed to reinforce this girder as shown on the sketch with two (2) 12" channels bolted through and supported on the walls at each end and on the steel plates carried by the hangers from the girders in the attic. It will be necessary to shore the second floor from the first floor by 3 x 6's spaced 4'0" o.c. supported on sills and properly braced. The present joists must be cut to permit installation of the channels and the joists must be properly braced. The remaining girders in the

Floor beams in good condition.

Some of the joists are in bad condition - bent, twisted or cracked. These should either be replaced or a new one placed alongside. Replacement should not amount to more than 10% of the floor. Every other joist is now hung by joist hangers. Since many of the intermediate supports are inadequate, it is recommended that all joists be hung by hangers and the existing hangers be wedged where necessary to properly support the joists.

All bolts throughout should be tightened and all open joints wedged where necessary. The bridging should be inspected and re-nailed and split bridging should be replaced.

Respectfully submitted,

SHELDON A. KEAST
Consulting Engineer

MINUTES OF THE ADVISORY COMMITTEE ON HISTORICAL ARCHITECTURE
INDEPENDENCE NATIONAL HISTORICAL PARK
HELD IN THE BOARD ROOM
SECOND BANK OF THE UNITED STATES, PHILADELPHIA, PA.
JUNE 23, 1959 - 10 a.m.

The following Members of the Advisory Committee were present:

Mr. Sydney E. Martin
Mr. John Harbeson
Mr. G. Edwin Brumbaugh
Mr. Jos. T. Fraser, Jr.
Mr. George I. Lovatt, Jr.
Mr. Grant M. Simon
Dr. Roy F. Nichols

The following Members of the National Park Service were present:

Washington Office:

Mr. Rogers W. Young, Chief Historian

Region Five Office:

Mr. George A. Palmer, Assistant Regional Director
Dr. Murray H. Nelligan, Regional Chief of Interpretation

Eastern Office of Design and Construction:

Mr. John B. Cabot, Supervisory Architect
Mr. Thomas Wistar, Jr., Architect

Independence National Historical Park

Dr. Dennis C. Kurjack, Chief, Division of Interpretation
Mr. Charles S. Grossman, Park Architect
Dr. John D. R. Platt, Supervising Park Historian

KURJACK: Acting Superintendent Kurjack opened the meeting by expressing the gratitude of the Service to the members of the Committee for consenting to serve and for appearing at the meeting on such short notice. The Service appreciates, he said, that the members of the Committee are busy men but trusts that they will find some compensation for their efforts in the knowledge that they are serving a worthy cause.

He said that since 1951 the administration, preservation, and interpretation of the Independence Hall group of buildings has been the responsibility of the Park Service. Ownership, however, continued to reside with the City of Philadelphia and any major changes proposed for the buildings have to be made in consultation with the City.

Describing the circumstances leading up to the investigation of the three buildings by the George M. Ewing Company, he said that the Service considered the findings of the company disquieting, and their recommendations even more so because these were contrary to long established restoration policy in the Service. However, the Service is making a careful study of the Ewing report and so is the City, which of course has been informed. It is hoped that this special Committee on Historical Architecture---agreed upon by the Advisory Commission of the Independence National Historical Park and the Director of the National Park Service---will be able to help the Service and the City in studying the problem and in making the right decisions.

The present meeting was called to tackle first the problem of Congress Hall, which is the most urgent. Mr. Kurjack first called on Supervising Park Historian Platt to give a short resume of the building's physical history and its historical association.

PLATT: Observed first of all that the building's eminence had outlasted the 1790's when it was the meeting place of the Senate and House of Representatives. Outlining the story of its later use by courts, and county and city agencies, he stated that it had been hard used but relatively little changed. For this reason much of the building's original fabric had survived. Furthermore, the exacting restoration of 1912-1913 with few exceptions was accurate. The result is a building practically identical in appearance to the Congress Hall of 1793.

Mr. Platt revealed that Congress Hall is, in the opinion of National Park Service historians, surpassed in importance only by Independence Hall, the National Capitol, and the White House. As the scene of the inaugurations of Washington and Adams, as the oldest standing capitol building, as the meeting place of great men, it occupies a unique position among historic American buildings. In Congress Hall, the nascent government under the Constitution was given form and substance. Here too Congress set precedents and initiated practices and customs which have since become cherished traditions.

KURJACK: Now to outline for you the problem of Congress Hall, and later to conduct you on a tour of that building, we have present Mr. Cabot, who is the Chief Architect in the Eastern Office of Design and Construction, and Mr. Wistar, also of that office. First, Mr. Cabot:

CABOT: I want to give some of the recent background of the building. We came to a point last winter where there was evidence of failure of the trusses of the roof. We had to do something in a hurry to relieve that - we took emergency measures to take the strain off the building itself. We did not have qualified engineers with the proper background and we thought a structural

ia: Conclusions
survey should be immediately undertaken. We hired the Ewing Company - we may have made an error in what we asked them to do. We asked them not only to make a structural survey of the building, but also to make recommendations to us. They did not have the opportunity to study the building as it can now be studied - they did not have the chance that we have to study the building. In making their recommendations for stabilizing the building they had their reputation at stake and they could do no less than they did. There has been much review of this report inside the Service, and I think we can say that there seems to be almost no agreement on the conclusions of the Ewing report. We agree with the report to the extent of putting steel trusses in. Our position is that we are the custodians, the City is the owner, and it is a mutual responsibility. At the [INHP] Advisory Commission meeting we felt that it would be a good idea to get a group of experts to analyze the building. The Park Service has a restoration policy which was conceived about 20 years ago. I would like to read you certain excerpts from this established policy statement of ours in regard to restoration:

It is well to bear in mind the saying:
'Better preserve than repair, better
repair than restore, better restore than
construct.'

It is ordinarily better to retain genuine
old work of several periods, rather than
arbitrarily to 'restore' the whole, by
new work, to its aspect at a single period.

This applies even to work of periods later
than those now admired, provided their work
represents a genuine creative effort.

In no case should our own artistic preferences
or prejudices lead us to modify, on aesthetic
grounds, work of a bygone period representing
other artistic tastes. Truth is not only
stranger than fiction, but more varied and
more interesting, as well as more honest.

The recommendations of this Committee are important - we will want to check the whole group of buildings in Independence Square. Throughout this emergency period we went ahead on the best recommendations we could get to advertise for bids on low pressure grouting - at this moment we have not allowed them to proceed. There is some question in our mind as to whether this building is as hollow as the Ewing report states it is. We hope to have help from the City and from the wise background of you people. Tom Wistar here is a member of the AIA Committee on Historic Buildings. Tom has some drawings you should see and he can explain it as he goes along.

HARBESON: I would like to propose for consideration of this meeting that we adopt some policy - I am thinking of Congress Hall - it should not be used for television at any time because TV requires the setting up of cameras - the people are careless about what they do and it serves no purpose.

KURJACK: Television plays an important part in our expanding interpretive program, and I think it would be difficult to eliminate it even if that were our desire. In Congress Hall, in the House of Representatives Chamber, for instance, we have had for the past several years a series of telecasts called the "Bulletin Forum." We felt that this chamber lent itself ideally to such use. A maximum of 140 people were allowed in the area once reserved for Congressmen - plus two cameras, lights, and monitoring equipment.

Now of course, if it were determined that this load was excessive, we could easily arrange to reduce it. The number of people allowed in the Chamber for instance, could be controlled. But I think we need remember that interpretation is a vital activity of the Service and television an important medium in a modern interpretive program. I am, of course, speaking of the first floor of Congress Hall. No one in this office has ever suggested that the second floor be used in a similar manner.

MARTIN: It seems to me that we want to come to some answer. I was very much impressed by the philosophy that was read - it expresses exactly my own personal opinion.

The following resolution was proposed and adopted by the Committee:

That this committee goes on record as heartily endorsing the established policy of the National Park Service in regard to restoration and rehabilitation of historic structures as set forth in the statement read by Mr. Cabot.

[Copies of plans and sections of Congress Hall were then handed out.]

WISTAR: Some of us have come to the conclusion that the Ewing recommendations do not embody the right solution for this building. For one thing, they are based on the assumption that the second floor would have to meet a 100-pound per square foot for assembly loading. In our MISSION 66 Program it says that Congress Hall will be used as a "house museum;" that means it will be preserved for controlled exhibit to the public - a place for assembly has no part in it - this is the reason we do not consider any drastic reinforcement necessary to the second floor. So the Ewing Report, although it represents a good physical survey, to our minds seems inappropriate when you

consider what the building will be used for. Then too, the Ewing people base their recommendation on the assumption that these walls will not continue to do their job. After further investigation assisted by our more extensive exposure of the fabric of the building, we find these old walls are more solid than expected - they are solid bonded brick throughout with the exception of the failure on the east side wall at the south end. The south part of this building ~~is~~ the alcove end - was an addition put on in 1793. It is in that addition that there is an extraordinary design to the roof trusses; they were weakened in 1820 by fire and they were never replaced. Sometime ago one of these trusses failed and it has endangered the 2nd floor ceiling under it.

PLATT: There are two partitions - one of brick and one of wood - they carried much of the weight of the building.

KURJACK: We thought we might walk over to Congress Hall and take a look so that you gentlemen could see what we are up against. We want you to see first-hand the situation as it exists and get your thinking on what should be done.

BRUMBAUGH: You want us to go over and look at the buildings. Should we merely look today and discuss this later? It seems to me that the whole question needs to be almost basically discussed. If we depart from this room and go over there we will break up into groups of two or three and not much will be accomplished.

HARBESON: Can we say that we all agree with the principles which were read?

BRUMBAUGH: The elements that are hidden from view are just as necessary historically as what you can see - the old structure could be retained. The AIA showed how they moved two beams and imbedded a steel beam so that the present appearance of the beam is as it appeared to be before. I think we should not overlook that. I brought along this book of the White House restoration (several pictures in the book were shown); this is certainly not the original White House. You can see they practically gutted the whole interior and made additions and deletions. It was thought that the President and his staff should move out of the White House and that the White House should be a Museum, but it was ruled that the President should reside in the White House and it was altered to suit the needs of the present time. That is not the White House as it was, that is a complete reconstruction. I think we should try to save as much of the original building as we can - I think we are all looking for a permanent stabilization construction but it may not be possible to do that - it may be that something else will have to be done in the next 30 or 40 years or so. If you go into removing molding and old wood and so forth, no matter how careful you are, some of it gets lost; we must weigh the values.

NELLIGAN: Since the City moved out of this structure in 1912 no one has paid any attention to it, but now it is going to get continual loving care.

WISTAR: (Showing drawings) In the attic you will see in the south addition the old trusses which survived the fire in 1820 - these are still there - they definitely need replacing. We are not all agreed whether it would be necessary to replace those old wood trusses with steel, built-up wood or laminated.

BRUMBAUGH: We had a problem at "Gloria Dei" due to the movement of the building. All we did there to arrest the move was to brace the rafters to make triangular truss forms, and this prevented the building from moving. I don't think you necessarily have to tear this building apart; you may be able to add members and work that into a form that would no longer move.

CABOT: Of course we do have complete failure in one truss.

BRUMBAUGH: This can possibly be arrested without taking it out. We had to repair structurally for preservation purposes. I was never in a more poorly designed place (Gloria Dei), the rot was in the wrong place. We did not tear down the walls, we stabilized them and added plates to the top of the walls, that way we took care of the roof structure above. The truss joints could be strengthened. There are many angles which could be worked. I don't think the Ewing Company have any concept of that kind of approach; that is: to take the roof and stabilize it.

WISTAR: The second floor girder which was the old bottom cord of the trussed partition, which is the south wall of the Senate Chamber on the second floor is badly cracked and needs stabilizing. The old wood truss partition is no longer performing any function since the supporting hangers were installed in 1912.

SIMON: It would seem to me that a Committee as large as this cannot pass on details discussed here. There are problems that would have to be approved under certain conditions. It seems to me that all this Committee can do is to approve a general course of action.

WISTAR: I think that is just what we would like you to do.

CABOT: We would work out the details and then present them to the Committee.

SIMON: My feeling is that we should recommend a procedure that will insure stability of the buildings. I think our sentimental loss of the old things should be taken into account. We should try to stabilize the buildings for bigger and greater numbers of people. We should use any modern method available to preserve these buildings.

NICHOLS: Have you any figures as to the present visitation?

KURJACK: We had about 1,500,000 visitors to the Park last year. Congress Hall does not receive as many visitors as Independence Hall; its visitation is probably in the neighborhood of 500,000.

NICHOLS: Do you have 10 times as many visitors as 20 years ago?

KURJACK: We have no accurate figures for the years prior to 1951. My guess is, no. But insofar as the Park Service is concerned, we can make certain not to go beyond what is proposed as a maximum number of people allowable in the building at one time.

SIMON: It is better to be sure that these buildings will be here 50 years from now than to take a chance.

GROSSMAN: It is less than 50 years since the last restoration. If we start patching we will not be able to tell in 25 years what we have. The people who visit these buildings will not be able to see anything behind the ceiling or the wall. The visitor will not see the trusses and the roof. These things can be removed and kept where the people can see them. The floor load should be designed to make the building available to the public. If we have to replace wood with steel, it will be in the records and the original can be removed where it can be seen. If we take steel and encase it with wood we are not showing them the original construction. Each time you open up one of the buildings something is lost or destroyed. I may be in opposition to everyone here, but I personally feel we are being unjust to future generations if we don't make the rehabilitation of these buildings as permanent as possible. We have buildings that must stand as long as this nation exists.

WISTAR: Can you make a proper rehabilitation that is "permanent" within the policy that is established by the National Parks?

CABOT: Busses and trucks are going down on the outside and it shakes the buildings; if you could remove the trucks and other traffic from the street that would eliminate the buildings being shaken.

SIMON: You can remove the trucks and busses from the street, and at least your conscience would be clear, but how about explosions. Remember the explosion at 30th & Market - why it blew the windows right out of the Bulletin building - you have these jets going over with their vibrations. I think we should insist on the most thorough reconstruction of the buildings.

BRUMBAUGH: I don't think you can make buildings of this sort sufficiently modern that they will endure forever. If you wanted to make them last forever, you would have to completely tear them down and rebuild them on a steel frame. I don't think we have to make these things so modern that they will last forever. I think a proper stabilization of the buildings can be accomplished with less than that.

GROSSMAN: The only parts of the building which are original are the walls, the Senate Chamber, the roof framing, the window trim and sash and some reused doors and miscellaneous trim.

SIMON: I think there is so much of these buildings that are not antique, that we should take some liberties with them.

NELLIGAN: Since the White House always comes into these discussions, the decision they had to make was whether the building should be preserved as an historic structure or not. They considered the advantages of moving the President out to another place where they would have plenty of room, etc., but that was ruled out; therefore, the White House had to be adapted to the President's use. We have here a building that is dead, it is nothing but a relic and we want to preserve that as long as we can.

THE GROUP MOVED TO CONGRESS HALL.

Before the final session of the conference, which was held in Congress Hall, Mr. Wistar conducted the members of the Committee on a thorough tour of Congress Hall to permit them to acquire a first-hand knowledge of the structural condition of this building. During the tour the particular features of the rehabilitation problem as they pertain to that building were pointed out. The alterations and measures taken in 1912 to strengthen the structure were also described.

Mr. Simon left before the tour ended; he did not participate in the final discussions which were held on the second floor of Congress Hall.

At these discussions it was proposed that Mr. Martin assume the Chairmanship of the Committee on Historical Architecture. Mr. Martin agreed to serve as their spokesman but pointed out that because of his projected trip to Europe this summer he would delegate this position during his absence to Mr. Brumbaugh or Mr. Lovatt. [It was later decided by these two gentlemen that Mr. Lovatt would serve as interim chairman of the committee during the absence of Mr. Martin.]

By unanimous agreement of those present, the Committee recommended to the National Park Service that they retain a consulting engineer who from long experience has particular knowledge of old wood and masonry structures. Mr. Brumbaugh proposed the name of Mr. Sheldon A. Keast. The nomination was seconded and his selection was unanimously agreed upon. This was a verbal recommendation upon which the Service is to take action without further report from the Committee. They emphasized the point that their recommendation should not be acted upon until any prior commitment the government might have for engineering services in regard to this building is terminated. This is obvious for professional reasons. The hope was expressed that the consulting engineer could complete his examination and present his recommendations as to extent and method of rehabilitation after about a two-week period.

The meeting adjourned shortly after noon.

Eastern Office 71 AM 8 10
 Division of Design and Construction
 Philadelphia 6, Pa.

July 30, 1959

DIV. OF DESIGN AND CONSTRUCTION	
JUL 31 1959	
	Vint
	Morrell
	Miller
	Sager
	Smith
	Joseph
	D&C Files
	Records Files

Memorandum

To: Superintendent, Independence National Historical Park

From: Chief, EODC

Subject: Report by Mr. Sheldon A. Keast, R. E. - Congress Hall

Attached for your review is a copy of the Report on Structural Rehabilitation of Congress Hall prepared by Mr. Sheldon A. Keast, R.E. As you know, Mr. Keast is the engineer recommended for this study by the Advisory Committee on Historic Architecture. With the assistance of Architect Wistar of this office, he made a careful study of the condition of the fabric and design of the old building taking into particular consideration the structural reinforcements installed in 1912.

Upon obtaining the views of the Advisory Committee on this report, we will request comment from you. By copy of this memorandum, we also will request the views of the Regional Director. This should be in about two weeks time.

(Sgd.) Edward S. Zimmer
 Edward S. Zimmer
 Chief

Attachment

Copy to: Regional Director, Region Five w/attachment
 Chief of Design and Construction - 2 w/2 attachments and -
 also two copies of minutes of meeting of June 23