

# St. Helena's House, 89 Union Park Street, Boston, MA

## Roof Replacement Project Design Review South End Landmark District Commission 4 May 2021

### Address

89 Union Park Street  
Boston, MA 02118

**Building Management Company**  
Maloney Properties, Inc.

**Building Envelope Engineer**  
Simpson Gumpertz & Heger Inc. (SGH)  
800 Boylston Street, Suite 2320  
Boston, MA 02199

### Maloney Properties Team

Michael Frazier  
Amy Lawton  
Pedro Rodriguez

### SGH Project Team

Susan Knack-Brown  
Kelsey Dunn  
Fernanda Brena  
Carolyn Olmstead

# Overall Building Images from Union Park St.

For Reference



SGH Project 201465.00

# Proposed Energy Upgrades

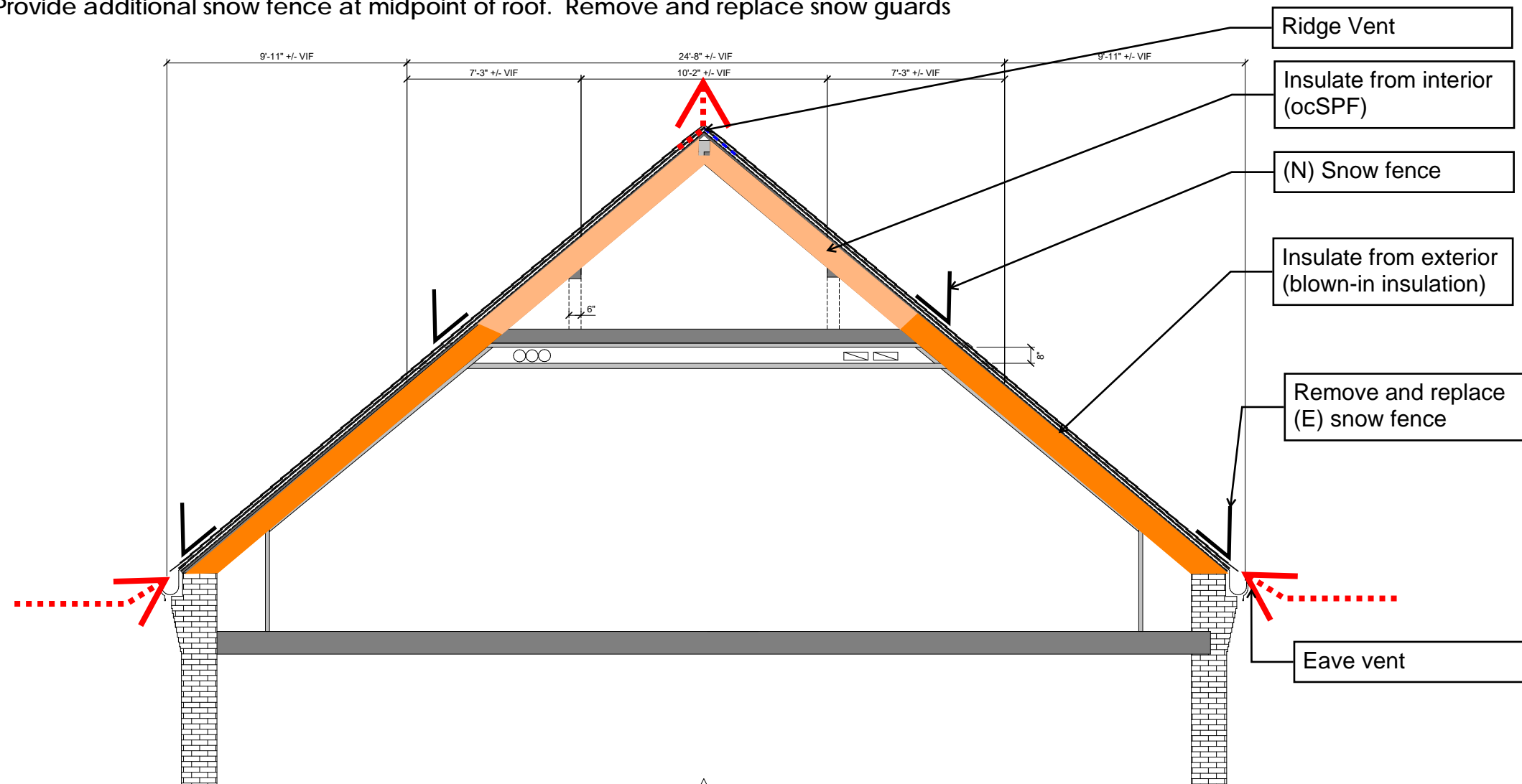
## Insulate from Exterior and Interior [Vented Roof Assembly]

### Existing Conditions

- No insulation within existing roof system.
- Slate is becoming disengaged. Existing slate is cracked, deteriorated, and delaminated.
- Underlayment is deteriorated.
- Isolated locations of leakage to the interior.

### Proposed Scope of Work

- Provide blown-in insulation between the rafters at the sixth-floor level. Install from exterior to avoid interior finish removal.
- Provide ocSPF in the unfinished attic between rafters and coat with an intumescent coating.
- Provide an air barrier/weather-resistive barrier underlayment on the existing roof deck.
- Provide furring and a new plywood roof deck to create a ventilated cavity outboard on the exterior.
- Provide self-adhered membrane underlayment on the new plywood deck.
- Provide slate roofing system. Modify eave, gutter, dormer, and ridge details to allow for ventilation through the cavity created by the raised roof.
- Remove and replace snow fence. Provide additional snow fence at midpoint of roof. Remove and replace snow guards



1 BUILDING SECTION  
3/8" = 1'-0"

# Overall Scope of Work

Shed - cladding and EPDM Roof to remain; modify base of wall flashing

Remove and replace copper gutter in-kind, connecting to (E) downleaders, typ. Modify profile for venting

Remove and replace copper ridge flashing in-kind; modify profile to allow for venting

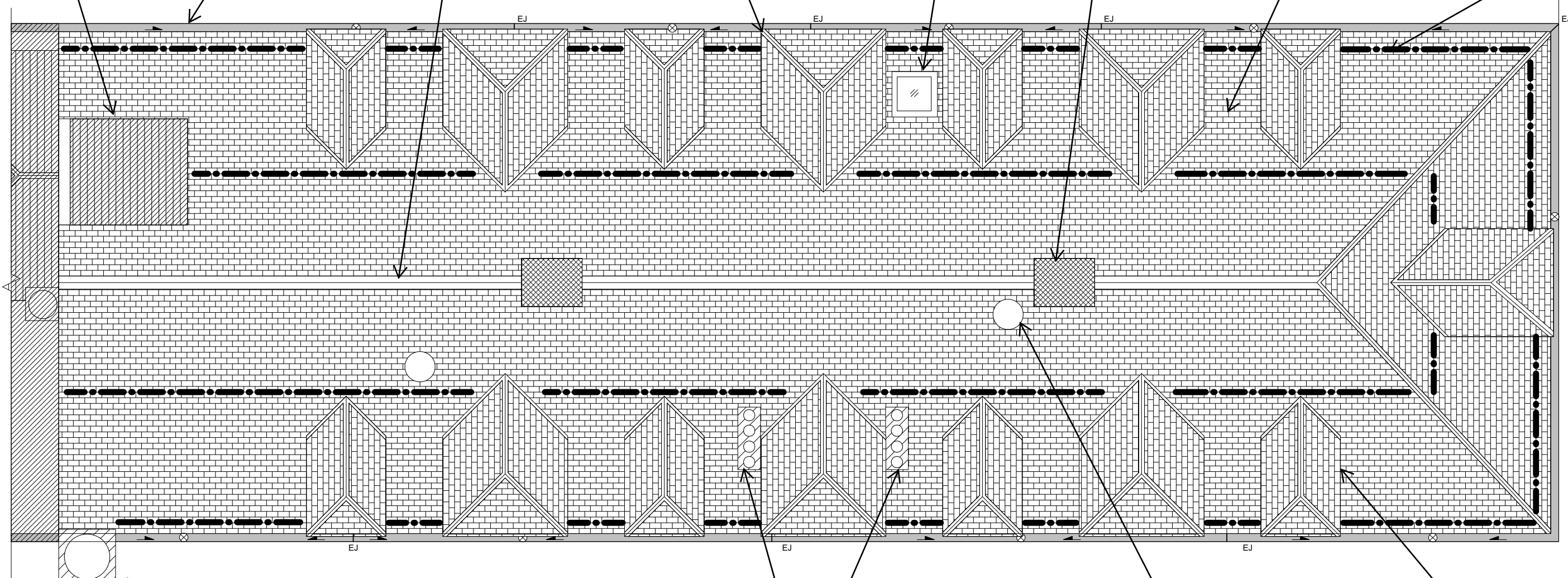
Remove and replace dormer slate roofs and side walls; insulate roof and walls and provide raised roof deck to vent system, typ. Remove and replace copper flashing in kind (including front cladding), modifying profile to allow for venting. Remove and reinstall windows as required to complete flashing work.

Remove and reinstall skylight. Raise curbs 2.5" and replace flashings.

Remove and replace slate cladding and flat seam copper roof in-kind, typ.; insulate walls and roof and provide venting at eave

Remove and replace slate roof in kind; insulate roof and provide raised roof deck to vent roof system.

Remove (E) snow fence; provide replacement snow fence and (N) upper snow fence. Remove and replace (E) wire snow guards with pad style snow guards



See attached outline specification for full scope of work and representative project materials

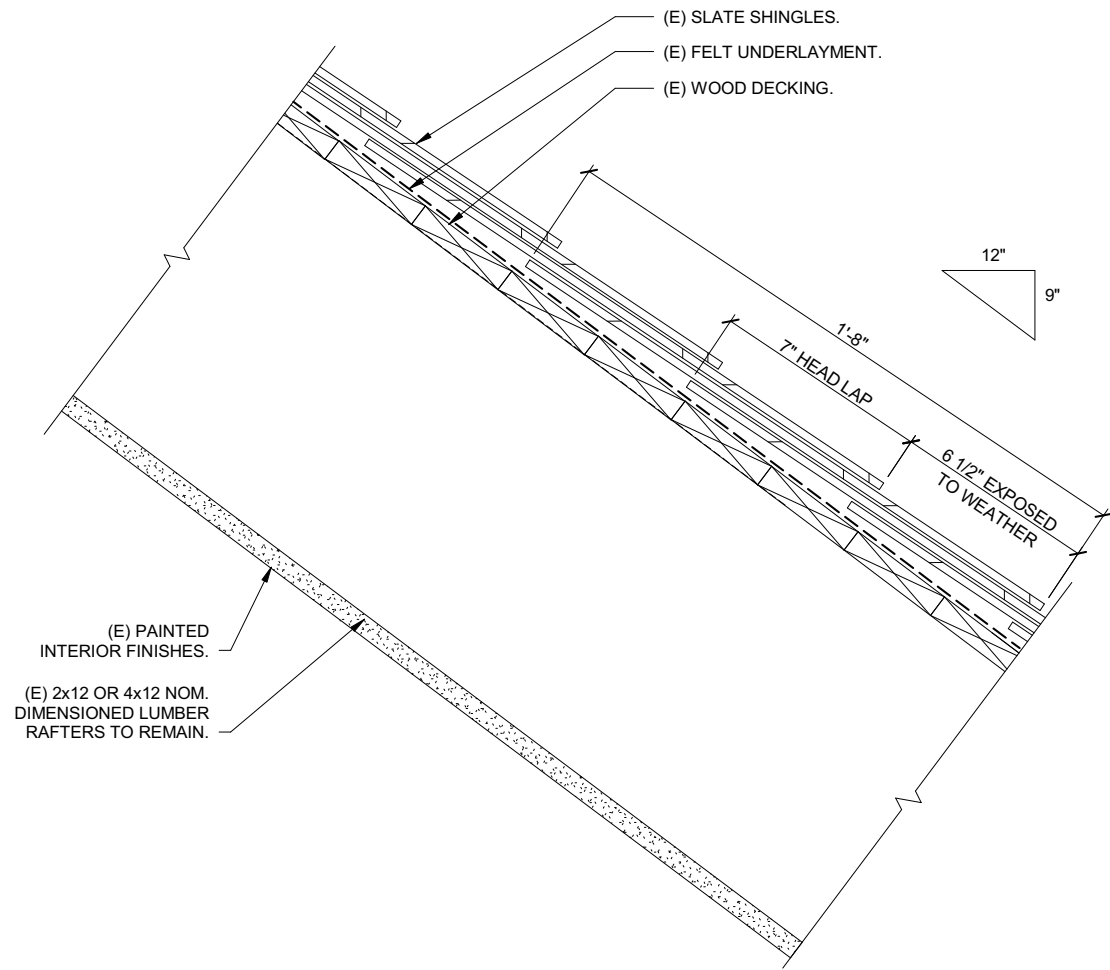
Replace flashing at chimney base; point isolated deteriorated mortar joints

Remove and reinstall mechanical equipment; replace copper flashing in-kind at base of equipment.

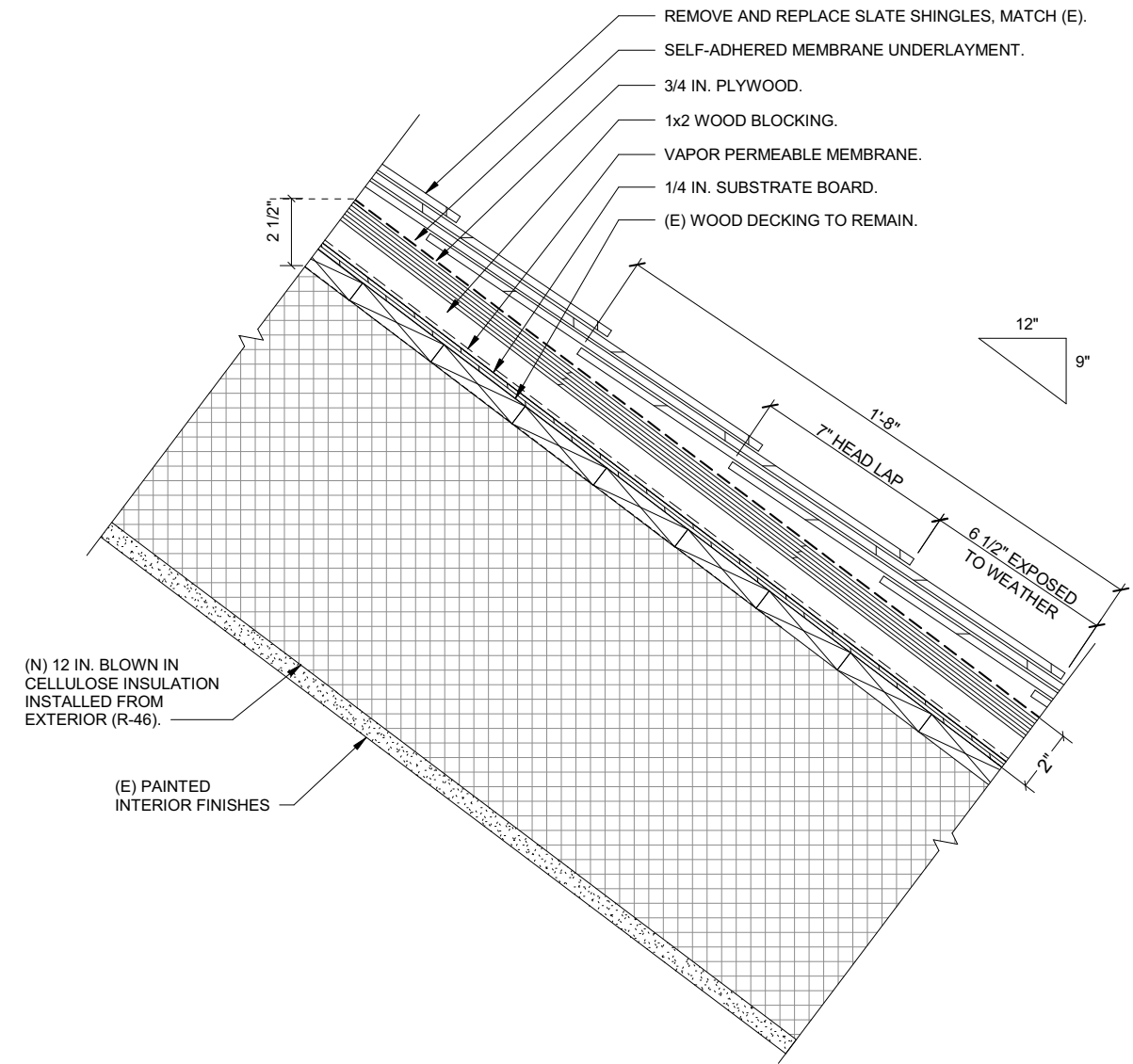
Replace copper perimeter flashing in-kind, including hip, rake and other miscellaneous flashing



# Existing vs. Proposed Roof System



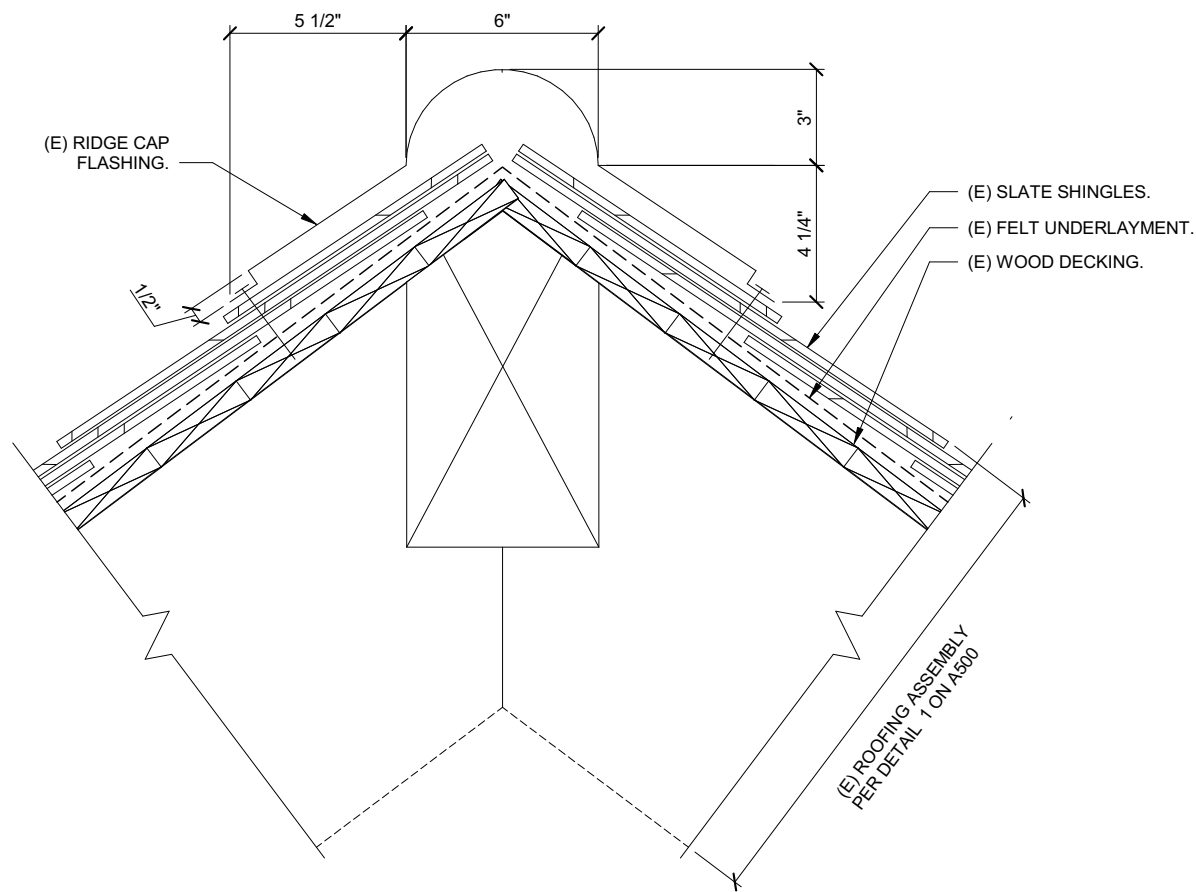
1 EXISTING ROOFING ASSEMBLY



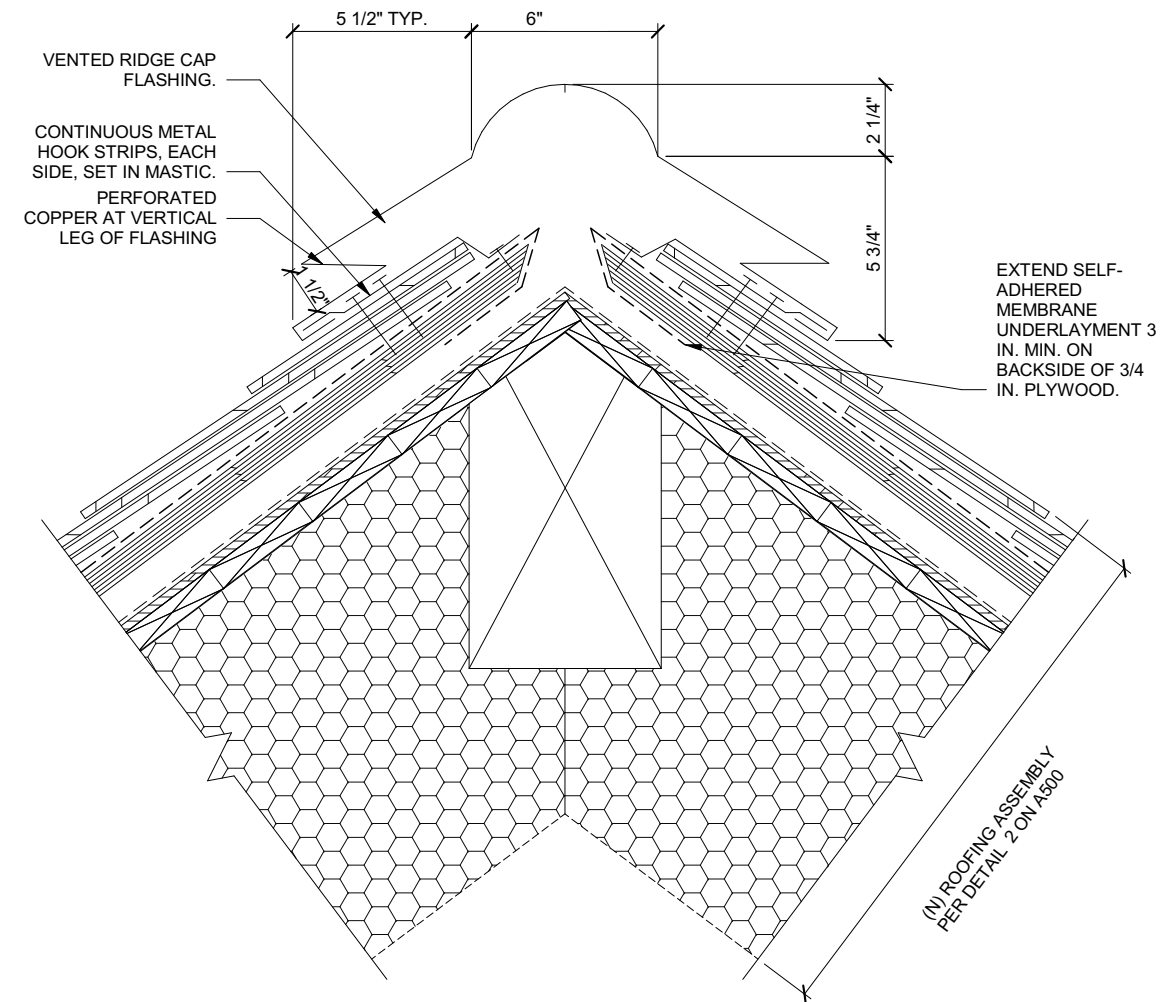
2 PROPOSED ROOF SYSTEM - LOWER ROOF



# Existing vs. Proposed Ridge Detail



3 EXISTING RIDGE CAP

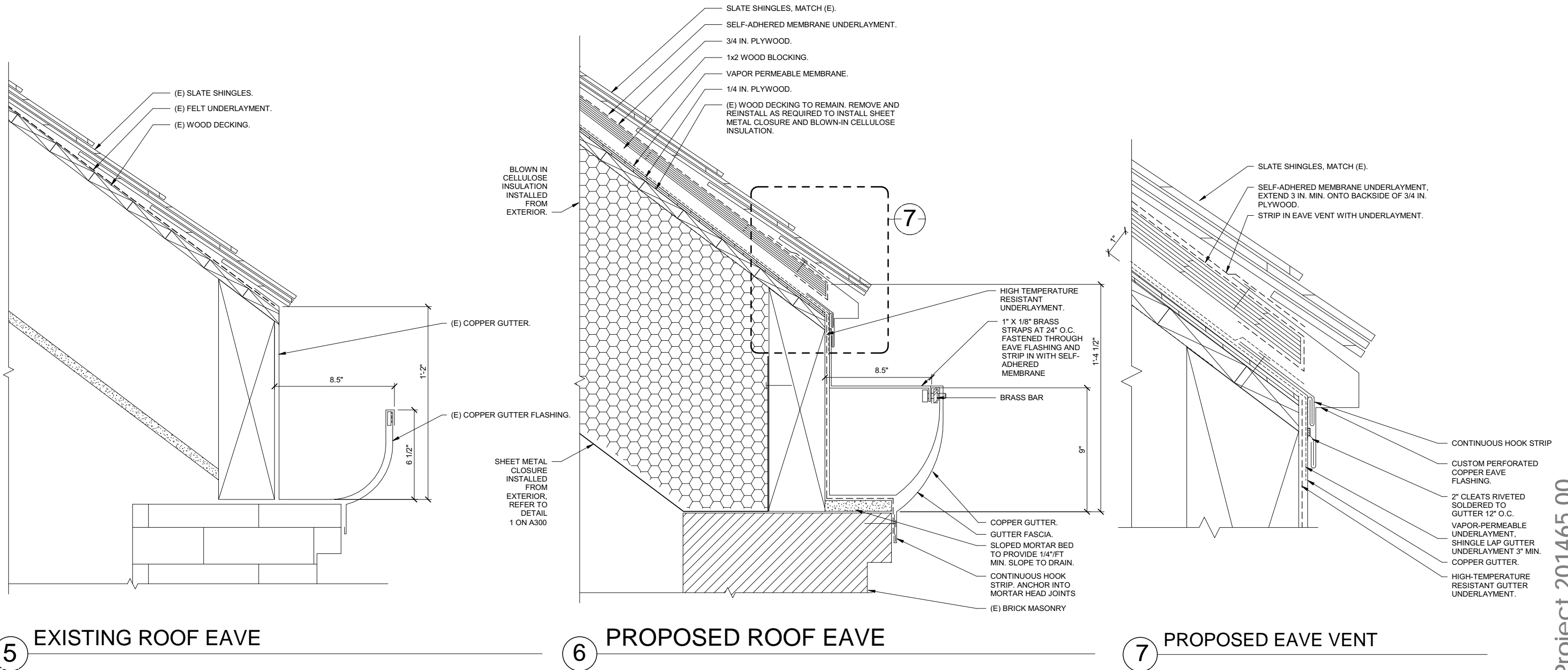


4 PROPOSED RIDGE CAP

NOTE: 2x1 WOOD BLOCKING IN VENT SPACE NOT SHOWN FOR CLARITY. EXTEND TO PEAK OF RIDGE ON BOTH SIDES.



# Existing vs. Proposed Eave Detail



# Aesthetic Impact at Eaves

Approx. zone where not visible



50 ft. Perimeter Around Building



# Aesthetic Impact at Eaves

Images Taken from Union Park Street



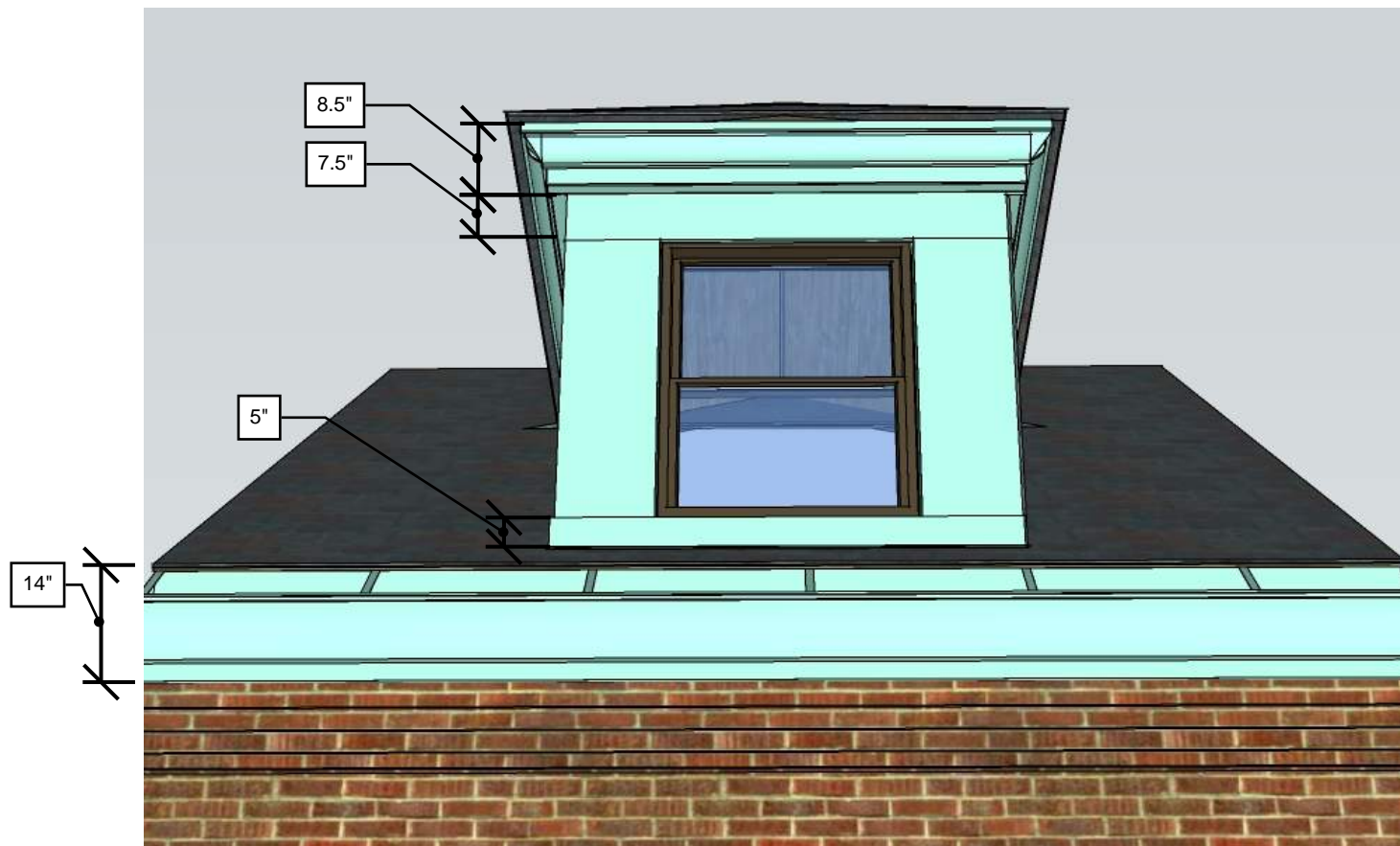
45 ft. From Building



55 ft. From Building

# Aesthetic Impact at Dormers/Eaves

## Sketch-up Model: View from Below



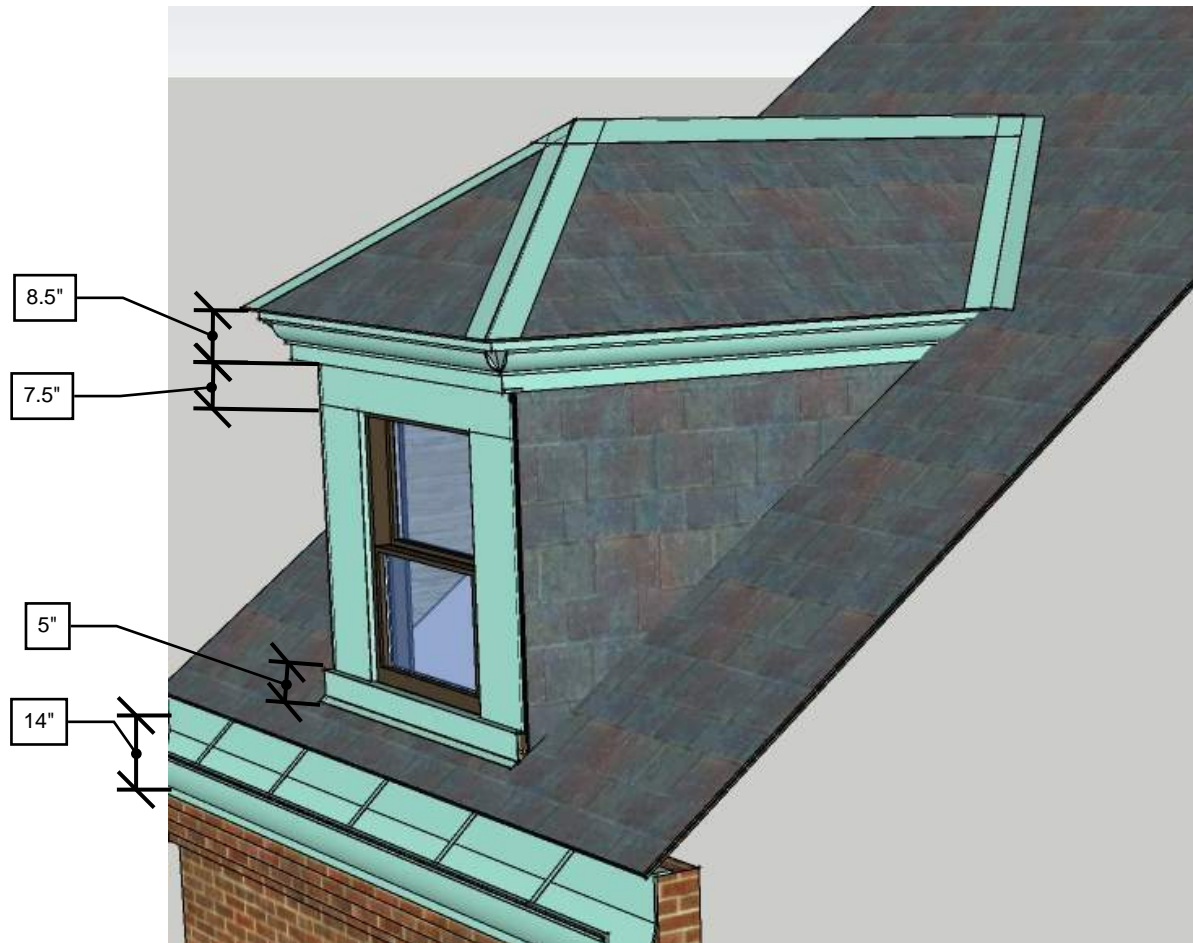
Existing Dormer Condition:  
Model



Existing Dormer Condition:  
Photo

# Aesthetic Impact at Dormers/Eaves

## Sketch-up Model: Angled View



Existing Dormer Condition:  
Model



Existing Dormer Condition:  
Photo

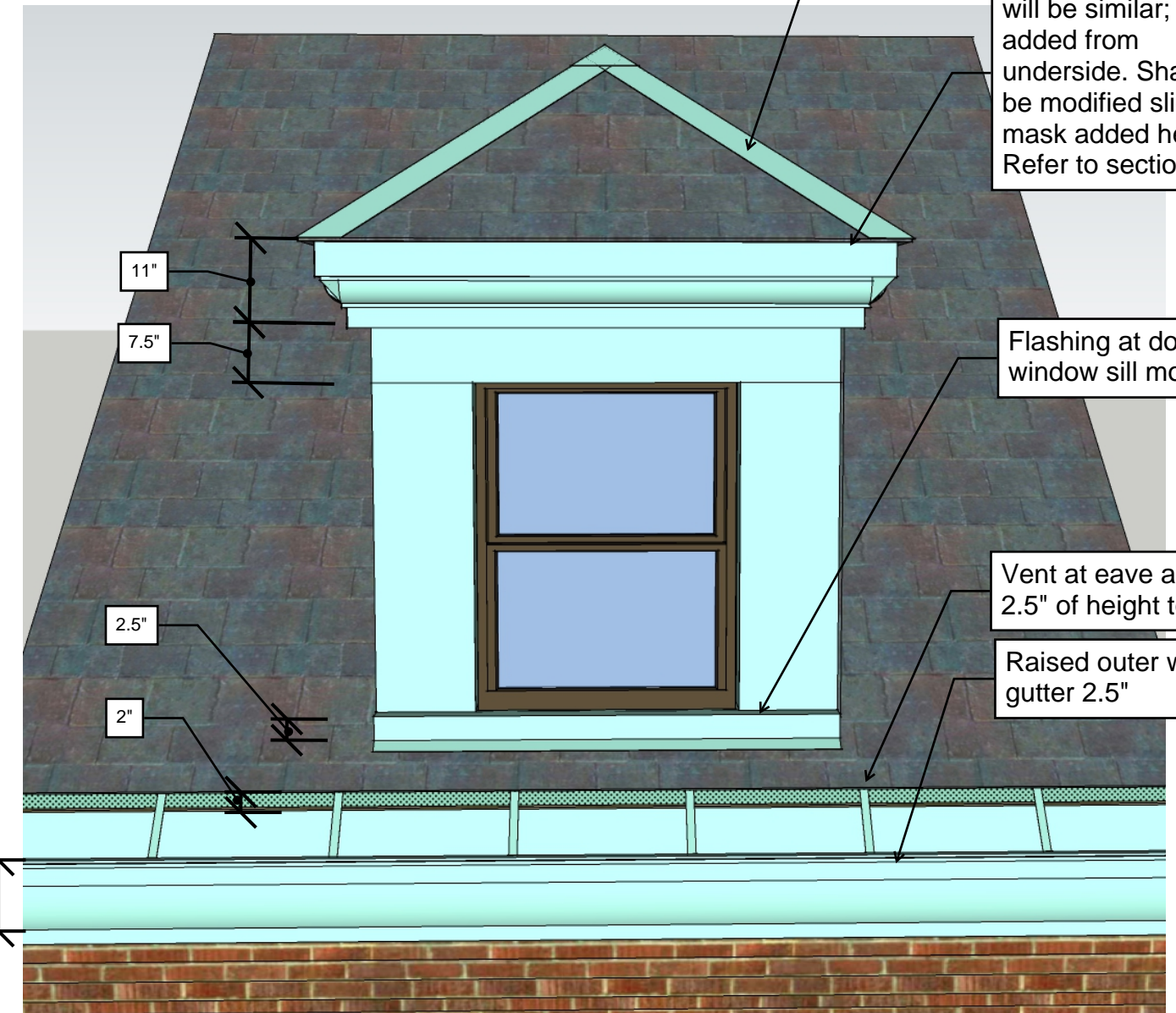


# Aesthetic Impact at Dormers/Eaves

## Sketch-up Model: Straight-On View



**Existing Dormer Condition:**  
**Model**

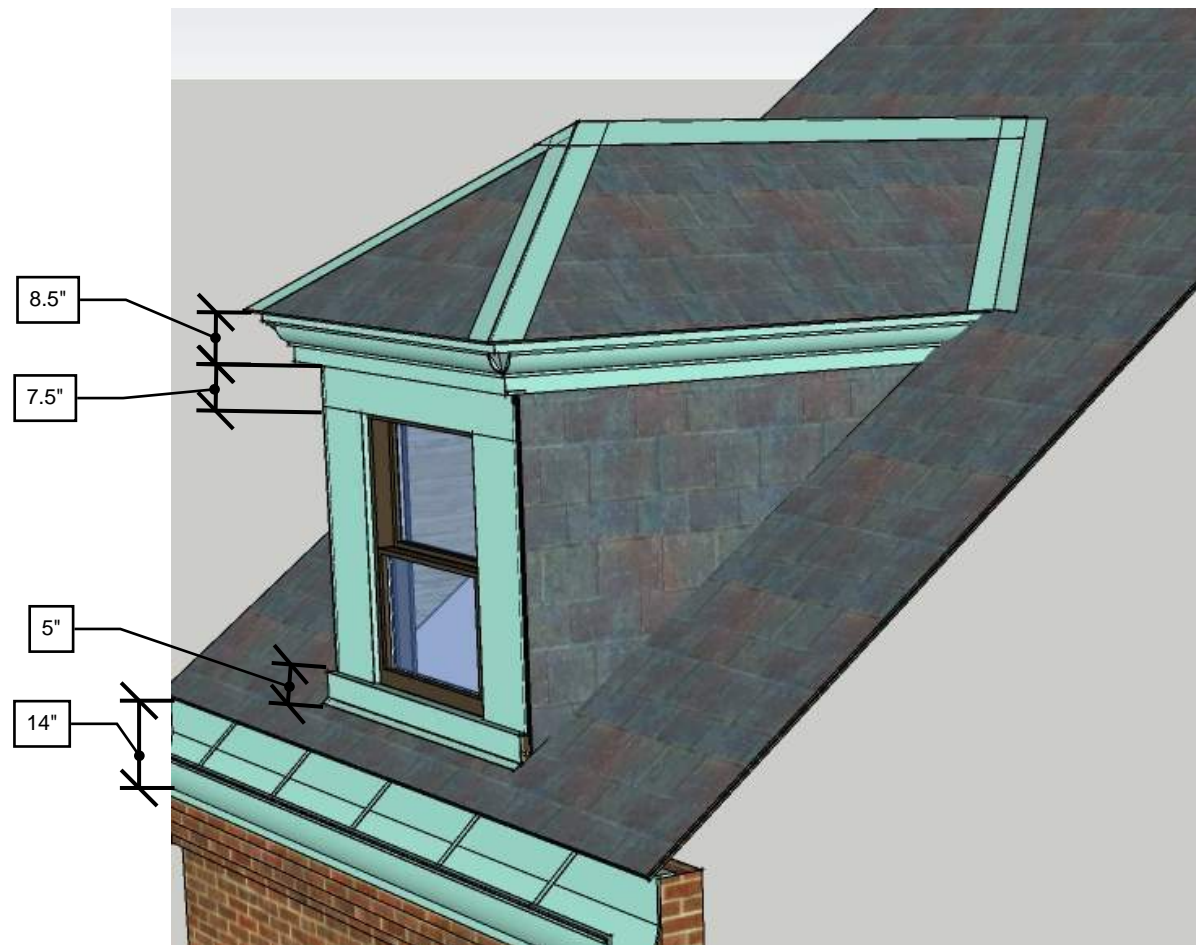


**Proposed Dormer Condition:**  
**Model**

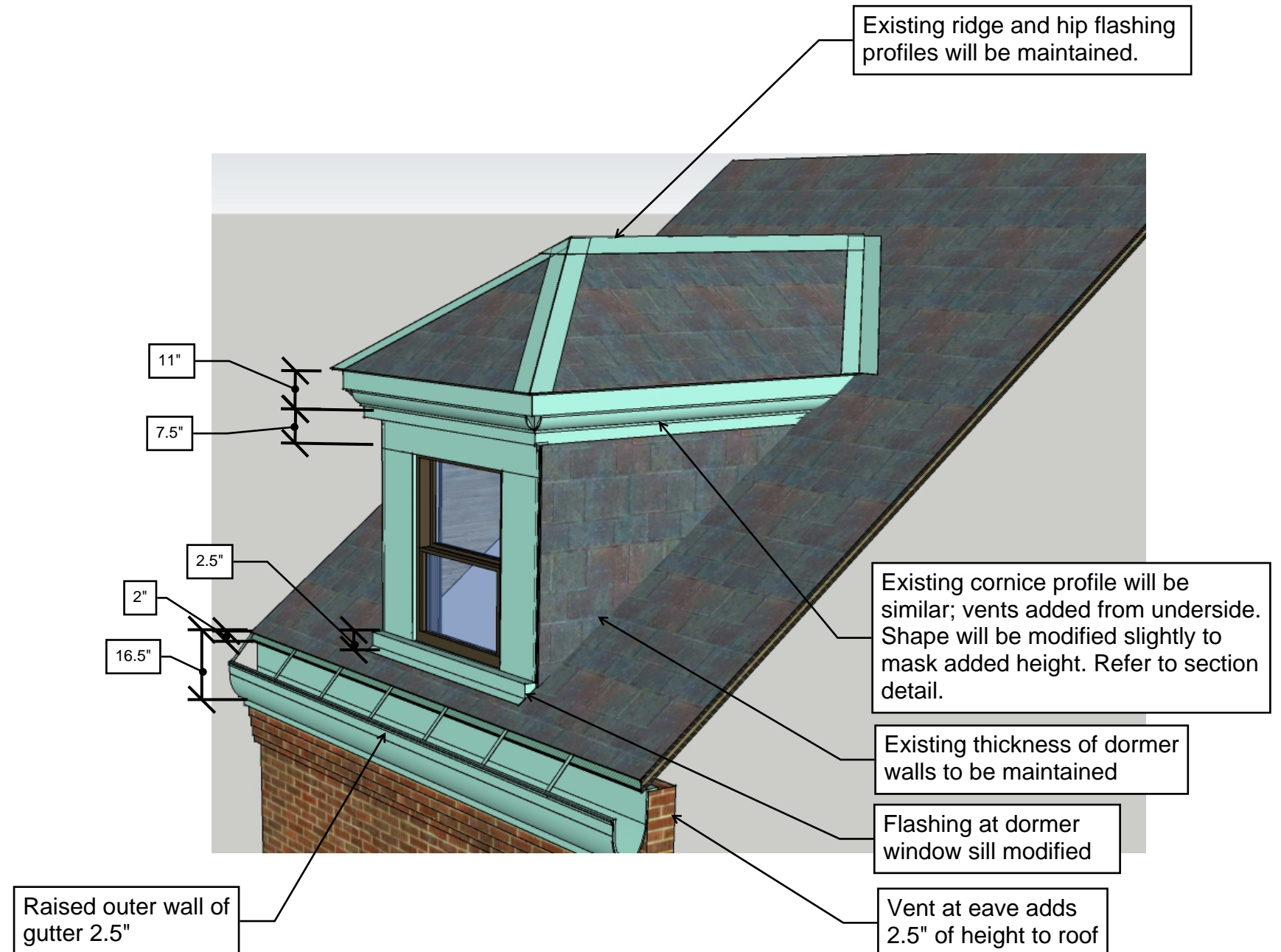
SGH Project 201465.00

# Aesthetic Impact at Dormers/Eaves

## Sketch-up Model: Angled View



**Existing Dormer Condition:**  
**Model**

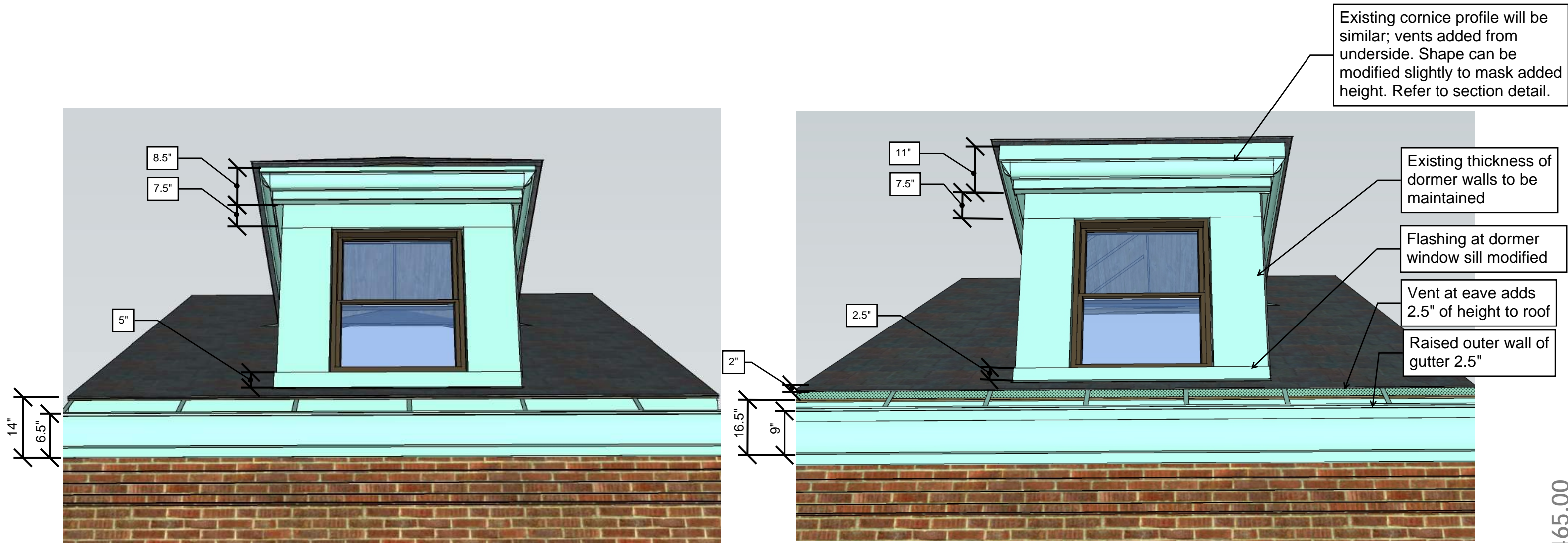


**Proposed Dormer Condition:**  
**Model**



# Aesthetic Impact at Dormers/Eaves

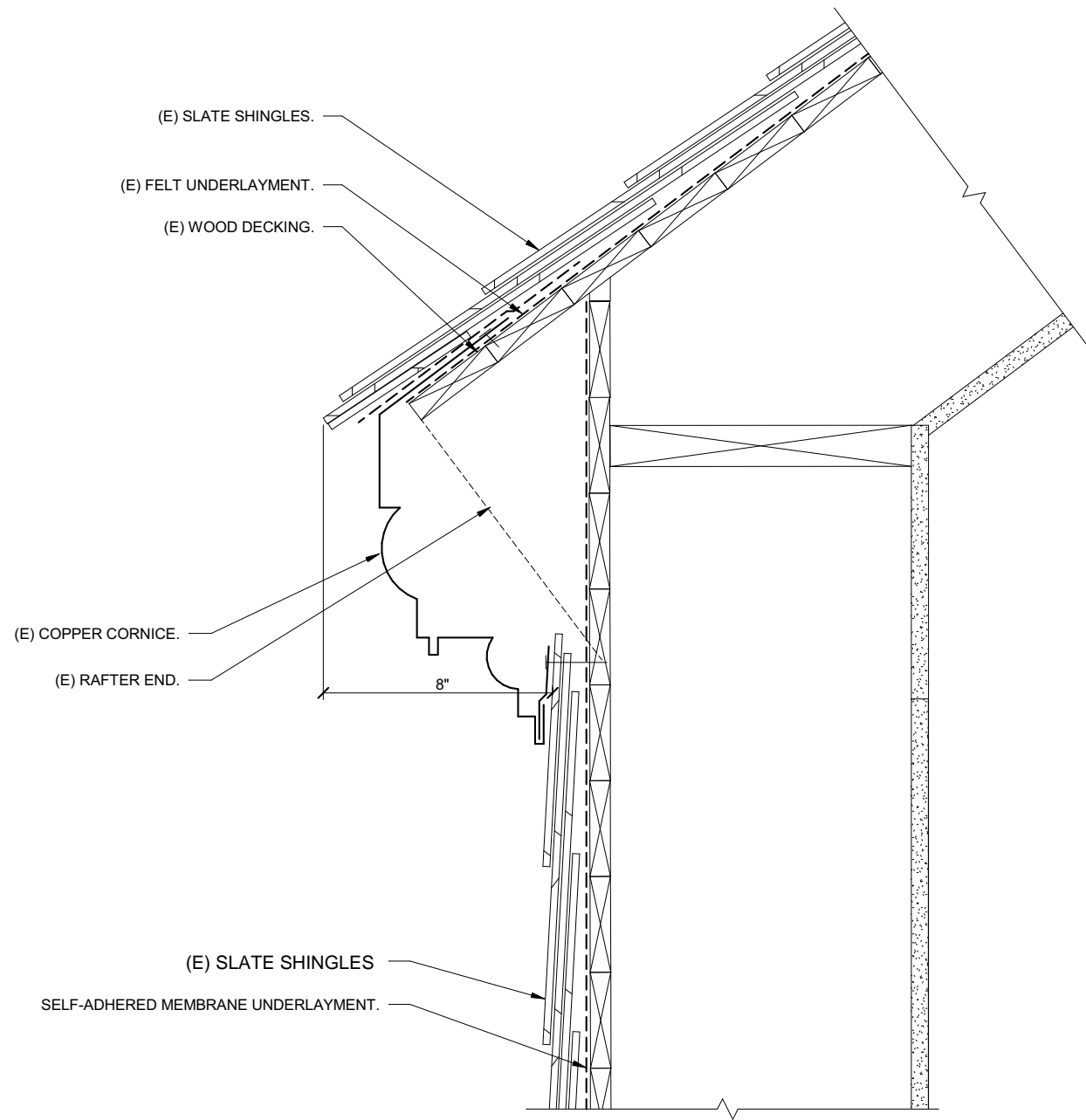
## Sketch-up Model: View from Below



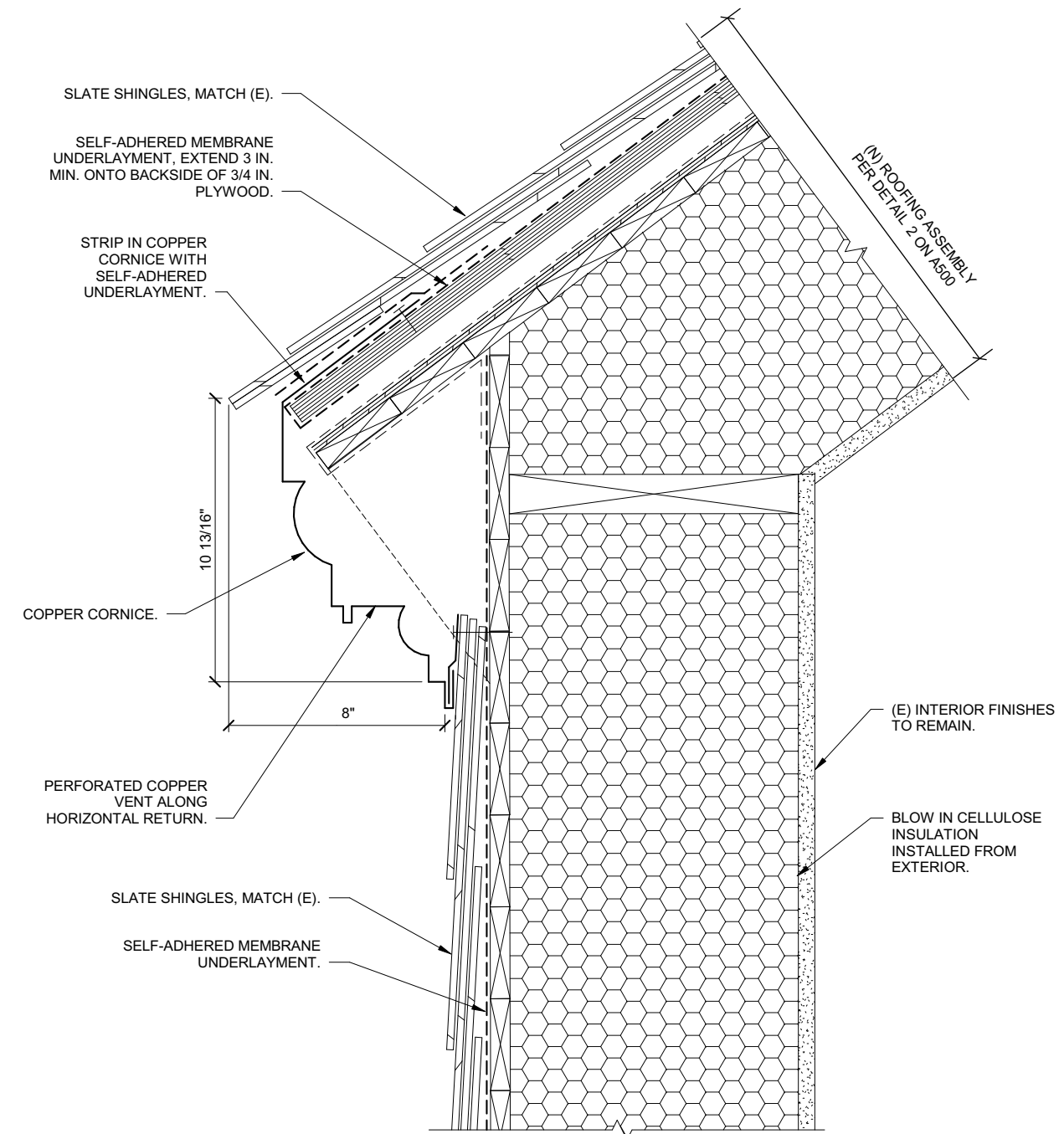
Existing Dormer Condition:  
Model

Proposed Dormer Condition:  
Model

# Existing vs. Proposed Dormer Cornice



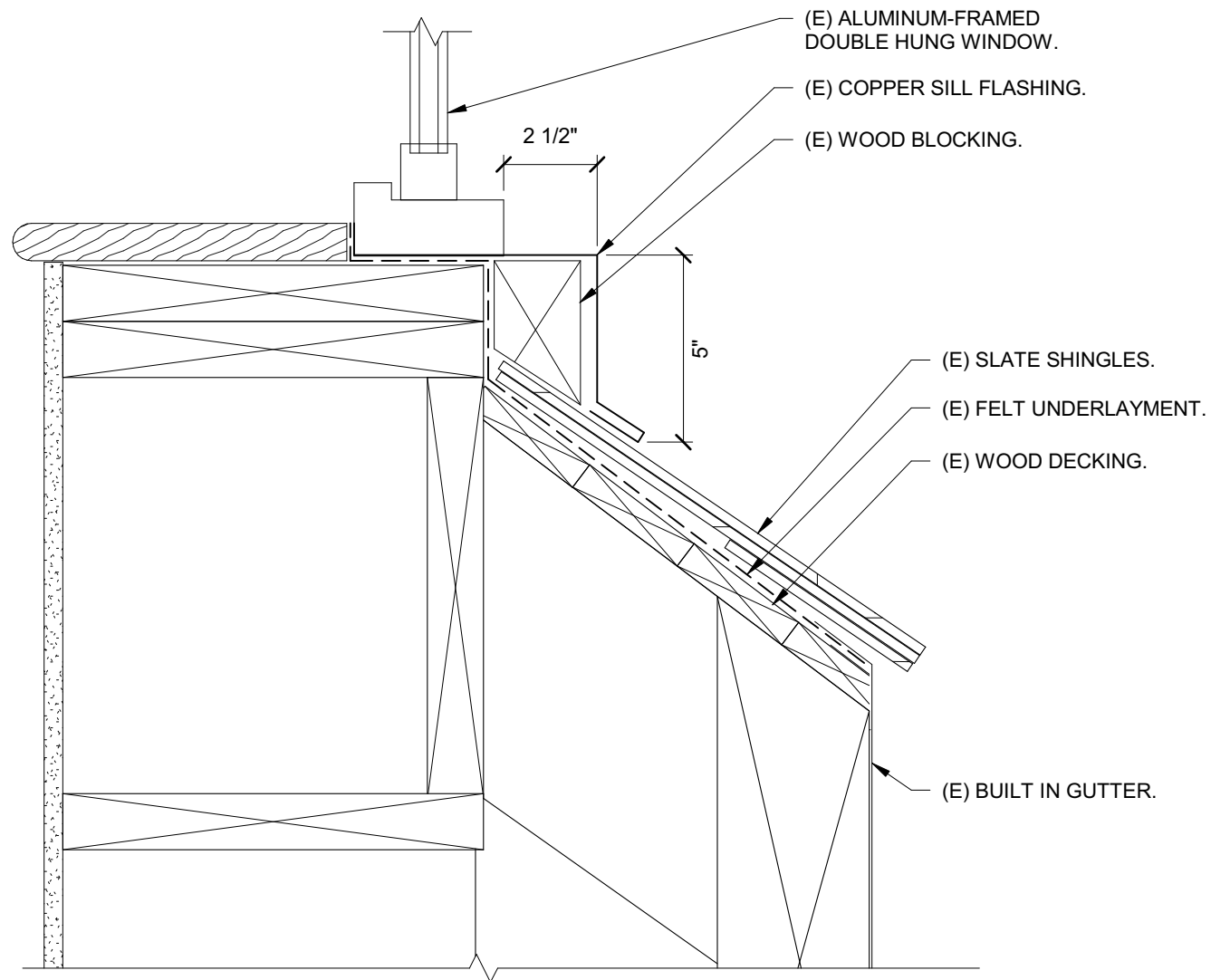
8 EXISTING DORMER CORNICE



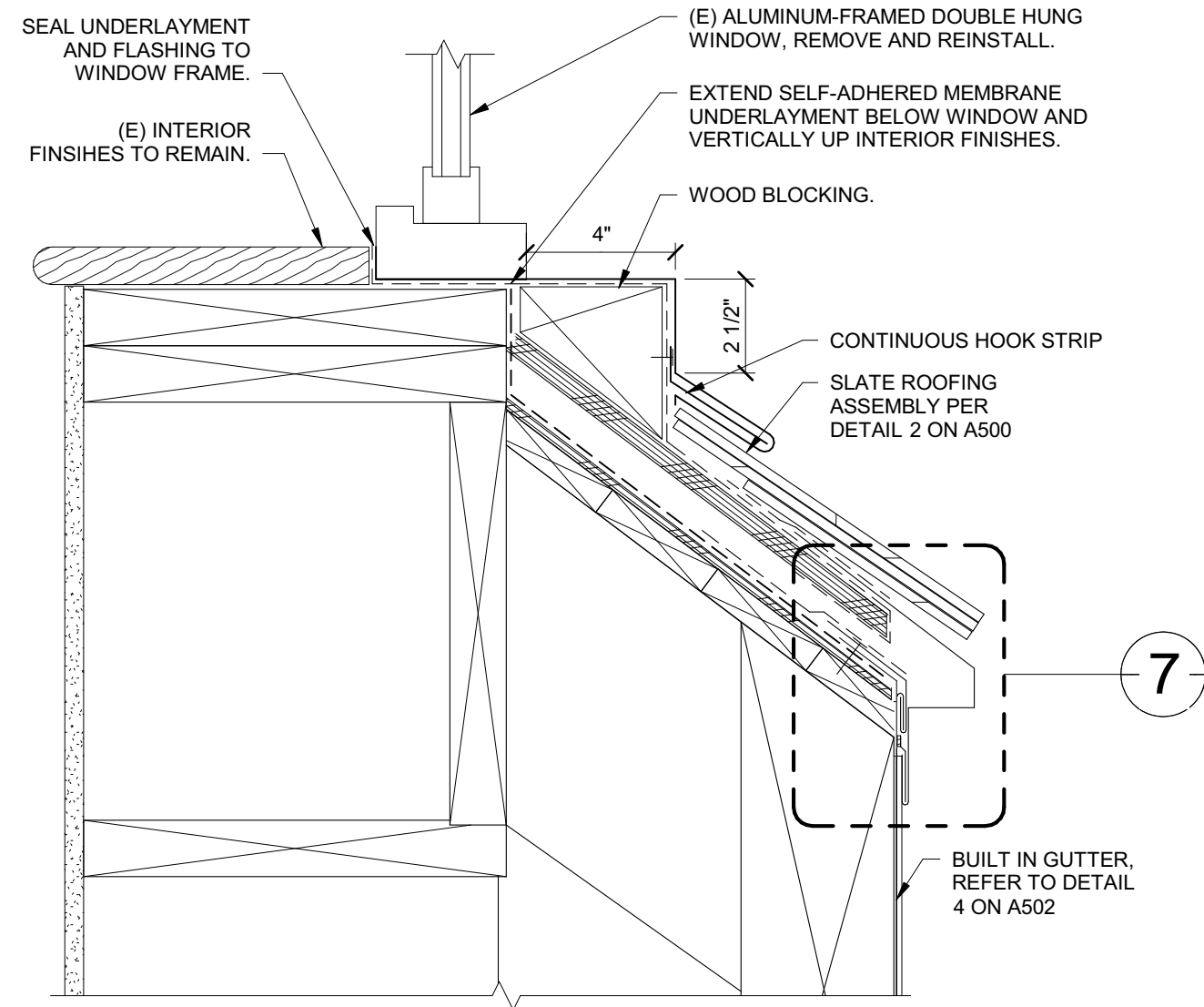
9 PROPOSED DORMER CORNICE



# Existing vs. Proposed Dormer Window Sill



10 EXISTING DORMER WINDOW SILL



11 PROPOSED DORMER WINDOW SILL





# Snow Fence

(N) Snow fence to be installed at approx. mid point of roof slope



**Proposed Snow Fence Layout**



(E) Snow fence to be replaced

**(E) Snow Fence**



**Proposed Snow Fence\***

\*Note that the snow fence comes in various colors and finishes. The intent is to match the existing color as closely as possible.

# Snow Guards



**(E) Snow Guards on Main Roof**



**(E) Snow Guards on Dormer Roof**

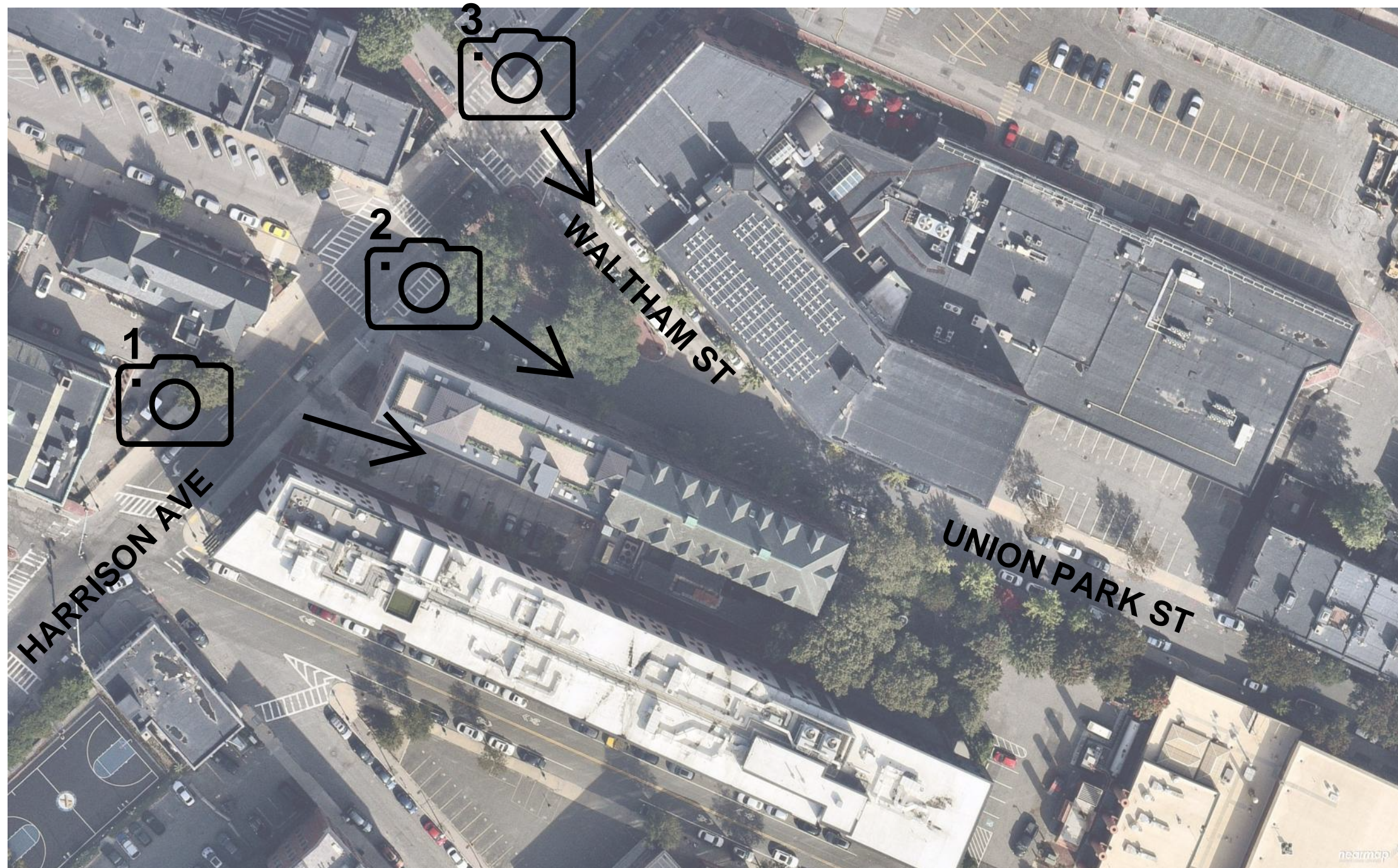


**Proposed Snow Guards\***

Spacing and layout similar to existing; proposed in FreedomGray copper to limit visibility



# Visibility - Harrison Avenue



Aerial Image of Building

# Visibility - Harrison Avenue

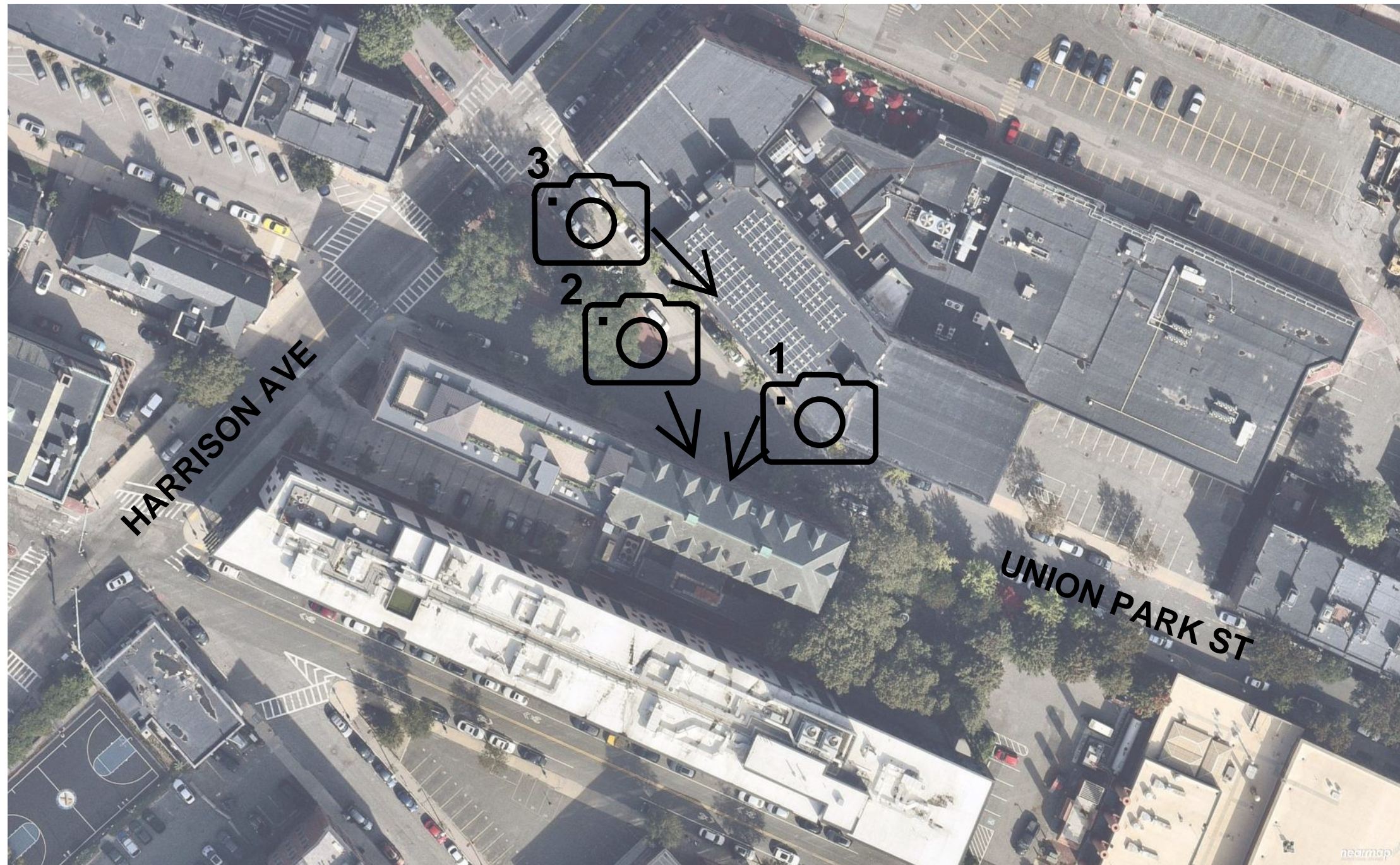


**Location 1:**  
**602 Harrison Ave.**

**Location 2:**  
**553 Harrison Ave.**

**Location 3:**  
**535 Harrison Ave.**

# Visability - Waltham Street



Aerial Image of Building



# Visability - Waltham Street

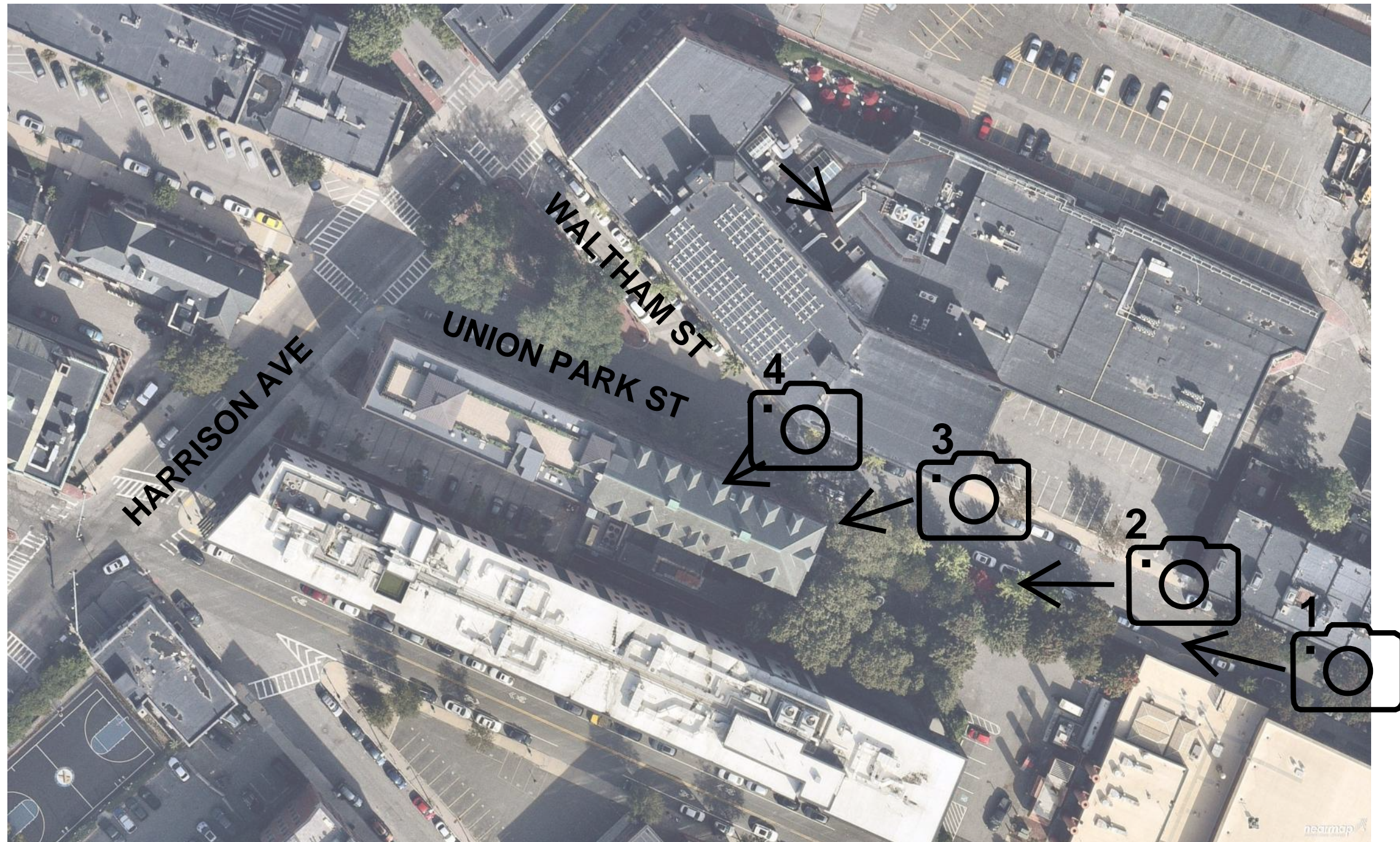


**Location 1:**  
**Intersection of Union**  
**Park St & Waltham St**

**Location 2:**  
**Waltham Square**

**Location 3:**  
**Middle of Waltham St.**

# Visability - Union Park Street



Aerial Image of Building

# Visability - Union Park Street



**Location 1: 114  
Union Park St.**

**Location 2: 104  
Union Park St.**

**Location 3: 95 Union  
Park St.**



# Visibility - Union Park St



Location 4: 89 Union Park St.

**OUTLINE SPECIFICATION**  
**89 Union Park Street Roof Replacement**  
**Boston, MA**

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St. Helena's House  
89 Union Park Street  
Boston, MA 02118  
12 April 2021

Simpson Gumpertz & Heger Inc.  
800 Boylston Street, Suite 2320  
Boston, MA 02199  
SGH Project 201465.00

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**1.0 SCOPE OF WORK**

**1.1 General**

- A. Provide access as required to complete work shown on the Drawings and as listed herein. Contractor must provide shop drawings for any staging or hoists attached to the building, designed and stamped by a registered Massachusetts Professional Engineer, for Owner and Engineer review.
- B. Provide continuous pedestrian protection as required to protect all building entrances, public sidewalks, and any accessible space adjacent to or below work areas. Provide cordoning as required to direct public away from construction areas; coordinate cordoning and pedestrian protection with the City and Owner. Provide permits as required for any street or sidewalk closures.
- C. Protect all adjacent building features and landscape from construction activity, including neighboring properties. Repair all damage to adjacent building or landscape areas caused by construction activity at no cost to Owner.
- D. Coordinate location of any equipment with Owner. Coordinate overnight storage of any equipment with Owner.
- E. Coordinate with Owner on any noise, access, or work hour restrictions. For pricing, assume work hours will be restricted to 8 a.m. to 5 p.m. on weekdays. The building will be fully occupied throughout construction; contractor must maintain all access to the building throughout construction.
- F. Contractor to have limited access into the premises and must be coordinated with Owner prior to entry.
- G. Mockups will be used to establish both technical and aesthetic standard for the project. Follow manufacturer's written instructions for all products except as modified herein. Reconstruct mockup as many times as necessary to obtain approval. Provide the following mockups:
  - 1. 10 LF of gutter and eave flashing, including eave below one dormer and slate for 4 courses up slope.

2. 10 LF of ridge flashing, including termination at shed. Include installation of slate around shed termination.
3. One complete dormer including removal and reinstallation of window, removal and replacement of roof, cladding and flashing and all associated deck and insulation work.
4. One complete ridge shed including removal and replacement of roof, cladding and flashing and associated deck and insulation work.
5. 5 SF of pointing, including cutting and pointing of mortar joints.
6. 5 LF of cladding modification at (E) shed with cladding to remain, including work at one corner.
7. ocSPF foam installation in 2 bays of roof area. Mockup adhesion will be evaluated before work may continue.
8. Blown-in cellulose installation at 2 bays of roof area.
9. Installation of slate roofing at one snow fence bracket.
10. Installation of snow guards in a 10 SF area.

## **1.2 Project Scope of Work**

### **A. REMOVALS**

1. Remove (E) slate roof, underlayment, perimeter and penetration flashing, including gutters. Remove (E) snow fences and snow guards
2. Remove (E) slate roof and cladding at dormers, including any underlayment and perimeter flashing and cladding. Remove (E) dormer windows and store for reinstallation.
3. Remove (E) slate cladding and flat seam copper roof on sheds at roof ridge, including any underlayment and perimeter flashing.
4. Remove (E) mechanical equipment and store for reinstallation. Remove existing flashing at equipment.
5. Remove (E) skylight and store for reinstallation.

### **B. INSULATION**

1. Provide open cell spray polyurethane foam (ocSPF) insulation between the attic rafters for the full depth. Clean existing deck and framing surfaces prior to application. Provide intumescent coating over ocSPF.
2. Provide blown-in cellulose insulation between rafters above occupied space for the full depth. Provide ports in wood deck to install installation

and as necessary of quality control of insulation installation to confirm no voids without insulation. Repair deck at port locations.

C. DECK REPAIR, VENTING AND UNDERLAYMENT

1. Remove and replace any deteriorated (E) roof deck. For pricing, assume replacement of 5% of roof deck. This includes deck on main roof, dormers, and sheds.
2. Provide ¼" plywood sheathing over existing deck including deck on main roof, dormers, and sheds.
3. Provide vapor permeable membrane underlayment on all roof, dormer and shed surfaces.
4. Provide 1x2 wood blocking to create ventilation space, including at main roof, dormers, and shed surfaces.
5. Provide ¾" plywood sheathing over wood blocking.
6. Provide self-adhered membrane underlayment, including at main roof, dormers, and shed surfaces. Integrate with (E) membrane at elevator shed.
7. Raise skylight curb. Extend interior finishes at skylight opening to match height of raised curb.

D. ROOF, FLASHING AND GUTTER REPLACEMENT

1. Provide replacement copper gutter, including flashing below, similar in profile to (E). Slope gutter minimum ¼ in. per foot to drain to (E) downleaders; integrate with (E) downleaders. Provide expansion joints between expansion joints as shown on the Drawings.
2. Provide replacement slate roof system including new copper flashing at perimeters and penetrations. Flashing includes vented eave, vented ridge, hip, eave, rake, step flashing, dormer flashing and other miscellaneous flashing shown on the Drawings.
3. Modify the (E) copper cladding on the shed rising walls to remain; cut existing flashing and provide new transition flashing with replacement apron and step flashing.
4. Replace the flat-seam copper roof on the ridge sheds, including perimeter flashing.
5. Provide replacement snow fences and snow guards as shown on the Drawings.
6. Reinstall (E) windows, skylight, and mechanical equipment when work is complete.

E. MISCELLANEOUS REPAIRS

1. Point isolated deteriorated mortar joints at (E) chimneys.

## **2.0 MATERIALS**

Representative major materials are listed below. The materials listed are not inclusive of all materials which will be used on the project.

### **2.1 Masonry Materials**

- A. Water: Potable, free of acids, alkalis and other dissolved organic materials.
- B. Mason's sand: ASTM C144, fineness modulus 2.0 to 2.5. For restoration work, sand must match color, size, and texture of original mortar sand as closely as practical.
- C. Hydrated lime: ASTM C207, Type "S."
- D. Portland cement: ASTM C150, Type I (white, non-staining), low alkali (equivalent alkalis less than 0.6%).
- E. Mortar pigment: Use integral coloring material consisting of inert, nonorganic, nonfading, finely ground, alkali-fast mineral oxides, meeting ASTM C979. Limit coloring additive to 10% by weight of cementitious material with carbon black limited to 2%.
- F. Mortar: ASTM C270, Type N. Proportions by volume 1: 1: 6 (portland cement: hydrated lime: mason's sand). Do not use ground limestone or prepared masonry mortar mixes. Use the same brands of cement and lime, and the same source of sand throughout the project, for each mix. Do not use any admixture except those called for herein without written approval by the Engineer.
  1. Select mason's sand and use combination of white and gray portland cement to match existing mortar appearance. Sand and necessary ratio of white:gray cement to be determined at pointing mock-up.

### **2.2 Rough Carpentry Materials**

- A. All wood in contact with masonry or exposed wood, including plywood, is to be preservative treated under pressure in a closed retort and kiln dried after treatment (KDAT). Treatment to be ACQ (alkaline copper quaternary) – Type C by Osmose, Inc., or approved equal. CCA (chromated copper arsenate) treatment is NOT permitted, and CCA-treated materials are not permitted on the jobsite. The treatment used is to be stamped on each piece by the processor. Also treat plywood to this minimum standard. Do not use solvents that can stain adjoining materials or will affect any roofing bituminous material.
- B. Wood Blocking and Shims: Southern yellow pine, No. 2 Grade or better. Lumber is generally specified in standard nominal dimensions; however, taper cuts will be required as shown on the Drawings.

- C. Plywood Decking: APA "Exposure 1" or better rated plywood (C-D veneer) to meet requirements of PS 1-07, made with Southern Yellow Pine, 4 ft x 8 ft. Use in sizes shown on the Drawings.

### **2.3 Insulation:**

- A. ocSPF: Two-part open-cell polyurethane formula. Material shall meet requirements of ULC S705.1, Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material – Specification. CCMA Evaluation Report or reports from accredited testing laboratory shall be made available upon request.
- B. Ignition Barrier for Foam Plastic Insulation at Attic and Crawl Spaces (including areas not separated from occupied spaces by a thermal barrier): Provide ignition barrier recommended by foam plastic manufacturer and tested with the specific product. Product shall have an active building code evaluation report that lists report number and effective dates of product acceptance.
- C. Blown-in Insulation: Low dust, cellulose insulation

### **2.4 Underlayments**

- A. Self Adhered Membrane Underlayment: Grace Ice & Water Shield by G.C.P
- B. Liquid applied membrane: Bituthene Liquid Membrane by G.C.P.
- C. Primer for self-adhered membrane underlayment: Bituthene Primer WP-3000 by G.C.P.
- D. Vapor Permeable Membrane: 30 lb felt or vapor permeable self-adhered membrane (Vapro Shield Slopeshield Plus Self-Adhered)
- E. High-Temperature Resistance Underlayment: Grace Ultra by G.C.P.
- F. Separation Layer (install between all metal flashing and underlayment): Rosin-sized Kraft Paper, 4 lb/100 sq ft minimum.

### **2.5 Slate Materials**

- A. Slate: Color to match existing, ASTM C406, Grade S<sub>1</sub>, 1/4 in. thick (minimum) x 20 in. long x 12 in. wide. Color match to be approved by Owner, and Boston Landmark's Commission (BLC) if required by BLC project approval. Possible slate manufacturers/suppliers include:
  - 1. Camara Slate Products, Fair Haven, Vermont, T: 802-265-3200, F: 802-265-2211, [www.camaraslate.com](http://www.camaraslate.com)
  - 2. Evergreen Slate Company, Granville, New York, T: 518-642-2530, F: 518-642-9313, [www.evergreenslate.com](http://www.evergreenslate.com)
  - 3. New England Slate Company, Poultney, Vermont, T: 802-287-2295, F: 802-387-2295, [www.neslate.com](http://www.neslate.com)

- B. Nails: 10 ga copper annular ring nails with large slater's head, lengths to penetrate full depth in wood decking by the Swan Secure Company.
- C. Slater's cement: Bulldog Red Plastic Cement, for use in concealed locations only. Consult with Engineer before use.
- D. Wire (to attach angle-out slate): 30 ga copper.

## **2.6 Flashing Materials**

- A. Metal flashing and roofing, except where noted otherwise: cold rolled "red" copper, conforming to ASTM B370; weights as specified below unless noted otherwise on the Drawings. All sheets shall carry markings of producer, temper, and weight.
  - 1. Flashing (except valleys), flat-seam roofing, gutter and all related cleats, hook strips, and similar attachments: 20 oz.
  - 2. Valley sheets: 24 oz.
- B. Rivets for metal flashing connections: Solid copper 3/16 in. dia. flat head rivets of proper length for the material being fastened.
- C. Solder: ASTM B32, Class 50A or 50B, Bar Form, 50% block tin and 50% pig lead.
- D. Flux: Conforming to ASTM B813.

## **2.7 Roofing Accessories**

- A. Snow Fence: PP503 Three-Pipe Height Adjustable Snow Guard, Brass by Alpine SnowGuards or approved equal. Provide with approved powder coated finish.
- B. Snow Guards: PD10 Half Round Pad-Style Snow Guard, FreedomGray copper by Alpine SnowGuards or approved equal

## **3.0 EXECUTION**

Representative execution sections included below. This does not include execution instructions for all conditions.

### **3.1 Mortar Removal**

- A. Procedure for removing existing mortar shall be decided upon successful completion of a mockup and approval by the Engineer.
- B. Remove existing mortar by cutting down the center of the joint with power tools and then removing remaining mortar with hand tools. To prevent joint enlargement, do not chip or cut into adjacent masonry. Do not overcut into masonry. If joint enlargement occurs, use of power tools may be further restricted.

- C. Remove mortar from joints scheduled for pointing to depths equal to 2-1/2 times their widths, but not less than 5/8 in. Leave no cavities in the existing mortar, and remove all deteriorated mortar.
- D. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and exposed masonry sides for contact with pointing mortar.

### **3.2 Mortar Mixes**

- A. Measurement: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Measure materials with an approved device, not by shovel.
- B. For pointing only, use prehydrated mortar prepared as follows: Mix materials in a clean mechanical batch mixer. Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 60 min. Add remaining water in small portions until mortar of desired consistency (somewhat stiffer than bed mortar) is reached. Use within 60 min. of final mixing. Do not retemper or use partially hardened material. Mortar color must match approved mockup mortar color.
- C. Do not use admixtures in mortar, unless specifically approved by the Engineer.

### **3.3 Masonry Pointing**

- A. Rinse joint surfaces with water to remove dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.
- B. Apply mortar in successive layers until a uniform depth is formed. After joints are filled to a uniform depth, place remaining pointing mortar in successive layers of no greater than 1/2 in. depth until flush with exterior face of stone. Fully compact each layer and allow mortar to become thumbprint-hard before applying next layer. Allow at least 24 hrs to pass between successive stages of mortar application to allow for mortar shrinkage between stages. Where existing stones have rounded edges, recess final layer slightly from face. Take care not to spread mortar over edges and onto exposed face.
- C. When mortar is thumbprint-hard, tool joints to match existing with a pointing tool slightly larger than the masonry joint to compact the mortar thoroughly. Remove excess mortar from edge of joint by brushing.
- D. If shrinkage cracks develop because of too-fast curing, cure mortar by maintaining in a damp condition for not less than 72 hrs. Keep tiles covered with tarpaulins and use a fog spray periodically to maintain moist conditions under the cover. Do not wash the newly pointed mortar with a stream of water.



### 3.4 Slate Installation

- A. Inspect each slate shingle prior to installing, to ensure that the slates are sound, without cracks or delaminations. Tap each slate with a hammer; sound slates should "ring", and should not have a dead sound. Twist slates to ensure that they are not cracked or delaminated. Dispose of slates that are cracked or delaminated.
  - 1. Broken corners on exposed ends are prohibited; broken corners on unexposed ends greater than 1-1/2 in. any direction are prohibited.
  - 2. Reject slates with knots projecting 1/16 in. or greater from the face of the slate.
  - 3. Reject slates with inclusions or ribbons (such as quartz or pyrite).
  - 4. Reject slates that are curved or warped 1/8 in. in 12 in. length or more.
- B. Provide roofing slate in strict accordance with industry practice and recommendations, as described in "Slate Roofs," by Vermont Structural Slate Co. Inc., 1926 Edition. The most-restrictive practices and recommendations shall govern.
- C. Provide slate as shown on the approved shop drawings. Match the size, and coursing of slate on the existing roofs as documented on the layout drawings.
- D. Lay horizontal courses of slate with headlap as shown on Drawings. Nail slate with two nails each. Drive nails until underside of heads contact slate surface lightly. Do not strain slates. Exposed nails are not acceptable.
- E. Stagger joints with preceding course to provide the required headlap, including at under-eave shingles (starter course). Shingles at eave line shall be doubled and canted with tapered wood blocking. Under-eave slate shall be applied with the long dimension horizontal. Project slate 2 in. at eaves, unless noted otherwise on the Drawings.
- F. Provide slater's cement in concealed locations where required to hold small pieces in place (one nail or less). Consult with Engineer before use.
- G. Upon completion of shingle installation, shingles shall be sound, whole, properly attached, configured to shed water, and clean.
- H. If any shingles are damaged or broken during the work, remove them with a slater's ripping bar. Provide replacement shingles using two nails located between the vertical joint of the overlying shingle, just above the head lap of the slate below. Place a 3 in. wide copper bib with a 1/2 in. return hook over the exposed nail heads and engage over top edge of the replacement shingle. Bibs shall be sized to extend to within 1-1/2 in. of the bottom edge of the overlying shingle. Areas of excessive breakage shall be completely removed and replaced as required by the Engineer.

- I. Do not puncture metal valley flashing sheets with roofing nails when installing roof slates. Where necessary to attach angle-cut slates or tiles at metal valley sheet edges, secure one side of the slate or tile with a twisted copper wire fastened to a nail upslope and away from the flashing.

### **3.5 General Metal Installation**

- A. Prior to all metal flashing and cladding installation inspect the self-adhered membrane underlayment for holes and tears in the membrane. Provide repair patches and liquid membrane at edges and at all deficiencies. Extend repair patches a minimum of 6 in. beyond the tear on all sides.
- B. Except as called for in this Section, comply with all recommendations of the current edition of Revere's "Copper and Common Sense" Standards for Details. Completed metal shall be straight, flat, and without buckles, dents, scratches, or other blemishes.
- C. Form sheet metal on a bending break. Perform shaping, trimming, and hand seaming in the shop as far as practicable, with the proper sheet-metal working tools. Make the angle of the bends and the folds for interlocking the metal with full regard for expansion and contraction, to avoid buckling or other deformation in service. All lines and arises shall be straight and crisp except where thickness of metal dictates radius bend, and all exposed edges shall be hemmed 1/2 in. minimum. All lines and arises shall tightly follow the existing construction profiles as shown on the Drawings.
- D. Immediately prior to soldering, mechanically clean all metal to be soldered with steel wool or by other acceptable means, apply flux, and pre-tin. Clean metal again if it is not soldered on the same work day. Perform all soldering slowly with well heated heavy (10 lbs per pair) coppers (irons) with properly tinned clean blunt tips. Do not use torches. Apply enough heat to sweat the solder completely through the full width of the seam. Close clinch-lock seams gently with a block of wood and mallet, then flux and show at least one full inch of continuous and evenly flowed solder. Whenever possible, do all soldering in flat position. All sloped and vertical seams shall be laced and soldered a second time. Wipe and wash clean soldered joints to remove all traces of acid from the flux immediately after the joints are made.
- E. Arrange work sequence to avoid use of newly completed roofing for storage, walking surface, and equipment movement. Protect work from mechanical damage. Notify the Engineer immediately if anyone abuses or damages flashing components.
- F. Arrange panel layouts properly to ensure all panel penetrations are in the middle of panels. Penetrations at seams in the metal panels are prohibited.
- G. Detail expansion joints in all flashing pieces to provide a watertight connection, and allow for expansion/contraction of the metal at each joint as shown on the Drawings. Unless shown otherwise on the Drawings, provide expansion joints at 20 ft o.c. and at 2 ft away from all changes in flashing direction (each side) and from all terminations of flashing.

- H. Provide prefabricated corner pieces with joints locked, riveted, and soldered watertight.
- I. Space rivets at 1-1/2 in. o.c. in staggered pattern unless otherwise indicated.
- J. Provide backer plate as required at flashing transitions and corners to fully solder watertight.

### **3.6 Flat-Seam Metal Roof Installation**

- A. Provide separator sheet between self-adhered membrane underlayment and metal flashing.
- B. Form 18 in. x 24 in. pans from sheet copper. Fold 3/4 in. of the top edge and one side 180° over the pan, and 3/4 in. of the bottom edge and other side 180° under the pan. Notch the corners of the pans, so that the folded edges do not interfere at the corners. Secure the panels to the substrate with 2 in. wide copper cleats, locked onto the top and side folds, and fasten to the deck with two nails each, staggered. Fold backs of cleats over the nail heads. Provide cleats in the pattern shown on the drawings for each panel. Lock the edges of the upper panel that are folded under onto the edges of the lower panel that are folded over, to form a flat-locked seam. Stagger the vertical seams 12 in., as shown on the Drawings.
- C. Solder all flat-locked seams, as described above, between panels. Pre-tin all locks in panels as required prior to bending and assembling panels.
- D. At rising walls, form a 3/4 in. fold on the edge of the panel. Provide cleats along the fold at 12 in. o.c., fastened to the substrate. Lock the horizontal flange of the base flashing onto the lock on the panel, and "dress" down using a mallet and block of wood. Solder the locked seam as described above.

### **3.7 Metal Flashing Installation**

- A. Provide metal flashing systems as shown on Drawings. Coordinate metal flashing details with other related scope of work. Provide separator sheet between self-adhered membrane underlayment and all metal flashing.
- B. Provide continuous edge/hook strips where indicated on the Drawings, nailed 10 in. on center into solid wood blocking. Crimp the formed hook of metal flashing onto the hook strip, forming a 3/4 in. loose lock, overlapping the hook strip at least 1/2 in.
- C. Provide individual valley sheets. Nail the upper end of each piece to the deck; attach side edges with 2 in. wide metal cleats at 12 in. o.c. Lap valley sheets a minimum of 1 ft at transverse joints; strip upper edge of sheet with self-adhered membrane underlayment.
- D. Provide individual step flashings at all rising masonry walls between each slate adjacent to the wall. Extend bottom edge of step flashings to within 1/2 in. of the bottom of the overlying slate. Extend step flashing up the wall to the height of the counterflashing (12 in. minimum unless shown otherwise on the Drawings), and

onto the roof deck at least 12 in. Provide an open hem at the top of each step, and hook onto the top edge of the underlying slate. Provide 3 in. minimum headlap at slates between steps.

- E. Provide metal flashing into saw-cut reglets (specified in Section 04 40 00 – Masonry) as shown on the Drawings, fastening the upturned leg of flashing in the reglet at 6 in. o.c. Provide sealant into reglet joint as specified in Section 07 90 00 – Joint Sealants.
- F. Provide flashing at roof eaves, hips, ridges, and other miscellaneous locations as detailed on the Drawings.

END OF SECTION