SECTION 13 34 21 - STRUCTURAL RETROFIT ROOF SUB-FRAMING SYSTEM

PART 1 - GENERAL

1.1 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. Reference Division 1 for General Requirements

1.2 RELATED WORK

A. Section 05 40 00 - Cold-Formed Metal Framing.

B. Section 07 22 00 - Roof and Deck Insulation.

C. Section 07 40 00 Metal Roofing.

D. Section 07 72 00 - Roof Accessories.

E. Section 08 60 00 – Skylights.

F. Section 13 34 19 - Pre-Engineered Structures (Metal Building Systems).

G. Section 22 05 00 - Basic Mechanical Materials and Methods for Plumbing Piping.

H. Section 23 31 00 Ventilation Ducts.

I. Section 26 05 00 – Electrical Demolition and Modifications.

1.3 QUALITY ASSURANCE AND REFERENCES

A. ASTM International

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 , and Ultra-High Strength.

3. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

B. American Iron and Steel Institute (AISI)

1. AISI D100-13: Cold-Formed Steel Design Manual, [2013 Edition].

2. AISI S100-16: North American Specification for the Design of Cold-Formed Steel Structural Members, [2016 Edition].

C. American Institute of Steel Construction (AISC)

1. ANSI/AISC 360-16: - Specification for Structural Steel for Buildings, [2016 Edition].

D. 2015 Florida Product Approval FL9352-R3, FL17626

1. FL 9352.1 238T 18-22 over Roof Hugger Re-roofing System.

2. FL 9352.2 26 ga. PBR over Roof Hugger Re-Roofing System.

3. FL 9352.3 24 ga. PBR over Roof Hugger Re-Roofing System.

4. FL 9352.4 22 ga. PBR over Roof Hugger Re-Roofing System.

5. FL 9352.5 Super Lok 16-24 over Roof Hugger Re-Roofing System.

6. FL 17626.1 24 GA. 18" Wide 238-T over Roof Hugger Re-Roofing System.

1.4 SUBMITTALS

A. Comply with Section 01 33 00 - Submittals.

B. Product Data: Submit manufacturer's product data, including installation instructions.

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.

1.5 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.

1.6 EXISTING ROOF SYSTEM AND PRE-CONSTRUCTION INSPECTION

A. The existing roof is a [*Insert existing roof description here per specifier notes below*]

B. Conduct a detailed inspection of the existing roof(s) to identify any existing roof elements that are a cause for concern such as: panel deterioration, structural deterioration, equipment curbs, plumbing and electrical penetrations, special flashing requirements, and any other items that should be submitted to the Architect [Engineer][Consultant] for review and evaluation.

C. 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 must be determined.

D. Record 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.

1.7 DESIGN REQUIREMENTS

A. General

1. Design for approval and installation in accordance with the Contract Documents, a complete retrofit sub-framing and metal roof panel assembly as a structural package.

2. Engineer and factory fabricate sub-framing system in accordance with applicable references.

3. Coordinate design with the retrofit sub-framing manufacturer and the metal roof panel manufacturer to perform as one engineered structural package where the metal roof system controls the placement of sub-framing members.

4. 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:

1. Building Code: *[IBC 2015/ASCE7-2010, FBC 2010, IBC 2009/ASCE7-2009, BOCA, Florida Building Code, Etc.]* Additional Requirements: [*None, Factory Mutual, Underwriters Lab, US Army Corps of Engineers Standard, Miami Dade, Other]*

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]*

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

2.1 MANUFACTURER QUALIFICATIONS

A. Manufacturer shall have a minimum of five years experience in manufacturing and fabrication of retrofit sub-framing systems of this nature.

B. 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.

C. Acceptable Manufacturers

1. Roof Hugger, LLC., 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. Other manufacturers must submit a request for approval prior to the established bid date according to applicable Division 1 Section(s) and shall be equal to Roof Hugger, Inc.

2.2 RETROFIT STEEL SUB-PURLINS

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

B. Description:

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

C. Material:

1. Galvanized steel, ASTM A 653 or A 1011, G-90, yield strength 50 KSI.
2. Thickness: [*0.060inch minimum, 16-Gauge] or [0.071inch minimum, 14-Gauge]*.
3. Web Height: [_____ inches] [manufacturer's standard].
4. Base Flange Width: Pre-punch base flange to manufacturer's standard unless otherwise specified.
5. Top Flange Width: Nominally 2inches with 0.25inch minimum stiffening lip unless otherwise specified.
6. Length: Nominally 10 feet long, plus an additional +/- 1inch top flange extension for part lap or per manufacturer’s recommendations.

D. Attachment Fasteners/Anchorage

1. "Standard" Roof Hugger Sub-Purlin:

    a. Attachment to Existing Purlins/Joist/Decking: [two- ¼ inch-14 2 inch], DP3 self-drilling screws.
    b. Existing Purlin Strengthening, Top Flange Lap Connection: [four- #10-16 x 1inch] pancake head screws through overlapping sub-purlin top flanges, joining them into a continuous member, per lap connection or as specified.
    c. Mid-Span Hugger Sub-Purlin to Sub-Rafter: [two, ¼"-14 1 inch], DP3 self –drilling on each side of cutout and [one #10-16x1inch] pancake head screw installed through sub-purlin top flange, into sub-rafter.
    d. Mid-Span Hugger Sub-Purlin to Existing Panel: #17-14 fasteners shall be installed through the mid-span of 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 2-¼inches-14 x 2inches DP3 self-drilling fastener with 1inch standoff or as specified.

    b. Attachment of Anti-Rotational Arm to Existing Panel: #17-14 fastener or as specified.

3. Integral Sub-Rafters beneath the rib cut out in the sub-purlin: ¼inch-14 threads per inch, DP3 self-drilling fasteners install through the 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 for designated high load areas:

    a. Attachment to Existing Purlins, Trusses, Rafters or Joist: 1/4inch-14 threads per inch DP3 self-drilling screws.

    b. Length as required for minimum required penetration into truss, rafter or joist.

5. Sub-Purlin Hat Channels: Attachment to installed sub-rafters: ¼ inch-14 threads per inch, DP3 self-drilling fasteners, quantity as specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing roof areas to receive sub-purlins. Notify Architect [Engineer][Consultant] 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.

3.2 INSTALLATION OF SUB-FRAMING AND OTHER ROOFTOP APPURTENCES

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

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

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.

E. If integral sub-rafters are used, loosely lay Sub-rafters 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] [applicable Roof Hugger, Florida Product Approval].

F. Press the Roof Hugger sub-purlins over the sub-rafters on the existing purlin lines in areas where they are specified and install [1/4”-14 DP3 screws] [fasteners shown on engineered Drawings] through the base flange of the sub-purlin, through the sub-rafter and then into the existing purlins being careful to maintain the alignment of the sub-rafters.

G. Install sub-purlins onto the integral sub-rafters between the existing purlins as specified with 1/4”-14 threads per inch, DP3 fasteners, typically one fastener on each side of the sub-rafter unless otherwise specified.

H. Where the sub-purlin 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 sub-purlin passes over the fitted sub-rafter, fasten through the top flange of the sub-purlin with a #10-16 pancake head fastener into the top of the new fitted sub-rafter.

J. Removal of Existing Roof Fasteners: 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.

K. Skylights:

1. Install sub-purlins over existing skylights prior to removal of the old skylight.

2. Modify existing skylights according to provisions of Section 08 60 00.

3. Seal gap between existing metal roof and new metal roof with sheet metal trim to prevent air infiltration into the newly created roof cavity.

L. 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. Submit construction details for this condition to the Architect [Engineer][Consultant].

2. When electrical service and equipment needs to be removed, extended and reinstalled at the new metal roof system height/plane, extend the wiring in accordance with the Section 26 05 00, local building and electrical codes.

3. Comply with provisions Section 07 40 00, Section 22 05 00 and local building codes for extending, relocating and flashing vent pipes.

4. Comply with provisions Section 07 40 00, Section 23 31 00 and local building codes for extending, relocating ducts and curbs.

M. New Equipment within the New Roof Cavity

1. 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