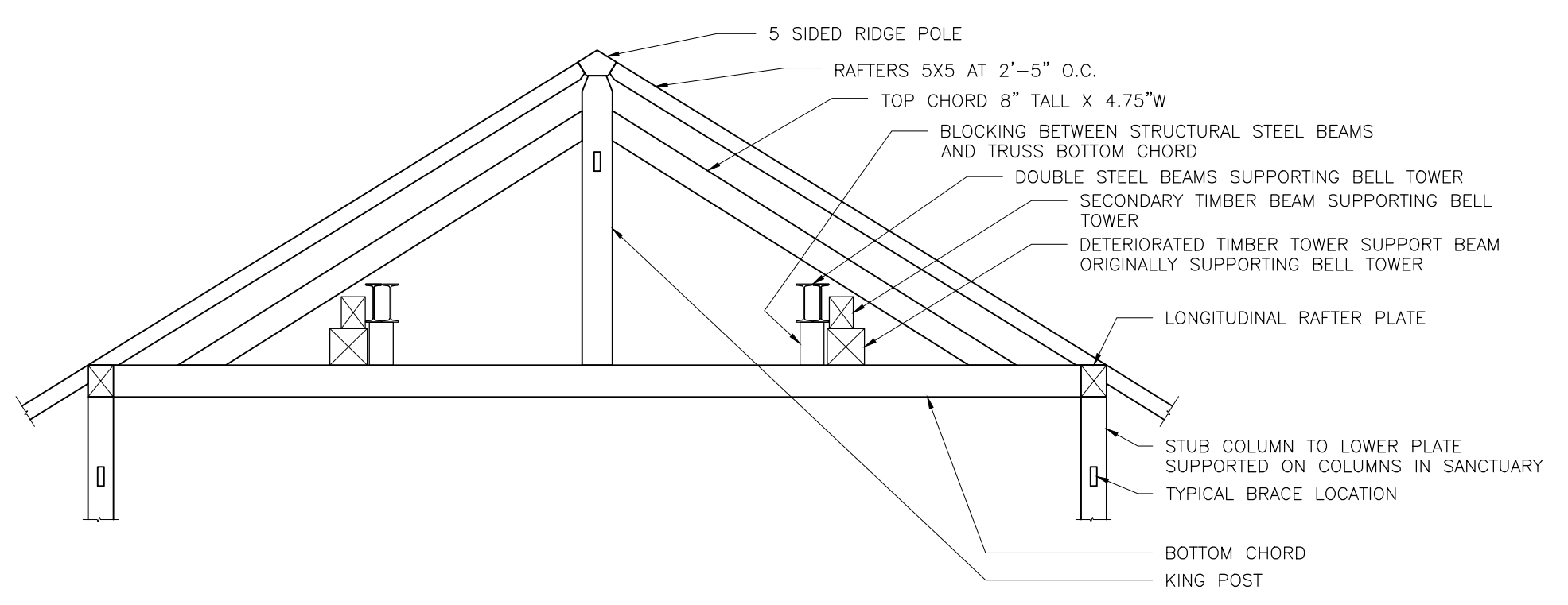
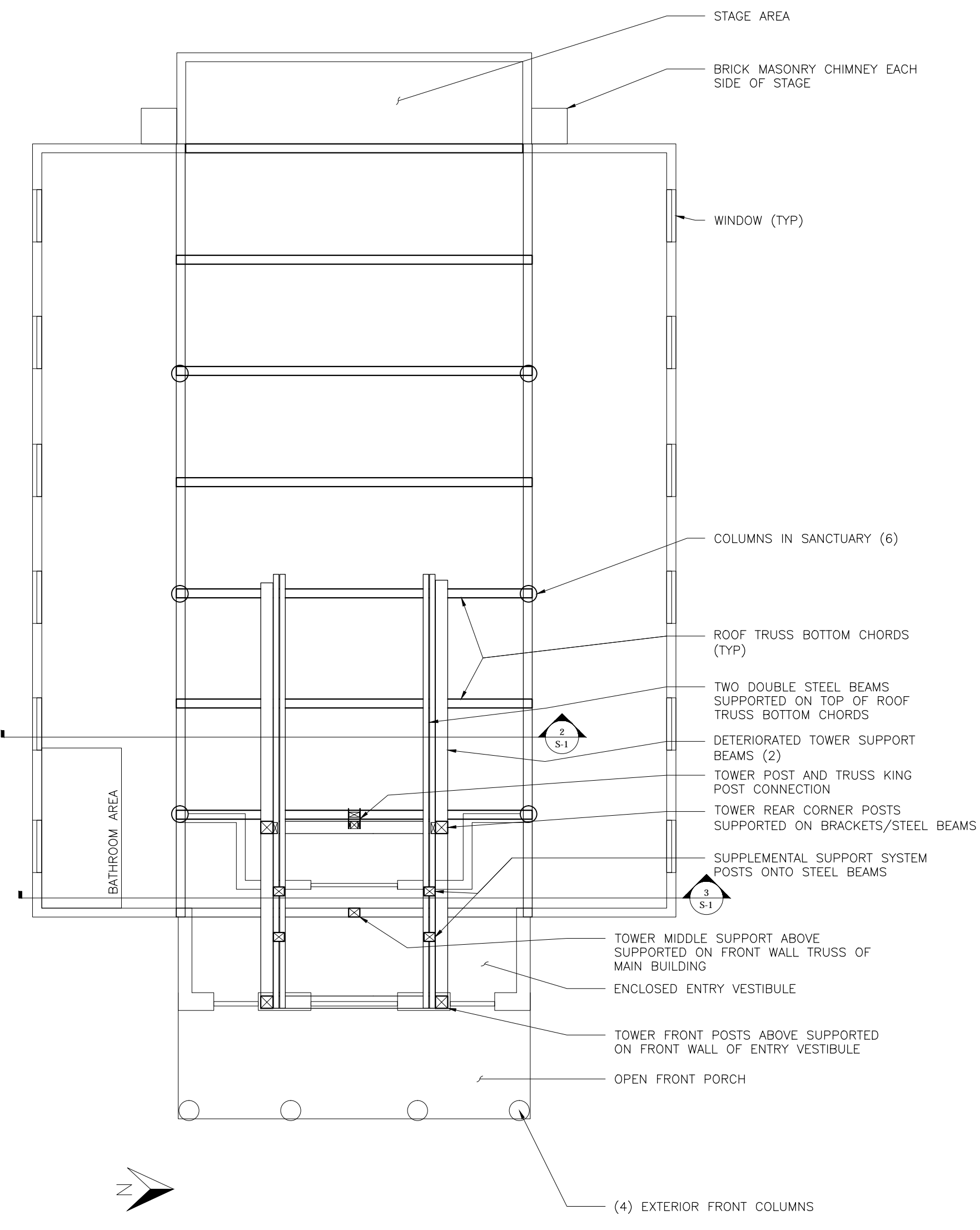


3 BELL TOWER SECTION AT WEST (REAR) FACE
SCALE: 1/4"=1'-0"



2 COMMON TRUSS SUPPORTING TOWER
SCALE: 1/4"=1'-0"



1 TOWER OVER ATTIC/OVER OVERALL BUILDING PLAN
SCALE: 1/8"=1'-0"

DAMAGE AND CONDITION ASSESSMENT

SITE INVESTIGATIONS WERE PERFORMED IN RESPONSE TO OBSERVED DECAY CONDITIONS AT THE BASE OF LANTERN-BELFRY POSTS JUST ABOVE THE BELL DECK. UPON FURTHER INVESTIGATION ADDITIONAL DETERIORATED CONDITIONS WERE DISCOVERED AS OUTLINED BELOW. IT IS ANTICIPATED THAT AS REPAIRS OR REPLACEMENTS ARE PERFORMED, AND AS FINISHES OR OBSTRUCTIONS REMOVED, DETERIORATION NOT PREVIOUSLY READILY VISIBLE MAY BE DISCOVERED.

- LANTERN-BELFRY POSTS**
(8) POSTS 13" SQUARE AND DIAMETER. DECAY CONDITIONS FOUND AT BELLDECK LEVEL UP TO TWO FEET ABOVE. LOSS OF SIGNIFICANT PORTIONS OF CROSS SECTION (GREATER THAN 50% IN SOME CASES). CONDITION ABOVE THIS UNKNOWN.
- LANTERN-BELFRY POST BEAMS**
(3) OF (4) BEAMS EXHIBITED SIGNIFICANT DECAY. THE BEAMS THEMSELVES PROVIDE MINIMAL TO NO SUPPORT AT THIS TIME AND ARE FUNCTIONING AS BLOCKING TO TRANSFER LOAD TO SUPPLEMENTAL SUPPORTS. (1) OF (4) BEAMS HAS BEEN REPLACED AT AN EARLIER DATE AND DOES APPEAR TO BE FUNCTIONING ADEQUATELY.
- SUPPLEMENTAL SUPPORT SYSTEM FOR LANTERN-BELFRY POST BEAMS**
THE ADDITIONAL SUPPORT SYSTEM FOR LANTERN-BELFRY POST BEAMS HAS BEEN ADDED AT A HISTORICAL TIME. THE SUPPORT SYSTEM CONSISTS OF AN UPPER AND LOWER PART. THE UPPER PART CONSISTS OF TWO BEAMS AND FOUR POSTS WHICH ARE BOLTED TO AND DIRECTLY SUPPORT LANTERN-BELFRY POSTS. THE LOWER PART CONSISTS OF BLOCKING, TWO WOOD BEAMS, FOUR WOOD POSTS, AND TWO STRUCTURAL STEEL BEAM ELEMENTS THAT SUPPORT THE LANTERN-BELFRY POST BEAMS. THE SUPPLEMENTAL SYSTEM PROVIDES ONLY PARTIAL SUPPORT FOR THE LANTERN BEAMS; POSTS AND COMPONENTS MAY BE UNDERSIZED. STEEL BEAMS EXHIBITED SOME TORSIONAL STRAINING (TWISTING).
- TOWER SUPPORT BEAMS**
ORIGINAL TOWER SUPPORT BEAMS EXHIBITED DETERIORATION AND HAVE BEEN REPLACED BY THE SUPPLEMENTAL SUPPORT SYSTEM STEEL BEAMS. BEAMS ARE TWISTING FROM ECCENTRIC LOAD. ATTENTION REQUIRED.
- BELL DECK BEAM REINFORCED MEMBER**
REINFORCEMENT ON A BELL DECK BEAM APPEARED UNDERSIZED AND INSUFFICIENTLY CONNECTED.
- BELL DECK JOINT DETERIORATION**
PROBING AT THE CENTRAL JOINT OF BELL DECK BEAMS SUGGESTED DETERIORATION WITHIN THE JOINT.
- LANTERN BEAM DETERIORATION**
A FLOOR BEAM IN THE LANTERN SECTION EXHIBITED DETERIORATION. THE EXTENT OF THE DETERIORATION IS UNKNOWN DUE TO ACCESSIBILITY.
- BELL TOWER REINFORCEMENTS**
MULTIPLE STEEL REINFORCEMENT ANGLES AND STRAPS WERE OBSERVED IN THE BELL TOWER. SPECIFIC PROBLEMS WERE NOT OBSERVED BUT IT IS BELIEVED THE REINFORCEMENT PIECES WERE ADDED FOR PARTICULAR REASONS AND SHOULD BE NOTED.

PRIORITY OF REMEDIATION

- LANTERN-BELFRY POSTS**
THESE POSTS PROVIDE VERTICAL AND LATERAL SUPPORT FOR THE LANTERN AND SPIRE AND EXHIBIT SIGNIFICANT DETERIORATION. REINFORCING, SHORING, OR REPLACEMENT IS MANDATORY AND THE NUMBER ONE PRIORITY.
- LANTERN-BELFRY POST BEAMS AND SUPPLEMENTAL SUPPORT SYSTEM**
THE ORIGINAL LANTERN-BELFRY POST SUPPORT BEAMS AND THE SUPPLEMENTAL SUPPORT FOR THEM ARE INTERRELATED AND THE SECOND PRIORITY. THE INDEPENDENT FUNCTION OF THE ORIGINAL BEAMS HAS BEEN PARTIALLY REPLACED BY THE SUPPLEMENTAL SUPPORT SYSTEM. THE ORIGINAL MEMBERS ACT AS BLOCKING FOR VERTICAL SUPPORT AND ALSO PROVIDE LATERAL STABILITY TO THE SYSTEM. THE FUNCTION OF THE ORIGINAL BEAMS IS COMPROMISED EVEN AS PART OF THE SUPPLEMENTAL SYSTEM DUE TO DETERIORATION. THE SUPPLEMENTAL SYSTEM ITSELF REQUIRES IMPROVED CONNECTIONS AND STABILIZING.
- BELL DECK BEAM REINFORCED MEMBER AND CENTRAL JOINT DETERIORATION**
THE MAIN MEMBERS OF THE BELL DECK SUPPORT THE LARGE BELL AND WILL REQUIRE ADDITIONAL REINFORCEMENT OR REPLACEMENT.
- LANTERN BEAM DETERIORATION**
FURTHER PROBING AND INVESTIGATION MAY REVEAL ADDITIONAL ISSUES. THE STEEL FRAME SEEN AT THE UNDERSIDE OF THE LANTERN MAY PROVIDE ADEQUATE SUPPORT FOR A SIGNIFICANT TIME.
- BELL TOWER REINFORCEMENTS**
MULTIPLE STEEL REINFORCEMENT ANGLES AND STRAPS WERE OBSERVED IN THE BELL TOWER. SPECIFIC PROBLEMS WERE NOT OBSERVED BUT IT IS BELIEVED THE REINFORCEMENT PIECES WERE ADDED FOR PARTICULAR REASONS AND SHOULD BE CHECKED.

REMEDATION STRATEGIES

MULTIPLE MEANS OF ADDRESSING ADVERSE CONDITIONS EXIST. FACTORS TO CONSIDER INCLUDE COST, TIME, LEVEL OF REPAIR, HISTORIC PRESERVATION, AND CONTRACTOR CAPABILITIES, MEANS, AND METHODS.

SUMMARY NOTE: SPLICE REPAIRS MAY BE FASTER AND LESS COSTLY IN THE SHORT TERM BUT DO NOT FEASIBLY ALLOW REPAIR OF ALL COMPONENTS AND MAY LACK HISTORICAL ACCURACY. IN DEPTH REPAIR WILL BE MORE COSTLY, AND TAKE LONGER, BUT WILL PROVIDE PERMANENT LONG TERM REPAIRS. REMOVAL OF THE LANTERN AND SPIRE MAY REQUIRE THE REMOVAL OF THE SUSPENDED BELLS. THE LARGE BELL ON THE BELL DECK WILL NEED TO BE REMOVED TO ADDRESS BELL DECK BEAM DETERIORATION.

- LANTERN-BELFRY POSTS**
(8) POSTS 13" SQUARE AND DIAMETER X 22'. (800#±)
REMEDATION
PATCH AND SPLICE: REMAINDER OF COLUMN MUST BE STRIPPED OF PAINT TO INSPECT. REMOVE PORTIONS OF BELLDECK SURROUNDING COLUMN. MAY REQUIRE STEEL SPLICE ELEMENTS. TEMPORARY SHORING REQUIRED. DOES NOT ALLOW LANTERN REPAIR OR BELLDECK INSPECTION OR REPAIR. PURPOSE IS TO ALLOW REPAIR WITHOUT LANTERN AND SPIRE REMOVAL.
REPLACE WITH BUILT-UP COLUMN: REPLACE WITH COLUMN COMPOSED OF 3 OR MORE FULL LENGTH PIECES WHICH ARE BOLTED TOGETHER FOLLOWING PLACEMENT. TEMPORARY SHORING REQUIRED. PURPOSE IS TO ALLOW REPAIR WITHOUT LANTERN AND SPIRE REMOVAL.
REPLACE WITH NEW COLUMNS: BELL SYSTEM, LANTERN, AND SPIRE REMOVAL REQUIRED. LIFTING FRAMEWORK AND CRANE REQUIRED. MOST HISTORICALLY ACCURATE AND STABLE. ALLOWS GROUND LEVEL LANTERN AND SPIRE INSPECTION AND REPAIR. ALLOWS BELLDECK REPAIR. ALLOWS LANTERN-BELFRY POST BEAM REPLACEMENT WITHOUT SHORING.
- LANTERN-BELFRY POST BEAMS**
(4) BEAMS 14"x13" X 14' (600#±)
REMEDATION
PATCH AND SPLICE: PROVIDE STEEL OR ENGINEERED LUMBER SPLICES ON EACH SIDE OF EXISTING BEAMS AS WELL AS ADDITIONAL POSTING IF NEEDED TO TRANSFER LOAD TO EXISTING STEEL BEAMS. CONNECTIONS TO LANTERN POSTS REQUIRES TEMPORARY JACKING TO TRANSFER LOAD TO NEW ELEMENTS. PURPOSE
REPLACE WITH NEW BEAMS (A): REPLACE WITH LANTERN IN PLACE. TEMPORARY SHORING REQUIRED. REPLACE BEAMS WITH BUILT UP MEMBERS THROUGH SIDE OF TOWER. TEMPORARY DECK OUTSIDE OF BELL TOWER MAY BE REQUIRED.
REPLACE WITH NEW BEAMS (B): REPLACE WITH LANTERN AND BELL DECK REMOVED. REPLACE ALL (4) BEAMS WITH FULL SIZE MEMBERS. CRANE CAN BE USED TO SET MEMBERS.
- SUPPLEMENTAL SUPPORT SYSTEM FOR LANTERN-BELFRY POST BEAMS**
UPPER PART / LOWER PART - ACTION DEPENDS ON PARTIAL OR FULL REPLACEMENT OF OTHER ELEMENTS
REMEDATION
PARTIAL POST AND BEAM REPAIR METHOD: UPPER AND LOWER SUPPLEMENTAL SUPPORT SYSTEM TO REMAIN.
FULL POST AND BEAM REPAIR METHOD: UPPER SUPPLEMENTAL SUPPORT SYSTEM TO BE REMOVED. LOWER SUPPORT SYSTEM INCLUDING CENTER POSTS AND STEEL BEAMS TO REMAIN. POSSIBLE REMOVAL UPON ANALYSIS OR ALTERNATE TRANSFER OF LOADS TO STEEL BEAMS.
STEEL BEAM TORSION TO BE ADDRESSED WITH THE BEAM OR TIE ROD ADJUSTMENT.
- LANTERN BEAM DETERIORATION**
FLOOR BEAM - BUILT UP 2X MEMBER
REMEDATION
IN PLACE PATCH AND SPLICE: PROVIDE STEEL OR ENGINEERED LUMBER SPLICES ON EACH SIDE OF EXISTING BEAM AND SPECIAL CONNECTIONS TO TRANSFER LOAD. DOES NOT ADDRESS HIDDEN DAMAGE.
LANTERN REMOVAL REPAIR: REMOVE LANTERN AND PERFORM MEMBER REPLACEMENT ON GROUND LEVEL SHORING. REQUIRES TEMPORARY SUPPORT FOR LANTERN/SPIRE FROM THE SIDE OF THE LANTERN TO SUPPORT VERTICAL LANTERN POSTS AND MAST TO ALLOW THE BASE OF THE LANTERN TO BE DISMANTLED AND RECONSTRUCTED FROM BELOW.
- BELL DECK**
(1) EXISTING DETERIORATED REINFORCED MEMBER AND (1) CENTRAL JOINT DETERIORATION
REMEDATION
IN PLACE PATCH AND SPLICE: PROVIDE IMPROVED CONNECTION AND MORE SUBSTANTIAL SPLICE FOR EXISTING SPLICE AND ADD ADDITIONAL SUPPORTS (BEAM OR COLUMN) BELOW ENTIRE EXISTING DECK.
LANTERN REMOVAL REPAIR: REMOVAL OF LANTERN AND BELLS REPLACEMENT OF DAMAGED MEMBERS IN BELL DECK AS WELL AS INSPECTION AND REPLACEMENT OF OTHER POSSIBLY DAMAGED MEMBERS. ALLOWS REMOVAL OF SPLICING AND AVOIDS REQUIREMENT OF FURTHER SUPPLEMENTAL SUPPORTS.
- BELL TOWER REINFORCEMENTS**
MULTIPLE STEEL REINFORCEMENT ANGLES AND STRAPS
REMEDATION
INSPECTION: CLOSELY INSPECT EACH BRACKET / STRAP AND VERIFY ADEQUACY OF CONNECTION AND IF SETTLING OR MOVEMENT HAS OCCURRED.

DESIGNS AND ENGINEERED SOLUTIONS, LLC 114 SCOVILLE HILL ROAD, HARWINTON, CT Phone: 860.806.2094 email: MATTHEWSZYLO@GMAIL.COM	SCALE AS NOTED COM. NO. 17-106 DRAWN BY MCS DATE 05-23-17	BELL TOWER EVALUATION NORFOLK CONGREGATIONAL CHURCH BUILDING PLAN AND TOWER ELEVATION	DRAWING 5-1 SHEET NO. 1 NO. OF SHEETS 2
REV.	DESCRIPTION OF REVISION	DATE	APPR

