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INTERIM REPORT
HORIZONTAL TIE REPLACEMENT
STERLING TOWN HALL
STERLING, MASSACHUSETTS

RECEIVED

AUG 13 1987

TOWN OF STERLING
STERLING, MASS.

Prepared by

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143 Dewey Street
Worcester, MA 01610

August 1987

INTERIM REPORT
HORIZONTAL TIE REPLACEMENT
STERLING TOWN HALL
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PART I - AUTHORIZATION

The firm of Harvey & Tracy Associates, Inc. was authorized by the Town of Sterling to review structural repairs which were being undertaken by the Town and to comment on their appropriateness. Repairs consisted of replacement of horizontal ties at the eave lines of wood roof trusses. Components of two of these ties (A and B)* had failed at two different times during the past several months.

PART II - DESCRIPTION OF THE FACILITY

The facility is a two story wood frame structure approximately 38 feet 6 inches wide by 81 feet deep which was built in two distinct parts, the first part being the 50 feet plus or minus nearer the street. The first floor serves as offices for various town departments. The second floor serves as a meeting room. This room has a fixed stage at the rear and a small balcony at the front.

Presently the ties in question are of two types of construction. In the original part of the building the tie rods (A and B)* appear to have been installed sometime after the building was constructed. It appears they were installed to replace wooden tie members that existed at the eave line as part of the original structure. Consistent with this the tie rods were attached to the side wall by the use of a "U" shaped yoke which bracketed the original tie beam and in between the yokes there were tie rods with turnbuckles. In the second part of the building it appears that the tie rods (C and D)* were installed as part of the original construction in that they went straight through the outside wall framing in the same vertical plane with the rafter or truss beam above which followed the slope of the roof.

PART III - CONDITIONS NECESSITATING STRUCTURAL REPAIRS

Several months ago a failure occurred in one of the ties (A)* in the original building. When the failure occurred the eave line on the two opposite sides of the building spread somewhat at this location. Although the only information concerning the failure as related to this office is verbal, it appears that the failure occurred in the connection of the yoke device to the rod at one of the two ends.

This rod assembly was then replaced with a cable type of assembly while still utilizing the existing yokes at the ends. Sometime later a similar type of failure occurred at the second tie (B)* within the original portion of the building. This one was then repaired in a similar fashion and it was then the intent of the Town to replace the ties (C and D)* which were in the newer portion of the building. After tie (C) had been replaced Harvey & Tracy Associates, Inc. was contacted to review the repairs that were being and had been undertaken and to comment on their appropriateness.

PART IV - SCOPE OF REVIEW

The scope of the review undertaken consisted of visual observations of the existing conditions and a structural analysis of certain framing components of the facility along with field measurements necessary to perform this analysis.

PART V - RESULTS OF REVIEW

A. Visual Observation

The yoke type devices at the end of the ties (A and B)* in the original part of the building had undergone some distortion as might be expected as their configuration introduced forces and stresses that were not designed for. This distortion in turn caused distress in the wood members to which they are attached.

There does not appear to be any distress in the remaining tie (D)* in the building addition. A visual review in the attic (limited because of low head room) indicated that there were cracks in some of the wood framing components of the roof.

B. Structural Review

The structural review undertaken by this office consisted of an analysis of certain components of the roof framing using load requirements in the present Massachusetts State Building Codes. In general, as might be expected given the age and type of construction of the facility, the structural capacity of the framing appears deficient with respect to design load requirements of today's building code.

The pieces of the original tie rod assemblies (A and B)* which had failed were discarded when the replacement ties were installed. Therefore, it is impossible to determine precisely what the mode of failure was. Because the two failures occurred at different times it is also impossible to ascertain what type of loading the building may have been subjected to at the time those failures did take place.

The replacement tie rod assemblies installed to date (A, B, and C)* do not appear to be structurally adequate for code mandated loads and in the case of ties A and B particularly because these incorporate the yoke devices described previously.

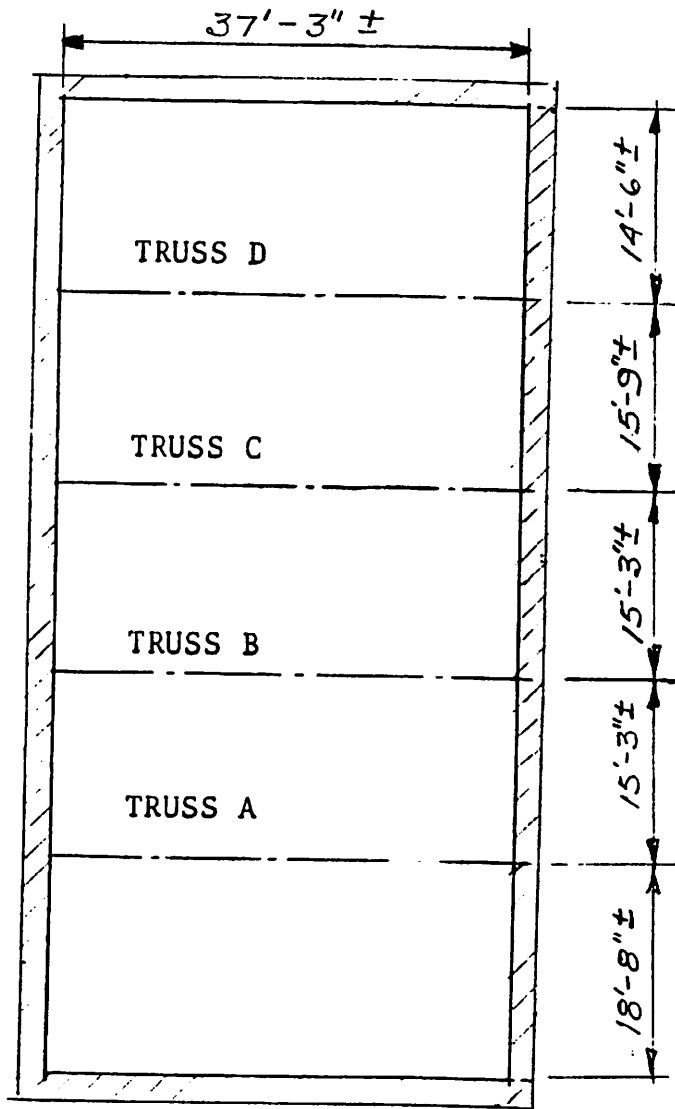
The one remaining tie rod assembly (D)* in the building addition does not at this time evidence any visible signs of distress.

PART VI - RECOMMENDATIONS

New tie rod assemblies should be designed and installed to replace all of the existing tie assemblies including the ones recently installed.

As discussed, with the building inspector, the town would then remove the ceilings in the auditorium in order that the conditions of other elements of the roof framing system can be assessed and any recommended repairs based on this assessment can then be made.

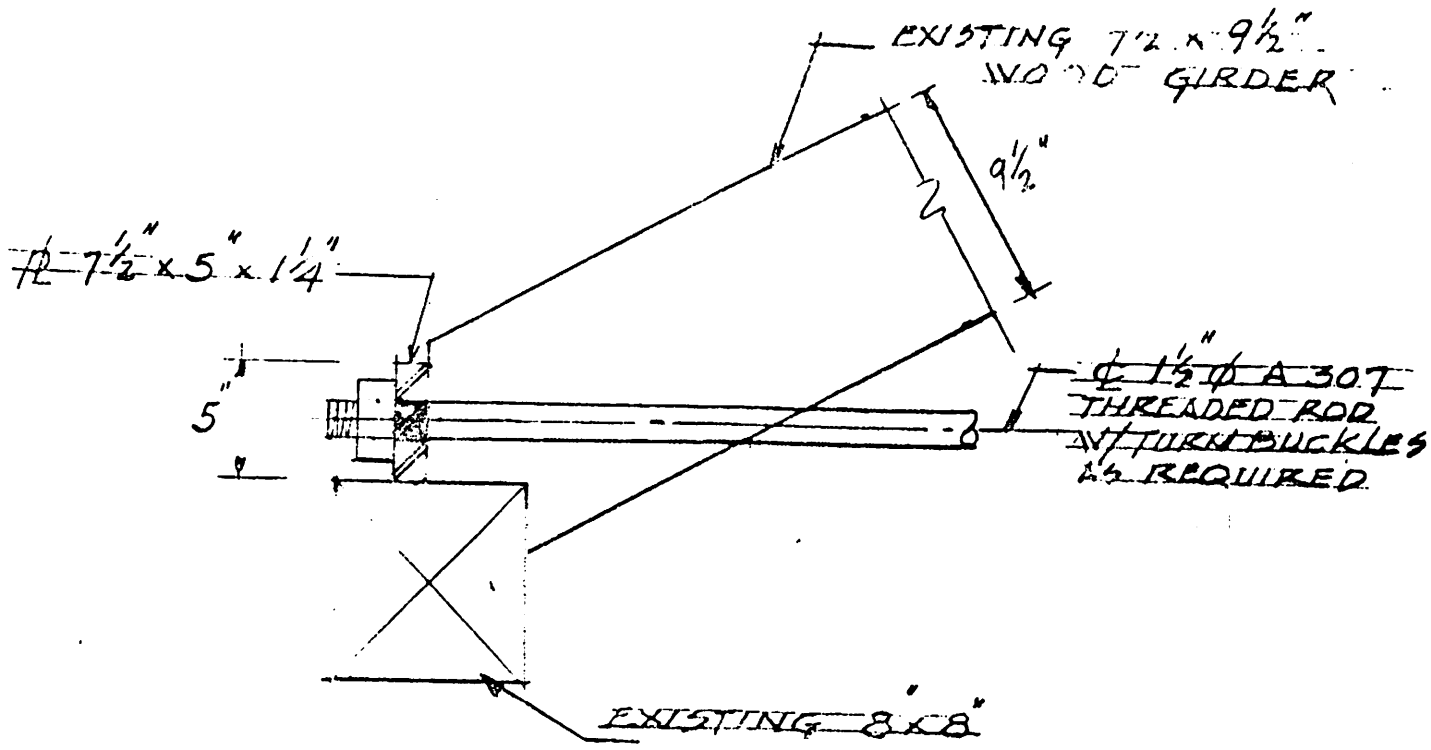
* See attached layout.



FRONT OF BUILDING

TRUSS LAYOUT PLAN

STERLING TOWN HALL



SECTION "B" scale 1/2" = 1'-0"

TRUSS TIE ROD DETAILS	
STERLING TOWN HALL STERLING, MASS.	DATE AUG 1987
HARVEY & TRACY WORCESTER, MASS.	SHEET NO. SK2

PLATING
WOOD GIRDER

6-1" Ø A307 THRU BOLTS
AND NUTS

3/4" Ø A325
BOLT & NUT

C6x8.2

4-1 1/2" Ø A307
THREADED ROD
W/TURNBUCKLES
AS REQUIRED

C6x8.2

3/4" Ø A325 NUT
& BOLT

C10x15.3 EACH
SIDE OF 7x12
WOOD GIRDER

BOT. OF C10x15.3
OR TOP OF EXISTING 8x8

PLATE WASHER

NUT

C

SECTION

SCALE 1/2" = 1'-0"

PLATE THREADED ROD

C10x15.3

C6x8.2

C6x8.2

SECTION "C"
SCALE 1/2" = 1'-0"

ALL STRUCTURAL STEEL SHALL BE A-3

TRUSS TIE ROD DETAILS

STERLING TOWN HALL
STERLING MASS. 198

DAT
AU
198

PARVEY & TRACY

SHEI
NC
SK