

September 1, 1961

Superintendent
Independence National Historical Park
420 Chestnut Street
Phila. 6, Pa.

Re: Inspection and Repairs to
Independence Hall Tower

Dear Sir:

As a matter of reference, the floor level at the attic floor (ceiling of Assembly Room, second floor) will be considered as Level No. 5; Level No. 4 is the Clock Floor Room; Level No. 3, next above; Level No. 2, Dial Room Floor; Level No. 1, floor above Dial Room Floor and below the roof under the bell; and above that, the floor or roof under bell. Above the bell is the cupola, where the bell is supported.

The tower is of brick up to the third level. Above this level, it is of frame construction. The upper part of the tower from the third level is supported on four principal columns, $14\frac{1}{2}$ " square at the bottom and 12" square at the top, resting on C.I. brackets from the wall corners. These C.I. brackets are located about 2' above the fourth level. Two sets of tie rods go completely around the tower at this point--one at the bottom of the $14\frac{1}{2}$ x $14\frac{1}{2}$ column, and the others under the lower flange of the bracket. Framing into

these columns at the third, second, and first level, and roof under the bell are wooden trusses carrying the sides and floor at each level. The cupola is supported on eight wood columns resting on the trusses below. The bell is supported at the cupola level by 2 - 12 x 12's framing east and west, hung from 2 - 12 x 12's framing north and south. The 12 x 12 support beams are hung from the 12 x 12 girders by 4 - 3/4" round bolts and 2 x 3/4" strap hangers.

A clock mechanism is supported on the fourth level on the west side. I estimate this mechanism to weigh approximately 5 or 6 tons. Some of the main support columns are badly checked, and some of the trusses framing into these columns have sagged. In general, the wood supports seem in good condition.

I recommend the following repairs be made to the tower framing:

1. No. 5 Level: The two interior trusses running east and west to be reinforced with two channels—one on each side with two tie rods under the floor serving as the bottom tie. This truss, with its two vertical posts, will be made to support the fifth, fourth, and third levels and carry the weight of the clock mechanism. A detail of this is shown in Sketch No. 1.

2. The bottom of the $14\frac{1}{2}$ x $14\frac{1}{2}$ inclined corner columns are supported on a C.I. shelf, or bracket, about 2" thick in each corner with a vertical C.I. web extending down

about 2' to another flange supported on the wall. These flanges, as far as I can see, are carried into the brickwork only about 3". There is considerable torque on these C.I. brackets; at least one has apparently moved out from its original position. I recommend that a steel "I" beam be placed diagonally across from wall to wall with a bearing of at least 10" to support the outer edge of the C.I. support, thus relieving the twisting action on the C.I. support. At the northeast corner, a timber now exists in the wall under this bearing. I would recommend this timber be removed from directly under the bearing. This can be done in three operations, cutting out the timber and rebuilding the brickwork. The same should be done if it occurs at other locations.

The bottom of the main tower supports is not fastened down at its bearing on the C.I. bracket. The only force holding the tower down against overturning is the weight of the frame tower, itself. According to my figures, this is inadequate to carry a 100 miles-per-hour wind load. The weight of the brickwork from the fourth to the third levels would add considerably to the dead load at each corner. I recommend that the weight of this brickwork be utilized to afford a sufficient factor of safety against overturning. This can be done by tying down the bottom of the four corner columns to its support, thus transferring the uplift to the brick walls. See Sketch No. 2.

3. At the roof level, the eight posts carrying the bell are supported on timber trusses framing between the four inclined posts, or columns. The top chords of some of these trusses have sagged due to the fact that no vertical member occurs under these posts, thus throwing bending into the top chord. I recommend that an 8 x 8 diagonal running from this post to the heel of the truss be placed at each of these points to carry this load directly, as shown on Sketch No. 3.

4. I can find no positive support of any of the framing into the four main column supports, other than bolts. I do not consider this adequate to carry the weight. I recommend that 3 - 2" rods be placed between the knee and inclined columns by drilling holes $1/16"$ less than the diameter of the rods and driving these rods to a tight fit, as shown in Sketch No. 4. These would be placed in the knee braces under the main carrying chords, only.

5. Some of the main column members have bad checks--some as much as $\frac{1}{2}"$ in width. These checks do not go completely through the members. I would reinforce these by using $2\frac{1}{2} \times 3/8$ bands spaced about 2' 0" o.c. where these checks occur. See Sketch No. 5.

6. Reinforce the north window arch, Level No. 5, which has sagged considerably, with 4 - $4 \times 3\frac{1}{2} \times 3/8"$ angles. Repair other lintels where necessary.

7. Several diagonals at the ceiling of the second level have badly twisted. I recommend that steel plates be

placed on each side with through bolts, as shown on Sketch No. 6.

8. Two large floor girders $11\frac{1}{2} \times 14\frac{1}{2}$, running north and south and supporting Level No. 2, frame in the middle between panel points of the top chord of the supporting truss. While there is no definite deflection in the top chords, I recommend inclined 8 x 8's be placed under this chord and framing into the middle of the diagonals, as shown on Sketch No. 7.

9. All open joints should be properly shimmed. All floor beams should be reinforced, where necessary, and properly supported from the floor stringers.

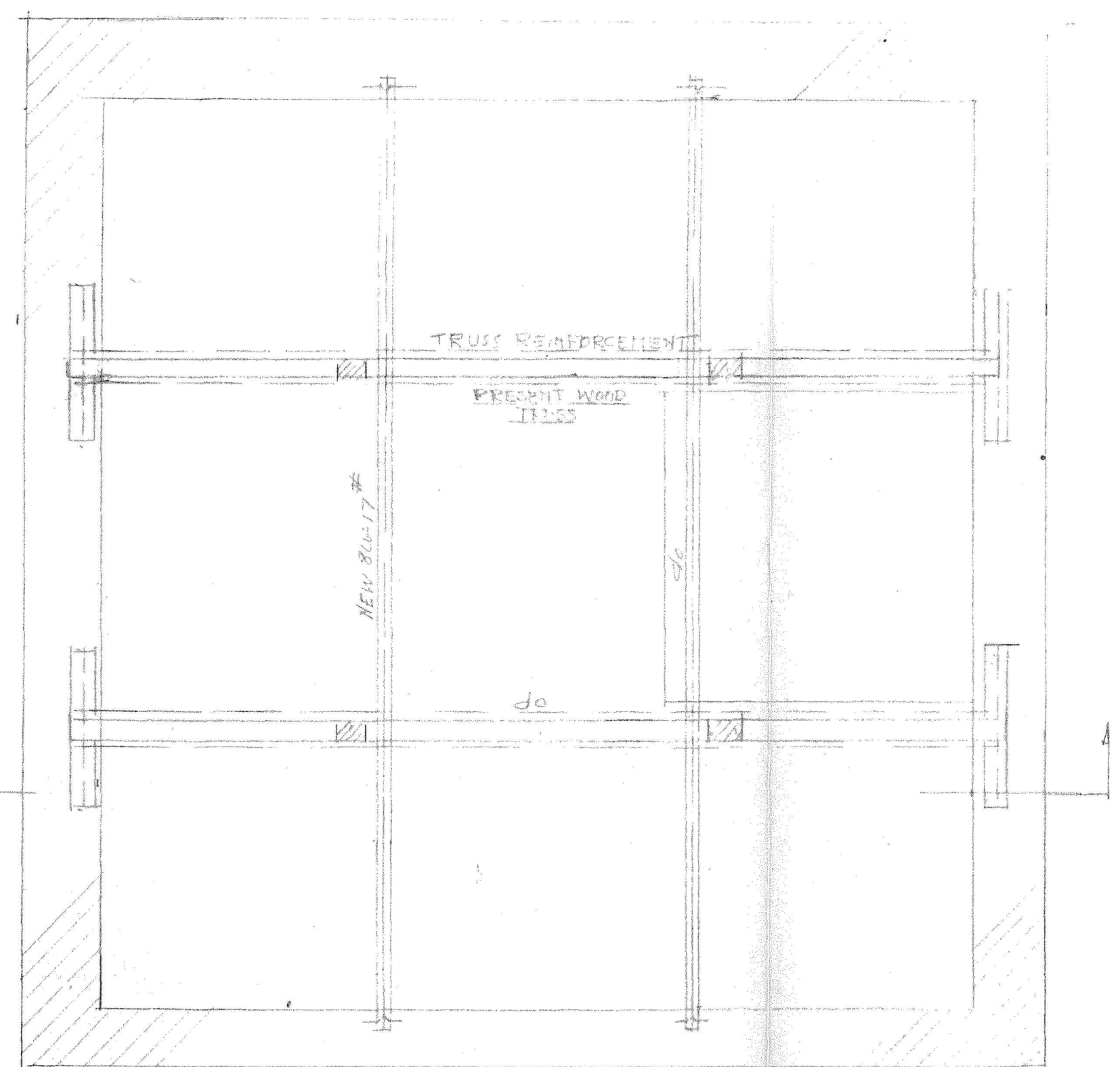
With the exception of a few places, the outside walls seem in good condition. At some of the circular windows, cracks occur in the masonry, probably due to settlement. These should be repointed and repaired where necessary.

The corner diagonals at Level No. 3 rest directly on the wood joists. I recommend that these bear on masonry walls by building up brick piers directly on the wall.

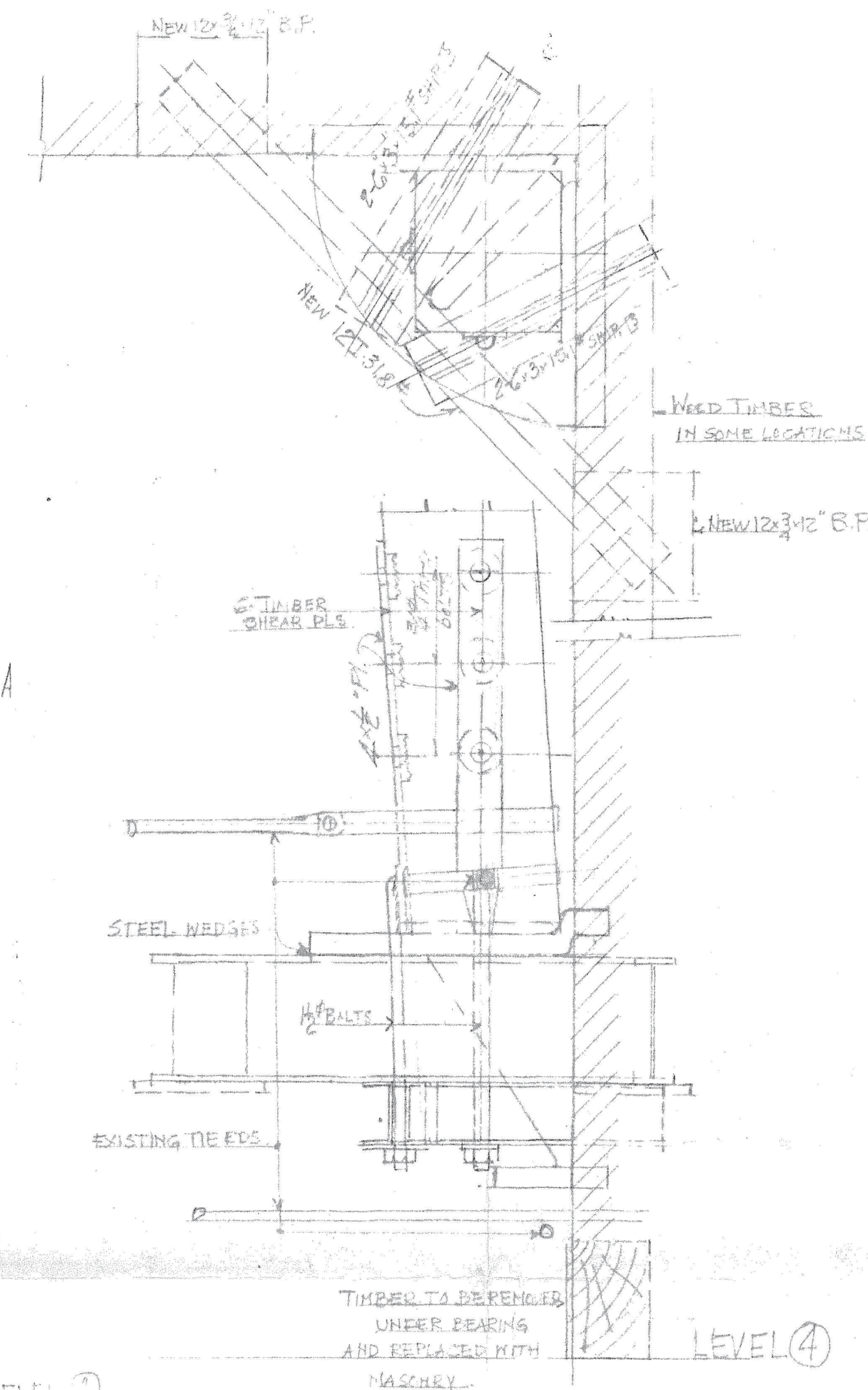
In order to give a better picture of the tower as a whole, I have attached to this report, in addition to my sketches, a cross section of the tower made by the Philadelphia Chapter A.I.A. for the City of Philadelphia.

Respectfully submitted,

/s/ SHELDON A. KEAST

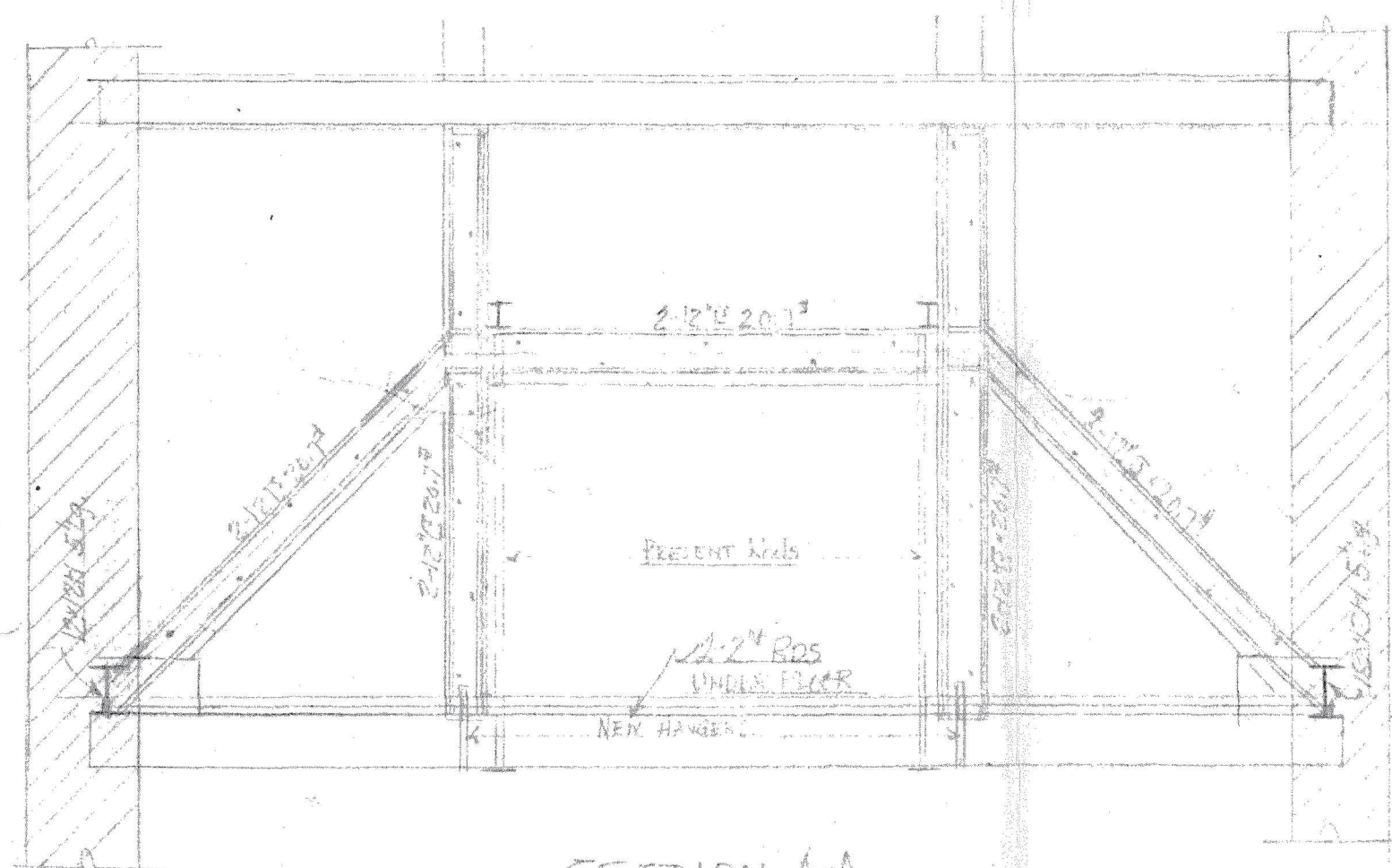


PLAN AT 5th LEVEL



LEVEL ④

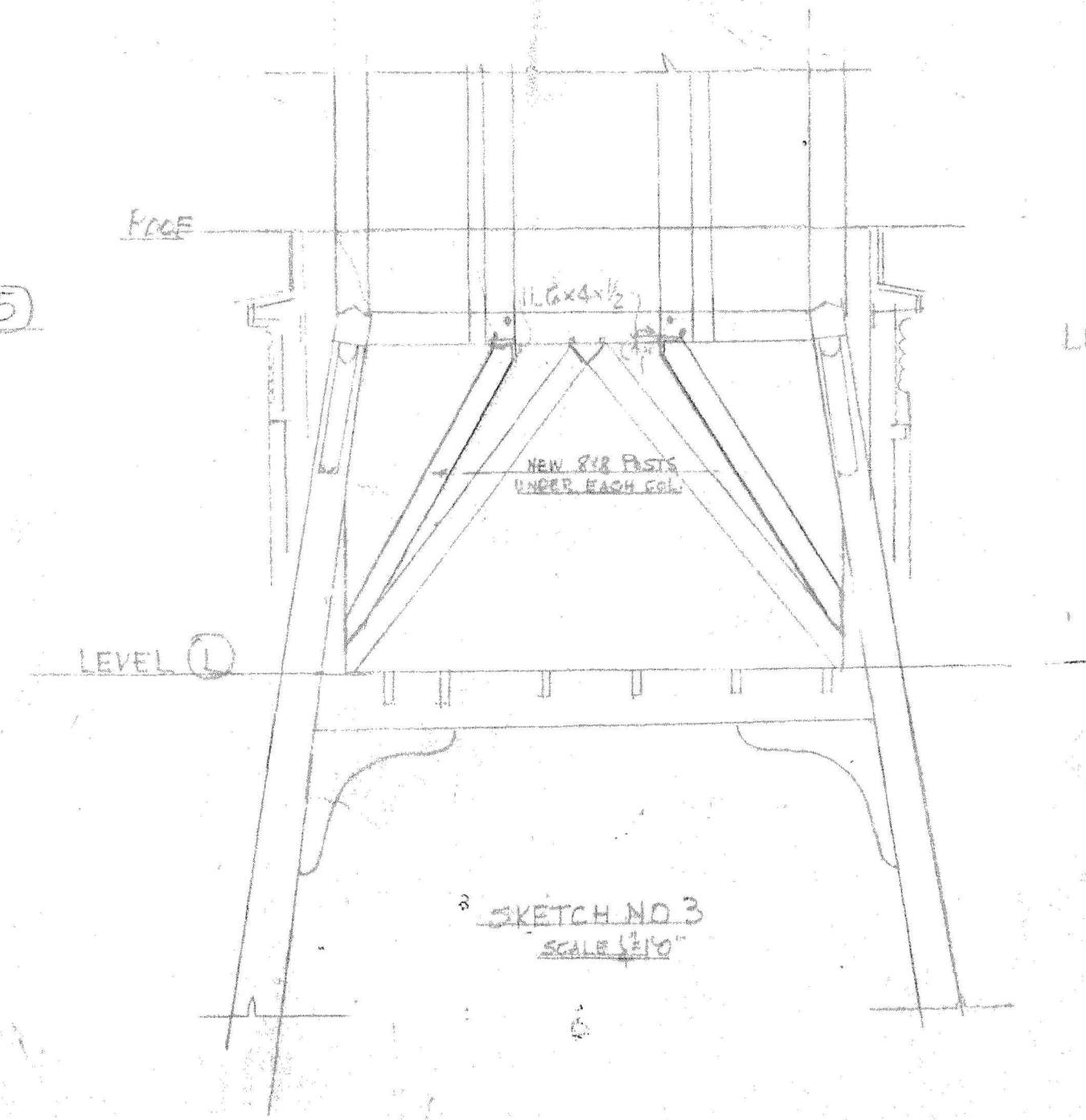
SKETCH NO. 2
SCALE 1/2"=1'-0"



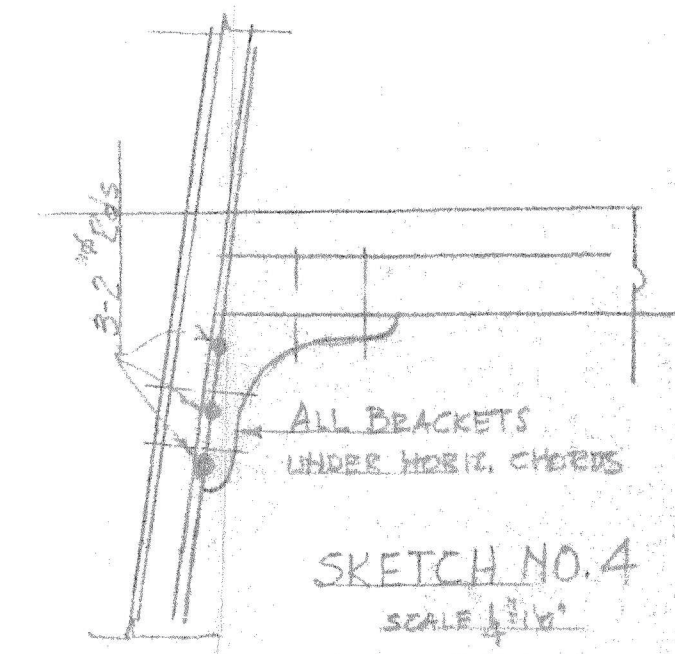
SECTION A-A

SKETCH NO. 1
SCALE 1/4"=1'-0"

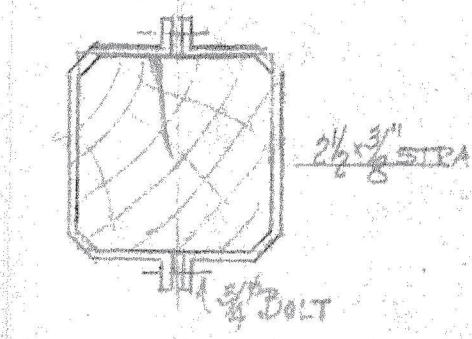
LEVEL ⑤



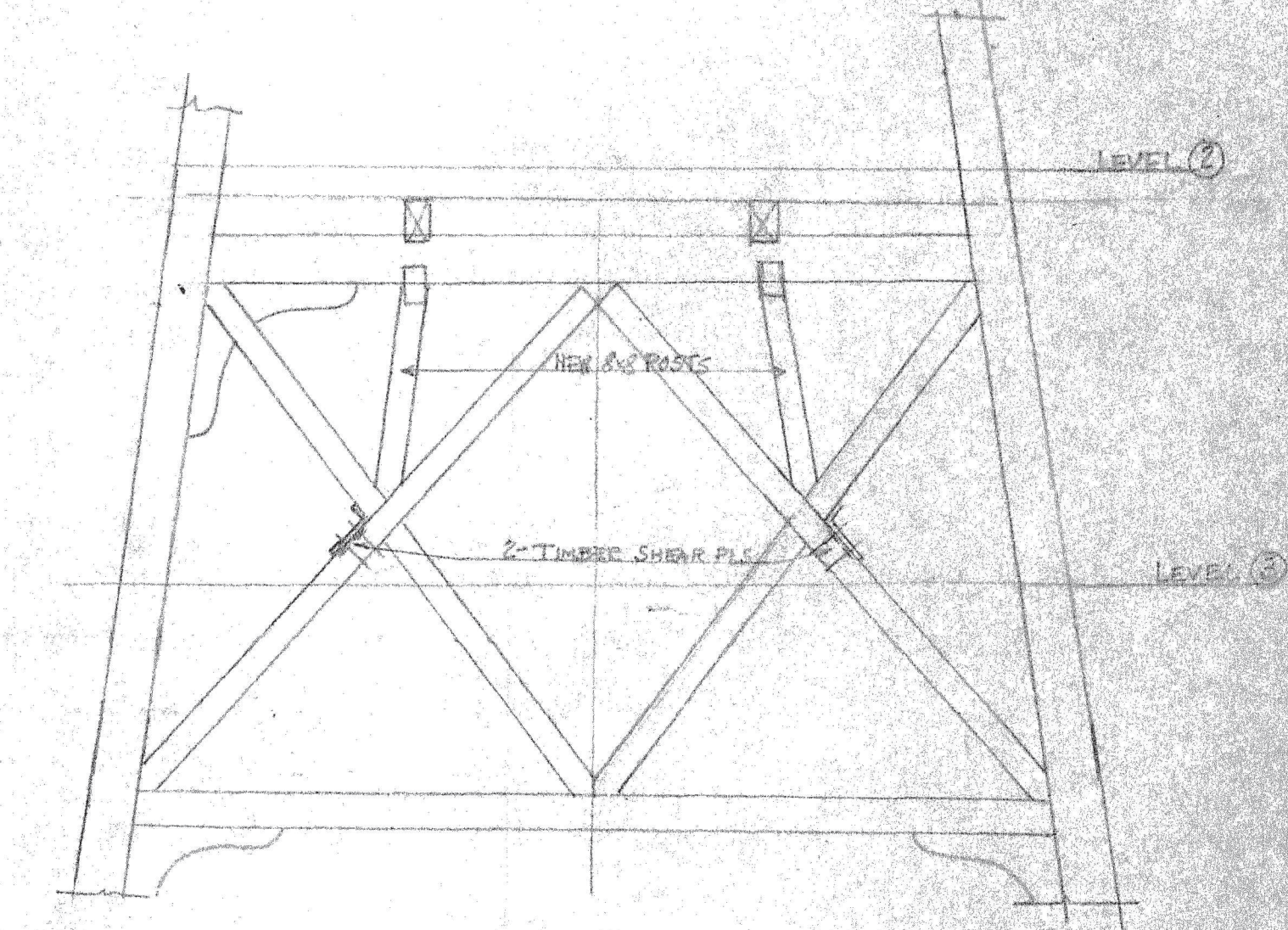
SKETCH NO. 3
SCALE 1/2"=1'-0"



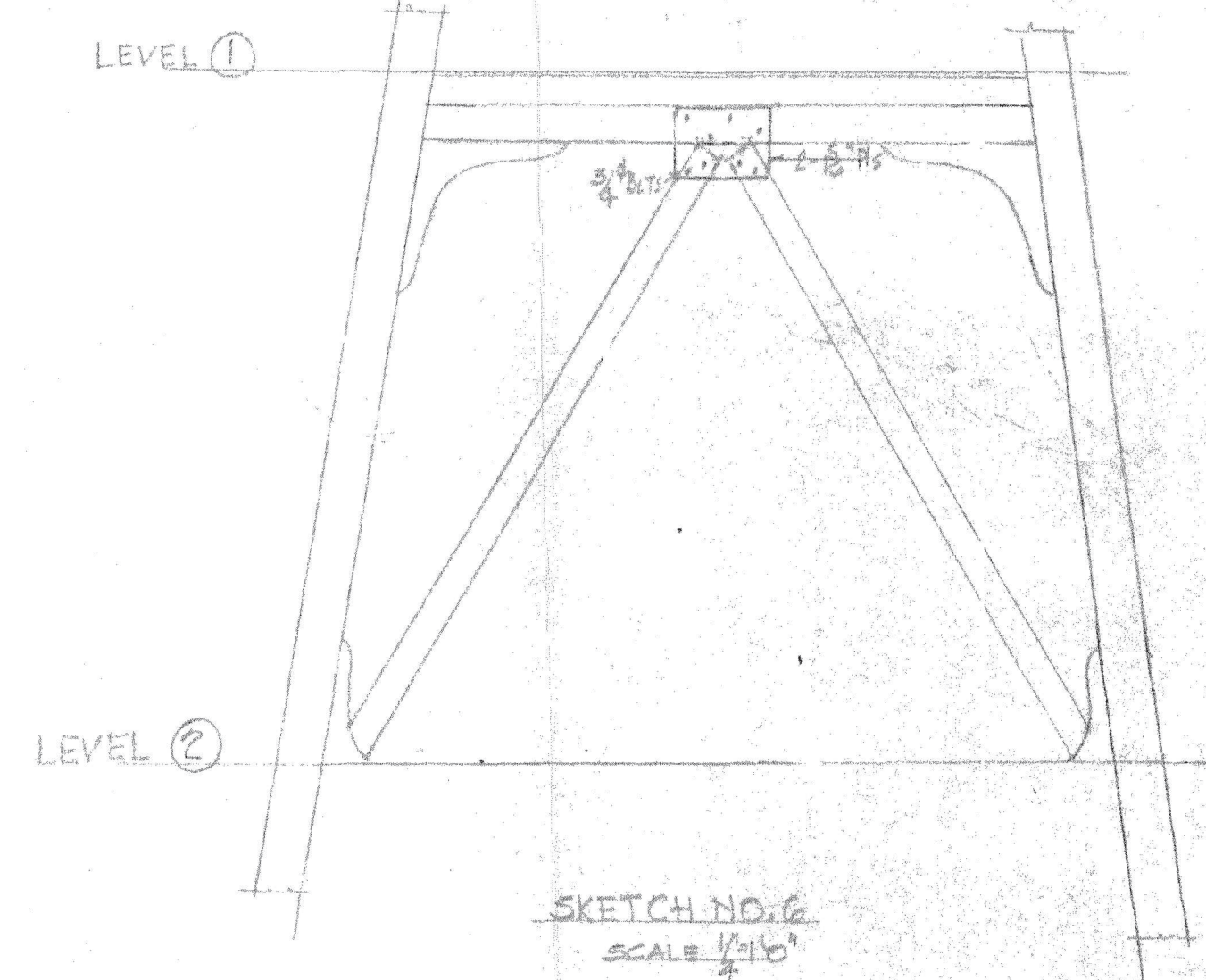
SKETCH NO. 4
SCALE 1/2"=1'-0"



SKETCH NO. 5
SCALE 1/2"=1'-0"



SKETCH NO. 7
SCALE 1/2"=1'-0"



SKETCH NO. 6
SCALE 1/2"=1'-0"

REPAIRS TO
INDEPENDENCE HALL TOWER
S.S. OF CHESTNUT BET. 5th & 6th STS.
NATIONAL PARK SERVICE

SCALE 1/2"=1'-0"

9/10/61

