Park Hill School District

Building Successful Futures • Each Student • Every Day

ADDENDUM No. 1

Park Hill School District

2023 Roofing Projects

December 21, 2022

You are instructed to read and note the following described changes, corrections, clarifications, omissions, deletions, additions, approvals and statements pertinent to the Construction Documents.

Addendum No. 1 is a part of the Contract Bid and Construction Documents and shall govern the performance of the Work.

I. General Information

A. The Bid Form has been revised and attached.

1. Attachment A form for Administration Building has removed Roof C from title.
2. Each project shall be quoted on the attached individual Revised Bid Forms.

B. Add the attached specification section 074113 to be included in the specification for the metal roof replacements English Landing Elementary.

C. May 30, 2023, has been set as the Start Date for roofing work unless accumulated snow days delay this date.

D. The Administration Building and Gerner Family EEC projects can start as weather allows after April 1, 2023.

1. Only preparation work can be completed prior to the end of the school year, which includes gravel removal during after-hours, flashing prep and restoration, and field membrane preparation and repairs.
2. New flood coat and gravel surfacing can only be completed after hours, 5:00 P.M. and weekends.
3. All staging locations will need to be approved by the district, along with your submittal requirements, prior to start of work.
   a) No staging will be allowed in the pick-up and drop-off areas.
4. If noise complaints are received the project will be shut down.

II. Scope of Work Additions and Changes

A. Administration Building – Roofs A & B

1. Remove and replace all gas line supports per specification section "Summary" on page 7 under item "ll".

B. Gerner Family Early Education Center

1. All protection treads shall be removed and replaced after new gravel surface has been installed.

ACKNOWLEDGEMENT: Each Bidder shall acknowledge receipt of Addendum No. 1 on the Revised Bid Form.

END OF ADDENDUM NO. 1

DOCUMENT 00411 – REVISED BID FORM

Park Hill School District
2023 Roofing – Administration Building

Bidder: _____
(Bidder enter name here)

BASE BID, SINGLE-PRIME (ALL TRADES) CONTRACT
The undersigned Bidder, having carefully examined the Bidding and Contract Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, all as issued by the Owner, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, and allowances as described in the specification documents, necessary to complete the construction with the following exceptions:

- Price includes labor and miscellaneous materials not supplied by the owner.
- Price does not include the attached "Owner Purchased Material List" to be purchased by owner directly.
- All material not listed as purchased by owner shall be the responsibility of this contractor (See Attachment A forms)

BASE BID

1. Administration Building
   A. Roofs A and B – Roof Restoration $_____

UNIT PRICES

1. Metal Deck Replacement $_____per sq. ft
2. Metal Deck Repair $_____per sq. ft
3. Wood Blocking Replacement $_____per board ft
4. Drain Bowl Replacement (Case Iron 4") $_____per drain
5. Drain Clamping Ring Replacement $_____per ring
6. Blister Repair – (2' x 2'/each on gravel or granular surface) $_____per blister

BONDING

The undersigned Bidder agrees to furnish a Payment & Performance Bond in the amount of 100% of total contract value.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified and shall fully complete 100% of the Work no later than August 11, 2023. If work cannot be completed by August 11, 2023, contractor shall pay as Late Fees the sum of $1,000.00 for each consecutive day that the work is not completed thereafter.

ACKNOWLEDGEMENT OF ADDENDA

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. 1, dated _____
Addendum No. 2, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2023.

By: _____
(Name of bidding firm or corporation)

Witness:

By: _____
(Signature)

Attest: _____
(Signature)

_____
(Type or print name)

By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice Pres.)

Title: _____
(Corporate Secretary or Assistant Secretary Only)

Address: _____
_____

Phone: _____

License: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Attachment A

Owner Purchased Material List
Administration Building – Roofs A and B - (Roof Restoration)

The following material list is to be included with the bid form and signed/dated by the Contractor. Failure to provide this information will render your bid unresponsive. The owner is purchasing the following list of material from EducationPlus through a pre-competed national cooperative purchasing organization. Only these materials, in the quantities listed, will be supplied.

The Contractor is responsible for purchasing any additional material directly from the roofing material manufacturer at the contractor's cost. The contractor is also responsible for ALL other items not on this list necessary for the completion of work specified. This includes, but is not limited to, fasteners, wood components, insulation, cants and taper edge, gravel, sheet metal, warranty charges, inspections, maintenance agreements, and other consumable materials.

The unloading of material and the storage of said material in a secure area is the sole responsibility of the contractor. Any unused material will become the property of the contractor at the completion of the project.

Material	Quantity	Container Size
AlphaGuard Bio Top Coat	30 kits	3.1-gallon kits
AlphaGuard Bio Base Coat	35 kits	4-gallon kits
AlphaGuard WB Primer	3 buckets	1-gallon buckets
Burmesh	2 rolls 1 roll	6" x 300' rolls 36" x 300' rolls
Geogard Primer	3 buckets	1-gallon buckets
Ecolastic Adhesive	45 barrels	53-gallon barrels lined
ELS Mastic	36 buckets	5-gallon buckets
Permafab Reinforcement	2 rolls	4" x 300' rolls
TremSeal Pro – White	1 cases	30 tube cases
TremTred Roof Walkway Panels	20 Panels	3' x 4' x ½"

Bidding Contractor: _____

Contractor Signature: _____

Date: _____

END OF SECTION 00411

DOCUMENT 00411 – REVISED BID FORM

Park Hill School District
2023 Roofing – English Landing Elementary

Bidder: _____
(Bidder enter name here)

BASE BID, SINGLE-PRIME (ALL TRADES) CONTRACT
The undersigned Bidder, having carefully examined the Bidding and Contract Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, all as issued by the Owner, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, and allowances as described in the specification documents, necessary to complete the construction with the following exceptions:

- Price includes labor and miscellaneous materials not supplied by the owner.
- Price does not include the attached "Owner Purchased Material List" to be purchased by owner directly.
- All material not listed as purchased by owner shall be the responsibility of this contractor (See Attachment A forms)

BASE BID

1. English Landing Elementary School
   A. Roofs A, B, and C – Roof Replacement $_____

   B. Roofs E, F, G, H, I, & J – Metal Roof Replacement $_____

UNIT PRICES

1. Metal Deck Replacement $_____per sq. ft
2. Metal Deck Repair $_____per sq. ft
3. Wood Blocking Replacement $_____per board ft
4. Drain Bowl Replacement (Case Iron 4") $_____per drain
5. Drain Clamping Ring Replacement $_____per ring

BONDING

The undersigned Bidder agrees to furnish a Payment & Performance Bond in the amount of 100% of total contract value.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified and shall fully complete 100% of the Work no later than August 11, 2023. If work cannot be completed by August 11, 2023, contractor shall pay as Late Fees the sum of $1,000.00 for each consecutive day that the work is not completed thereafter.

ACKNOWLEDGEMENT OF ADDENDA

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Addendum No. 1, dated _____
Addendum No. 2, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2023.

By: _____
(Name of bidding firm or corporation)

Witness:

By: _____
(Signature)

Attest: _____
(Signature)

_____
(Type or print name)

By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice Pres.)

Title: _____
(Corporate Secretary or Assistant Secretary Only)

Address: _____

_____

Phone: _____

License: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Attachment A

Owner Purchased Material List
English Landing Elementary School – Roofs A, B, and C - (Roof Replacement)

The following material list is to be included with the bid form and signed/dated by the Contractor. Failure to provide this information will render your bid unresponsive. The owner is purchasing the following list of material from EducationPlus through a pre-competed national cooperative purchasing organization. Only these materials, in the quantities listed, will be supplied.

The Contractor is responsible for purchasing any additional material directly from the roofing material manufacturer at the contractor's cost. The contractor is also responsible for ALL other items not on this list necessary for the completion of work specified. This includes, but is not limited to, fasteners, wood components, insulation, cants and taper edge, gravel, sheet metal, warranty charges, inspections, maintenance agreements, and other consumable materials.

The unloading of material and the storage of said material in a secure area is the sole responsibility of the contractor. Any unused material will become the property of the contractor at the completion of the project.

Material	Quantity	Container Size
Alumanation 301	39 buckets	5-gallon bucket
Thermastic Adhesive	342 cartons	55-lb/carton (9-cartons/pallet)
THERMglass Premium Type VI	225 rolls	5-sq/roll (25-rolls/pallet)
Burmastic Composite Ply HT	200 rolls	20 rolls per pallet - 2/sq./roll
Burmesh	3 rolls	6" x 300' rolls
ELS Mastic	36 buckets	5-gallon bucket
Premium III Asphalt	456 cartons	100-lb/carton (24 cartons/pallet)
TRA Flashing	21 rolls 35 rolls	24" x 50' roll 18" x 50' roll
TremSeal Pro - Bonze	1 cases	30 tubes per case
TremTred Roof Walkway Panels	25 Panels	3' x 4' x ½"

Bidding Contractor: _____

Contractor Signature: _____

Date: _____

END OF SECTION 00411

DOCUMENT 00411 – REVISED BID FORM

Park Hill School District
2023 Roofing – Gerner Family EEC

Bidder: _____
(Bidder enter name here)

BASE BID, SINGLE-PRIME (ALL TRADES) CONTRACT
The undersigned Bidder, having carefully examined the Bidding and Contract Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, all as issued by the Owner, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, and allowances as described in the specification documents, necessary to complete the construction with the following exceptions:

- Price includes labor and miscellaneous materials not supplied by the owner.
- Price does not include the attached "Owner Purchased Material List" to be purchased by owner directly.
- All material not listed as purchased by owner shall be the responsibility of this contractor (See Attachment A forms)

BASE BID

1. Gerner Family Early Education Center
   Roofs 1, 2, and 3 – Roof Restoration $_____

UNIT PRICES

1. Metal Deck Replacement $_____per sq. ft
2. Metal Deck Repair $_____per sq. ft
3. Wood Blocking Replacement $_____per board ft
4. Drain Bowl Replacement (Case Iron 4") $_____per drain
5. Drain Clamping Ring Replacement $_____per ring
6. Blister Repair – (2' x 2'/each on gravel or granular surface) $_____per blister

BONDING

The undersigned Bidder agrees to furnish a Payment & Performance Bond in the amount of 100% of total contract value.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified and shall fully complete 100% of the Work no later than August 11, 2023. If work cannot be completed by August 11, 2023, contractor shall pay as Late Fees the sum of $1,000.00 for each consecutive day that the work is not completed thereafter.

ACKNOWLEDGEMENT OF ADDENDA

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. 1, dated _____
Addendum No. 2, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2023.

By: _____
(Name of bidding firm or corporation)

Witness:

By: _____
(Signature)

Attest: _____
(Signature)

_____
(Type or print name)

By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice Pres.)

Title: _____
(Corporate Secretary or Assistant Secretary Only)

Address: _____

_____

Phone: _____

License: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Attachment A

Owner Purchased Material List
Gerner Family Early Education Center – Roofs 1, 2, and 3 - (Roof Restoration)

The following material list is to be included with the bid form and signed/dated by the Contractor. Failure to provide this information will render your bid unresponsive. The owner is purchasing the following list of material from EducationPlus through a pre-competed national cooperative purchasing organization. Only these materials, in the quantities listed, will be supplied.

The Contractor is responsible for purchasing any additional material directly from the roofing material manufacturer at the contractor's cost. The contractor is also responsible for ALL other items not on this list necessary for the completion of work specified. This includes, but is not limited to, fasteners, wood components, insulation, cants and taper edge, gravel, sheet metal, warranty charges, inspections, maintenance agreements, and other consumable materials.

The unloading of material and the storage of said material in a secure area is the sole responsibility of the contractor. Any unused material will become the property of the contractor at the completion of the project.

Material	Quantity	Container Size
AlphaGuard Bio Top Coat	56 kits	3.1-gallon kits
AlphaGuard Bio Base Coat	65 kits	4-gallon kits
AlphaGuard WB Primer	5 buckets	1-gallon buckets
Burmesh	2 rolls	6" x 300' rolls
	1 roll	36" x 300' rolls
Geogard Primer	5 bucket	1-gallon buckets
Ecolastic Adhesive	60 barrels	53-gallon barrels lined
ELS Mastic	54 buckets	5-gallon buckets
Permafab Reinforcement	12 rolls	4" x 300' rolls
TremSeal Pro – Aluminum/Stone	1 case	30 tube per case
Bronze	1 case	30 tubes per case
TremTred Roof Walkway Panels	15 Panels	3' x 4' x ½"

Bidding Contractor: _____

Contractor Signature: _____

Date: _____

END OF SECTION 00411

DOCUMENT 00411 – REVISED BID FORM

Park Hill School District
2023 Roofing Lakeview Middle

Bidder: _____
(Bidder enter name here)

BASE BID, SINGLE-PRIME (ALL TRADES) CONTRACT
The undersigned Bidder, having carefully examined the Bidding and Contract Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, all as issued by the Owner, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, and allowances as described in the specification documents, necessary to complete the construction with the following exceptions:

- Price includes labor and miscellaneous materials not supplied by the owner.
- Price does not include the attached "Owner Purchased Material List" to be purchased by owner directly.
- All material not listed as purchased by owner shall be the responsibility of this contractor (See Attachment A forms)

BASE BID

1. Lakeview Middle School
   Roofs A, C, D, G, and K – Roof Restoration $_____

UNIT PRICES

1. Metal Deck Replacement $_____per sq. ft
2. Metal Deck Repair $_____per sq. ft
3. Wood Blocking Replacement $_____per board ft
4. Drain Bowl Replacement (Case Iron 4") $_____per drain
5. Drain Clamping Ring Replacement $_____per ring
6. Blister Repair – (2' x 2'/each on gravel or granular surface) $_____per blister

BONDING

The undersigned Bidder agrees to furnish a Payment & Performance Bond in the amount of 100% of total contract value.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified and shall fully complete 100% of the Work no later than August 11, 2023. If work cannot be completed by August 11, 2023, contractor shall pay as Late Fees the sum of $1,000.00 for each consecutive day that the work is not completed thereafter.

ACKNOWLEDGEMENT OF ADDENDA

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Addendum No. 1, dated _____
Addendum No. 2, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2023.

By: _____
(Name of bidding firm or corporation)

Witness:

By: _____
(Signature)

Attest: _____
(Signature)

_____
(Type or print name)

By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice Pres.)

Title: _____
(Corporate Secretary or Assistant Secretary Only)

Address: _____

_____

Phone: _____

License: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Attachment A

Owner Purchased Material List
Lakeview Middle School – Roofs A, C, D, G, and K - (Roof Restoration)

The following material list is to be included with the bid form and signed/dated by the Contractor. Failure to provide this information will render your bid unresponsive. The owner is purchasing the following list of material from EducationPlus through a pre-competed national cooperative purchasing organization. Only these materials, in the quantities listed, will be supplied.

The Contractor is responsible for purchasing any additional material directly from the roofing material manufacturer at the contractor's cost. The contractor is also responsible for ALL other items not on this list necessary for the completion of work specified. This includes, but is not limited to, fasteners, wood components, insulation, cants and taper edge, gravel, sheet metal, warranty charges, inspections, maintenance agreements, and other consumable materials.

The unloading of material and the storage of said material in a secure area is the sole responsibility of the contractor. Any unused material will become the property of the contractor at the completion of the project.

Material	Quantity	Container Size
AlphaGuard Bio Top Coat	45 kits	3.1-gallon kits
AlphaGuard Bio Base Coat	55 kits	4-gallon kits
AlphaGuard WB Primer	2 buckets	5-gallon buckets
Burmastic Adhesive	14 buckets	5-gallon buckets
Burmastic Composite Ply HT	20 rolls	2-sq/roll (20 rolls/pallet)
Burmesh	6 rolls	6" x 300' rolls
	1 roll	36" x 300' rolls
Ecolastic Adhesive	72 barrels	53-gallon barrels lined
ELS Mastic	72 buckets	5-gallon buckets
Geogard Primer	10 bucket	1-gallon buckets
Permafab Reinforcement	8 rolls	4" x 300' rolls
TRA Flashing	7 rolls	36" x 50' per roll
TremSeal Pro – Aluminum/Stone	2 cases	30 tube cases
TremTred Roof Walkway Panels	70 Panels	3' x 4' x ½"
Sheeting Bond	5 buckets	5-gallon buckets

Bidding Contractor: _____

Contractor Signature: _____

Date: _____

END OF SECTION 00411

DOCUMENT 00411 – REVISED BID FORM

Park Hill School District
2023 Roofing - Line Creek Elementary

Bidder: _____
(Bidder enter name here)

BASE BID, SINGLE-PRIME (ALL TRADES) CONTRACT
The undersigned Bidder, having carefully examined the Bidding and Contract Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, all as issued by the Owner, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, and allowances as described in the specification documents, necessary to complete the construction with the following exceptions:

- Price includes labor and miscellaneous materials not supplied by the owner.
- Price does not include the attached "Owner Purchased Material List" to be purchased by owner directly.
- All material not listed as purchased by owner shall be the responsibility of this contractor (See Attachment A forms)

BASE BID

1. Line Creek Elementary
   Roofs A, C, and E – Roof Restoration $_____

UNIT PRICES

1. Metal Deck Replacement $_____per sq. ft
2. Metal Deck Repair $_____per sq. ft
3. Wood Blocking Replacement $_____per board ft
4. Drain Bowl Replacement (Case Iron 4") $_____per drain
5. Drain Clamping Ring Replacement $_____per ring
6. Blister Repair – (2' x 2'/each on gravel or granular surface) $_____per blister

BONDING

The undersigned Bidder agrees to furnish a Payment & Performance Bond in the amount of 100% of total contract value.

TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified and shall fully complete 100% of the Work no later than August 11, 2023. If work cannot be completed by August 11, 2023, contractor shall pay as Late Fees the sum of $1,000.00 for each consecutive day that the work is not completed thereafter.

ACKNOWLEDGEMENT OF ADDENDA

The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

Addendum No. 1, dated _____
Addendum No. 2, dated _____

CONTRACTOR'S LICENSE

The undersigned further states that he is a duly licensed Contractor, for the type of work proposed, in the State of Missouri, and that all fees, permits, etc., pursuant to the submission of this proposal have been paid in full.

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2023.

By: _____
(Name of bidding firm or corporation)

Witness:

By: _____
(Signature)

Attest: _____
(Signature)

_____
(Type or print name)

By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice Pres.)

Title: _____
(Corporate Secretary or Assistant Secretary Only)

Address: _____

_____

Phone: _____

License: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Attachment A

Owner Purchased Material List
Line Creek Elementary School – Roofs A, C, and E - (Roof Restoration)

The following material list is to be included with the bid form and signed/dated by the Contractor. Failure to provide this information will render your bid unresponsive. The owner is purchasing the following list of material from EducationPlus through a pre-competed national cooperative purchasing organization. Only these materials, in the quantities listed, will be supplied by the owner.

The Contractor is responsible for purchasing any additional material directly from the roofing material manufacturer at the contractor's cost. The contractor is also responsible for ALL other items not on this list necessary for the completion of work specified. This includes, but is not limited to, fasteners, wood components, insulation, cants and taper edge, gravel, sheet metal, warranty charges, inspections, maintenance agreements, and other consumable materials.

The unloading of material and the storage of said material in a secure area is the sole responsibility of the contractor. Any unused material will become the property of the contractor at the completion of the project.

Material	Quantity	Container Size
AlphaGuard Bio Top Coat	27 kits	3.1-gallon kits
AlphaGuard Bio Base Coat	30 kits	4-gallon kits
AlphaGuard WB Primer	5 buckets	1-gallon buckets
Burmastic Adhesive	15 buckets	5-gallon buckets
Burmastic Composite Ply HT	20 rolls	2-sq/roll (20-rolls/pallet)
Burmesh	2 rolls	6" x 300' rolls
	1 roll	36" x 300' rolls
Geogard Primer	5 bucket	1-gallon buckets
Ecolastic Adhesive	32 barrels	53-gallon barrels lined
ELS Mastic	36 buckets	5-gallon buckets
Permafab Reinforcement	2 rolls	4" x 300' rolls
TremSeal Pro – Aluminum/Stone	1 cases	30 tube cases
TremTred Roof Walkway Panels	25 Panels	3' x 4' x ½"

Bidding Contractor: _____

Contractor Signature: _____

Date: _____

END OF SECTION 00411

Style Definition: PRT
Style Definition: ART
Style Definition: PR2: Space Before: 0 pt
Style Definition: PR3: Space Before: 12 pt

SECTION 07 41 13 - STANDING SEAM METAL ROOF PANELS

This Tremco Product Masterspec specifies **Tremco TremLock T-238** metal standing seam roof panel system, including miscellaneous framing, insulation, metal trim, and roof drainage products.

The companion Section 074200 "Metal Wall (and Soffit) Panels," Section 076200 "Sheet Metal Flashing and Trim," Section 077100 "Roof Accessories," and Section 077129 "Roof Expansion Assemblies" specify the wall, soffit, reglet, counterflashing, parapet, and expansion products, and custom roof edge, copings and roof drainage items that together with the work of this Section form the total roof system. Section 054000 "Cold-Formed Metal Framing" may be added to include truss or rafter engineered structural framing assemblies.

PART 3 – PART 1 - GENERAL

3.1 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

3.2 1.2 SUMMARY

A. Section Includes:
1. Architectural standing-seam metal roof panels.
2. Metal roof accessories.
3. Roof insulation.
0. Miscellaneous metal framing.

If retaining the optional article below, edit to include only products and construction that the reader might expect to find in this Section but are specified elsewhere. For less complex projects, delete Related Sections.

D. B. Related Sections:
1. Division 01 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 05 Section "Structural Steel Framing" for steel roof purlins supporting metal roof panels.
3. 1. Division 05 Section "Steel Decking" for steel roof deck supporting metal roof panels.
4. Division 05 Section "Cold-Formed Metal Framing" for engineered cold-formed metal roof framing supporting metal roof panels.
5. 2. Division 06 rough carpentry section for wood nailers, curbs, and blocking.
6. Division 07 air barrier section for transition material from wall air barrier assembly to roof air barrier.
7. 3. Division 07 Section "Metal Wall Panels" for factory-formed metal wall and soffit panels.

Retain one of first two subparagraphs below for fasciae, copings, flashings, and roof drainage systems not part of metal roof panel assemblies. First is for field- or shop- formed items; second is for manufactured and tested systems. Tremco offers the TremLock and TremLine lines of manufactured roof edge products.

9.4. Division 07 Section "Sheet Metal Flashing and Trim" for field- or shop- formed fasciae, copings, flashings, roof drainage systems, and other sheet metal work not part of metal roof panel assemblies.

10. Division 07 Section "Roof Specialties" for manufactured fasciae, copings, roof drainage systems, and other roof specialties not part of metal roof panel assemblies.

11.5. Division 07 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

Retain one or more of three following paragraphs if applicable to Project.

F.C. **Alternates**: Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

F.D. **Allowances**: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

G.E. **Unit Prices**: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

3.31.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

3.41.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Meet with Owner, [Architect,] Owner's insurer if applicable, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, substrate Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
   2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
   4. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   5. Review structural loading limitations of substrate during and after roofing.
   6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
   7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
   8. Review temporary protection requirements for metal roof panel assembly during and after installation.
   9. Review roof observation and repair procedures after metal roof panel installation.
   10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

3.51.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. LEED Submittals:

Verify range of coatings and colors tested for compliance with LEED certification reflectance and emissivity requirements.

0. Product Test Reports for Credit SS 7.2: For roof panels, indicating that panels comply with solar reflectance index requirement.

Retain subparagraph below if recycled content is required for LEED-NC Credits MR 4

0. Product Data for Credit MR 4: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

. Include statement indicating costs for each product having recycled content.

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H.B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details specific to project, signed and sealed by the qualified professional engineer responsible for their preparation. Distinguish between factory- and field-assembled work.

I.C. Accessory Details: Include details of the following items:
1. Flashing and trim.
2. Pipe penetration flashings.
3. Roof curbs.
4. Gutters.
5. Downspouts.

Retain "Delegated-Design Submittal" paragraph and corresponding paragraph under Quality Assurance article if Project size and complexity warrants design of installation by Contractor's qualified professional engineer. This is recommended for all installations in high-wind design areas.

K.D. **Delegated-Design Submittal**: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the metal roof panel manufacturer's qualified professional engineer responsible for their preparation. Include the following:
1. Structural analysis data indicating compliance with Performance Requirements Article.

L. **Shop Drawings for Snow Guards:** By snow guard manufacturer. Show fabrication and installation layouts and attachment to other construction.

M.E. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.

Delete "Samples for Initial Selection" Paragraph above if colors and other characteristics are preselected and specified or scheduled. Retain first paragraph below with or without above.

N.F. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Roof Panels: 12 inches (300 mm) long by actual panel width. Include fasteners, clips, closures, and other metal roof panel accessories.
2. Trim and Closures: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- (300-mm-) long Samples for each type of accessory.

~~3.6~~1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer, Installer[, professional engineer], and manufacturer's technical representative.
1. Submit Installer qualifications in the form of an original letter on manufacturer's letterhead signed by authorized manufacturer representative.

B. Material Certificates: For thermal insulation, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product. Indicate compliance with requirements in Performance Requirements Article:
1. Air Infiltration.
2. Water Penetration.
3. Hydrostatic-Head Resistance.
4. Wind-Uplift Resistance.
~~5. FM Approvals Listing.~~
~~6.~~5. Solar Reflectance.
~~7.~~6. Minimum Emissivity Rating.

D. Field Quality Control Reports.

E. Sample Warranties: For special warranties.

~~3.7~~1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal roof panels to include in maintenance manuals.

~~3.8~~1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer of plant-fabricated metal roof panel systems listed in this Section and meeting performance requirements, with a minimum of [five] years experience providing metal roof panel systems for projects of similar type and scope, offering engineering, warranty, technical inspection, and maintenance inspection services specified.

B. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of [five] years experience installing similar work, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to furnish warranty of type specified.
~~1. Manufacturer's On-Site Roll Former Operators: Experienced full-time employees of metal roof panel manufacturer.~~

C. **Professional Engineer Qualification**: A qualified professional engineer licensed in the project state, and experienced in metal roof panel system design similar to that required for Project.

~~D. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.~~

~~E.~~D. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer, certified as a Registered Roof Observer by the Roof Consultants Institute, and experienced in the installation and maintenance of the specified roof panel system and qualified to determine Installer's compliance with the requirements of this Project.

Retain below for projects where Owner requires Contractor to furnish independent third party inspection, or where below is allowable as an alternative to furnishing manufacturer's technical representative

~~F.~~E. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing and inspection indicated.

1. Inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

~~G.~~F. Source Limitations: Obtain metal roof panels and accessories [and related engineered structural support members] from a single source supplied or approved by metal roof panel manufacturer.

Retain "Mockups" paragraph when size or complexity of Project warrants added cost.

~~H.~~G. **Mockups**: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia and gable trim[, as shown on Drawings]; approximately four panels wide by full eave width, including insulation, underlayment, attachments, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless **Architect** specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

~~3.9~~1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

~~3.10~~1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

~~3.11~~1.11 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of substrate, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

~~Retain "Air Barrier Coordination" paragraph below for projects that include wall air barrier assemblies. Coordinate requirement for making transition from insulation to wall air barrier in Division 07 air barrier section.~~

~~C. **Air Barrier Coordination**: Coordinate installation of roofing insulation with installation of wall air barrier system wall-to-roof transition material specified in Division 07 Section air barrier section to provide a continuous air barrier across roofing and adjacent assemblies.~~

~~3.12~~1.12 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Roof System Warranty, General: Warranties specified in this Section include the following components and systems specified in other sections supplied by the metal roof panel manufacturer:

~~Edit list of related warranted components below to correspond to Project.~~

~~1. Manufactured copings, roof edge, counterflashings, and reglets.~~
~~2.~~1. Roof curbs, hatches, and penetration flashings.
~~3.~~2. Roof expansion joint assemblies.
~~4.~~3. Low slope-roofing system.
~~5.~~4. Metal wall and soffit panels and trim.
~~6.~~5. Penetration flashings.
~~7.~~6. Wall expansion joint assemblies.

C. Special Warranty for Metal Roof Panels: Written warranty in which Manufacturer agrees to repair or replace metal roof panels that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: [5] years from date of Substantial Completion.

Below is Optional Warranty which is in addition to basic warranty above.

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D. Special System Weathertightness Warranty for Metal Roof Panels: Written warranty in which Manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
1. Warranty Period: [10] [15] [20] years from date of Substantial Completion.
2. Limit of Warranty Coverage: Not to exceed original installed cost of metal roof panel assembly including labor and materials.
3. Qualified Installer Requirement: Installer must meet requirements in Quality Assurance Article.
4. Installation Inspection Requirement: By manufacturer's technical representative in accordance with requirements of Part 3 Field Quality Control Article.
5. Annual Manufacturer Inspection Requirement: By qualified manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's annual inspections is included in the Contract Sum. Inspections to occur in Years 2, 5,[10], and[15] following Substantial Completion.

E. Special Warranty on Panel Finishes: Written warranty in which Manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes under normal atmospheric conditions within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

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~~PART 4 -~~ PART 2 - PRODUCTS

~~4.1~~2.1 MANUFACTURERS

Retain this Article if list of manufacturers is included in specification, or if Tremco basis of design product is retained in Manufacturer paragraph below. Delete this Article if proprietary specifying is not allowed, such as for Federal and some state projects.

If retaining alternative manufacturers, edit to suit Project. If statutes require "open" specification, retain first option in Substitutions subparagraph below.

A. **Basis of Design Manufacturers/Products**: Subject to compliance with requirements, provide products by one of the following manufacturers comparable to the Basis of Design product specified:
1. Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com.
2. Substitutions: [In accordance with Instructions to Bidders and Division 01 General Requirements] [None allowed].

B. **Available Manufacturers/Products**: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com.
2. AEP-Span.
3. CENTRIA Architectural Systems.
4. Garland Company, Inc. (The).

4.22.2 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. **Delegated Design**: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

Retain paragraph below and edit recycled content requirement to correspond to source of supply recycled content data and LEED or general sustainable design Project requirements.

C. **Recycled Content of Steel Products**: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] percent.

Retain first paragraph below if required for LEED-NC Credit SS 7.2. First option is minimum for roofs with slopes of 2:12 or less; second option is minimum for roofs with slopes steeper than 2:12.

D. **Energy Performance:** Provide roof panels with solar reflectance index not less than [78] [29] when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

Retain first paragraph below for roofs that must comply with ENERGY STAR requirements. ENERGY STAR Roof Products Qualified Product List is available in PDF at www.energystar.gov.

E. **Energy Performance:** Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for [low-slope] [steep-slope] roof products.

Usually retain paragraph below for roofs that must comply with CEC Title 24. Options are values required for low-slope roofs by prescriptive approach; insert other values if required for building envelope trade-off approach or whole building performance approach. A list of products tested according to ANSI/CRRC-1 with their test values is available in PDF at www.coolroofs.org.

F. **Energy Performance:** Provide roof panels with initial solar reflectance not less than [0.70] and emissivity not less than [0.75] when tested according to ANSI/CRRC-1.

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G.C. Structural Performance: Provide metal roof panel assemblies [and related engineered structural support members specified in Division 05 Section "Cold-Formed Metal Framing"] withstanding the effects of the following loads, based on testing according to ASTM E 1592:

Consult a structural engineer experienced in engineering metal roof panel assemblies of type indicated to quantify design loads. Coordinate information on drawings. Select one of three subparagraphs below corresponding to design method used to establish wind loads.

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: [As indicated on Drawings].
3. Deflection Limits: For wind loads, no greater than [1/180] [1/240] of the span.

H. FM Approvals Listing: Provide metal roof panels and component materials that comply with requirements in FM Approvals 4471 as part of a panel roofing system and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.

Retain one option in "Fire/Windstorm Classification" Subparagraph below based on windstorm classification of Project; the higher the value in the option, the greater the uplift resistance. FM Global Loss Prevention Data Sheet 1-28 multiplies the actual field-of-roof uplift pressure by a factor of 2 to obtain the factored pressure, the

~~number that establishes the minimum FM Global approval rating. Verify availability of roofing systems that meet these classifications. Other options for classifications increase in increments of 15 (e.g., Class 1A-135, Class 1A-150, Class 1A-165, and higher). "Class 1A" signifies complying with ASTM E 108, Class A fire performance for FM Global-approved, Class 1 panel roofs~~

~~1.~~4. ~~Fire/Windstorm Classification: [Class 1A-90] [Class 1A-195]~~.

~~2.~~5. Hail Resistance: SH Class 4.

~~I.~~D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

~~J.~~E. Hail Resistance: Provide metal roof panel assemblies listed with UL as Class 4 hail resistant panels.

~~K.~~F. Air Infiltration: Air leakage through assembly of not more than the following when tested according to ASTM E 1680, based upon 16 inch (406 mm) wide panel:

1. Maximum .0001 cfm/sq. ft. (0.001 L/s x sq. m) of roof area at test-pressure difference of -1.57 lbf/sq. ft. (-75.2 Pa).
2. Maximum .0028 cfm/sq. ft. (.014 L/s x sq. m) of roof area at test-pressure difference of -20.00 lbf/sq. ft. (-958 Pa).

~~L.~~G. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 20.00 lbf/sq. ft. (958 Pa).

~~M.~~H. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

~~N.~~I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): [120 deg F (67 deg C), ambient; 180 deg F (100 deg C)], material surfaces.

~~4.3~~2.3 ARCHITECTURAL STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

~~**TremLock T-238** panels are true architectural standing seam panels designed for seamed watertight installation on slopes as low as 1/2 inch in 12 for 2-3/8 inch high seam panels. They are panels are available in Galvalume steel with 70 percent Kynar fluoropolymer finish and Galvalume Plus steel (second option in subparagraph below) as an exposed metallic coating.~~

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B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Factory-formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Tremco, Inc., TremLock T-238.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 (Class AZM150 coating designation, Grade 340), ~~I~~prepainted by the coil-

coating process to comply with ASTM A 755/A 755M~~] [with chromate acrylic coating]~~; structural quality.

~~Select panel thickness required based on performance requirements. Note that "gauge," while often used, is an outdated term that does not conform to standards by which steel sheet is purchased.~~

a. Thickness: 0.023~~8~~-inch/24 ga. ~~(0.71 mm)~~ nominal thickness.

b. Surface: Smooth, flat finish.

c. **Exposed Coil-Coated Finish**: ~~[~~2-Coat Fluoropolymer~~] [3-Coat Fluoropolymer] [Mica Fluoropolymer] [Metallic Coat Fluoropolymer] [2-Coat Thick Coat Fluoropolymer] [2-Coat Extra Thick Coat Fluoropolymer] [Unpainted]~~.

~~Retain optional paragraph below in lieu of above to describe metal panels with exposed Galvalume Plus metallic coating without applied fluoropolymer finish.~~

~~d. **Exposed Finish**: Exposed metallic coating.~~

~~e.~~d. Color: Sherwin Williams 435R3047 Fluropon SR Blue Green ~~As selected by Architect from manufacturer's standard colors[meeting energy performance requirements]~~.

3. Clips: Fixed clips~~Low-movement floating clips~~ that ~~to~~ accommodate thermal movement; ~~fixed clips where design permits; intermittent or continuous clips as required~~ to meet performance requirements; and with clip bearing plate where required.

a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Joint Type: Field mechanically seamed.
5. Seam Cap: Match panel material and finish; provide with two rows of integral factory hot-applied sealant.
6. Panel Pan Configuration: ~~[Flat pan]~~ [Striated] [Stiffener Ribbed] [Pencil Ribbed] [Planked].
7. Panel Seam Height: Not less than 2-3/8 inch (60.3 mm).
8. Panel Coverage: ~~[~~16 inches ~~(406 mm)] [18 inches (457 mm)] [24 inches (610 mm)]~~.

~~4.~~42.4 METAL ROOF ACCESSORIES

A. Metal Roof Accessories, General: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Panel Sealants: Provide one of the following identical to that used in test panels meeting performance requirements:
   1. Sealant Tape: Pressure-sensitive, 99 percent solids, gray polyisobutylene or butyl rubber compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1 inch (25 mm) wide and 1/8 inch (3 mm) thick, with nylon spacer beads to prevent overcompression of the sealant tape.
   2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311, with nylon spacer beads to prevent overcompression of the sealant tape.

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C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.0238 inch ~~(0.71 mm)~~ thick. Provide flashing and trim 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 roof panels.

D. Pipe Penetration Flashings: Flexible boot type, with stainless steel compression ring, and stainless steel pipe strap. Use silicone-type boot at hot pipes.

E. **Gutters:** Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

F. **Downspouts:** Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

G. **Pipe Penetration Flashing:** Premolded EPDM pipe collar with flexible aluminum ring bonded to base and stainless steel pipe clamp to secure collar to pipe.

H. **Roof Curbs:** Fabricated from aluminum sheet, minimum 0.080 inch (1.2 mm) thick; with bottom of skirt profiled to match roof panel profiles, and welded top box, integral internal fastener flange, and water diverter. Fabricate curb subframing of minimum 0.0598-inch- (1.5-mm-) thick, angle-, C-, or Z-shaped galvanized steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.
1. Insulate roof curb with 1-inch- (25-mm-) thick, rigid insulation.

~~I. **Snow Guards:** Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.~~
~~1. Seam-Mounted, Bar-Type Snow Guards: Aluminum rods or bars held in place by stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.~~

~~a. Aluminum Finish: High-performance coating to match metal roof panels.~~

~~b. Products:~~

~~1) LM Curbs; S-5 SnoFence.~~
~~2) Snow Management Systems, a division of Contek, Inc.; Vermont Snowguard.~~

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4.52.5 FIELD-INSTALLED THERMAL INSULATION

A. **Faced, Polyisocyanurate Board Insulation**: ASTM C 1289, [Type II, Class 2 glass-fiber mat, Grade 3] [Type V, oriented-strand-board facing], with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core. 0.02 perm (1.15 ng/Pa x s x sq. m). FM Approvals 4450/4470 approved. CFC-, HCFC-, and HFC- free.
1. Insulation Seam Tape: Manufacturer's recommended tape compatible with insulation facing and with adjacent air barrier transition material.

~~Retain above paragraph for metal roof systems installed over continuous support such as metal or wood deck. Retain OSB facer if roof must sustain significant foot traffic or other loads. Insert other board insulation materials when required by project.~~

Metal building insulation in paragraph below is commonly used with metal roof panels installed over purlins, especially if it is to be exposed on the interior. Type I insulation is unfaced; Type II is faced.

B. **Metal Building Insulation**: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (50-mm-) wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.
   1. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96, Desiccant Method:
      a. Composition: Vinyl faced, scrim reinforced, and foil backing.
   2. Insulation Retainer Strips: 0.019-inch- (0.48-mm-) thick, formed, galvanized-steel or PVC retainer clips colored to match insulation facing.
   3. Thermal Spacer Blocks: Fabricated from extruded polystyrene, 1 inch (25 mm) thick.
   4. Facing Tape: Insulation manufacturer's recommended facing seam tape.

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4.6 SUBSTRATE BOARDS

Retain substrate board below or delete this article if not required. Substrate boards may be used as model building-code-required thermal barriers, separating certain types of foam insulation from steel or wood deck; some model codes exempt qualifying foam insulation materials meeting FMG 4450 from thermal barrier requirements. They may also be used over steel deck as part of a fire-resistance-rated roofing system or to provide a smooth substrate for a vapor retarder.

Material below can also be used as an insulation cover board, although this application is seldom required.

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.
   1. Type and Thickness: [Regular, 1/2 inch (13 mm)] [Type X, 5/8 inch (16 mm)].
   2. Product: Subject to compliance with requirements, provide Dens-Dek by Georgia-Pacific Corporation.

B. Substrate-Board Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate.

4.72.6 UNDERLAYMENT MATERIALS

Retain appropriate paragraphs in this article for metal roof panels applied directly over metal deck or solid sheathing.

Self-adhering, polymer-modified underlayments listed in first paragraph below are suitable for higher temperatures associated with metal roofing. Use only when required under metal panel installations that are not watertight installations.

A. **Self-Adhering, High-Temperature Sheet**: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
   2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

~~4.8~~2.7 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated. **[**For engineered structural support members, refer to Division 05 Section "Cold-Formed Metal Framing."**]**

~~Retain types of miscellaneous metal framing shapes required for project.~~

~~B. **Zee Clips**: 0.079-inch (2.01-mm) nominal thickness.~~

~~C. **Base or Sill Channels**: 0.079-inch (2.01-mm) nominal thickness.~~

~~D. Hat-Shaped, Rigid Furring Channels:~~
~~1. Nominal Thickness: As required to meet performance requirements, but not less than 0.025 inch (0.64 mm).~~
~~2. Depth: **[**7/8 inch (22 mm)**] [**1-1/2 inches (38 mm)**] [**As indicated**].~~

~~E. **Z-Shaped Furring**: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.~~
~~1. Nominal Thickness: **[**As indicated**] [**As required to meet performance requirements**] [**0.025 inch (0.64 mm)**].~~

~~F. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.~~

~~4.9~~2.8 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

~~4.10~~2.9 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

~~B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.~~

~~C.~~B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

~~D.~~C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

~~E.~~D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the 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. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
3. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

~~4.11~~2.10 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel Panels and Accessories:
1. **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. **Three-Coat Fluoropolymer**: AAMA 621. Fluoropolymer finish 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. **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.~~
~~4. **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.~~

~~Thick-coat and extra-thick-coat fluoropolymer coating systems are available and recommended for marine and industrial corrosive environments.~~

~~5. **Two-Coat Thick-Coat Fluoropolymer**: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat, over nominal 0.80-mil-thick urethane primer. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.~~
~~6. **Two-Coat Extra-Thick-Coat Fluoropolymer**: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat, over nominal 2.40-mil-thick urethane primer. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.~~
~~7. 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 (0.013 mm).~~

~~PART 5 –~~ PART 3 - EXECUTION

~~5.1~~3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

~~Retain one or both of first two paragraphs below based on Project structural design. Substrate flatness is critical to keeping "oil-canning" deformation of metal panel pans within normal limits.~~

~~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.~~1. **Examine solid roof substrate** to verify that substrate joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

~~3.~~2. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

~~4.~~3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

~~5.~~4. Proceed with installation only after unsatisfactory conditions have been corrected.

~~5.2~~3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

~~Retain first paragraph below if required as part of a fire-resistance-rated assembly, to separate certain types of foam-plastic insulation from interior, or to support vapor retarder sheet.~~

~~B. **Substrate Board:** Install substrate boards over roof substrate on entire roof surface. Attach with substrate-board fasteners.~~

~~1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.~~

~~2. Comply with requirements for fire-rated construction.~~

~~C. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.~~

~~5.3~~3.3 THERMAL INSULATION INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Extend insulation in thickness indicated to cover entire roof. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Seal all joints and penetrations air- and vapor-tight.

C. **Rigid Board Insulation**: Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

1. Where overall insulation thickness is 2 inches (50 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
2. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

Retain paragraph below for projects where board insulation is serving as roof air barrier. Coordinate requirement for making transition from insulation to wall air barrier in Division 07 air barrier section.

3. **Seam Tape**: Tape seams of board insulation to form unbroken air barrier across plane of insulation. Repair damaged facing with seam tape.

D. **Blanket Insulation**: Install insulation concurrently with metal roof panel installation, in thickness indicated to cover entire roof, according to manufacturer's written instructions and as follows:
1. Set vapor retarder faced units with vapor retarder **[to warm side]** of construction unless otherwise indicated. Do not obstruct ventilation spaces.
2. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
3. Install blankets straight and true in one-piece lengths with both sets of facing tabs sealed. Comply with the following installation method:

a. **Over-Purlin-with-Spacer-Block Installation**: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.

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Retain above or below based upon insulation requirements of project.

b. **Two-Layers-between-Purlin-with-Spacer-Block Installation**: Extend insulation and vapor retarder between purlins. Carry vapor retarder facing tabs up and over purlins, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.

4. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
5. **Thermal Spacer Blocks**: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

5.43.4 UNDERLAYMENT INSTALLATION

Retain this article for metal roof panels applied over solid roof sheathing where additional protection is desired.

A. **Self-Adhering Sheet Underlayment**: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm).[Extend underlayment into gutter trough.] Roll laps with roller. Cover underlayment within 14 days.
1. Apply over entire roof surface.

B. Apply slip sheet over underlayment before installing metal roof panels.

~~C.~~B. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

~~5.5~~3.5 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

~~Retain first paragraph below to allow thermal movement for panels. Delete for fixed panels. Tremco recommends allowing thermal movement when individual panels are 40 feet or greater in length.~~

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
1. Point of Fixity: Fasten each panel along a single line of fixing located at ~~[~~eave~~]~~ **[**ridge**]**.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:
1. Commence metal roof panel installation and install minimum of 300 sq. ft. (27.8 sq. m.) in presence of factory-authorized representative.
2. Field cutting of metal panels by torch or abrasive saw is not permitted.

~~Retain first subparagraph below if metal roof panels are installed over purlins.~~

~~3. Install panels perpendicular to supporting purlins.~~
~~4.~~3. Locate and space fastenings in uniform vertical and horizontal alignment.
~~5.~~4. Provide metal closures at rake edges, rake walls, and each side of ridge and hip caps.
~~6.~~5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
~~7.~~6. Install ridge and hip caps as metal roof panel work proceeds.

~~Retain first subparagraph below if end splices are allowed.~~

~~8. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.~~
~~9.~~7. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:
1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
1. Use slip sheet where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

~~5.6~~3.6 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended 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. Erection Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet (1:960) on slope and location lines as indicated and within 1/8-inch (3 mm) offset of splices and alignment of matching profiles.
4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

~~Retain "Watertight Installation" Subparagraph below for hydrostatic (watertight) panel installation; delete if not required.~~

5. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.

b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

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~~5.7~~3.7 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. 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. Form trim and transition joints using compressed joints with captive butyl sealant capable of resisting static water pressure. Cleated joints and exposed joint sealants do not meet this requirement.
2. Install exposed flashing and trim that is without excessive oil canning, 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 to result in waterproof and weather-resistant performance.
3. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) 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 (25 mm) deep, filled with mastic sealant (concealed within joints).

C. **Gutters**: Join sections with riveted and soldered or lapped, riveted, and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. **Downspouts**: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
   1. Provide elbows at base of downspouts to direct water away from building.
   2. Connect downspouts to underground drainage system indicated.

E. **Roof Curbs**: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

F. **Pipe Flashing**: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

~~Retain snow guards where sliding snow presents a hazard to pedestrians or otherwise requires control. Edit below to describe extend and configuration of snow guards, or indicated layout on drawings.~~

G. ~~**Bar-Type Snow Guards**: Attach bar supports to vertical ribs of standing-seam metal roof panels with clamps or set screws in array recommended by snow guard manufacturer. Do not use fasteners that will penetrate metal roof panels~~.

~~5.8~~3.8 FIELD QUALITY CONTROL

Retain this Article if field testing and inspecting are required. Revise to suit local practices and requirements of authorities having jurisdiction if applicable.

A. Testing Agency: **Owner will engage** a qualified independent testing and inspecting agency to perform substrate examination, interim observations, and final roof inspections, and to prepare reports.

B. Testing Agency: **Contractor shall engage** a qualified independent testing and inspecting agency acceptable to Owner for a minimum of [5] [7] [10] full-time days on site to perform substrate examination, interim observations, and final roof inspections, and to prepare reports.

Retain above or below. Coordinate with Quality Assurance Article in Part 1. Provide for inspection at 1 day per 100 squares of roofing over 200 squares.

C. Manufacturer's Technical Representative: Engage a qualified manufacturer's technical representative acceptable to Owner for a minimum of [5] [7] [10] full-time days on site to perform substrate examination, interim observations, and final roof inspections, and to prepare reports.

D. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

E. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

~~5.9~~3.9 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13