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PRODUCT GUIDE SPECIFICATIONS

Specifier Notes: This Metal-over-Metal roof replacement sub-framing product's guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format. The section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. When editing this specification, delete all references to "**Specifier Notes**" and any non-used or chosen text.

Section numbers and titles are from *MasterFormat 1995 Edition*, with numbers and titles from *MasterFormat 2004 Edition* in parentheses. Delete version not required.

SECTION 13145 (13 34 21)



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RETROFIT STEEL SUB-PURLINS

Specifier Notes: This section covers standard “Roof Hugger” sub-purlins for retrofitting roofs, walls, and fascias over existing “Through-Fastened Metal Panels” and existing “Standing Seam Metal Panel systems” with either low clip or high/standoff clips. For existing “sine wave” type corrugated roofs with ribs less than 1.25” high, refer to the “Roof Hugger Corru-fit” specifications.

Roof Hugger “Standard” ribbed roof sub-purlins are one-piece, notched and punched, galvanized steel, Z-shaped sections. They are factory-notched to nest into and over the existing roof’s ribbed profile, pre-punched for fasteners, and are attached directly into the existing purlins or joists with structural fasteners.

Existing standing seam roofs that were installed with high/standoff clips, as well as some standing seam roofs applied over structural deck with compressible insulation on the existing deck, may require the use of a “Special” sub-purlin. This sub-purlin is identical to the “Standard” Roof Hugger, except it has an “Anti-Rotational Arm” formed into the part. The identification of existing high/standoff clips or a compressible deck material is important to the structural design and pricing of the retrofit system and must be determined prior to product acquisition.

The International Building code adopted by all U.S. states requires the roofs to be analyzed by zones IE: corner, edge and field zones. Each zone will have a different wind uplift load (negative pressure) requirement. Most older metal buildings were designed with uniform roof loading as a result the 5’ purlin spacing typically found in these buildings may not be adequate for the new metal roof systems to meet current code requirements in higher wind speed areas. Snow loading is also analyzed differently and may also require additional framing for proper roof system support.

Roof Hugger recommends consulting a qualified design professional to determine the loads, a compliant roof panel and the proper sub-frame spacing. Framing is typically controlled by the chosen new metal roof system. To assist design professionals, Roof Hugger can perform a preliminary load estimate upon request (subject to final engineering confirmation by others). The new Roof Hugger sub-purlin type and spacing will be based on specified and/or required, snow loads, wind speeds and resulting loads, the existing roof purlin spacing, type of existing roof panel, and the tested maximum capacity of the proposed new roof panel. Different new roof systems may require different framing solutions.

Retrofitting an existing roof will create a cavity between the new and existing roofs. Consideration for ventilating and/or insulating this cavity is recommended. Many benefits including reduced heating/cooling energy consumption and Federal/State and local tax incentives can be realized. Third party, heat recovery systems built within this cavity are available, as are various insulating and ventilating systems. Each system has its own sub-framing design considerations.

Standing seam panels are known for their tendency to rumble in high winds if insulation is not used. Consult your panel supplier for their specific recommendations.

Consult Roof Hugger, if needed, for assistance in editing this section for the specific application.

PRODUCT IDENTIFICATION

(This page not to be included with your specification)

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STANDARD ROOF HUGGER SUB-PURLINS FOR ROOF WITH EXISTING PANELS MOUNTED ON STEEL PURLINS:



Through Fastened (Screw-down) Roofing



Vertical Rib Standing Seam



Trapezoidal Standing Seam

SPECIAL PART WITH ANTI-ROTATIONAL ARM FOR STANDING SEAM ROOFS WITH EXISTING HIGH CLIPS/THERMAL SPACERS:



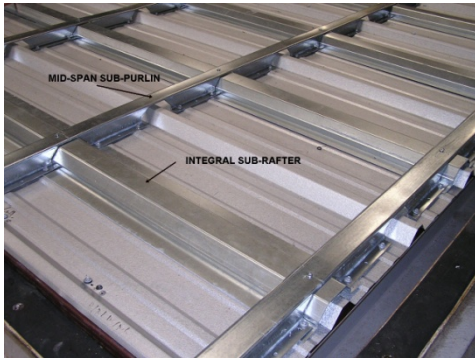
Vertical Rib Standing Seam w/ High Clips



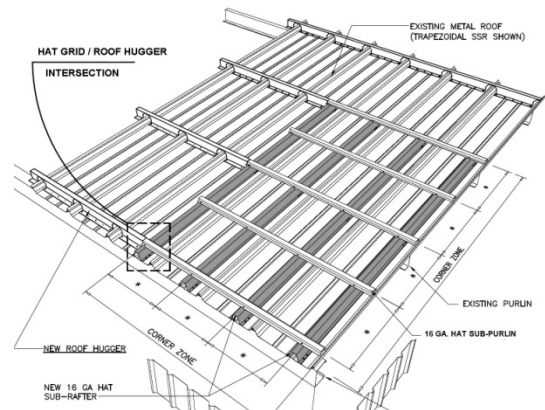
Trapezoidal Standing Seam w/ High Clips



Existing High Clip Example



Integral Sub-Rafters and Sub-Purlins



Hat Sub-Purlins installed over Hat Sub-Rafters



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SECTION 13145 (13 34 21) - SPECIFICATIONS FOR STRUCTURAL RETROFIT ROOF SUB-FRAMING SYSTEM

PART 1 - GENERAL

1.10 DESCRIPTION

- A. The structural retrofit roof sub-framing system will provide support for a new metal roofing system constructed over the existing building roof. It shall be engineered in accordance with the specified code and design loading and shall transfer positive acting loads at each attachment location into an existing structural member.
- B. Furnish labor, material, tools, equipment and services for the fabrication of retrofit roof sub-framing as indicated, in accordance with provisions of the Contract Documents.
- C. Completely coordinate work with of other trades.
- D. Although such work is not specifically indicated, the contractor/installer shall coordinate with the metal roof system supplier to furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- E. See Division 1 for General Requirements

1.20 RELATED WORK

Specifier Notes: Edit the following list of related sections as required for the project. List other sections with work directly related to this section.

- A. Section 05400 (05 40 00) - Cold-Formed Metal Framing.
- B. Section 07220 (07 22 00) - Roof and Deck Insulation.
- C. Section 07400 (07 40 00) - Roofing and Siding Panels.
- D. Section 07720 (07 72 00) - Roof Accessories.
- E. Section 13120 (13 34 19) - Pre-Engineered Structures (Metal Building Systems).

1.30 QUALITY ASSURANCE AND REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.



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3. ASTM E 1592 - Structural Performance Test for Metal Panel and Siding Systems by Uniform Static Air Pressure Difference
- B. American Iron and Steel Institute (AISI)
 1. AISI – 2008 Edition of the “Cold Form Steel Design Manual”
 2. AISI – 2007 Edition of the “North American Specification for the Design of Cold-Formed Steel Structural Members”
- C. American Institute of Steel Construction (AISC)
 1. AISC - “Specification for Structural Steel for Buildings”
- D. 2010 Florida Product Approvals
 1. FL 9352-R2
 - i. FL 9352.1 JSM 200 DL 18-24 over Roof Hugger
 - ii. FL 9352.2 26 ga. PBR over Roof Hugger Re-Roofing System
 - iii. FL 9352.3 24 ga. PBR over Roof Hugger Re-Roofing System
 - iv. FL 9352.4 Super Lok 16-24 over Roof Hugger

1.40 SUBMITTALS

- A. Comply with Section 01330 (01 33 00) - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including installation instructions.

Specifier Notes: Edit the following paragraph regarding shop drawings as required for the project. “Standard” sub-purlins are typically produced 3/8” – 1-1/2” taller than the height of the major ribs of the existing roof panels. Indicate on the shop drawings if a specific sub-purlin height is required. Custom heights are available and can be specified.

- C. Shop Drawings: Submit manufacturer's shop drawings for sub-purlins indicating gauge, yield strength, flange and web sizes, cut-out dimensions, and punch pattern for attachment holes in base flange.
- D. Design Data: Submit design data from independent engineering firm indicating table of wind uplift capacity of sub-purlins.

1.50 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened bundles, containers, and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
 1. Store materials in accordance with manufacturer's instructions.
 2. Protect sub-purlins from corrosion, deformation, and other damage.
 3. Store sub-purlins off ground, with 1 end elevated to provide drainage.



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- C. Handling: Protect materials during handling and installation from corrosion, deformation, and other damage.

1.60 EXISTING ROOF SYSTEM AND PRE-CONSTRUCTION INSPECTION

- A. The existing roof is a [Insert existing roof description here per instructions below]

Specifier Notes: Briefly describe the construction of the existing roof support system, panel type, spacing and profile. Example: [The existing roof system consists of through-fastened metal panels with 12" o.c. major rib spacing x 1 1/2" major rib height, attached to existing zee-shaped purlins spaced 5' o.c. supporting the metal panels]

- B. The Contractor shall conduct a detailed inspection of the existing roof(s) to identify any existing roof elements that are a cause for concern IE: panel deterioration, structural deterioration, equipment curbs, plumbing and electrical penetrations, special flashing requirements, and any other items that should be submitted to the Architect for review and evaluation.
- C. The Contractor shall perform a detailed survey of the existing roof(s) and confirm the existing panel dimensions, type and profile. In the case of existing standing seam roofing it should be determined if the existing roof employs standard or tall clips. If high panel clips are existing, the standoff dimension should be determined.
- D. The Contractor shall obtain field measurements on the existing roof geometry including width, length, eave height, roof pitch and purlin spacing. This information is to be forwarded to the retrofit sub-framing system manufacturer for coordination and integration into the design and installation documents.

1.70 DESIGN REQUIREMENTS

- A. General
 - 1. Design for approval and installation in accordance with the included drawings and these specifications, a complete retrofit sub-framing and metal roof panel assembly as a structural package, engineered and factory fabricated in accordance with AISI, MBMA and ASCE references with the understanding the sub-framing system may be designed by the retrofit sub-framing manufacturer and the metal roof panel system may be designed by the metal roof manufacturer. However, both systems are to be designed to perform as one engineered structural package where the metal roof system controls the placement of sub-framing members.
 - 2. Any additions/revisions to sub-framing members as a result of field conditions and/or demands, shall be the contractor's responsibility, and shall be submitted for review and approval by the manufacturer.
- B. Engineering Design Criteria:

Specifier Notes: Edit the following paragraph outlining the basic design criteria for the building to be retrofitted. This information, along with the building plans, will be the basis of design to determine the positive and negative pressures by roof zone. These zone pressures determine the



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type of roof panel and the spacing of the necessary sub-framing to support the panels. The most cost effective design will be one where the new panels achieve the current required loads in zones 1 and 2 on the existing purlin spacing. Different panels may require different sub-framing design solutions based upon the individual tested panel capacities. This information is typically placed in Division 1 General Requirements or Division 7 Metals.

The Engineering design criteria for retrofit metal roof panels and sub-framing should be consistent and in a format similar to the following:

1. Building Code: [IBC 2010/ASCE7-2010, FBC 2010, IBC 2009/ASCE7-2009, BOCA, Etc.] Note: codes are Mutually Exclusive, specifier should confirm which code has been adopted by the State or local governing code body for the project, codes should not be mixed.
2. Additional Requirements: [None, Factory Mutual, Underwriters Lab, US Army Corps of Engineers Standard, Other] Note: These criteria are Mutually Exclusive and can be significantly more stringent or in some cases less stringent than a specified building code. Determine if additional requirements are appropriate and should take precedence.
3. Occupancy Group: [Assembly-A, Business-B, Educational-E, Factory Industrial-F, High-Hazard-H, Institutional/Industrial-I, Mercantile-M, Storage-S, Etc.]
4. Occupancy Category: [I (Low Hazard), II (General), III (300+Occupancy), IV (Essential)]
5. Importance Factor: [0.87, 1.0, 1.15] (IBC 2009 or earlier only)
6. Minimum Roof Snow Load: [XXX] PSF
7. Ground Snow Load: [XXX] PSF
8. Wind Speed: [XXX] MPH, 3 Second Gust
9. Exposure Category: [B, C, D]
10. Enclosure: [Enclosed, Partially Enclosed, Open]

PART 2 - PRODUCTS

2.10 MANUFACTURER QUALIFICATIONS

- A. Manufacturer shall have a minimum of five years experience in manufacturing and fabrication of retrofit sub-framing systems of this nature. Light-gauge steel sub-framing components specified in this section shall be produced in a factory environment by roll forming and press-brake equipment assuring the highest level of quality control.
- B. Acceptable Manufacturers
 1. Roof Hugger, Inc., PO Box 1027, Odessa, Florida 33556. Toll Free Phone (800) 771-1711. Toll Free Fax (877) 202-2254. Phone (813) 909-4424. Fax (813) 948-4742. Website: www.roofhugger.com. E-Mail: sales@roofhugger.com .
 2. Others manufacturers must submit a request for approval no later than two weeks prior to the established bid date and shall be equal to Roof Hugger, Inc.

2.20 RETROFIT STEEL SUB-PURLINS



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A. Standard Retrofit Factory-notched Sub-Purlins: "Roof Hugger".

1. Description:

- a. 1-piece, custom-notched and punched, Z-shaped section.
- b. Pre-punched to nest over existing through-fastened, low clip and high clip standing seam roof panel ribs for low-profile attachment.
- c. Pre-punched for attachment fasteners.
- d. Integrally formed Anti-Rotational Arm as required for high clip standing seam panels.
- e. Fastens directly into existing purlins, joists or structural decking with fasteners.

B. Material:

1. Galvanized steel, ASTM A 653 or A 1011, G-90, yield strength 50 KSI.

Specifier Notes: [Specify gauge] Please note that the gauge thickness is only a criteria for satisfying the new roof panel's attachment criteria to meet specified wind uplift loading. It is new roof panel system specific. All laboratory testing of Roof Huggers assemblies have been conducted using 16-gauge. Consult Roof Hugger for gauges other than 16-gauge for engineering values and lead time.

2. Thickness: [0.060" minimum, 16-Gauge] or [0.071" minimum, 14-Gauge].

Specifier Notes: Sub-purlins are typically produced 3/8 inch to 1-1/2 inch taller than the height of the major ribs of the existing roof panels. Consult Roof Hugger for cost-efficient sizes to meet project requirements if web height other than manufacturer's standard is needed to accommodate the addition of new insulation between the old and new roofs.

3. Web Height: [_____ inches] [manufacturer's standard].

Specifier Notes: The number of holes provided in the base flange will be greater than or equal to the required number of fasteners to be installed per linear foot. Custom hole-punching of the base flange is available upon request. Roof Hugger may punch additional unused holes in the base flange to aid in installation or to minimize conflict with existing fasteners.

4. Base Flange Width: Pre-punch base flange to manufacturer's standard unless otherwise specified.
5. Top Flange Width: Nominally 2" with 0.25" minimum stiffening lip unless otherwise specified.
6. Length: Nominally 10'-0" long, plus an additional +/- 1" top flange extension for part lap or per manufacturer's recommendations.



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C. Attachment Fasteners/Anchorage

Specifier Notes: The following fasteners are typical minimum for attachment of new sub-purlins to existing metal building purlins. Fastener length of 1-1/4 to 1-1/2 inches is typical, but will vary with thickness of existing insulation. Other fasteners may be specified based upon engineered load requirements or other special conditions. Attachment of sub-purlins to existing structural steel (i.e. bar joist/structural channels, decking) will require appropriate fasteners. Roof Hugger does not supply fasteners. Consult Roof Hugger for additional information regarding fasteners.

1. "Standard" Roof Hugger Sub-Purlin:
 - a. Attachment to Existing Purlins/Joist/Decking: Typical 2- 1/4" -14 or #12-14 threads per inch, DP3 self- drilling fastener per L.F., or as specified.
 - b. Existing Purlin Strengthening, Top Flange Lap Connection: Typical 4-#10-16 x 1" pancake head fasteners through overlapping Hugger top flanges, joining them into a continuous member, per lap connection or as specified.
 - c. Mid-Span Hugger Sub-Purlin to Sub-Rafter: Typical 1 #10-16x1" pancake head installed through Hugger top flange, into sub-rafter.
 - d. Mid-Span Hugger Sub-Purlin to Existing Panel: Typical #17-14 fasteners shall be installed through the mid-span Roof Hugger sub-purlin into the existing roof panels as specified or per standard details (over-drilling of pre-punched hole will be required).
 - e. Fastener Length: As required to penetrate existing purlins in accordance with fastener attachment standards.
2. "Special" Roof Hugger Sub-Purlin w/ Anti-Rotational Arm:
 - a. Attachment to Existing Purlins/Joist/Decking: Typical 2-1/4" -14 x 2" DP3 self-drilling fastener with 1" standoff or as specified.
 - b. Attachment of Anti-Rotational Arm to Existing Panel: #17-14 fastener or as specified.
3. Integral Sub-Rafters (sub-rafters that fit beneath the rib cut out in the Roof Hugger sub-purlin):
 - a. 1/4" -14 threads per inch, DP3 self-drilling fasteners install through the Roof Hugger sub-purlin, through the integral sub-rafter, through the existing panel and into the existing purlin, rafters or joist; quantity as specified by design (typically 4 per intersection)
4. Sub-Rafter Hat Channels (used in lieu of integral sub-rafters in certain high load areas):
 - a. Attachment to Existing Purlins, Trusses, Rafters or Joist: #1/4" -14 threads per inch DP3 self-drilling fasteners or equal.
 - b. Length as required for minimum required penetration into truss, rafter or joist.
5. Sub-Purlin Hat Channels:
 - a. Attachment to installed sub-rafters: 1/4" -14 or #12-14 threads per inch, DP3 self-drilling fasteners, quantity as specified.



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PART 3 - EXECUTION

3.10 EXAMINATION

- A. Examine existing roof areas to receive sub-purlins. Notify Architect if areas are not acceptable or structurally adequate. Do not begin installation until unacceptable conditions have been corrected.
- B. Verify existing purlins and eave struts are in good serviceable condition, without rust-thru of flanges.
- C. Field Verify Before Ordering of and Installation of Sub-Purlins:
 - 1. Existing panel profile and panel rib dimensions.
 - 2. Existing panel run-out by measuring roof over several 20-foot areas to confirm panels were installed on module and in-square. Note variations.

Specifier Notes: Indicate on the construction drawings, the details of the major and minor rib configurations of the existing roof panels. If the existing roof is a standing seam, verify whether thermal blocking has been installed. If thermal blocking exists consult Roof Hugger, Inc. regarding this situation because special details and parts may be required for this type of panel system. Roof Hugger existing panel details are available to aid in obtaining this information. Refer to www.roofhugger.com for the most current application details.

3.20 INSTALLATION OF SUB-FRAMING AND OTHER ROOFTOP APPURTENCES

Specifier Notes: Consult Roof Hugger for information regarding the installation of sub-purlins for special situations and visit www.roofhugger.com for specific details pertaining to installation

- A. Install sub-purlins in accordance with manufacturer's instructions at locations indicated on the standard details or Engineered Drawings if provided.

Specifier Notes: The existing roof is not weather-tight until new roof panels are installed over the sub-purlins. Installation of sub-purlins may need to be limited to the amount that can be roofed over each day. Consult Roof Hugger to discuss other options to minimize weather issues. Edit the following paragraph as required.

- B. Limit installation of sub-purlins to amount that can be roofed over each day.

Specifier Notes: Specify number of fasteners (typically less than or equal to the number of holes specified in paragraph 2.2.B) required to be installed per linear foot, as determined by wind load criteria. Typically 2 fasteners per linear foot are required. Refer to Roof Hugger engineering data for allowable uplift loads. Edge zones and field can be specified separately if desired.



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- C. Install [1] [2] [3] fasteners per linear foot or as directed by Manufacturer.
- D. Install sub-purlins directly over existing purlins and fasten to existing purlin through existing panel pan section.

Specifier Notes: In higher wind zones, special fitted sub-rafter may be required to allow for the installation of Huggers mid-span between existing purlins. Grids made of “Cee’s”, “Zee’s”, and/or “hats” may be needed in lieu of special fitted sub-rafter in the corner and/or edge areas to meet the load requirements. The selection of the fitted sub-rafter or grid system is a function of existing roof panel, the new roof panel and the corner, edge and field pressures. A preliminary estimate of the roof zone pressures can be made at <http://www.roofwinddesigner.com/>

- E. If integral sub-rafter are used, loosely lay Sub-rafter over the existing panel high ribs and between the existing purlins. Sub-rafter spacing and number of fasteners shall be as specified on the engineered drawings or as specified in the Roof Hugger, Florida Product Approval.
- F. Press the Roof Hugger sub-purlins over the sub-rafter on the existing purlin lines in areas where they are specified and install #12-14 DP3 fasteners (or as specified) through the base flange of the Hugger sub-purlin, through the sub-rafter and then into the existing purlins being careful to maintain the alignment of the sub-rafter.
- G. Install Huggers onto the integral sub-rafter between the existing purlins as specified with #12-14 threads per inch, DP3 fasteners, typically one fastener on each side of the sub-rafter unless otherwise specified.
- H. Where the Roof Hugger is attached to the existing roof panel the pre-punched base flange hole should be drilled out to the correct diameter to allow for the installation of a #17-14 fastener through the Roof Hugger and into the existing roof panel.
- I. Where the Roof Hugger passes over the fitted sub-rafter a #10-16 pancake head fastener should be installed through the top flange of the Roof Hugger into the top of the new fitted sub-rafter.

Specifier Notes: Removal of Existing Roof Fasteners: Typically, the existing roof fasteners are located adjacent to the major panel ribs and need not be removed. When the Hugger is installed atop these fasteners they may cause the base flange of the new Hugger to bend, this is normal. Fasteners located in the center of the existing roof pan can cause sub-purlins to “roll” or “porpoise” these fasteners would need to be removed. Special punching by Roof Hugger may be possible to minimize the removal of existing roof fasteners located in the center of the existing roof pan. Consult Roof Hugger to review options.



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J. Removal of Existing Roof Fasteners:

1. Do not remove existing roof fasteners unless installation of sub-purlins over fasteners causes sub-purlins to “roll” or “porpoise”. Some distortion of base flange of sub-purlins caused by existing roof fasteners is normal.

Specifier Notes: In colder climates, special attention should be given to flashing the opening created by removal of the existing skylights to minimize migration of warm, moist air into this cavity.

Delete the following paragraph if there are no existing skylights.

2. Skylights:
 - a. Install sub-purlins over existing skylights prior to removal of the old skylight.
 - b. Cut out the existing skylight as required.
 - c. Trim openings so as to minimize the infiltration of air within the building into the newly created roof cavity.

K. Existing Rooftop Components and Equipment

1. When mechanical equipment locations conflict with retrofit roof sub-framing components, the contractor will provide additional framing that accommodates the relocation, replacement or re-flashing of the equipment. Contractor shall submit construction details for this condition, if deemed necessary by the Architect.
2. When electrical service and equipment needs to be removed, extended and reinstalled at the new metal roof system height/plane, the contractor shall extend the wiring in accordance with the specified building and electrical code. Junction boxes shall be provided at splices in wire or conduits and secured as required.
3. Existing sanitary plumbing vents shall be extended with new roof jacks located at the new metal roof plane. Extension of piping shall be accomplished with materials matching the existing piping composition subject to local building and plumbing code requirements. Use of elbow fittings to redirect the pipe to locate the penetration between the metal roof panel side seams shall be used.
4. Existing flue stacks for high temperature apparatus shall be extended to the new metal roof plane and protected with a high temperature jack or curb. The contractor shall install the new equipment 3 feet higher than the elevation of any roof in accordance with the governing building code.
5. Existing gravity vents, power vents, fresh air make-up, and other vents are to be installed on new metal curbs at the new metal roof plane unless approved by the Architect to remove and re-install on new metal roof. The contractor shall construct new ductwork from the existing roof penetration to the new roof curb. Ductwork joints shall be sealed tight to provide a leak-



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proof assembly and shall be made with material of like composition and gauge of the ductwork being extended.

L. New Equipment within the New Roof Cavity

1. The contractor shall review all clearances, attachment requirements, penetrations, and other critical details as necessary for the proper installation of any equipment to be installed within the new roof cavity.
2. Obstructions with new sub-purlins shall be avoided. If cutting of sub-purlins is necessary, a continuous top flange must be provided to provide continuous bearing for the new metal roof system.

END OF SECTION