

February 22, 2021

Mr. Michael Shunta
Claremont Companies
Two Lakeshore Center
Bridgewater, MA 02324

Re: Smokestack Observations
Residence Inn
370 Congress Street
Boston, MA

Dear Mr. Shunta:

Matthew C. Carlton, Todd E. Watson, and Tam Tuong from R. J. Kenney Associates, Inc. (RJK), visited the above-named building on June 6, 2019, to observe the condition of the abandoned circular mass masonry brick smokestack (stack) that penetrates the northeast corner of the roof. RJK was assisted by Sean Whelan Contracting (SWC). SWC provided access to the top of the stack, via aerial lift, and removed brick for evaluation of the condition of the inner wythe and collar joint in the system.

The purpose of the visit was to determine the best course of action for addressing the following conditions:

- Observed water penetration and efflorescence in the occupied spaces below the abandoned stack.
- Vertical cracking and bulging in the abandoned stack above the roof level.

It is concluded that significant deterioration of the brick due to a historic lack of maintenance, as well as specific design characteristics of the stack, mean that the observed water penetration issues are likely to recur. In addition, the stability of this unreinforced masonry structure, which is positioned above and immediately adjacent to a heavily-used sidewalk, cannot be assured. Removal of the chimney and sealing of the roof is recommended.

1. OBSERVATIONS

Observations were made from the roof and from an aerial lift.

1.1 General

- The exposed portion of the stack extends vertically approximately fifteen feet above the roof level at the northeast corner. The stack aligns with the exterior wall at the building's rear right corner, rendering the stack directly above a public sidewalk.

- Along the roofline base, a roof membrane termination flashing has been set into a kerf cut in the horizontal mortar joint.
- The top of the stack is covered with a copper cap that extends vertically down and partially covers an upper concrete band.
- The upper edge of rusticated brick coursing is covered with sloped mortar wash.

1.2 Brick

- The exterior face brick is cracked, spalled, and bulging outward at intermittent locations around the stack. This condition is distinct from that of most of the building's exterior brick, indicating differential maintenance over the building's history.
- Vertical cracks are visible emanating from the lower portions of the stack towards the top. The cracks are larger towards the center of the stack.
- A sloped mortar wash installed at a stop in the brick covering towards the top of the stack is cracked and can easily be removed by hand. Portions of the wash are missing.
- The portion of the stack above the roofline is at least three wythes deep, with an average of every fourth header brick used as a collar tie.

1.3 Mortar

- Multiple spot pointing campaigns have been performed around the stack.
- The pointing mortar is in poor condition. Approximately 75% of the joints are cracked or missing.
- Setting mortar was observed by removing several brick just above the roofline and also was observed just behind the pointing mortar. The three wythe depth appeared to be set using a loose lime/sand mix, which possesses limited rigidity, characteristic of deteriorated setting mortar, with a consistency of sand.
- Setting mortar was damp and could easily be removed by hand pressure.

2. DISCUSSION

The exterior wythe of brick and mortar that comprises the abandoned stack is extensively deteriorated, with mortar wash missing in locations at the top of the stack. It is likely that the mortar wash has fallen to the public sidewalk below. Various futile maintenance campaigns have been performed to the brick and mortar joints, only to exacerbate the structural deterioration currently exhibited. It is likely that the stack will always allow water ingress into the units below, and that any means to repoint the stack will not alleviate the issues on the interior.

Partial removal of the exterior wythe of brick was observed to understand the collar joint condition. The collar joint and setting mortar interior to the stack is a loose lime/sand mix. The mix was

deteriorated, without rigidity or bond strength, and can be easily removed from the system. As a result, inner wythes of brick were found to be easily dislodged with hand pressure. The stack, therefore, has little structural integrity.

Numerous vertical cracks were observed in mortar joints that stair-step through the brick coursing, including cracking through bricks themselves. The nature of the cracking is indicative of radial expansion, a probable result of the freeze/thaw dynamic and likely combined with hygrothermal cycling and building movement in general. Such movement is exacerbated by the soft, absorbent setting mortar.

The exterior of the of brick above the roofline also functions as the interior exposed brick wall in the occupied spaces below. Therefore, any water that penetrates the exterior wythe of brick has a direct path into the occupied spaces below. Given the extensive cracking and separation of the pointing mortar and the spalling and cracked brick, there is no doubt as to the source of water ingress to the interior. The poor condition of the brick is causing extensive efflorescence in the occupied spaces below and has contributed to the deterioration of the setting mortar in the interior wythes of the stack.

The amount of efflorescence emanating from the brick mortar joints on the interior of the building indicates that moisture is bypassing the outer layer of brick, migrating through the vertical cracking, and depositing in the collar joints within the units below. The existing cracks in the exterior brick allow bulk moisture into the system, which compounds damage due to freeze thaw cycles in the cold climate. The moisture expands in volume as it freezes, causing the bricks and mortar bond to break apart.

Water has been funneled through the stack deteriorating the bonding agents of the setting mortar within the inner wythes of brick. The setting mortar was easily dislodged from the inner wythes of brick with hand pressure. The outward movement of the brick has exacerbated over time, due to futile attempts to point the open joints when maintenance operations deemed it necessary. A holistic approach to the stack repair should have been programmed decades ago that included consolidation of the setting mortar to structurally bind together the inner wythes of brick, in order to maintain the bond and strength of the entire system. At this point in the service life of the abandoned stack, it is not likely that the condition of the stack can be remediated in a long-term durable manner.

There is evidence that the missing mortar wash has fallen from the building. This is because the internal binding mechanics are no longer functioning.

To eliminate the ongoing structural deterioration, the water penetration into the occupied spaces beneath the stack, and any falling hazard to the sidewalk directly below, complete removal of the disused chimney structure above the roof line is recommended.

3. RECOMMENDATIONS

To eliminate the interior water penetration and resulting efflorescence problem in the guest rooms and alleviate ongoing structural deterioration of the abandoned stack, it is recommended that the bricks be dismantled down to the roof line.

It is recommended that the efflorescence on the building interior be cleaned from the brick surface. Once cleaned, the efflorescence should not return and the aesthetic appeal of the historic brick on the interior can be enjoyed.

Repair specifics outlined below:

Brick Removal

- Remove brick from the roofline up.
- Remove cementitious parging from the top of the brick curb that abuts the smokestack.
- Install framing and roof sheathing, as necessary to close off the smokestack penetration. Match adjacent roof deck construction.
- Apply new thermoplastic roof membrane over brick curb and roof sheathing, interface with existing roof membrane. Terminate with edge flashing to match the existing cornice. Terminate the roof membrane to the horizontal flashing leg.

The recommended scope of work will require the erection of pipe staging from grade to the top of the stack, in order to provide safe access for the masonry contractor to perform their work.

If you have any questions or require additional information, please do not hesitate to contact our office.

Respectfully submitted,

R. J. KENNEY ASSOCIATES, INC.



Matthew C. Carlton, AIA, LEED AP
Director of Building Enclosure Design

MCC/mb/ek

Attachments: Detailed Photographs
RJK Chimney Details

Figure 1

Callouts:

Comments:



B_0606034

R. J. Kenney Associates, Inc

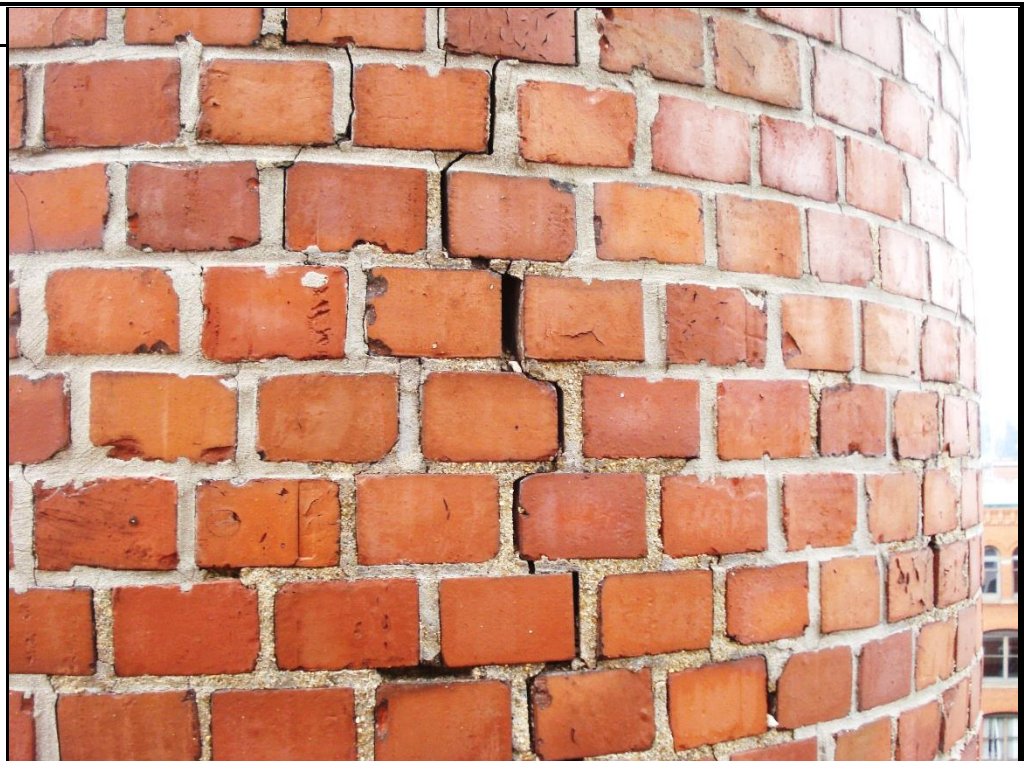
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Northeast Rear Corner Stack

Figure 2

Callouts:

Comments:



A_0606036

R. J. Kenney Associates, Inc

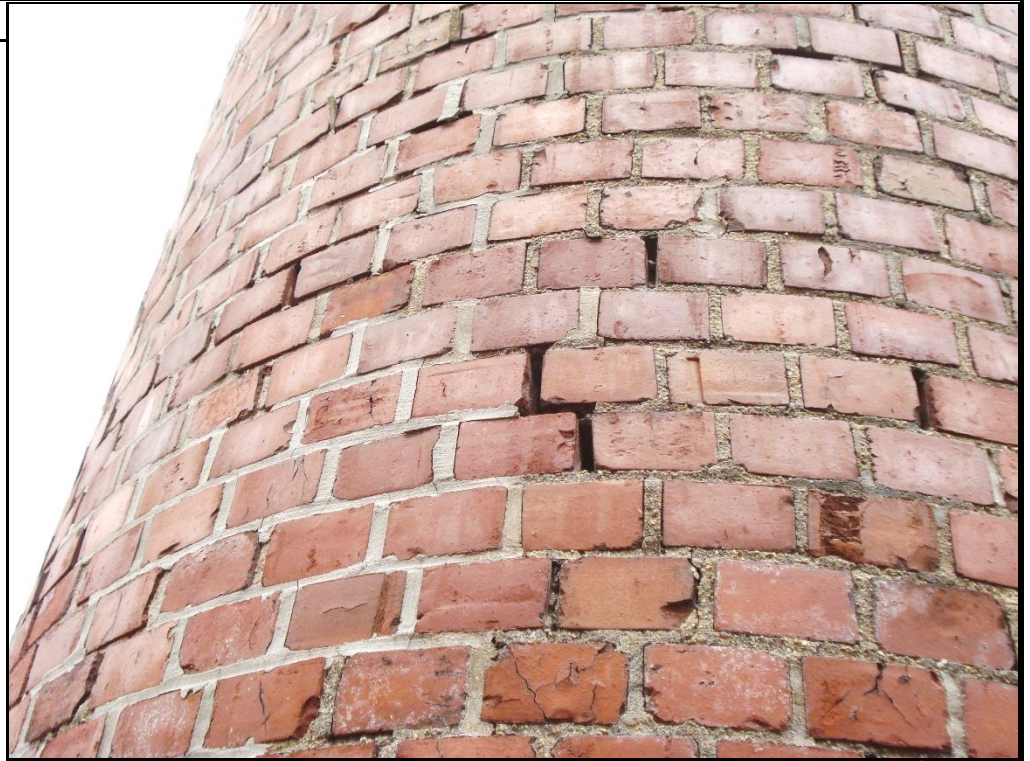
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Typical Radial Separation Condition

Figure 3

Callouts:

Comments:



A_0606015

R. J. Kenney Associates, Inc

Title:

Typical Stack Condition

Figure 4

Callouts:

Comments:



A_0606043

R. J. Kenney Associates, Inc

Title:

Deteriorated Wash and Bricks at Top of Stack

Figure 5

Callouts:

Comments:



A_0606047

R. J. Kenney Associates, Inc

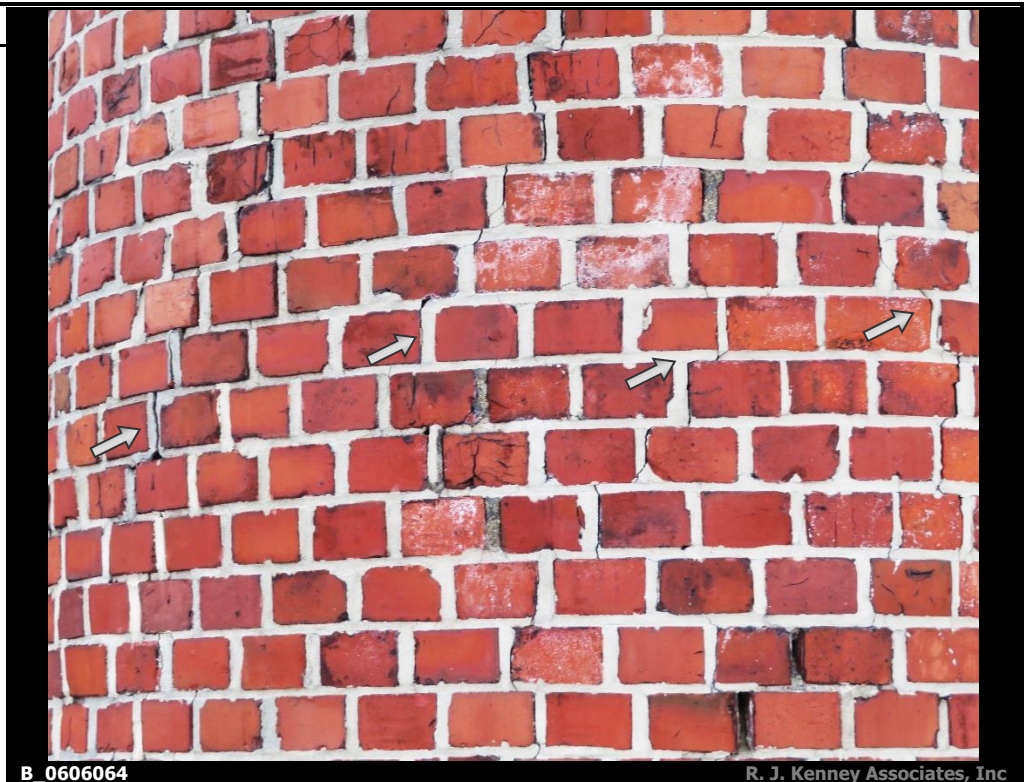
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Top of Stack Cracked and Displaced

Figure 6

Callouts:

Comments:



B_0606064

R. J. Kenney Associates, Inc

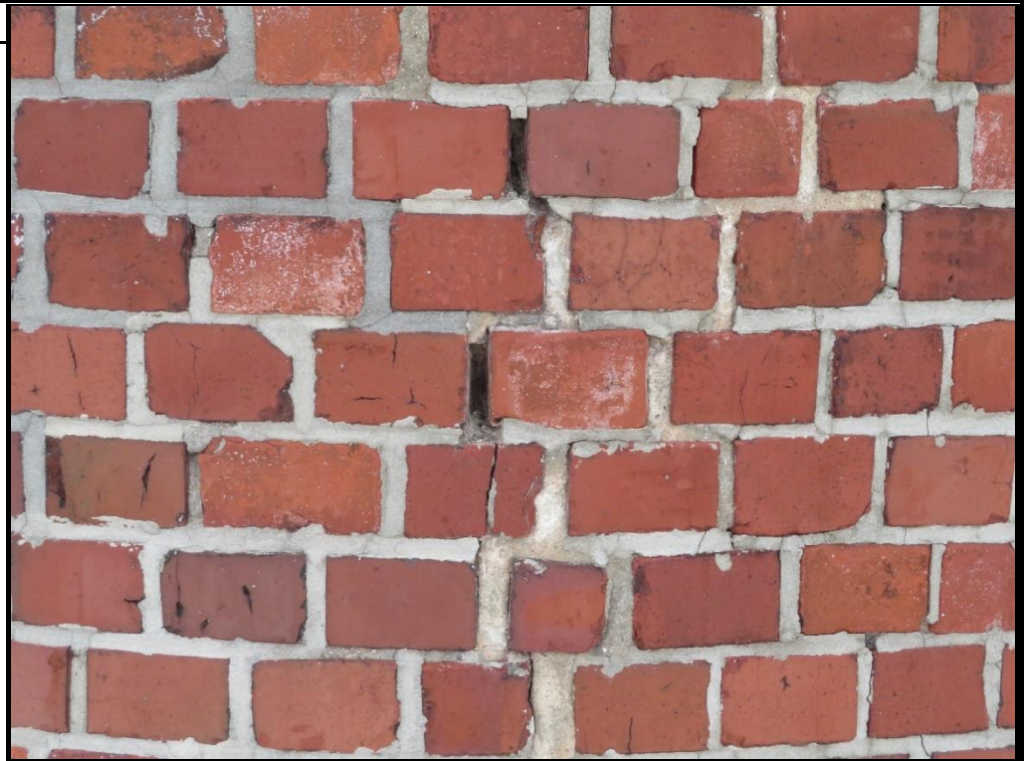
Title:

Various Vertical Step Cracks

Figure 7

Callouts:

Comments:



B_0606070

R. J. Kenney Associates, Inc

Title:

Various Mortar Pointing and Open Joints

Figure 8

Callouts:

Comments:



B_0606087

R. J. Kenney Associates, Inc

Title:

Test Cut

Figure 9

Callouts:

Comments:



Title:

Setting Mortar at Test Cut is a Sand Consistency

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CODE REQUIREMENTS:

THE NEW WORK MUST MEET THE REQUIREMENTS OF THE 9TH EDITION OF THE STATE OF MASSACHUSETTS BUILDING CODE, WHICH IS COMPRISED OF THE FOLLOWING INTERNATIONAL CODE COUNCIL (ICC) DOCUMENTS WITH APPLICABLE STATE AMENDMENTS:
2015 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
2015 INTERNATIONAL BUILDING CODE (IBC)
2015 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)

LEGEND:

-  = DENOTES EXISTING MATERIALS TO BE REMOVED
-  = DENOTES EXTENTS OF NEW MATERIALS
-  = EXISTING MASONRY PARAPET TO BE REMOVED
-  = NEW MASONRY PARAPET
-  = DENOTES LIMIT OF WORK AREA
-  = DENOTES EXISTING MATERIALS TO REMAIN
-  = BUILDING ELEVATION/DWG NUMBER WHERE SECTION APPEARS
-  = WALL SECTION OR DETAIL/DWG NUMBER WHERE SECTION APPEARS

ABBREVIATIONS:

AD	AREA DRAIN	HC	HOLLOW CORE
ALUM	ALUMINUM	HI	HIGH
ANOD	ANODIZED	HM	HOLLOW METAL
BSMT	BASEMENT	HP	HIGH POINT
BYND	BEYOND	INSUL	INSULATED OR INSULATION
BOT	BOTTOM	INT	INTERIOR
CI	CONTINUOUS INSULATION	LO	LOW
CIP	CAST-IN-PLACE	MAX	MAXIMUM
CHNL	CHANNEL	MO	MASONRY OPENING
CJ	CONTROL JOINT	MECH	MECHANICAL
CLG	CEILING	MEMBR	MEMBRANE
CLR	CLEAR	MIN	MINIMUM
CMU	CONCRETE MASONRY UNIT	MTL	METAL
COL	COLUMN	NIC	NOT IN CONTRACT
COMPR	COMPRESSIBLE	NO	NUMBER
CONC	CONCRETE	NOM	NOMINAL
CONT	CONTINUOUS	NTS	NOT TO SCALE
CPT	CARPET	OC	ON CENTER
CT	CERAMIC TILE	OPP	OPPOSITE
CTYD	COURTYARD	PCC	PRECAST CONCRETE
DBL	DOUBLE	PLYD	PLYWOOD
DEMO	DEMOLISH OR DEMOLITION	PT	PRESSURE TREATED
DIA	DIAMETER	PNT	PAINT OR PAINTED
DIM	DIMENSION	PVC	POLYVINYL CHLORIDE
DIMS	DIMENSIONS	RCP	REFLECTED CEILING PLAN
DN	DOWN	RD	ROOF DRAIN
DR	DOOR	REQD	REQUIRED
DWG	DRAWING	RM	ROOM
EA	EACH	SIM	SIMILAR
EJ	EXPANSION JOINT	SPEC	SPECIFIED OR SPECIFICATION
EL	ELEVATION	SPK	SPRINKLER OR SPEAKER
ELEC	ELECTRICAL	SSTL	STAINLESS STEEL
ELEV	ELEVATOR OR ELEVATION	STL	STEEL
EPDM	ETHYLENE PROPYLENE DIENE MONOMER M-CLASS (ROOFING)	STRUCT	STRUCTURE OR STRUCTURAL
EQ	EQUAL	T&G	TONGUE AND GROOVE
EXIST	EXISTING	TME	TO MATCH EXISTING
EXP JT	EXPANSION JOINT	TO	TOP OF
EXT	EXTERIOR	TOC	TOP OF CONCRETE
FLR	FLOOR	TOS	TOP OF STEEL
FND	FOUNDATION	TYP	TYPICAL
GA	GAUGE	UNO	UNLESS NOTED OTHERWISE
GALV	GALVANIZED	U/S	UNDERSIDE
GWB	GYPSTUM WALLBOARD	VIF	VERIFY IN FIELD
		VP	VISION PANEL
		W/	WITH
		WD	WOOD

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Building Enclosure Consulting & Testing Laboratory
72 Washington Street/P.O. Box 1748
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Professional Seal:

Project Title:
RESIDENCE INN
370 CONGRESS STREET
BOSTON, MA

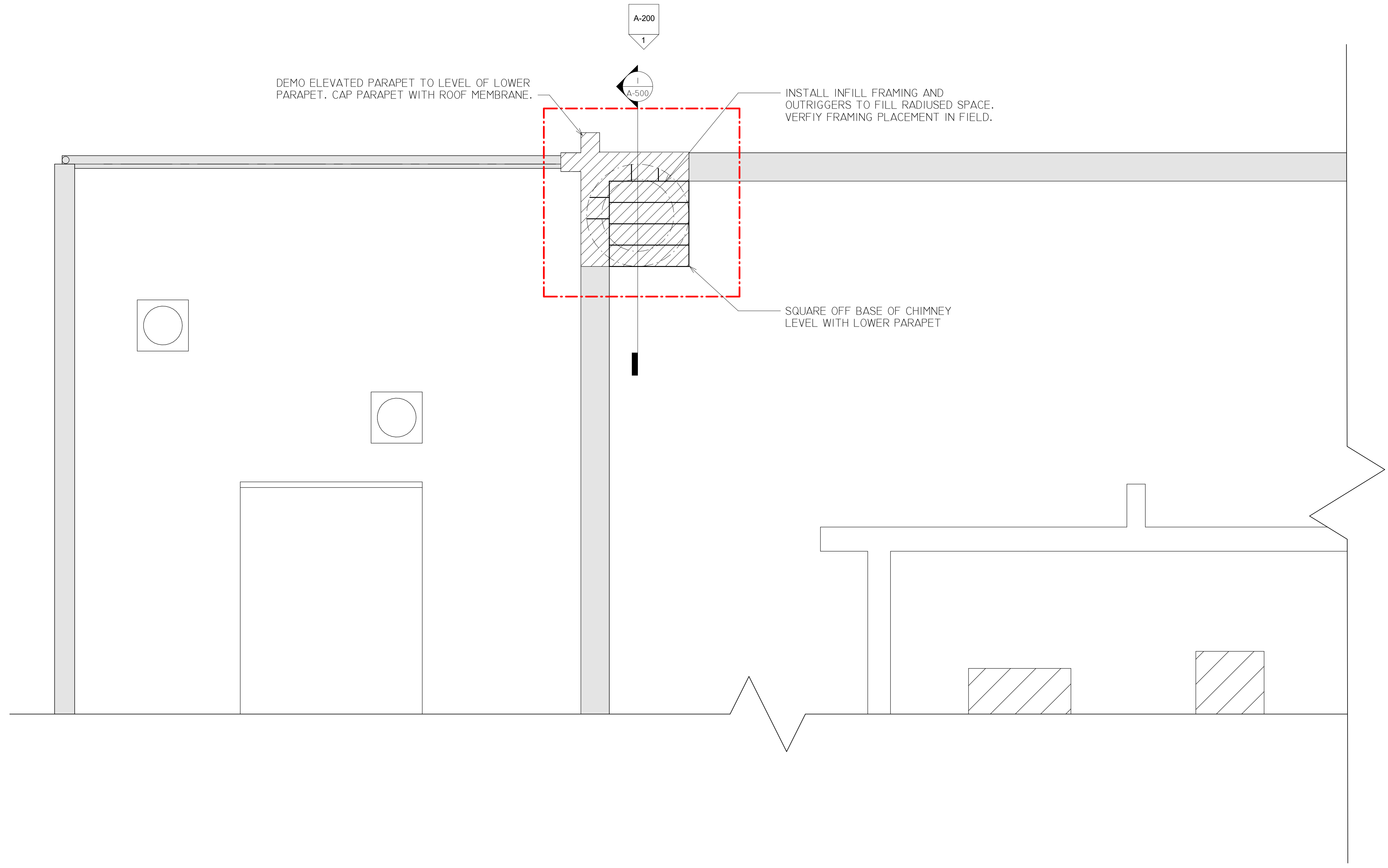
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Scale:	As Indicated
Drawn By:	MJB
Checked By:	MCC
RJK Proj. #:	0462

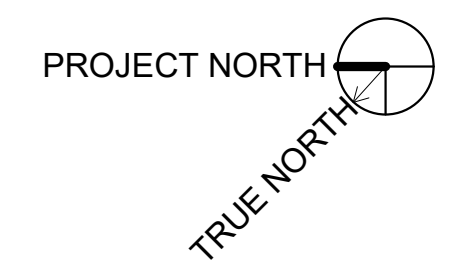
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**CODES/
LEGEND**

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2 ROOF Copy 1
1/4" = 1'-0"



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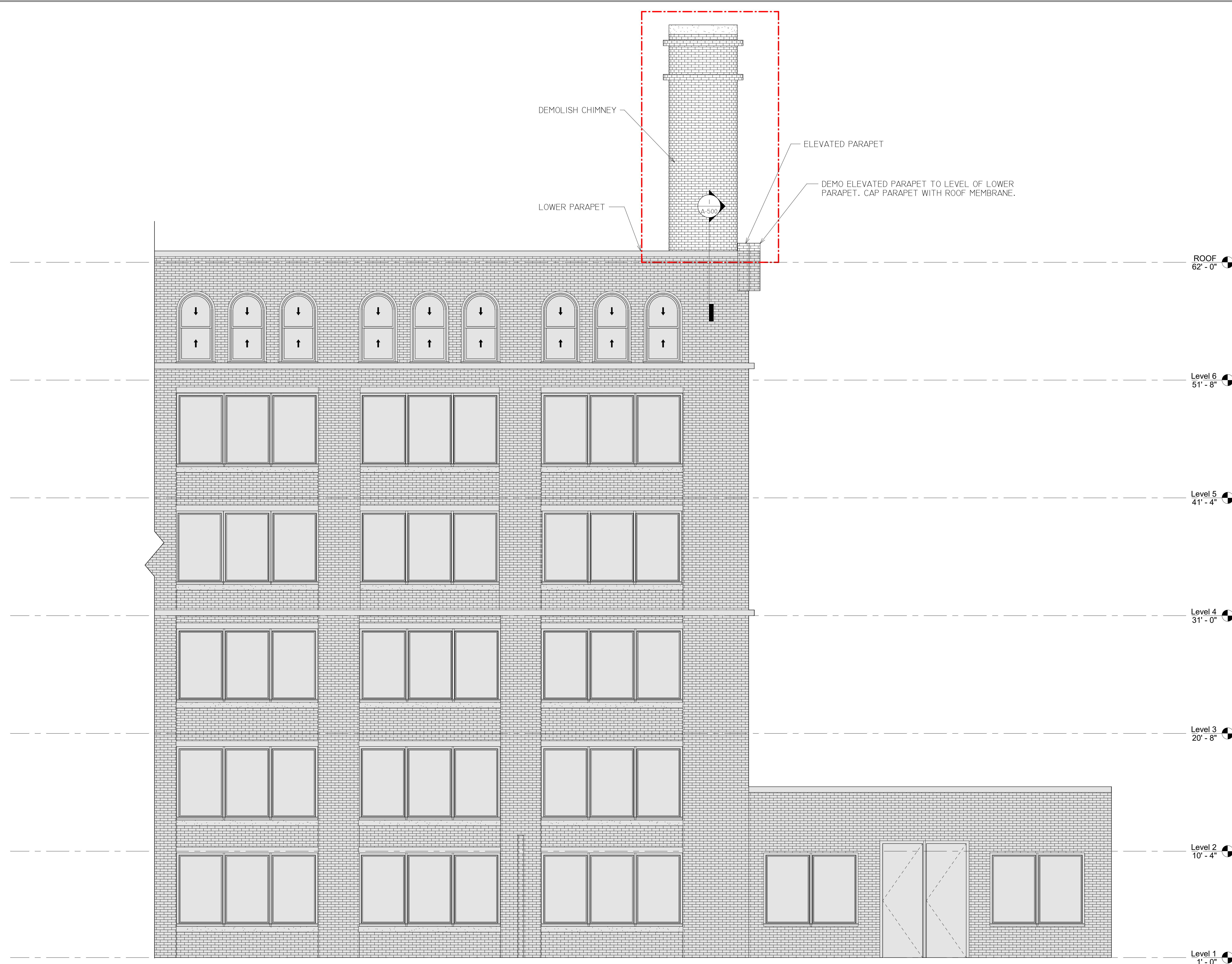
Revision Schedule	
No.	Revision Description

Issue Date: 2/22/2021
 Scale: As Indicated
 Drawn By: MJB
 Checked By: MCC
 RJK Proj. #: Q462

Sheet Title:
PROPOSED ROOF PLAN

A-101

05/24/2021 10:52:52 AM RJK/PLM/05/24/2021 10:52:52 AM RJK/PLM/05/24/2021 10:52:52 AM



1 EAST ELEVATION
1/4" = 1'-0"

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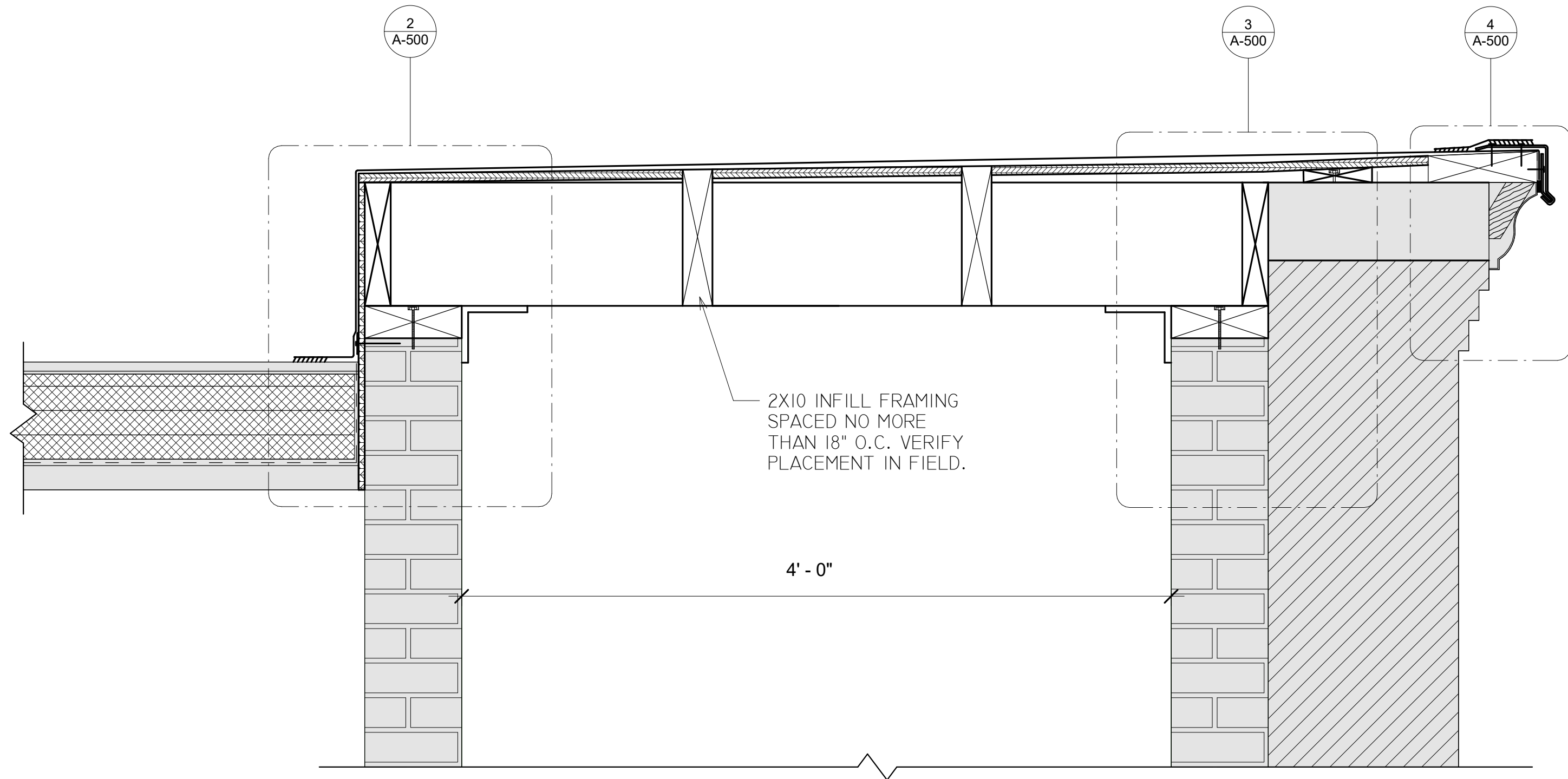
Project Title:
RESIDENCE INN
370 CONGRESS STREET
BOSTON, MA

Revision Schedule		Revision Description
No.	Date	

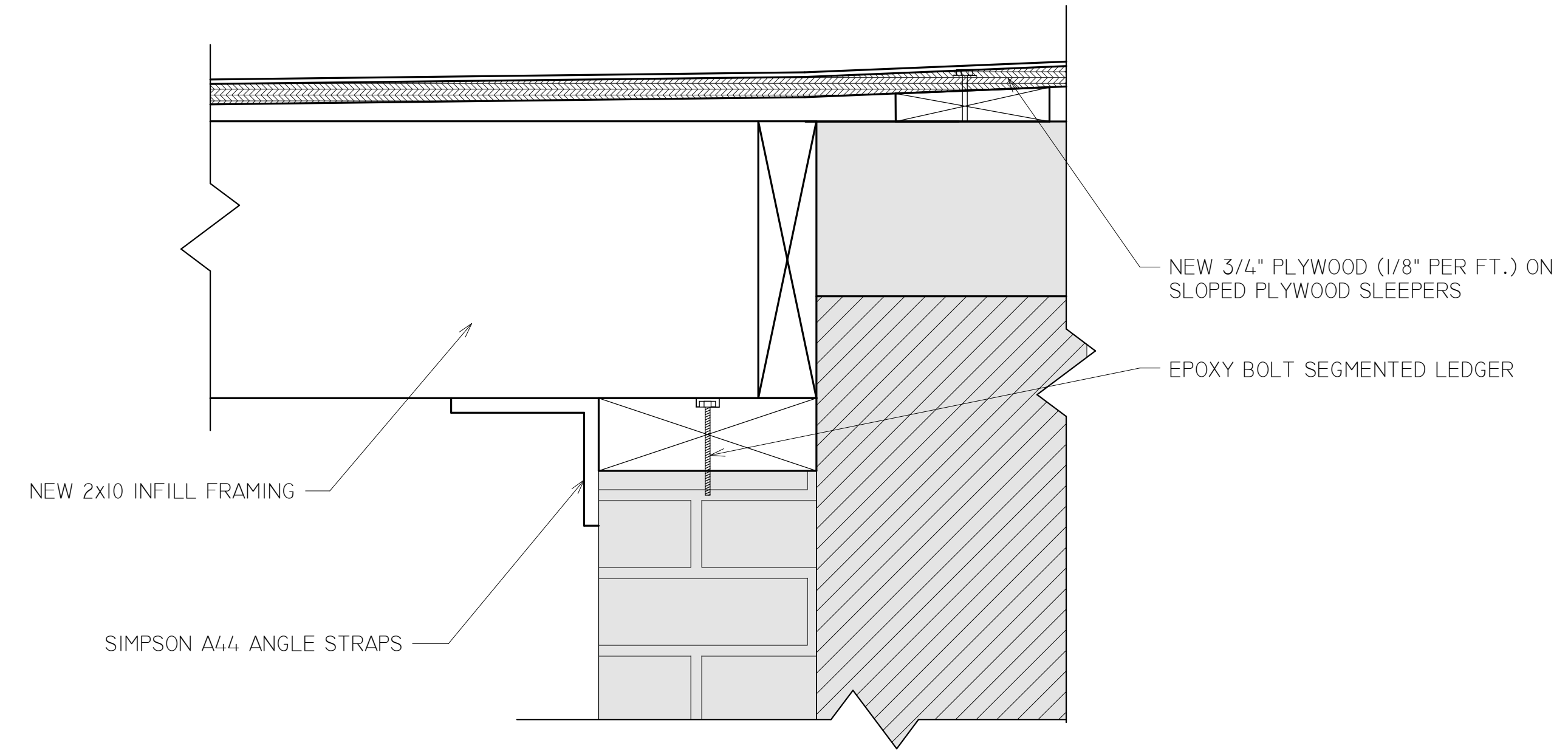
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 Scale: As Indicated
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 Checked By: MCC
 RJK Proj. #: Q462

Sheet Title:
ELEVATION

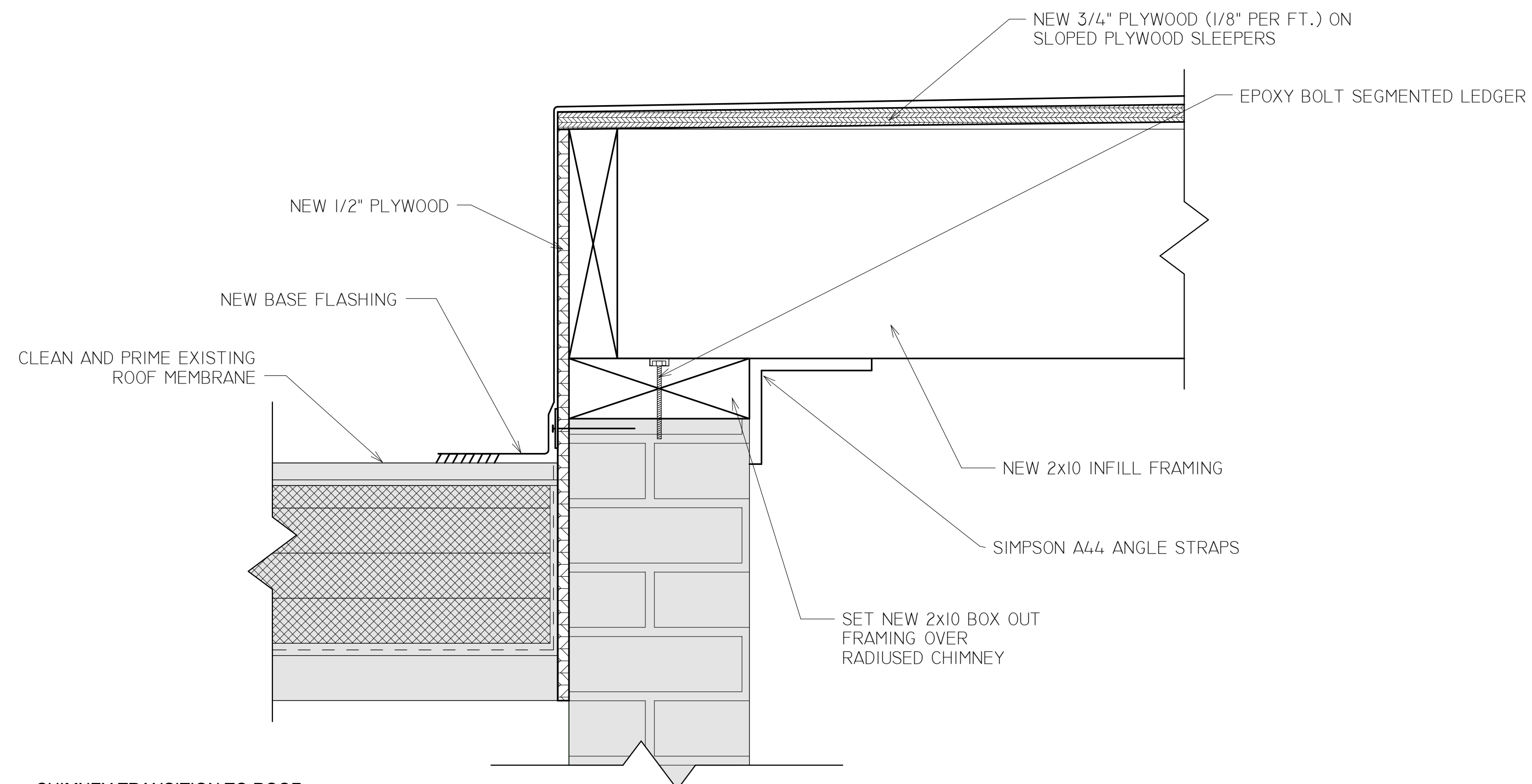
A-200
CHIMNEY DEMOLITION PLAN 2/22/2021



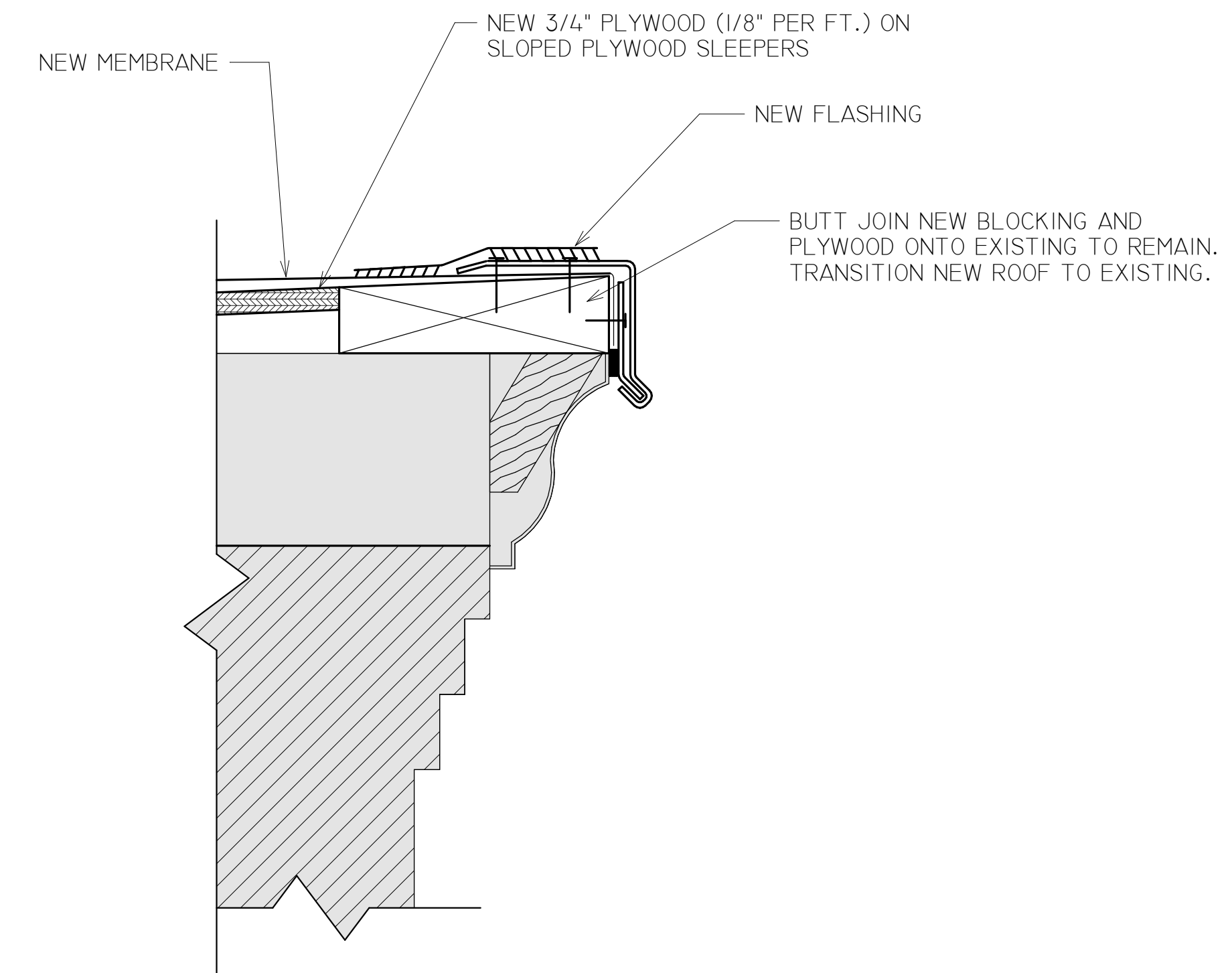
1 SECTION THROUGH CHIMNEY
1 1/2" = 1'-0"



3 CHIMNEY DETAIL
3" = 1'-0"



2 CHIMNEY TRANSITION TO ROOF
3" = 1'-0"



4 CHIMNEY ROOF EDGE
3" = 1'-0"

Professional Seal:

Project Title:
RESIDENCE INN
370 CONGRESS STREET
BOSTON, MA

Issue Date:	Revision Schedule
2/22/2021	No. Date Revision Description
Scale: As Indicated	
Drawn By: MJB	
Checked By: MCC	
RJK Proj. #: Q462	

Sheet Title:
SECTION AND DETAILS

A-500