SECTION 07 41 13

STANDING SEAM METAL ROOF PANELS

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\*\* NOTE TO SPECIFIER \*\* FGM-Fabral LLC; Metal roof panel products.
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This section is based on the products of FGM-Fabral LLC, which is located at:16435 N. Scottsdale Rd.Scottsdale, AZ 85254Tel: 770-775-4484Fax: 717-735-2879Email: [request info (mvaughn&amp;fabral.com)](https://arcat.com/rfi?action=email&company=FGM-Fabral%252BLLC&message=RE%253A%2520Spec%2520Question%2520(07411fab)%253A%2520&coid=32409&spec=07411fab&rep=&fax=717-735-2879)
Web: <https://fabral.com>
 [ [Click Here](https://arcat.com/company/fgm-fabral-llc-32409) ] for additional information.
Fabral is the premier supplier of metal roofing and wall panels for architectural, commercial, post frame, industrial, transportation and agricultural applications.
Founded in 1967, Fabral is widely recognized as the benchmark leader. Specified by leading firms worldwide, Fabral products have been used in projects ranging from Langley Air Force Base buildings and the Harvey B. Gantt Center for African American Arts and Culture to Lady Bird Johnson Middle School in Irving, Texas, the largest net zero school in the United States. As a leader in the post frame market, Fabral's quality product offering, advanced LEAN manufacturing processes and dedicated customer service values have elevated Fabral to become the post frame provider of choice.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Pre-finished, prefabricated, structural standing seam roof system and accessories.
			1. Stand ' N Seam
			2. PowerSeam
			3. PowerSeam II
			4. Thin Seam
			5. Slim Seam
			6. 2-1/2 inch SSR
			7. Snap on Seam
			8. Snap on Seam High Profile
			9. Snap on Batten
			10. IP Seam 3
			11. IP Snap 3
			12. 1-1/2 inch SST
			13. Horizon S
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 05 10 00 - Structural Metal Framing.
		2. Section 05 40 00 - Cold-Formed Metal Framing.
		3. Section 06 10 00 - Rough Carpentry.
		4. Section 07 21 19 - Foamed-In-Place Insulation.
		5. Section 07 27 00 - Air Barriers.
		6. Section 07 42 13 - Metal Wall Panels.
		7. Section 07 50 00 - Membrane Roofing
		8. Section 07 60 00 - Flashing and Sheet Metal.
		9. Section 07 90 00 - Joint Protection.
		10. Section 08 90 00 - Louvers and Vents.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
		2. ASTM A 755 - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
		3. ASTM A 792 - Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot- Dip Process.
		4. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
		5. ASTM E 98 - Reference Radiographs for Inspection of Aluminum and Magnesium Castings.
		6. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
		7. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
		8. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
		9. ASTM E 1514 - Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
		10. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
		11. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
		12. ASTM E 1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
		13. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Panel Roof Systems by Static Water Pressure Head.
		14. UL 580 - Tests for Uplift Resistance of Roof Assemblies.
		15. UL Building Materials Directory.
		16. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.
		17. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings.
		18. UL 2218 - Standard for Impact Resistance of Prepared Roof Covering Materials.
		19. SMACNA - Architectural Sheet Metal Manual.
		20. AISI - Cold Formed Steel Design Manual.
		21. Aluminum Association - Aluminum Design Manual/
		22. AAMA 621 - Voluntary Specifications For High Performance Organic Coatings On Coil Coated Architectural Hot Dipped Galvanized (Hdg) And Zinc-Aluminium Coated Steel Substrates.
		23. AAMA 2605 - Voluntary Specifications For High Performance Organic Coatings On Coil Coated Architectural Hot Dipped Galvanized (Hdg) And Zinc-Aluminium Coated Steel Substrates.
		24. MCA - Preformed Metal Wall Guidelines.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: Manufacturer's data sheets on each product to be used, including:
			1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
			2. Preparation instructions and recommendations.
			3. Storage and handling requirements and recommendations.
			4. Installation methods.
		3. Shop Drawings: Submit detailed drawings and panel analysis showing: Profile, gauge of both exterior and interior sheet, location, layout and dimensions of panels, location and type of fasteners, shape and method of attachment of all trim, locations and type of sealants, and installation sequence.
			1. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
			2. Other details as may be required for a weathertight installation.

\*\* NOTE TO SPECIFIER \*\* Delete selection samples if colors have already been selected.

* + 1. Selection Samples: For each material and finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
		2. Verification Samples: For each material and finish product specified, two samples, minimum size 12 inches (300 mm) long, representing actual product, color, and patterns.
		3. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
		4. Field Quality Control Reports: Submit manufacture's field representative's quality control and inspection reports regularly during installation.
		5. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all components.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Minimum of ten years experience in the production of metal roof panels. Demonstrate experience with examples of projects of similar type and exposure.
		2. Installer Qualifications: Installer with a minimum of five years experience with projects of similar size and scope with supervisors trained and approved by manufacturer.

\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
			1. Finish areas designated by Architect.
			2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
			3. Refinish mock-up area as required to produce acceptable work.
			4. Accepted mock-ups shall be comparison standard for remaining Work
	1. PRE-INSTALLATION MEETINGS
		1. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and related trades. Coordinate structural support requirements in relation to roof panel panel system, installation of any separate air/water barriers, treatment of fenestration, roof penetrations and other requirements specific to the project.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
		2. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
		3. Store panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.
	3. PROJECT CONDITIONS
		1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
	4. WARRANTY
		1. Warranty: Provide manufacturer's standard limited warranties for products and finishes

.\*\* NOTE TO SPECIFIER \*\* Delete warranty information not specific to project.

* + - 1. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. Items covered by the warranty include structural performance and finish performance.
				1. Warranty Period: Two years from date of Substantial Completion.

\*\* NOTE TO SPECIFIER \*\* Finish warranty periods are limited by the coil coater and the coating manufacturer and the finish. Delete if fluoropolymer finish is not required.

* + - 1. Paint Finish: Standard form in which paint manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish.
				1. Warranty Period: Fluoropolymer finish, thirty years from date Substantial Completion.
				2. Warranty Period: Metallic/Mica Fluoropolymer finish, Custom finish, twenty years from date Substantial Completion.
			2. Installer's Warranty: Installer's warranty covering the Work of this Section, including all components of roof panels for two years from date of Substantial Completion.
			3. Weather-tight Warranty: Twenty years from date of Substantial Completion.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: FGM-Fabral LLC, which is located at:16435 N. Scottsdale Rd.Scottsdale, AZ 85254Tel: 770-775-4484Fax: 717-735-2879Email: [request info (mvaughn&amp;fabral.com)](https://arcat.com/rfi?action=email&company=FGM-Fabral%252BLLC&message=RE%253A%2520Spec%2520Question%2520(07411fab)%253A%2520&coid=32409&spec=07411fab&rep=&fax=717-735-2879);Web: <https://fabral.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Select the STANDING SEAM METAL ROOF PANEL System required from the following paragraphs and delete those not required.
\*\* NOTE TO SPECIFIER \*\* STAND `N SEAM Panels can be roll-formed and curved to span an entire roof without end seams.

* 1. STAND `N SEAM
		1. Roof Panels: STAND `N SEAM structural standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels, curved or tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel width paragraphs and delete those not required. Note that 12 inch and 16 inch are factory formed and 16 inch is also available field formed.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Seam Height: 2-1/2 inch (63 mm).
				4. Maximum Panel Length: Factory Formed 47 feet.
				5. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. AZ50 Galvalume Steel: Aluminum-zinc alloy-coated steel sheet (Galvalume) complying with ASTM A 792/A 792M, Class AZ50/AZ55 coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M

Gauge:

24 gauge.

22 gauge.

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.030 inch

0.040 inch

Surface:

Smooth, flat

Stucco Embossed

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
				2. Copper:
			1. Performance Requirements:
				1. Minimum Roof Slope: 1/2:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Thermal Cycling Test: 100,000 cycles
				5. Wind Uplift:

UL580: Class 90, #275, 275A, 275B, 319

ASTM E 330/ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

* + - * 1. Air Infiltration

ASTM E 283: 0.006 cfm/ft2 @ 20 psf

ASTM E 1680: No air penetration @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 20 psf

ASTM E 1646: No Water @ 20 psf

ASTM E 2140: No leakage of standing water

* + - * 1. Miami Dade NOA (steel & aluminum)
		1. Roof Panel Accessories:
			1. General: Provide components required for a complete, weather-tight panel system including trim, copings, fasciae, mullions, sills, corner units, panel clips, flashings, sealants, gaskets, fillers, panel closures, and similar items. Match material and finish of metal panels unless otherwise indicated.
			2. Miscellaneous Metal Sub-framing and Furring: Provide manufacturer's standard sections as required for support and alignment of metal panel system.
			3. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
			4. Panel Fasteners: Self-tapping screws recommended by the manufacturer designed to withstand design loads.
			5. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.
			6. Sealant Tape: Buytl
				1. Joint Sealant: One Part Poly
				2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

\*\* NOTE TO SPECIFIER \*\* POWER SEAM panels can be roll-formed and curved or tapered. Contact the manufacturer for additional information.

* 1. POWER SEAM
		1. Roof Panels: POWER SEAM structural standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels, curved or tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan.
				2. Panel Type: Step Up with batten seam lines.

\*\* NOTE TO SPECIFIER \*\* Select one of the following three panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Panel Width: 18 inch (457 mm).
				4. Seam Height: 2 inch (51 mm).

\*\* NOTE TO SPECIFIER \*\* Select one of the following two paragraphs if required and delete those not required.

* + - * 1. Seaming: 90 degree where indicated.
				2. Seaming: 180 degree where indicated.
				3. Maximum Panel Length: Factory Formed 47 feet.
				4. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with AZ50 (0.50 oz./ft.2) aluminum-zinc alloy coating, both conforming to ASTM A 792.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, #90, 176, 180, 238, 548, 549, 675.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

Factory Mutual FM Class I-180 tested and approved

* + - * 1. Air Infiltration

ASTM E 283: 0.01 cfm/ft2 @ 15 psf

ASTM E 1680: 0.01 cfm/ft2 @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 6.24 psf

ASTM E 1646: No Water @ 20 psf

ASTM E 2140: No leakage of standing water

* + - * 1. Texas Department of Insurance Approved
		1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8 inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* POWER SEAM II panels have 180 degree seaming and can be roll-formed and curved to a minimum 10 foot radius. Contact the manufacturer for additional information.

* 1. POWER SEAM II
		1. Roof Panels: POWER SEAM II mechanically seamed standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels, curved or tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan with shadow line.
				2. Panel Type: Flat Pan with stiffening ribs.

\*\* NOTE TO SPECIFIER \*\* Select one of the following three panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Panel Width: 18 inch (457 mm).
				4. Seam Height: 2 inch (51 mm).

\*\* NOTE TO SPECIFIER \*\* Select one of the following two paragraphs if required and delete those not required.

* + - * 1. Seaming: 90 degree where indicated.
				2. Seaming: 180 degree where indicated.
				3. Maximum Panel Length: Factory Formed 47 feet.
				4. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following two material paragraphs and delete the one not required.

* + - * 1. AZ50 Galvalume Steel: Aluminum-zinc alloy-coated steel sheet (Galvalume) complying with ASTM A 792/A 792M, Class AZ50/AZ55 coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M

Gauge:

24 gauge.

22 gauge.

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Stucco Embossed

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, #90, 176, 180, 238, 548, 549, 675.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

Factory Mutual FM Class I-180 tested and approved

* + - * 1. Air Infiltration

ASTM E 283: 0.01 cfm/ft2 @ 15 psf

ASTM E 1680: 0.01 cfm/ft2 @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 6.24 psf

ASTM E 1646: No Water @ 20 psf

ASTM E 2140: No leakage of standing water

* + 1. Roof Panel Accessories: Provide components required for a complete, weather-tight panel system.
			1. Metal Sub-framing and Furring: Provide manufacturer's standard sections as required for support and alignment of metal panel system.
			2. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance.
				1. All flashing and trim shall be of the same material, gauge, finish, and color as the roof panels and fabricated in accordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changes pitch.
			3. Panel Fasteners: Self-tapping screws designed to withstand design loads.
			4. Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish. Coordinate color with roof panels
				1. Sealant Tape: Butyl.
				2. One-part polyurethane joint sealant.
				3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* THIN SEAM panels can be field roll-formed curved or tapered to a minimum 200 foot radius. Contact the manufacturer for additional information.

* 1. THIN SEAM
		1. Roof Panels: THIN SEAM structural standing seam, snap together roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels, curved or tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan.
				2. Panel Type: Step Up with batten seam lines.

\*\* NOTE TO SPECIFIER \*\* Select one of the following three panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Panel Width: 18 inch (457 mm).
				4. Seam Height: 1-3/4 inch (44.5 mm).
				5. Maximum Panel Length: Factory Formed 47 feet.
				6. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Stucco Embossed

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1:12
				2. Wind Uplift:

UL580: Class 90, #303, 359, 359A, 343, 417.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

Texas Department of Insurance tested and approved

* + - * 1. Air Infiltration

ASTM E 283: 0.009 cfm/ft2 @ 6.94 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 15 psf

* + - * 1. Texas Department of Insurance Approved
		1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* SLIM SEAM panels can be field roll-formed or tapered. Contact the manufacturer for additional information.

* 1. SLIM SEAM
		1. Roof Panels: SLIM SEAM structural standing seam snap together roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels or tapered panels where recommended by the manufacturer.
				3. Panel Type: Flat Pan.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Seam Height: 1-1/2 inch (28 mm).
				4. Maximum Panel Length: Factory Formed 47 feet.
				5. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Stucco Embossed

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, #274, 274A, 369.

ASTM E 1592: 24 gauge Allowable Load of 48.48 psf @ 2 feet 5 inches.

Texas Department of Insurance tested and approved

* + - * 1. Air Infiltration

ASTM E 283: 0.009 cfm/ft2 @ 1.57 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 25 psf

ASTM E1646: No Water @ 12 psf

* + - * 1. Texas Department of Insurance Approved
		1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* 2-1/2 INCH SSR panels can be field tapered. Contact the manufacturer for additional information.

* 1. 2-1/2 INCH SSR
		1. Roof Panels: 2-1/2 INCH SSR wide batten structural standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.
				1. Panel Type: Flat Pan with stiffening ribs.
				2. Panel Width: 18 inch (457 mm).
				3. Seam Height: 2-7/16 inch (62 mm).
				4. Seaming: Wide Batten.
				5. Maximum Panel Length: Factory Formed 51 feet.
				6. Minimum Panel Length: 6 feet.
			2. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			3. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Stucco Embossed

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1/2:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, #190, 190B.

* + - * 1. Air Infiltration

ASTM E 283: No air penetration @ 20 psf

ASTM E 1680: 0.019 cfm/ft2 @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 20 psf

ASTM E 1646: No Water @ 20 psf

* + 1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* SNAP ON SEAM panels can be Factory curved to a minimum radius of 5 feet or field curved to a minimum 25 feet radius or 35 feet convex. Contact the manufacturer for additional information.

* 1. SNAP ON SEAM
		1. Roof Panels: SMAP ON SEAM structural standing seam, snap together roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete those not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for long panels, curved or tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following three panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan.
				2. Panel Type: With batten seam lines.
				3. Panel Type: Flat Pan with stiffening ribs.

\*\* NOTE TO SPECIFIER \*\* Select one of the following three panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Panel Width: 18 inch (457 mm).
				4. Panel Width: 20 inch (508 mm).

\*\* NOTE TO SPECIFIER \*\* Select one of the following two seam height paragraphs and delete those not required.

* + - * 1. Seam Height: 1 inch (25.4 mm).
				2. Seam Height: 1-1/2 inch (38 mm).
				3. Maximum Panel Length: Factory Formed 47 feet.
				4. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 3:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, #296, 397, 397A.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

* + 1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* SNAP ON SEAM panels can be Factory tapered options available. Contact the manufacturer for additional information.

* 1. SNAP ON SEAM HIGH PROFILE
		1. Roof Panels: SMAP ON SEAM HIGH PROFILE structural standing seam, snap together roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete the one not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan.
				2. Panel Type: With shadow lines.

\*\* NOTE TO SPECIFIER \*\* Select one of the following panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 12 inch (305 mm).
				2. Panel Width: 16 inch (406 mm).
				3. Panel Width: 18 inch (457 mm).
				4. Panel Width: 20 inch (508 mm).
				5. Seam Height: 1-3/4 inch (45 mm).
				6. Maximum Panel Length: Factory Formed 47 feet.
				7. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 3:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
		1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* SNAP ON BATTEN panels can be Factory tapered options available. Contact the manufacturer for additional information.

* 1. SNAP ON BATTEN
		1. Roof Panels: SNAP ON BATTEN structural standing seam, snap together roof system with cap and clip batten.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel paragraphs and delete the one not required.

* + - * 1. Panel: Factory formed.
				2. Panel: Factory formed except for tapered panels where recommended by the manufacturer.

\*\* NOTE TO SPECIFIER \*\* Select one of the following two panel type paragraphs and delete those not required.

* + - * 1. Panel Type: Flat Pan.
				2. Panel Type: With shadow lines.

\*\* NOTE TO SPECIFIER \*\* Select one of the following panel width paragraphs and delete those not required.

* + - * 1. Panel Width: 11-1/8 inch (282.6), 12 inch (305 mm) coverage.
				2. Panel Width: 15-1/8 inch (384 mm), 16 inch (406 mm) coverage.
				3. Panel Width: 17-1/8 inch (435 mm), 18 inch (457 mm) coverage.
				4. Panel Width: 19-1/8 inch (486 mm), 20 inch (508 mm).
				5. Seam Height: 1-1/2 inch (38 mm).
				6. Maximum Panel Length: Factory Formed 47 feet.
				7. Minimum Panel Length: 6 feet.
			1. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			2. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

Thickness:

0.032 inch

0.040 inch

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - 1. Performance Requirements:
				1. Minimum Roof Slope: 3:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
		1. Roof Panel Accessories:
			1. Concealed roof caps and clips:
				1. 2 pc.: 18 gauge base wit h 22 gauge top, sliding designed for thermal movement.
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* IP SEAM 3 trapezoidal panel design is mechanically seamed and works well for low-slope industrial applications and high performance, pre-engineered metal buildings

* 1. IP SEAM 3
		1. Roof Panels: IP SEAM 3 trapezoidal panel design is mechanically seamed standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.
				1. Panel Type: Flat Pan with stiffening ribs.
				2. Panel Width: 24 inch (610 mm).
				3. Seam Height: 3-1/64 inch (78 mm).
				4. Seaming: Mechanical.
				5. Maximum Panel Length: Factory Formed 47 feet.
				6. Minimum Panel Length: 6 feet.
			2. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			3. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1/2:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, # 93, 210A.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

Factory Mutual FM Class I-120 tested and approved.

* + - * 1. Air Infiltration

ASTM E 283: 0,006 @ 20 psf

ASTM E 1680: 0.00 @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 20 psf

ASTM E 1646: No Water @ 10 psf

* + 1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.

\*\* NOTE TO SPECIFIER \*\* IP SNAP 3 trapezoidal panel design is snap fit panels works well for low-slope industrial applications and high performance, pre-engineered metal buildings

* 1. IP SNAP 3
		1. Roof Panels: IP SNAP 3 trapezoidal panel design is a Snap Fit standing seam roof system.
			1. Roof Panel Description: Provide to the configurations indicated on the Drawings.
				1. Panel Type: Flat Pan with stiffening ribs.
				2. Panel Width: 24 inch (610 mm).
				3. Seam Height: 3-1/64 inch (78 mm).
				4. Seaming: Snap Fitl.
				5. Maximum Panel Length: Factory Formed 47 feet.
				6. Minimum Panel Length: 6 feet.
			2. Design Loads: Verify panels will withstand design loads indicated without detrimental effects or deflection. Include thermal differential effects between exterior and interior panel facings and resistance to fastener pullout.
				1. Calculate wind uplift using ASCE-10
				2. Calculate clip spacing
				3. Verify stress and deflection of panel meet project design load
				4. Verify project design load conditions with ASTM E 1592
				5. Verify project design load conditions with UL 580
			3. Materials:

\*\* NOTE TO SPECIFIER \*\* Select one of the following three material paragraphs and delete those not required.

* + - * 1. Grade 50 (50 ksi yield strength) Structural Steel with G90 (0.90 oz./ft.2) hot dipped galvanized coating conforming to ASTM A 653.

Gauge:

24 gauge.

22 gauge.

Surface:

Smooth, flat

Exterior Finish: As selected from manufacturer's premium finishes.

Color: As selected from manufacturer's full range.

* + - * 1. Sealant: Factory applied for factory formed panels.
			1. Performance Requirements:
				1. Minimum Roof Slope: 1/2:12
				2. Hail Resistance: UL 2218, Class 4
				3. Fire Resistance: UL 790, Class A
				4. Wind Uplift:

UL580: Class 90, # 93, 210A.

ASTM E 1592: Results Vary Depending on Gauge and Panel Thickness.

Factory Mutual FM Class I-120 tested and approved.

* + - * 1. Air Infiltration

ASTM E 283: 0,006 @ 20 psf

ASTM E 1680: 0.00 @ 20 psf

* + - * 1. Water Penetration

ASTM E 331: No Water @ 20 psf

ASTM E 1646: No Water @ 10 psf

* + 1. Roof Panel Accessories:
			1. Concealed roof clips:
				1. 2 pc.: 18 gauge base with 22 gauge top, sliding UL90 rated clip designed for thermal movement.
				2. 1 pc.: 22 gauge fixed clip (for use with short panel lengths only).
			2. Flashing and Trim
				1. All flashing and trim shall be of the same material, gauge,finish, and color as the roof panels and fabricated inaccordance with standard SMACNA procedure and details.
				2. Provide transition rib covers where roofing changespitch.
				3. Fabricate gutters and downspouts in the same gauge,material, finish, and color as the roof panels.
			3. Fasteners
				1. Clips to substrate: Screw shall be #12 or #14 diameter, self tapping type, zinc-plated steel.
				2. Flashings to panels: exposed screws shall be zinc plated with a #14 x 7/8inch combination steel and neoprene washer, color to match panel.
				3. Pop rivets: #43 stainless steel, color finish to match panel.
			4. Sealants
				1. Shall not contain oil, asbestos, or asphalt.
				2. Factory applied sealant shall be applied in the seam and designed for metal to metal concealed joints.
				3. Field applied panel end sealant shall be mastic tape sealant.
				4. Exposed sealant shall be one-part polyurethane joint sealant. Coordinate color with roof panels.
			5. Closures
				1. Ridge and hip closures shall be protected and supported by a formed metal closure manufactured from the same material, color, and finish as the panels.
				2. Metal closures shall be factory-fabricated and field-cut as needed.
			6. Vapor Retarder:
				1. Retarder with a permeance of 0.05 or less as determined by ASTM E 98.
	1. FINISH
		1. Steel Panels and Accessories:
			1. Exposed Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
			2. Exposed Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
			3. Exposed Three-Coat Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
			4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
		2. Aluminum Panels and Accessories:
			1. Exposed Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
			2. Exposed Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
			3. Exposed Three-Coat Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
		3. Exposed Anodized Finish:
			1. Clear Anodic Finish:
				1. AAMA 611
				2. AA-M12C22A41, Class I, 0.018 mm or thicker.
				3. AA-M12C22A31, Class II, 0.010 mm or thicker.
			2. Color Anodic Finish:
				1. AAMA 611
				2. AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
				3. AA- M12C22A32/A34, Class II, 0.010 mm or thicker.
	2. FABRICATION
		1. General: Provide factory-formed metal roof panel system complying with ASTM E 1514.
		2. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
		3. Form panels in continuous lengths, endlaps are not permitted.
		4. Field forming of panels shall be done by factory employees operating the machines.
		5. Fabricate metal panel joints with factory-installed butyl sealant that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
		6. Sheet Metal Flashing and Trim: Fabricate flashing and trim shall comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
			1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
			2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
			3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
			4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
			5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
			6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
			7. Provide to size recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.
1. EXECUTION
	1. EXAMINATION
		1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
			1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
			2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
		2. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
		3. Do not begin installation until substrates have been properly prepared.
		4. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Install system sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
		3. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
	3. INSTALLATION
		1. General: Install metal panels according to manufacturer's written instructions and in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components securely in place, with provisions for thermal and structural movement.
			1. Shim or otherwise plumb substrates receiving metal panels.
			2. Flash and seal metal panels at perimeter of all openings in conformance with manufacturer's recommendations.
			3. Install flashing and trim as metal panel work proceeds.
			4. Panels to be in one continuous length, long length roofs must be field formed by Manufacturer.
			5. Provide weather-tight escutcheons for pipe and conduit-penetrating panels.
		2. Fasteners:
			1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized- steel fasteners for surfaces exposed to the interior.
			2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
		3. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturer's written instructions.
		4. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
		5. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
			1. Install clips to supports with self-tapping fasteners.
			2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
			3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so metal roof panels, and factory-applied sealant are completely engaged.
		6. Accessory Installation: Install accessories with positive anchorage to building and weather tight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
		7. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
			1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
			2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
	4. ERECTION TOLERANCES
		1. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
	5. FIELD QUALITY CONTROL
		1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.
		2. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
		3. Prepare inspection reports.
		4. Installer must have installation shop drawings on site at all times.
	6. CLEANING AND PROTECTION
		1. Remove temporary protective coverings and strippable films as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions.
		2. On completion of installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
		3. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures

END OF SECTION