Amphitheater Public Schools

Copper Creek Elementary School
MPR Roof Replacement

BG Project No.: 17.14.72
SFB Project No.: BRG-DSGN-00357

100% Construction Document Specifications

REGISTRATION EXPIRATION DATE: 3/31/2023

November 2021

Breckenridge
group
architects
planners
1735 e ft. lowell rd. #12
tucson arizona 85719

1 REV 1 - 12/16/2021 -
Section 073217 - Clay Roof Tiles (added)
Section 075216 - Concrete Roof Tiles (removed)
Section 075216 - SBS Modified Bituminous Membrane Roofing: 2.1C (modified)

SECTION 000110
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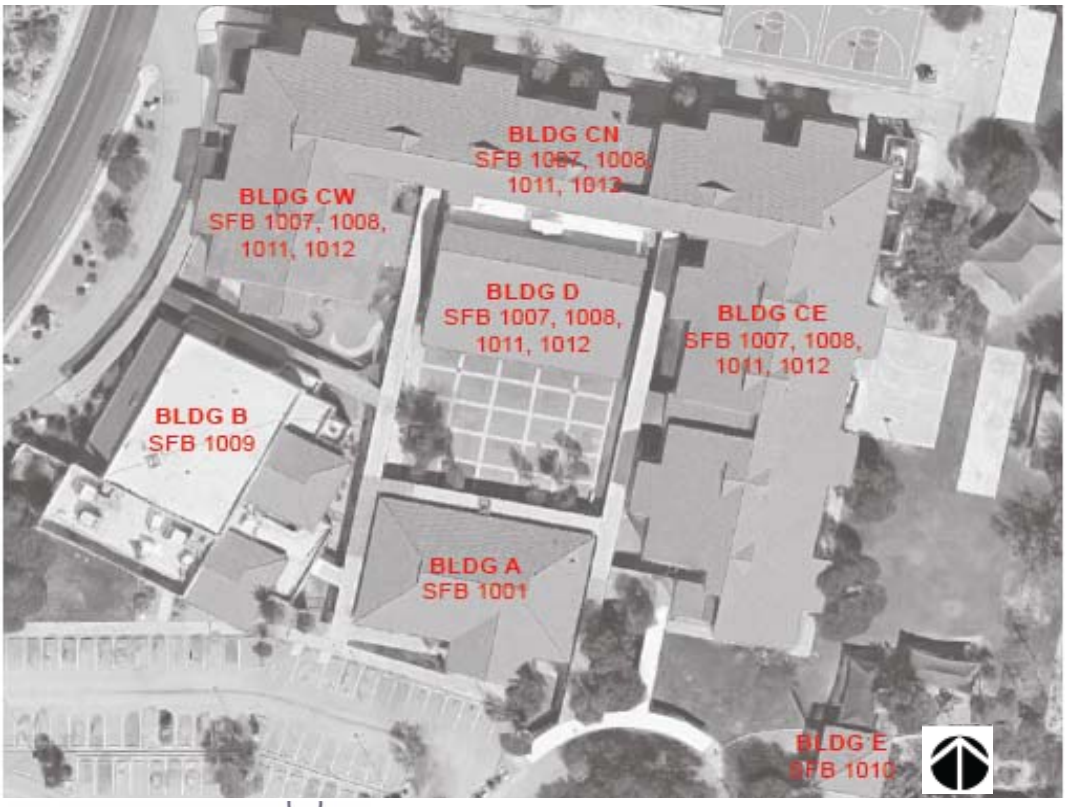
AMPHITHEATER
Public Schools

Copper Creek Elementary School

MPR Roof Assessment Document

SFB Project No. BRG__ASMNT- 00020



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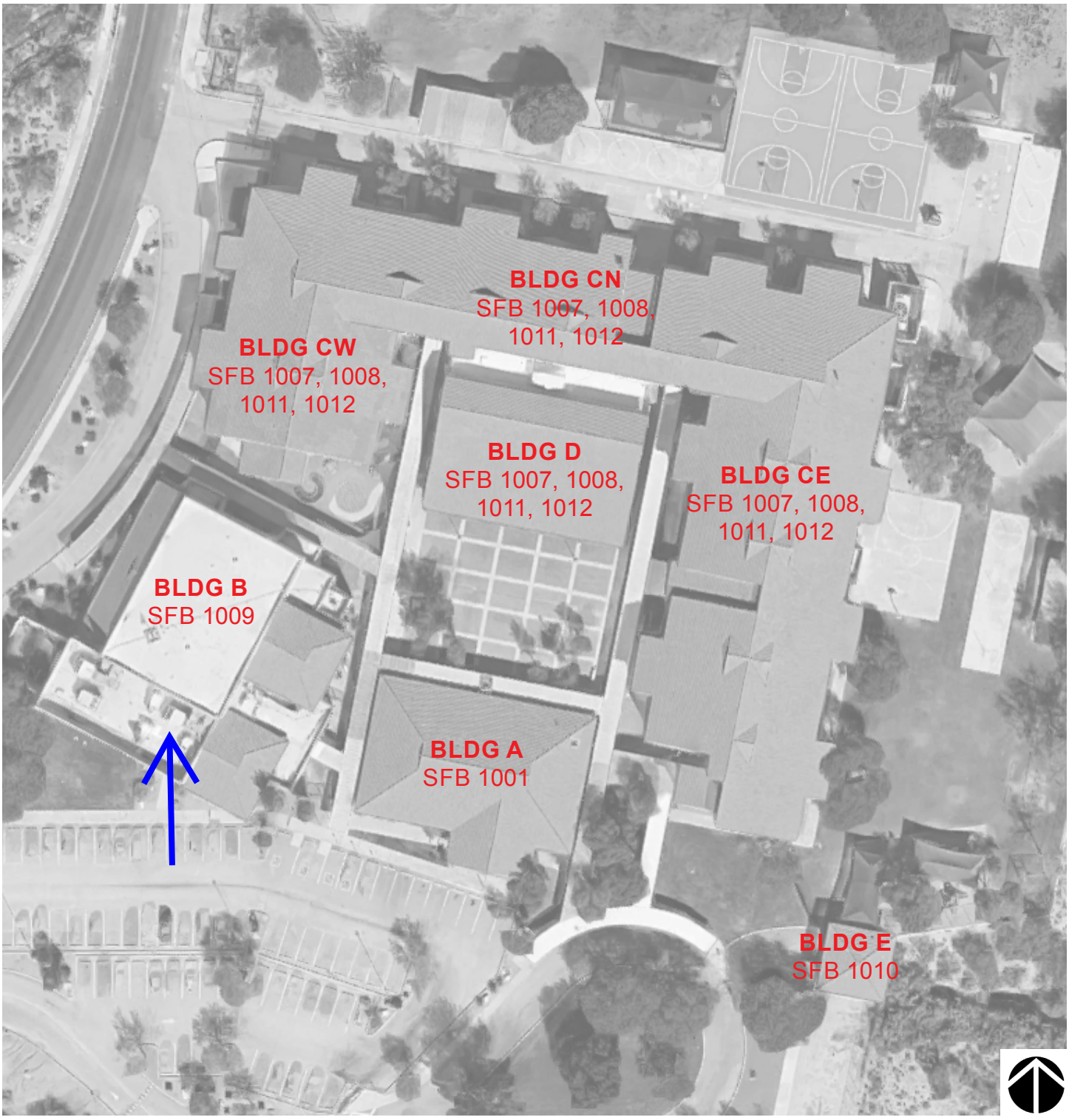
February 25, 2021

COPPER CREEK ELEMENTARY SCHOOL - **COP**

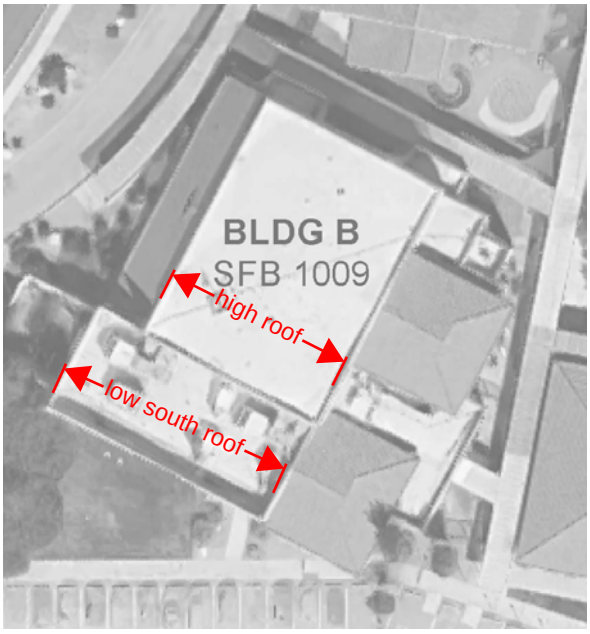
11620 N COPPER SPRINGS TRAIL, ORO VALLEY, AZ 85737



School:	Copper Creek Elementary School			CTDS:	100210118				
Building No	Building Desc.	Building Use	Year Built	Grades Served	Gross Area	Gross Excluded	Net Area	Int Cord	SFB Fund
1001	Administration	Administration	1978	E	5,800	0	5,800	Y	N
1007	Classroom, Library - Original - First Floor	Classrooms, Library	1987	E	30,385	0	30,385	Y	N
1008	Classroom, Library - Addition #1 - First Floor	Classrooms	1994	E	16,360	0	16,360	Y	N
1009	MPR	MPR	1987	E	13,636	0	13,636	Y	N
1010	Storage Room	Storage	1987	E	676	0	676	N	N
1011	Classroom, Library - Original - Second Floor	Classrooms	1987	E	25,445	0	25,445	Y	N
1012	Classroom, Library - Addition #1 - Second Floor	Classrooms	1994	E	13,700	0	13,700	Y	N
Totals:					**106,002**	**0**	**106,002**		

1 EXECUTIVE SUMMARY

AMPHITHEATER PUBLIC SCHOOLS
COPPER CREEK ELEMENTARY SCHOOL - MPR ROOF ASSSESSMENT
11620 N. Copper Springs Trail Building 'B' – SFB Bldg #1009
Total building square footage = 16,636 s.f.
Observation Date: January 5, 2021



Description of Facility
The campus, located at **11620 Copper Springs Trail, Oro Valley, AZ** consists of multiple buildings as shown on previous page campus map. Observations for this assessment report include only the MPR building 1009, (Amphi Building 'B') at both the high and low parapet roof conditions, but not including clay tile roof areas, except for incidental observations of deterioration noted at the west sloped tile roof. Roof core samples were taken at all the parapet roof areas. Typical exterior walls and parapets are CMU masonry. The as-built roof structure appears to be mostly plywood deck on wood framed roof joists and trusses, with a built-up roof system (BUR) directly over plywood deck. At some incidental add-on canopy locations there is self adhered roofing on rigid insulation on metal deck on steel joists.

Date of inspections : January 5, 2021
District representative: Rich LaNasa
Prepared by: Scott Rumel, RA
System type: Low slope roofs with built-up roofing
Roof access: Internal roof hatch to south roof, fixed parapet ladder to high roof. Ladder access to low roofs

Weather conditions: Mostly clear
Temp: 65 deg
Arrived on site: 10:00 a.m.
Departed: 12:00 noon.
Eave height: varies – estimated 24' from exterior finish grade up to high parapet

Report Contents
The report is divided into three parts that include:
1) executive summary
2) inspection notes & terminology
3) observation notes & photos

Inspection notes, section "2", include a variety of roofing terms, categories, and conditions applicable to the inspection and observation of each roof area. Observation photos, section "3", are a visual summary of existing conditions, including a brief written description of conditions, issues and deficiencies observed at each roof area.

continued…

Low northeast roof areas summary

A more detailed list of terms and issues is described in the following sections of the report, but the condition of the low roof areas can generally be described as failed roof systems in need of replacement. The roof coating is in worn condition, that is cracked and peeling in some locations. Better cricketing around various roof penetrations and scuppers would contribute to less ponding and better drainage. At the small most north roof area there is a roof drain with what appears to be an overflow drain that has non-compliant invert elevation and flashing. Two other issues related to the existing low roof configuration include deterioration of sheet metal coping cap assemblies at the top of parapet walls, and at the intersection with adjacent high walls.

In conclusion, the low northeast roof areas are recommended to be replaced before condition of the roofs degrade further.

Low northwest roof area summary

A more detailed list of terms and issues is described in the following sections of the report, but the condition of the low roof areas can generally be described as failed roof systems in need of replacement. The roof coating is in worn condition, that is cracked and peeling in some locations. Better cricketing around various roof penetrations and scuppers would contribute to less ponding and better drainage. There is a roof drain with what appears to be an overflow drain that has non-compliant invert elevation and flashing. Two other issues related to the existing low roof configuration include deterioration of sheet metal coping cap assemblies at the top of parapet walls, and at the intersection with adjacent high walls.

In conclusion, the low northwest roof area is recommended to be replaced before condition of the roof further degrades.

Low south roof/ equipment well summary

A more detailed list of terms and issues is described in the following sections of the report, but the condition of the low south roof area can generally be described as a poor-to-failed roof system in need of replacement. The roof coating is in worn condition, that is cracked in some locations. Better cricketing around various curbs and roof penetrations and scuppers would contribute to less ponding and better drainage. Metal coping cap assemblies at the top of parapet walls show signs of deterioration, and adjoining exposed CMU parapet walls should receive membrane flashing or water repellant coating to protect the wall from absorbing moisture that will migrate into the wall behind flashing.

In conclusion, the low south roof area is recommended to be replaced before condition of the roof further degrades.

High roof area summary

A more detailed list of terms and issues is described in the following sections of the report, but the condition of the high roof area can generally be described as being in poor condition, in need of replacement. The roof coating and cap sheet membrane are in a worn condition. Although this roof is relatively uncluttered with mechanical equipment or roof penetrations, there are roof vents that may no longer be needed, or if left in place, will require a raised curb to comply with 8” minimum curb height. The perimeter parapet conditions show signs of cracking and splitting, and show signs of previous repair for leaks. This roof might be considered for restoration roofing (applied over existing roofing), but there is a question of proper bonding over the existing roof coating, and new cant strips and flashing at the parapets to wrap up the face of the exposed CMU and under the coping cap (and replacement of the coping cap) would be needed to serve the cause of proper moisture resistance and roofing longevity.

In conclusion, the high roof area is considered to be in poor condition, for which replacement roofing is recommended, but restoration roofing could be considered as a more cost effective remedy.

continued…

Low east roof/ equipment well summary

A more detailed list of terms and issues is described in the following sections of the report, but the condition of the low east roof area can generally be considered to be in poor condition in need of replacement. The roof coating is in worn condition, that is cracked in some locations. Better cricketing around various curbs, roof penetrations and roof drains would contribute to less ponding and better drainage, including improvements needed along existing cricket flow lines. Metal coping cap assemblies at the top of parapet walls show signs of deterioration, and adjoining exposed CMU parapet walls should receive membrane flashing or water repellant coating to protect the wall from absorbing moisture that will migrate into the wall behind flashing. Splash pads should be placed at downspout locations to reduce possible scouring damage.

In conclusion, the east roof area is in overall poor condition and is recommended to be replaced before the roof further degrades.

Sections on "**inspection notes**" and "**observation photos**" follow, with more notes at each roof area.

Yours Truly,

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2 INSPECTION NOTES AND TERMINOLOGY

AMPHITHEATER PUBLIC SCHOOLS
COPPER CREEK ELEMENTARY SCHOOL - MPR ROOF ASSSESSMENT
11620 N. Copper Springs Trail Building 'B' – SFB Bldg #1009
Total building square footage = 16,636 s.f.
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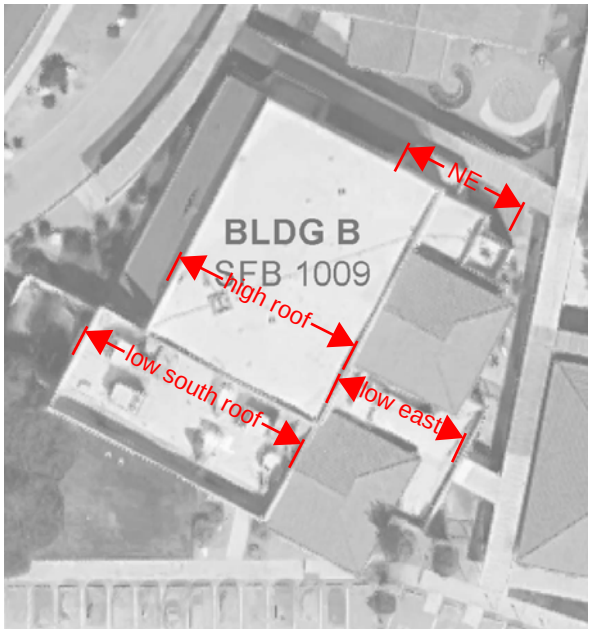

North

INSPECTION NOTES – LOW NORTHEAST ROOFS
Low north roof square footage = 600-700 s.f. +/-
Installed: assumed to be part of original 1987 construction
System type: Built-up roof system (BUR)
Slope: 1/4" : 12"
Roof access: Ladder
Overall rating and recommendations: Poor to Failed – Roof replacement recommended

The following conditions were observed during inspection of the low northeast roof areas - Refer to attached photos and notes section for description of specific circumstances and description of coring samples:

Signs of minor membrane splits: Membrane splits are usually caused by building movement, ridges, and expansion and contraction. Such movement can be caused by lack of attachment of one or more of the component parts of the roof system, or where the building itself generates movement. Weak or inflexible membranes reach a point where they cannot accommodate further movement. At this time the roof membrane splits open. The open split will allow water to enter the roofing system, saturating the insulation, and cause leaks into the building. If allowed to persist, the area of damage will expand.

Signs of minor ridges: These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate. Ridges are formed by either thermal changes expanding and contracting the roofing felts or by gaps in the underlying insulation that allow vapor to migrate upwards through the roof system. Over a period of time ridges will grow and erode until they are stripped of their protective asphalt. These exposed ridges, through repeated weather cycling, will eventually crack and split to allow water into the roof system.

Reglet Joint Deterioration: Expansion and contraction of the wall metal counter flashing coupled with the exposure to UV rays causes associated caulking to crack over time. This allows water to enter behind the metal and run down the wall. If any failure exists in the underlying BUR flashing membrane, leaks will occur.

continued...

Low Northeast Roofs Inspection notes continued:

Ponding: Ponding water occurs when moisture collects on the surface of a roof system. Ponding can form due to the following: 1) roof drains are blocked or clogged with debris, 2) the insulation package has lost dimensional stability and has reduced in thickness, 3) poor slope to drain design via overbuilt crickets or tapered insulation system, 4) roof drains are built alongside building support columns which maintain a consistent height under load while the balance of the roof system is applied over a live deck which tends to move and deflect under normal seasonal load. In all cases, roof depressions that collect and hold water can grow in size if added weight of the ponding water continues to deflect the roof deck even further.

This condition can damage the roof in a number of ways. Additional structural loads create more movement of the roof assembly creating more tear stress, and, of course, a potential for structural issues. UV intensity also increases under ponding conditions as the sun's rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods.

Perimeter Flashing Deterioration: Roof failures can start at perimeter locations. Metal edge conditions that are poorly designed, improperly installed, or aging, can fail due to the extreme expansion and contraction typical with metal. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building interior.

Coping Cap Seam Deterioration: Coping cap joints commonly leak due to the expansion and contraction and/or capillary action that takes place between two pieces of metal that make up the coping lap joints. In addition, a combination of factors such as poor joint design, poor installation, and incorrect material choice may cause the sealant in the joint to fail. Once the joint leaks water will infiltrate the flashing, walls, and roofing system, and probably leak into the building.

Caulking Deterioration: As caulking is exposed to UV rays and temperature fluctuations it loses its flexibility and develops cracks. Once this occurs, splits develop, allowing water to penetrate walls and buildings.

INSPECTION NOTES – LOW NORTHWEST ROOF

Low north roof square footage = 200 s.f. +/-
Installed: assumed to be part of original 1987 construction
System type: Built-up roof system (BUR)
Slope: 1/4" : 12"
Roof access: Ladder
Overall rating and recommendations: Poor – Roof replacement recommended

The following conditions were observed during inspection of the low northwest roof area - Refer to attached photos and notes section for description of specific circumstances and description of coring samples:

Signs of minor membrane splits: Membrane splits are usually caused by building movement, ridges, and expansion and contraction. Such movement can be caused by lack of attachment of one or more of the component parts of the roof system, or where the building itself generates movement. Weak or inflexible membranes reach a point where they cannot accommodate further movement. At this time the roof membrane splits open. The open split will allow water to enter the roofing system, saturating the insulation, and cause leaks into the building. If allowed to persist, the area of damage will expand.

Reglet Joint Deterioration: Expansion and contraction of the wall metal counter flashing coupled with the exposure to UV rays causes associated caulking to crack over time. This allows water to enter behind the metal and run down the wall. If any failure exists in the underlying BUR flashing membrane, leaks will occur.

continued…

Low Northwest Roof Inspection notes continued:

Perimeter Flashing Deterioration: Roof failures can start at perimeter locations. Metal edge conditions poorly designed, improperly installed, or aging, can fail due to the extreme expansion and contraction typical with metal. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building interior.

Coping Cap Seam Deterioration: Coping cap joints commonly leak due to the expansion and contraction and/or capillary action that takes place between two pieces of metal that make up the coping lap joints. In addition, a combination of factors such as poor joint design, poor installation, and incorrect material choice may cause the sealant in the joint to fail. Once the joint leaks water will infiltrate the flashing, walls, and roofing system, and probably leak into the building.

Caulking Deterioration: As caulking is exposed to UV rays and temperature fluctuations it loses its flexibility and develops cracks. Once this occurs, splits develop, allowing water to penetrate walls and buildings.

INSPECTION NOTES – LOW SOUTH ROOF/ EQUIPMENT WELL

Low south roof square footage = 3000 s.f. +/-
Installed: assumed to be part of original 1986 construction
System type: Built-up roof system (BUR)
Slope: 1/4" : 12"
Roof access: Roof hatch (roof hatch not locking)
Overall rating and recommendations: Poor to Failed – Roof replacement recommended

The following conditions were observed during inspection of the low south roof area - Refer to attached photos and notes section for description of specific circumstances and description of coring samples:

Signs of minor membrane splits: Membrane splits are usually caused by building movement, ridges, and expansion and contraction. Such movement can be caused by lack of attachment of one or more of the component parts of the roof system, or where the building itself generates movement. Weak or inflexible membranes reach a point where they cannot accommodate further movement. At this time the roof membrane splits open. The open split will allow water to enter the roofing system, saturating the insulation, and cause leaks into the building. If allowed to persist, the area of damage will expand.

Perimeter Flashing Deterioration: Roof failures can start at perimeter locations. Metal edge conditions poorly designed, improperly installed, or aging, can fail due to the extreme expansion and contraction typical with metal. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building interior.

Coping Cap Seam Deterioration: Coping cap joints commonly leak due to the expansion and contraction and/or capillary action that takes place between two pieces of metal that make up the coping lap joints. In addition, a combination of factors such as poor joint design, poor installation, and incorrect material choice may cause the sealant in the joint to fail. Once the joint leaks water will infiltrate the flashing, walls, and roofing system, and probably leak into the building.

Caulking Deterioration: As caulking is exposed to UV rays and temperature fluctuations it loses its flexibility and develops cracks. Once this occurs, splits develop, allowing water to penetrate walls and buildings.

Reglet Joint Deterioration: Expansion and contraction of the wall metal counter flashing coupled with the exposure to UV rays causes associated caulking to crack over time. This allows water to enter behind the metal and run down the wall. If any failure exists in the underlying BUR flashing membrane, leaks will occur.

continued…

INSPECTION NOTES – HIGH ROOF AREA
High roof square footage = 5,000 s.f. +/- estimated
Installed: assumed to be part of original 1986 construction
System type: Built-up roof system (BUR)
Slope: 1/4" : 12"
Roof access: Parapet wall roof ladder from low south roof to high roof
Overall rating and recommendations: Poor – Roof replacement recommended

The following conditions were observed during inspection of the high roof area - Refer to attached photos and notes for description of specific circumstances and description of coring samples taken:

Coping Cap Seam Deterioration: Coping cap joints commonly leak due to the expansion and contraction and/or capillary action that takes place between two pieces of metal that make up the coping lap joints. In addition, a combination of factors such as poor joint design, poor installation, and incorrect material choice may cause the sealant in the joint to fail. Once the joint leaks water will infiltrate the flashing, walls, and roofing system, and probably leak into the building.

Ponding: Minor signs of ponding were observed at the low north roof area.
This condition can still damage the roof. For example, UV intensity increases under ponding conditions as the sun's rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods. Wintertime ponding water will expand as it freezes. This expansion will weaken small imperfections in the roof system. Small cracks and tears will widen until they rupture to allow water into the building.

Exposed Felts: Weathering causes the roof's surfacing materials to oxidize and wear away after a period of time- Loss of protection from the surfacing material results in accelerated deterioration of the primary waterproofing asphalt, along with effectiveness of reinforcement plies which provide the strength for the system. The exposed reinforcement will begin to absorb and wick moisture into the built up layers of the roof system. This condition can lead to more damage via blisters and layer delamination.

Alligatoring at Perimeter cant strips: Alligatoring is the result of drying out and shrinking of the asphalt surface resulting in a "mud-cracking" pattern. As the surface continues to shrink and dry out, cracks will develop down to the depth of felts. Alligatoring appears at parapet wall flashing conditions.

INSPECTION NOTES – LOW EAST ROOF/ EQUIPMENT WELL AREA
High roof square footage = 5,000 s.f. +/- estimated
Installed: assumed to be part of original 1986 construction
System type: Built-up roof system (BUR)
Slope: 1/4" : 12" +
Roof access: Roof hatch
Overall rating and recommendations: Poor – Roof replacement recommended

The following conditions were observed during inspection of the low east roof/ equipment well area - Refer to attached photos and notes for description of specific circumstances and description of coring samples taken:

Coping Cap Seam Deterioration: Coping cap joints commonly leak due to the expansion and contraction and/or capillary action that takes place between two pieces of metal that make up the coping lap joints. In addition, a combination of factors such as poor joint design, poor installation, and incorrect material choice may cause the sealant in the joint to fail. Once the joint leaks water will infiltrate the flashing, walls, and roofing system, and probably leak into the building.

continued…

Ponding: Minor signs of ponding were observed at the low north roof area.
This condition can still damage the roof. For example, UV intensity increases under ponding conditions as the sun's rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods. Wintertime ponding water will expand as it freezes. This expansion will weaken small imperfections in the roof system. Small cracks and tears will widen until they rupture to allow water into the building.

Splits/ Tears (primarily at perimeter cant strip and flashing): Membrane splits are usually caused by building movement, ridges, and expansion and contraction. Such movement can be caused by lack of attachment of one or more of the component parts of the roof system, or where the building itself generates movement. Weak or inflexible membranes reach a point where they cannot accommodate further movement. At this time the roof membrane splits open. The open split will allow water to enter the roofing system, saturating the insulation, and cause leaks into the building. If allowed to persist, the area of damage will expand.

Perimeter Flashing Deterioration: Roof failures can start at perimeter locations. Metal edge conditions poorly designed, improperly installed, or aging, can fail due to the extreme expansion and contraction typical with metal. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the building interior.

END OF INSPECTION NOTES
OBSERVATION PHOTOS FOLLOW

3 OBSERVATION NOTES AND PHOTOS

AMPHITHEATER PUBLIC SCHOOLS
COPPER CREEK ELEMENTARY SCHOOL - MPR ROOF ASSSESSMENT
11620 N. Copper Springs Trail Building 'B' – SFB Bldg #1009
Total building square footage = 16,636 s.f.
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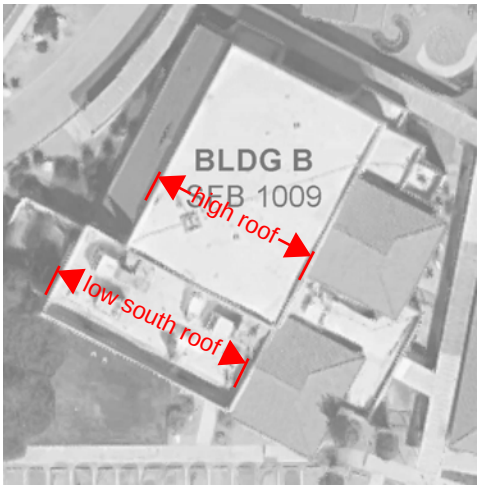
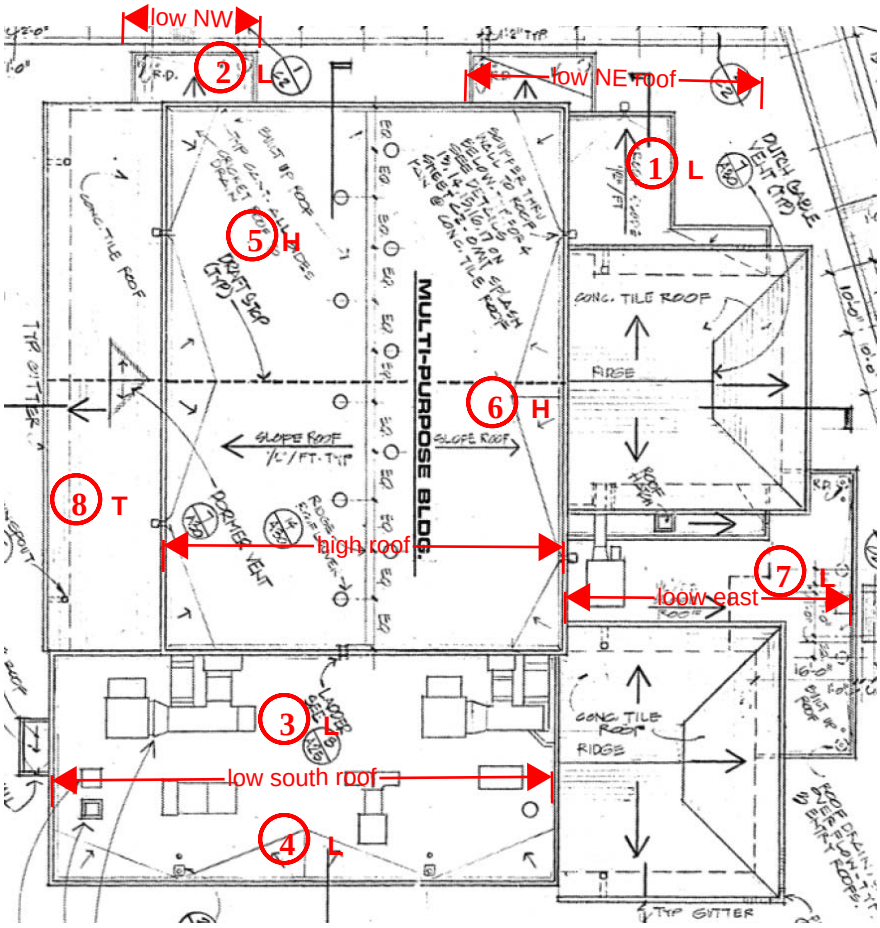


KEY TO SYMBOLS:

⊙ = Observation Point Number
e.g. bldg 'B', observation point #1

H = High Main Roof
L = Low Roof
T = Tile Roof

Key to Building 'B' Observation Points



(Building 'B' Reference Roof Plan) North

BUILDING 'B' OBSERVATIONS

Observation Point 1
(Low Northeast Roof)

- Signs of splits and brittleness.
- Inadequate flashing where roof meets high walls.
- Scouring protection needed where downspout meets rooftop.
- Cracking and alligatoring at cant strips.
- Signs of aged parapet coping caps and joints.
- Signs of ponding water at scupper flow lines.
- Signs of patching at intersection between parapet wall and flashing, presumably to address leaking.

- Roof core shows evidence of three course BUR on plywood deck, with indication of dried asphalt.

BUILDING 'B' OBSERVATIONS

Observation Point 1
(Low North Roof)

- Signs of some cracking and splits at cant strips.
- Signs of ponding near roof drain.
- Improperly placed and flashed roof overflow drain.
- Signs of aged parapet coping caps and joints.

Observation Point 1
(Low Northeast Roof Equipment Well)

- Non-compliant equipment curb less than 8" above rooftop.
- Roof core shows evidence of two course self adhered BUR over 2" rigid insulation (no cover board) on metal B deck – BUR plies show signs of little tensile strength.

BUILDING 'B' OBSERVATIONS

Observation Point 2
(Low Northwest Roof)

- Signs of some cracking and splits at cant strips.
- Signs of ponding near roof drain.
- Improperly placed and flashed roof overflow drain.
- Signs of aged parapet coping caps and joints.
- Inadequate flashing where roof meets high walls and where low parapet meets high walls.

- Roof core shows evidence of three course BUR on plywood deck, with indication of dried asphalt.

BUILDING 'B' OBSERVATIONS







Observation Point 3
(Low South Roof/ equipment well - north side)

- Roof core shows evidence of three course BUR on plywood deck, with indication of dried asphalt.
- Signs of ponding and roofing deterioration.

- Signs of failed sealant at counterflashing and cracking where roofing meets counterflashing – Lack of tapered intersection between roof and flashing. Signs of patching indicate possible leaking.
- Signs of ponding and roofing deterioration.

BUILDING 'B' OBSERVATIONS

<u>Observation Point 4</u>
(Low South Roof/ equipment well - south side)

- Signs of ponding and roofing deterioration.
- Water absorption could be taking place into exposed CMU, where membrane flashing up the face of the wall or at very least water repellant coating would offer protection.
- Some signs of coping cap and coping cap seam deterioration.

- Roof hatch not locking.

- Roof core (taken at cricket) shows evidence of three ply BUR on plywood deck, with indication of dried asphalt.

- Signs of failed sealant at counterflashing and cracking where roofing meets counterflashing – Lack of tapered intersection between roof and flashing. Signs of patching indicate possible leaking.
- Signs of minor membrane splits/ cracking at equipment curb cants and cricketing, plus signs of ponding. Signs of patching indicate possible leaking.

BUILDING 'B' OBSERVATIONS

Observation Point 5
(High Roof – west side)

- Roof core (taken at mid-roof) shows evidence of three ply BUR on plywood deck, with indication of dried asphalt.

- Roofing shows signs of UV degradation and patches of faded roof coating are visible throughout the roof, where the roof coating may not be properly bonded to, or incompatible with, the underlying coating.
- Existing roof vents are likely no longer necessary, but if retained, need new curbs to comply with requirements for being raised 8" above the roof.

- Signs of cracking and splits at cant strips and parapet flashing.
- Signs of patching at parapet flashing indicate possibility of leaking.
- Signs of aged parapet coping caps and joints.
- Signs of patching at scuppers and overflow scuppers indicate possibility of leaking.
- Signs of ponding around scupper boxes.

BUILDING 'B' OBSERVATIONS

Observation Point 6
(High Roof – west side)

- Roofing shows signs of UV degradation and patches of faded roof coating are visible throughout the roof, where the roof coating may not be properly bonded to, or incompatible with, the underlying coating.
- Existing roof vents are likely no longer necessary, but if retained, need new curbs to comply with requirements for being raised 8" above the roof.
- Roof core (taken at east cricket area) shows evidence of three ply BUR on plywood deck, with indication of dried asphalt.

- Junction box and conduit mounting over top of parapet does not account for much movement, and also has mounting configuration that retains water at parapet cap.

- Signs of aged parapet coping caps and joints.

- Signs of cracking and splits at cant strips and parapet flashing.
- Signs of patching at parapet flashing indicate possibility of leaking.

BUILDING 'B' OBSERVATIONS

Observation Point 7
(Low East Roof/ Equipment Well)

- Scouring protection needed where downspout meets rooftop.
- Signs of ponding along cricket valley flow lines – slopes may need enhancement.

- Duct support legs need slip pads and various duct penetrations may need raised curbs to meet 8" minimum height above rooftop criteria.
- Signs of aged parapet coping caps and joints.

- High walls adjoining BUR and clay tile roof areas likely need weatherization treatment to provide better masonry coating to reduce possible moisture absorption into the wall where water could migrate behind flashing and into the roof structure or into the building.

BUILDING 'B' OBSERVATIONS

Observation Point 7
(Low East Roof/ Equipment Well)

- Signs of cracking and splits at cant strips and parapet flashing.
- Signs of patching at parapet flashing indicate possibility of leaking.
- Scouring protection is needed where downspout meets rooftop.

- Roof core shows evidence of three ply BUR on plywood deck, with indication of dried asphalt.

BUILDING 'B' OBSERVATIONS

Observation Point 8
(West Low Roof)

In general, tile roof areas were not included under observation since they appear to be in good condition, however, casual observation of the west tile roof area noted the following concerns:

- Various areas of broken or loose tiles prompt concern for subsequent compromise of roof integrity.
- Observation of flashing from adjacent low north roof noted that sealant at surface mounted flashing is cracked and needs replacement to maintain watertight integrity.

Miscellaneous Interior Observation

- Signs of water damage at storage room drywall ceiling below low north roof area.

STRUCTURAL CONCEPTS INC.
CONSULTING ENGINEERS

06 October 2021

Mr. Shane Chism, AIA
Breckenridge Group
1735 E. Fort Lowell Road, #12
Tucson, Arizona 85719

Subject: Structural Review of Proposed Roofing Replacement
Copper Creek Elementary School
11620 N. Copper Springs Trail, Oro Valley, Arizona 85737
Owner: Amphitheater Public Schools
SCI Project No. 21-192

Dear Mr. Chism:

In accordance with your request, we have completed a structural review of the proposed roofing replacement at Cooper Creek Elementary School. It is our understanding the roofing replacement is slated for the multipurpose building "B"– SFB Building #1009. The evaluation included the review of the architectural roof evaluation report, photos taken during the architectural investigation, the original construction drawings for the noted building, and the architectural drawings for the proposed replacement. Neither the review nor this report is intended to cover mechanical, electrical, or architectural features.

The subject building has multiple roof elevations and was constructed in 1987. The building roof structures are constructed typically of wood trusses, engineered timber members, or sawn lumber members, and plywood roof sheathing, supported by concrete masonry bearing walls and columns. Existing roof materials are typically three-layer built-up roof system, and at some attached canopy locations, the roofing system consists of a two-layer self-adhered roofing on rigid insulation on metal deck. Three areas of tiled roof are specifically excluded from this review.

The architectural assessment indicates that the built-up roof systems are failed in some areas and in need of replacement. There is evidence of patching at the intersection between parapet walls and flashing. Additionally, the architectural assessment notes that flashing at curbs, parapets and roof transitions are weathered and/or deteriorating. The architectural assessment indicates that there are signs of water ponding and roof deterioration on multiple areas. Based on the evidence of water infiltration and failed flashing, it is possible that structural components have been exposed to water leading to compromising damaged. It is likely that select areas of structural plywood will require replacement. It is possible that isolated structural roof framing members may require replacement.
During the construction phase, it is recommended to assess the condition of the structural plywood sheathing and select roof framing members after removal of the existing roofing materials. All

sheathing panels identified to have experienced degradation should be replaced like-in-kind, New panels shall be fastened to the structural framing members with the more stringent attachment as specified in the original drawings or as specified as minimally required by the 2018 International Building Code.

Where sheathing panels are removed for replacement, all adjacent roof joist, trusses, and beams shall be visually inspected for evidence of degradation. Degraded structural members shall be replaced like-in-kind or repaired in-place based on engineered repair details. General review and consideration of the roof framing may be performed by the architect and an experienced and trusted contractor with the owner's representative for like-in-kind replacement. A structural engineer may also perform the general review. A structural engineer should be contacted for inspection of moderate to severe degraded conditions and for the design of in-place repairs.

Architectural recommendations intend to replace existing roofing with a high-performance modified built-up roofing system over the structural deck. Existing roofing in most locations appears to consist of a three-layer built-up roof system applied directly over plywood sheathing. Based on the available information, it appears the new roof loads will increase the original design roof loads by approximately five-percent. As per chapter 502.4 of the *2018 International Existing Building Code*, it is generally acceptable for loads to increase up to five-percent. Based on this allowance, existing sound structural roof framing members will be sufficient for the proposed roofing repairs. Our office shall be contacted if there is a possibility that these assumed loads will increase. Please consider that a location specific review can be performed by our office at the request of the client/owner.

This report is based on visual observations and there is no claim, either stated or implied, that all conditions were observed. If the contractor or architect identifies areas of concern during the repair of the existing roofing materials, our office should be contacted for further evaluation.

We hope this report is responsive to your needs. Please do not hesitate to call our office at (520) 721-2324 if you have any questions.

Sincerely,
Structural Concepts Inc.,

Prepared by,

Manuel Naves, EIT
Structural Designer

Reviewed by,

Registered Professional Engineer (Structural)
55005
JENNIFER M. PATRONSKI
Date Signed 10/6/2021
ARIZONA, U.S.A.

Jennifer McMahon Patronski, S.E.
Principal | Structural Engineer

SECTION 011000
SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.

1.2 PROJECT INFORMATION

A. Project Identification: Copper Creek Elementary School MPR Roof Replacement.

1. Project Location: 11620 N. Copper Spring Trail, Oro Valley, Arizona 85737.

B. Owner: Amphitheater Public Schools, 701 W. Wetmore Road, Tucson, Arizona 85705.

1. Owner's Representative: Tracy Hill.

C. Architect: Breckenridge Group Architects/Planners, 1735 E. Fort Lowell Road #12, Tucson, Arizona 85719.

1. Managing Principal: Klindt Breckenridge.
2. Project Manager: Edgardo Parra.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Roof Replacement (Roof Tiles):

a. Remove existing roof tiles and salvage for re-installation. Remove existing underlayment to the structural deck and dispose of per local requirements.
b. Provide and install self-adhering sheet underlayment and re-install roof tiles as indicated on Drawings. Replace all missing, broken, or damaged tiles.
c. Clean and remove all debris caused by new construction.
d. Provide contractor's warranty and manufacturer's roof material and labor warranty as indicated in Specifications.
e. The roofing manufacturer shall submit an "Intent to Warrant" document and that document shall be included in the bid / quote submission.
f. Associated work as indicated on Drawings.

2. Roof Replacement (Built-Up Roofing):

a. Remove existing built-up roof down to the structural deck and dispose of per local requirements.

b. Remove existing wall flashings and dispose per local requirements.
c. Remove and replace all existing metal flashing, including but not limited to roof edge flashing, copings, base flashing, counterflashing, roof-penetration flashing, and parapet scuppers unless noted otherwise.
d. Remove all wood and PVC blocks supporting ductwork and piping/conduit. All ductwork and piping/conduit on roof shall be supported using factory fabricated assemblies of solid base polycarbonate, high density polypropylene plastic, recycled tire rubber, galvanized, or stainless steel.
e. Provide and install factory tapered crickets as required to create positive slope to drains and to eliminate ponding areas.
f. Provide and install roof insulation as indicated on Drawings, adhered to structural deck per specifications, and cover board, adhered to roof insulation.
g. Provide and install one layer of approved SBS-modified bitumen base sheet and one layer of approved SBS-modified bitumen cap sheet as indicated on Drawings.
h. Provide and install one layer of approved SBS-modified bitumen base flashing sheet and one layer of approved high-performance fabric reinforced thermoplastic membrane in approved flashing adhesive.
i. Clean and remove all debris caused by new construction.
j. Provide contractor's 2-year warranty and manufacturer's 20-year minimum roof material and labor warranty.
k. The roofing manufacturer shall submit an "Intent to Warrant" document and that document shall be included in the bid / quote submission.
l. Associated work as indicated on Drawings.

3. Low or abandoned conduit and piping shall be moved or removed by the Owner unless noted otherwise.
4. All other miscellaneous incidental work and coordination not shown that may be required to complete the project.

B. This work may be conducted during school session and as such the General Contractor shall make provisions for separating, with fencing and similar non-traversable barriers, the functioning school facilities including interior corridors, classrooms, exterior walkways and outdoor areas from all construction activities and areas, including but not limited to outdoor equipment, material storage, contractor parking, staging areas and equipment access routes.

C. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section. The Project site will be used by staff and students throughout the project and improvements will be coordinated with the campus schedule.

B. Use of Site: Limit use of Project site to areas within the Contract limits designated by Owner. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways, and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: All on-site work must take place during non-school hours.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

E. The contractor shall remember and remind its subcontractors that school may be in session during the construction period and proper behavior by all construction personnel is required. This shall include but not be limited to the following:

1. District campuses maintain a “No Tobacco” policy. This includes all tobacco product types including e-cigarettes.
2. Inappropriate language is not tolerated at any time.
3. Staring at students and staff is considered inappropriate and shall be avoided. Amphitheater Public School District policy adheres to the “Two Second Rule” which means, no vendors will look at (stare at) a student or staff member for more than two seconds.
4. Use of any school facilities including toilets, break areas, phones, computers, copiers / printers, office or classrooms, etcetera are not allowed at any time.
5. Contractor is responsible for protection of all furniture and equipment in occupied campus areas.
6. Any furniture that is moved or altered to perform work is to be replaced at the end of daily work shifts to its original position and condition.

7. The use of music radios when school is in session is prohibited.

F. Amphitheater Public Schools maintains a “zero tolerance policy” on these points of emphasis and any breach of this policy shall be grounds for removing the party from the project and at the sole discretion of the District Staff.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012143
TIME EXTENSION - WEATHER

PART 1 - GENERAL

1.1 WEATHER TABLE

A. A weather table reflecting the meteorological data from the National Weather Service at Tucson International Airport is given on this page. It establishes what will be considered as normal weather for the purposes of this contract.

1.2 CONTRACT TIME LIMIT

A. The contractor shall allow for the impact of normal weather in his planned contract performance, as indicated in the weather data attached.

1.3 TIME EXTENSIONS

A. Time extensions for weather may be granted for conditions in excess of the normal annual rainfall/snowfall which impacts ongoing activities at the site that have successive following activities that must be accomplished in a required sequence for completion of the project within the specified performance period. These would be generally labeled as Critical Path Activities when that type of schedule is used.

B. Any request for a time extension for weather must include:

1. Impact on ongoing activities.
2. Revised project schedule must be included showing the impact on the Critical Path Activities.
3. Relation of those activities as indicated above must be made within 30 days of the period of excessive weather. No time extensions will be granted for weather if not requested within 30 days as indicated above. No time extensions will be granted for days which rain did not occur.

WEATHER TABLE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AVERAGE DAYS OF RAIN OR SNOW (1)	5	4	4	2	2	2	10	9	5	3	3	5	54
MEAN RAINFALL (2)	.87	.70	.72	.30	.18	.20	2.37	2.19	1.67	1.06	.67	1.07	12
NUMBER OF DAYS BELOW 32 F	6	4	1	0	0	0	0	0	0	0	2	5	18

(1) Average normal days of rainfall .01 inches or more.
(2) Average normal precipitation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012200
UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1 – Roof sheathing replacement

1. Description: Removal of existing deteriorated roof sheathing and replacement with new roof sheathing according to Section 070150.19 Preparation for Reroofing, Section 061600 Sheathing, and as shown on Drawings.
2. Unit of Measurement: Square foot of roof sheathing.
3. Base Bid Quantity: 0 square feet.

END OF SECTION

SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Arrange schedule of values consistent with format of AIA Document G703.
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site.

4. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
5. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
6. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

1. **Submit draft copy of Application for Payment seven days prior to due date for review by Architect.**

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored onsite and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

4. Provide pictures of stored items so the items are clearly shown in the photo.

F. Transmittal: Submit one signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. Certificates of insurance and insurance policies.
6. Performance and payment bonds.

H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706.
5. AIA Document G706A.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. RFIs.
3. Project meetings.
4. Documents and samples at the site.

1.2 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.

1.3 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

1.4 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.

4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect additional information.
2. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Critical work sequencing and long lead items.

d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for processing field decisions and Change Orders.
g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.
l. Preparation of Record Documents.
m. Use of the premises and existing building.
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Possible conflicts.
i. Compatibility requirements.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Testing and inspecting requirements.

s. Installation procedures.
t. Coordination with other work.
u. Required performance results.
v. Protection of adjacent work.
w. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals or as requested by Owner.

1. Coordinate dates of meetings with preparation of payment requests.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

1.6 DOCUMENTS AND SAMPLES AT THE SITE

A. The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Construction schedule updating reports.
3. Site condition reports.

1.2 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF file.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

C. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.3 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Procurement Activities: **Include procurement process activities for long lead items and major items as separate activities in schedule.** Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

1.4 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1.5 REPORTS

A. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: **Submit, as an action submittal, a list of submittals**, arranged in chronological order by dates required by construction schedule. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Names of subcontractor, manufacturer, and supplier.
6. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
7. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
8. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, **clearly indicate deviations from requirements in the Contract Documents**, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

SECTION 013300
SUBMITTAL PROCEDURES

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow 7 days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

B. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
4. Paper Transmittal: Include paper transmittal including complete submittal information indicated.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

D. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

E. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

A. Action Submittals: **Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.**

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. **Architect will not review submittals received from Contractor that do not have Contractor's review and approval.**

1.8 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.

B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

D. Architect will discard submittals received from sources other than Contractor.

E. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

D. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

E. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

1.4 REPORTS AND DOCUMENTS

A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Statement that products at Project site comply with requirements.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's

services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

3.3 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Temporary Egress: Maintain temporary egress from existing occupied facilities as required by authorities having jurisdiction.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. **Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.**

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. **Comparable Product Request Submittal: Comply with requirements in “Product Substitutions” Article.** Submit request prior to bid for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: As specified in “Product Substitutions” Article.

a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections 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.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: …"

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: …"

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.

a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

   a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product **prior to bid** when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

   1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties,

weight, dimension, durability, visual characteristics, and other specific features and requirements.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

2.3 PRODUCT SUBSTITUTIONS

A. The materials, products and systems described in the Contract Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution and shall not be construed as limiting competition.

B. Requests for approval of alternative products shall be made by Bidders bidding as prime contractors. No approvals for substitutions will be granted directly to suppliers, distributors, or subcontractors.

C. Each such request shall include a complete description of the proposed substitution, the name of the material or system for which it is to be substituted, drawings, product data, performance and test data and other data or information necessary for a complete evaluation. It is the sole responsibility of the Bidder to submit complete descriptive and technical information so that the Architect can make proper appraisal of the submittal. Lack of proper information will be sufficient cause for rejection. Reference to catalogs that may or may not be available to the Architect will not be acceptable. All requests shall be in writing, submitted directly to the Architect, and shall clearly indicate the substitution requested.

D. Pursuant to A.R.S. § 34-104-C, the following procedures shall be used:

1. Bidders desiring to submit alternative product proposals for prior approval of the Architect shall submit such proposals at least eight days prior to the original deadline for receiving bids. The Architect shall consider and either approve or reject all proposals submitted.
2. If, by the close of the fifth day prior to the deadline for receiving bids, the Architect has approved any alternative product proposals, the bidding documents shall be modified to include the alternative products. The Architect shall publish the modification in the same manner as the original bidding documents at least five days prior to the bidding deadline.
3. If the Architect rejects an alternative product proposal, he shall give notice of the rejection to the Owner prior to the deadline for receiving bids. Notice shall include a description of the rejected product.

E. Bidders shall not rely upon approval made in any other manner.

F. Any additional costs to the project brought about by the approval of a substitution shall be the responsibility of the person or firm requesting the substitution.

G. Timing: **Architect will only consider requests for substitutions prior to bid.**

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300
EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Installation of the Work.
2. Cutting and patching.
3. Progress cleaning.
4. Protection of installed construction.

1.2 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Remove and replace damaged, defective, or non-conforming Work.

3.4 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.2 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Perform preventive maintenance on equipment used prior to Substantial Completion.
2. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
3. Complete final cleaning requirements.
4. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 5 days prior to date the Work will be completed and ready for final inspection and

tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. List of Incomplete Items: Submit copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 5 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.6 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by email to Architect.

D. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    c. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    d. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    e. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations, before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 017839
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints and one PDF electronic file.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Revisions to routing of piping and conduits.
d. Actual equipment locations.
e. Changes made by Change Order or Construction Change Directive.

f. Changes made following Architect's written orders.
g. Details not on the original Contract Drawings.
h. Field records for variable and concealed conditions.
i. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

B. Format: Submit record Specifications as annotated PDF electronic file or PDF electronic file(s) of marked-up paper copy of Specifications.

1.5 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

C. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

SECTION 061600
SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof sheathing.

PART 2 - PRODUCTS

2.1 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

2.2 ROOF SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1 sheathing.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 070150.19
PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Full tear-off of roof system at areas indicated on Drawings.
2. Removal of flashings and counterflashings.

1.2 UNIT PRICES

A. Work of this Section is affected by insulation removal and replacement unit price and metal deck removal and replacement unit price and roof sheathing removal and replacement unit price.

1.3 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Photographs or Digital Video: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.

1. Submit before Work begins.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Approved by warrantor of existing roofing system to work on existing roofing.

1.6 FIELD CONDITIONS

A. Existing Roofing System: Asphalt shingle and built-up asphalt roofing.

B. Owner will occupy portions of building immediately below reroofing area.

1. Conduct reroofing so Owner's operations are not disrupted.
2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.

4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.

    a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.

C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

1. Construction Drawings for existing roofing system may be provided for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.

F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.

B. Shut off rooftop utilities and service piping before beginning the Work.

C. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Architect of any blockages or restrictions.

D. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.

1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

E. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

F. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.

1. Prevent debris from entering or blocking roof drains and conductors.

a. Use roof-drain plugs specifically designed for this purpose.
b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.

a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Notify Owner each day of extent of roof tear-off proposed for that day.

B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.

C. Full Roof Tear-off: Where indicated on Drawings, remove existing roofing and other roofing system components down to the existing roof deck.

1. Remove substrate board, roof insulation, and cover board.
2. Remove base flashings and counter flashings.
3. Remove perimeter edge flashing and gravel stops.
4. Remove copings.
5. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
6. Remove roof drains indicated on Drawings to be removed.
7. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing system.

B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

C. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

D. Replace plywood roof sheathing as directed by Architect.

1. Roof sheathing replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

3.4 BASE FLASHING REMOVAL

A. Remove existing base flashings.

1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain.

1. Replace metal counterflashings damaged during removal with counterflashings specified in Section 076200 "Sheet Metal Flashing and Trim."

C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage.

1. If parapet sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

END OF SECTION

SECTION 073213
CLAY ROOF TILES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay roof tiles.
2. Underlayment materials.
3. Metal flashing and trim.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Research reports for the following:

1. High-temperature self-adhering underlayment.

B. Sample warranty.

1.5 MANUFACTURER'S INSPECTIONS

A. When the project is in progress, the roofing system manufacturer will provide the following:

1. Report progress and quality of the work as observed.
2. Provide periodic job site inspections at least 3 days per week followed by emailed photo reports documenting the inspection on those days.
3. Report to the Owner and Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Do not apply roofing materials or membrane to damp deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.8 WARRANTY

A. Manufacturer's Warranty: Underlayment manufacturer must warranty the roof not to leak for 20 years. This must be a labor and materials warranty, be non-prorated, and include the removal of any tiles as needed to correct any leaks.

B. Contractor will warranty that roof section will be free from faults and defects in new tile materials and workmanship and also not leak for five (5) years. Contractor will provide labor and materials to correct any leak within 48 hours. Contractor will provide copy of this warranty to underlayment manufacturer.

C. Underlayment and low slope roofing membranes shall be from one manufacturer under one NDL warranty.

PART 2 - PRODUCTS

2.1 CLAY ROOF TILES

A. Clay Roof Tiles: Match existing.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 55-mil-thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied; and recommended in writing by manufacturer for use in tile roofing system required. Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Garland Company, Inc. (The); HPR Aqua Shield or prior approved comparable product by one of the following:

    a. APOC Roof Systems, Corp.; a division of Gardner-Gibson, Inc.
    b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    c. CertainTeed Corporation.
    d. Polyglas U.S.A, Inc.

2. Thermal Stability: Stable after testing at 240 deg F according to ASTM D1970/D1970M.
3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F according to ASTM D1970/D1970M.
4. Top Surface: Granule.
5. Moisture Vapor Permanence: Less than 0.1 perms according to ASTM E96.

2.3 ACCESSORIES

A. Asphalt Primer: Polymer emulsion-based primer as recommended by roofing system manufacturer for intended use and compatible with underlayment.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Garland Company, Inc. (The); SA Primer.
    b. Or prior approved comparable product.

B. Asphalt Roofing Cement: ASTM D4586/D4586M, Type II, asbestos free.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Garland Company, Inc. (The); Garla Flex.
    b. Or prior approved comparable product.

C. Mortar: ASTM C270, Type M, with ASTM C979/C979M, pigmented mortar matching the color of concrete roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar.

A. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended in writing for application by clay-roof-tile manufacturer.

B. Eave Closure: Manufacturer's standard eave closure formed to shape of clay roof tile.

C. Wood Nailers: Comply with requirements for pressure-preservative-treated wood in Section 061053 "Miscellaneous Rough Carpentry."

2.4 FASTENERS

A. Roofing Nails: ASTM F1667, hot-dip galvanized-steel, 0.120-inch-diameter shank, sharp-pointed, conventional roofing nails with barbed shanks; minimum 3/8-inch-diameter head; of sufficient length to penetrate 3/4 inch into substrate or through thickness of the sheathing, whichever is less.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

B. Nails for Wood Nailers: ASTM F1667; common or box, steel wire, flat head, and smooth shank.

C. Wire Ties: Copper, brass, or stainless steel, 0.083-inch-minimum diameter.

2.5 METAL FLASHING AND TRIM

A. General: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Sheet Metal: Zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for design, dimensions, metal, and other characteristics of the item.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

3.2 INSTALLATION, GENERAL

A. Comply with roofing underlayment system manufacturer's written instructions.

B. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.3 INSTALLATION OF UNDERLAYMENT MATERIALS

A. Comply with clay-roof-tile and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

1. Cover ridge and hip wood nailers with underlayment strips.

A. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.
3. Lap sides not less than 4 inches.
4. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
5. Roll laps with roller.
6. Prime concrete, masonry, and metal surfaces to receive self-adhering, polymer-modified bitumen sheet.
7. Single-Layer Installation: Install over entire roof deck.
8. Cover underlayment within seven days.

B. Valley Underlayment: Install one layer of 36-inch-wide underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.

1. Use same underlayment as installed on field of roof.
2. Stagger end laps between layers at least 72 inches.
3. Lap ends at least 12 inches in direction that sheds water, and seal with asphalt roofing cement.
4. Lap roof-deck underlayment over first layer of valley underlayment at least 6 inches.

3.4 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install in accordance with clay-roof-tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."

3.5 INSTALLATION OF WOOD NAILERS

A. Install wood nailers securely fastened to roof deck at the following locations:

1. Hips.
2. Ridges.
3. Rakes.

B. Install beveled wood cant at eaves and securely fasten to roof deck.

3.6 INSTALLATION OF CLAY ROOF TILES

A. Install clay roof tiles in accordance with manufacturer's written instructions and recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Installation Manual" and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" unless more stringent requirements are specified in this Section or indicated on Drawings.

1. Maintain uniform exposure and coursing of clay roof tiles throughout roof.
2. Extend tiles 2 inches over eave fasciae.
3. Nail Fastening: Drive nails to clear the clay roof tile so the tile hangs from the nail and is not drawn up.

    a. Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck and fasten to nails driven into deck.

4. Mortar Setting: Install clay roof tiles in accordance with manufacturer's written instructions and acceptance criteria of authorities having jurisdiction.
5. Cut and fit clay roof tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
6. Install clay roof tiles with color blend to match existing.

B. High-Profile Clay Roof Tile Installation:

1. Install eave closure.
2. Provide minimum 3-inch lap between succeeding courses of clay roof tiles.
3. Install rake tiles indicated.
4. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement.

C. Open Valleys: Cut clay roof tiles at open valleys to form straight lines. Maintain uniform width of exposed open valley from highest to lowest point.

1. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
2. Do not nail tiles to metal flashings.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations three days per week.

1. Warranty shall be issued upon manufacturer's acceptance of the installation.
2. Field observations shall be performed by a Technical Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
3. Provide observation reports from the Technical Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
4. Provide a final report from the Technical Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

2. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
3. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
4. Notify the Owner and Architect upon completion of corrections.
5. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

C. Roofing system will be considered defective if it does not pass inspections.

1. Additional inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 075216
STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.
2. Roof insulation.
3. Cover board.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, including slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Crickets, saddles, and tapered edge strips, including slopes.
7. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Wind Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

B. Product Test Reports: For roof membrane and insulation, tests performed by a qualified testing agency, indicating compliance with specified requirements.

1. Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Membranes must meet or exceed all performance characteristics including tensile strengths, tear strengths, elongation and recycled content. Testing must be performed at 73.4 deg. F +/- 3.6 deg. F.

C. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

D. Sample Warranties: For manufacturer’s special 20-year non-prorated no dollar limit warranty and installer’s sample two-year warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 PRODUCT INFORMATION REQUIRED WITH BID SUBMITTAL AND DUE AT BID OPENING

A. Required Product Information to be submitted with bid:

1. Product Identification: Include manufacturer's current literature and manufacturer's name and address. Submittal shall be limited to one roofing system manufacturer. Submittal of more than one roofing system manufacturer will not be accepted.
2. Test Reports: Provide independent test data for all modified surfacing sheets. Certification must be from an accredited independent testing laboratory comparing the physical and performance characteristics of the proposed material with those of the

specified materials. Test results must be dated, notarized, and on testing laboratory stationary.

3. Manufacturer's Fire Compliance Certificate: Certify that the roofing system furnished is approved by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey (WH), or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
4. List of at least five projects completed within the past five years, where the proposed material was used under similar climate conditions. Include project names, addresses, and contact information of installer and owner. These projects must be available for inspection by the Architect.
5. Statement from the roofing system manufacturer stating that all Bid Documents have been reviewed and approved, the site conditions are acceptable for the roofing assembly being installed, and the roofing system manufacturer will provide field inspections during construction as appropriate to the complexity and progress of the work, but no less than once per week, and until all construction work is completed and accepted by the Owner and Architect. Inspections shall be performed by a Manufacturer’s Representative who is a full-time employee of the manufacturer. Manufacturer’s Representative shall send to Architect electronically a written summary of details of inspection with photo documentation.

B. Products will not be considered if:

1. More than one roofing system manufacturer is submitted with bid.
2. Product or method of major waterproofing field components to be considered does not have a minimum of five years of successful performance in roofing and reroofing applications in the United States.
3. Roofing system manufacturer is unable to provide field inspections by a Manufacturer’s Representative as appropriate to the complexity and progress of the work, but no less than once per week.
4. Independent test data from an independent testing agency is not provided with the Bid Documents.
5. The independent test data does not meet or exceed the minimum performance standards specified.
6. Acceptance will require substantial revision of Contract Documents.
7. Architect/Owner reserves the right to be the final authority on the acceptance or rejection of any and all products.

1.8 MANUFACTURER’S INSPECTIONS

A. While the project is in progress, the roofing system manufacturer will provide the following:

1. Report progress and quality of the work as observed.
2. Provide periodic job site inspections no less than once per week followed by emailed photo reports documenting the inspection on those days.
3. Report to the Owner and Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor’s attention.
4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

C. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

D. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

E. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Do not apply roofing materials or membrane to damp deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Only one membrane manufacturer warranty will be accepted. SBS membranes and underlayment membrane must be from the same manufacturer.
2. Special warranty without monetary limit (non-prorated no dollar limit) that includes roofing membrane, base flashings, fasteners, cover boards, substrate boards, roofing accessories, and other components of roofing system. Failure includes roof leaks, blisters, ponding, sliding materials, loss of granules, etc.
3. Warranty Period: 20 years minimum from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, fasteners, cover boards, and substrate boards, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

B. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): <**36.2psf /sq. ft.**>
2. Zone 2 (Roof Area Perimeter): <**36.2psf /sq. ft.**>

a. Location: From roof edge to <**87’-4”**> inside roof edge.

3. Zone 3 (Roof Area Corners): <**36.2psf /sq. ft.**>

a. Location: <**88’-0”**> in each direction from each building corner.

D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.

1. Wind Uplift Load Capacity: 90 psf.

E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency.

1. Identify products with appropriate markings of applicable testing agency.

F. In a multi-ply BUR assembly, not to exceed three layers, the sum/composite of all layers must meet or exceed 850 lbf of tear strength and 500 lbf/in of tensile strength in both machine direction (MD) and cross machine direction (XD) when tested per ASTM D5147 at 73.4 +/- 3.6 deg. F.

2.2 MANUFACTURERS

A. It is the intent of this specification to set standards based performance. Performance criteria were based on product performance, specification requirements, financial stability to stand behind a provided warranty, system compatibility, and single source responsibility, service and design criteria.

B. Source Limitations: Obtain components for roofing system, including roof insulation, cover board, fasteners, coatings, mastics, sealants, and roof accessories from roof membrane manufacturer or manufacturer approved by roof membrane manufacturer.

2.3 BASE SHEET MATERIALS

A. SBS-Modified Bitumen Polyester and/or Fiberglass Mat Base Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, smooth surfaced, suitable for hot asphalt application method.

1. Tensile Strength, ASTM D5147:

a. MD 340 lbf./in. XD 340 lbf./in., 2 in/min @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

a. MD 650 lbf. XD 650 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

B. Self-Adhering SBS-Modified Bitumen Polyester and/or Fiberglass Mat Base Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, smooth surfaced, suitable for application method specified.

2.4 STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS CAP SHEET

A. Granule-Surfaced Roofing Cap Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade G, SBS-modified fire-retardant asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, suitable for hot asphalt application method.

1. Tensile Strength, ASTM D5147:

a. MD 160 lbf./in. XD 160 lbf./in., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

a. MD 200 lbf. XD 200 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

B. Self-Adhering Granule-Surfaced Roofing Cap Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade G, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, suitable for application method specified.

1. Tensile Strength, ASTM D5147:

a. MD 305 lbf./in. XD 305 lbf./in., 2 in/min @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

a. MD 500 lbf. XD 500 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2.5 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, smooth surfaced; suitable for application method specified.

1. Tensile Strength, ASTM D5147:

   a. MD 340 lbf./in. XD 340 lbf./in., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

   a. MD 650 lbf. XD 650 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

B. Flashing Cap Sheet: ASTM D6754/D6754M, high-performance fabric reinforced thermoplastic membrane; suitable for application method specified and approved by roofing membrane manufacturer.

1. Thickness: 60 mils.
2. Exposed Face Color: White.

C. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D1668/D1668M, Type I.

D. Liquid Flashing System: Roof membrane manufacturer's standard one- or two-part moisture curing resin with low solvent content, consisting of a primer, flashing cement, and scrim.

2.6 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing.

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

D. Self-Adhering Membrane Primer: Polymer emulsion-based primer as recommended by roof membrane manufacturer for intended use and compatible with self-adhering membrane applications.

E. Cold-Applied Asphalt Adhesive: ASTM D3019, Type III, roof membrane manufacturer's standard asphalt-based, one- or two-part, asbestos-free, zero-VOC, low odor, cold-applied adhesive, specially formulated for compatibility and use with base flashings.

F. Flashing Cap Sheet Adhesive: Roofing manufacturer's recommended low-rise polyurethane foam adhesive specially formulated for compatibility and use with flashing applications.

G. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required by roofing system manufacturer for application.

H. Mastic Sealant: White, polyether, trowel grade, flashing mastic for cold-applied applications.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

J. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve; bright white color.

K. Flood Coat: Highly reflective, aliphatic polyurea liquid-applied waterproofing membrane designed to maintain, restore, and upgrade the performance of existing membranes; suitable for application by squeegee and/or roller. For use in drains, scuppers, waterways, and bird bath areas.

L. Surface Coating: Liquid applied acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and complying with ASTM D6083.

1. Color: White.

M. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.7 ROOF INSULATION

A. Preformed insulation boards approved by roofing system manufacturer, selected from manufacturer's standard sizes suitable for application, and of thickness required.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.

1. Thickness: 1.5 inches.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings. All saddle and cricket slopes shall be twice that of the roof field, if possible.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

C. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

E. Cover Board: ASTM C208, Type II, Grade 2, cellulosic-fiber insulation board, primed two sides, 1/2 inch thick.

F. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board approved by roof membrane manufacturer for use under self-adhering membrane applications.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed.

2.9 ASPHALT MATERIALS

A. Asphalt Primer: ASTM D41/D41M.

B. Roofing Asphalt: ASTM D312/D312M, Type IV, low-odor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation (if specified).
3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
4. Any substrate found to be unsound shall be removed and replaced or repaired prior to the start of the roof installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

D. Asphalt Heating:

1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application.

a. For cap sheets, heat asphalt according to cap sheet manufacturer's recommendations.

2. Circulate asphalt during heating.
3. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application.

a. For cap sheets, comply with cap sheet manufacturer's recommendations.

4. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
5. Do not heat asphalt within 25 deg F of flash point.
6. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
7. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.

a. For cap sheets, comply with cap sheet manufacturer's recommendations.

E. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.

D. Installation Over Metal Decking:

1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

a. Locate end joints over crests of decking.

b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation, so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

h. At self-adhering membrane applications, adhere base layer of insulation to substrate using adhesive as follows:

1) Set base layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
e. Trim insulation, so that water flow is unrestricted.
f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Adhere each layer of insulation to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) At self-adhering membrane applications, set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

E. Installation Over Wood Panel Decking:

1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.

a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
b. Make joints between adjacent insulation boards not more than 1/4 inch in width.

c. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation, so that water flow is unrestricted.

d. Fill gaps exceeding 1/4 inch with insulation.
e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
f. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood panel decks.

1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

g. At self-adhering membrane applications, adhere base layer of insulation to substrate using adhesive as follows:

1) Set base layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation, so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
g. Adhere each layer of insulation to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) At self-adhering membrane applications, set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.5 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines, with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

2. At internal roof drains, conform to slope of drain sump.

    a. Trim cover board, so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:

    a. Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
    b. At self-adhering membrane applications, set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF ROOFING MEMBRANE, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Where roof slope exceeds 3/4 inch per 12 inches, install roofing membrane sheets parallel with slope.

1. Backnail roofing sheets to nailer strips or substrate according to roofing system manufacturer's written instructions.

D. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.7 INSTALLATION OF BASE SHEET

A. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature.

B. Installation of SBS-Modified Bitumen Polyester and Fiberglass-Mat Base Sheet:

1. Install base sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
2. Extend roofing sheets over and terminate above cants.
3. Install base sheet in a shingle fashion.
4. Adhere to substrate in a solid mopping of hot roofing asphalt.
5. Install base sheet without wrinkles, tears, and free from air pockets.

6. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

    a. Lap side laps as recommended by roof membrane manufacturer but not less than 4 inches
    b. Lap end laps as recommended by roof membrane manufacturer but not less than 8 inches.
    c. Stagger end laps not less than 36 inches.
    d. Completely bond and seal laps, leaving no voids.
    e. Roll laps with a 20-pound roller.

7. Repair tears and voids in laps and lapped seams not completely sealed.
8. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

C. Installation of Self-Adhering SBS-Modified Bitumen Polyester and Fiberglass-Mat Base Sheet:

1. Install base sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
2. Extend roofing sheets over and terminate above cants.
3. Install base sheet in a shingle fashion.
4. Self-adhere to primed substrate.
5. Install base sheet without wrinkles, tears, and free from air pockets.
6. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

    a. Lap side laps as recommended by roof membrane manufacturer but not less than 4 inches
    b. Lap end laps as recommended by roof membrane manufacturer but not less than 8 inches.
    c. Stagger end laps not less than 36 inches.
    d. Completely bond and seal laps, leaving no voids.
    e. Roll laps with a 20-pound roller.

7. Repair tears and voids in laps and lapped seams not completely sealed.
8. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

3.8 INSTALLATION OF SBS-MODIFIED BITUMINOUS CAP SHEET

A. Before installing, unroll cap sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature at which cap sheet will be installed.

B. Install modified bituminous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend cap sheet over and terminate above cants.
2. Install cap sheet in a shingle fashion.
3. Install cap sheet as follows:

    a. Adhere to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by cap sheet manufacturer.

4. Install self-adhering cap sheet as follows:

    a. Self-adhere to base sheet.

5. Install cap sheet without wrinkles, tears, and free from air pockets.
6. Install cap sheet, so side and end laps shed water.

C. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 4 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 8 inches.
3. Stagger end laps not less than 36 inches.
4. Completely bond and seal laps, leaving no voids.
5. Roll laps with a 20-pound roller.
6. Repair tears and voids in laps and lapped seams not completely sealed.
7. At self-adhering cap sheet, trim bottom corner of T-lap at 45-degree angle to prevent capillary effect. Apply quarter sized dab of approved mastic under all T-laps. Heat weld laps and probe.

D. Apply pressure to the body of the cap sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

E. Apply roofing granules of same color as roof membrane to cover exuded bead at laps while bead is hot, to provide a continuous color appearance.

F. Flood Coat:

1. Flood coat a 4-foot by 6-foot area around all drains, scuppers, and waterways, and 3-foot wide area around roof hatches as recommended by roofing manufacturer; flood coat bird bath areas if discovered.
2. Install after cap sheets and modified flashing, tests, repairs and corrective actions have been completed and approved.
3. All laps in area to be coated shall receive a 45-degree troweling of manufacturer’s approved sealant to prevent the liquid membrane from self-leveling off the vertical lap edge. Apply base coat at a rate of 2 gallons/square. Broadcast dry, bright white marble chip roof granules into wet coating and immediately back-roll to set. After base coat cures, but no more than 72 hours later, apply second coat at a rate of 1 gallon/square to clean and dry base coat.

G. Surface Coatings: Apply coating according to manufacturer's written instructions, by spray, roller, or other suitable application method.

3.9 INSTALLATION OF FLASHING AND STRIPPING

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer-Sheet Application:

a. Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt.
b. Seal all laps.

3. Backer-Sheet Application at Self-Adhering Membrane Field Applications:

a. Adhere backer sheet to substrate in cold-applied adhesive.
b. Seal all laps.

4. Flashing Sheet Application:

a. Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by flashing sheet manufacturer. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
b. At walls higher than 30”, adhere flashing sheet to substrate in low-rise polyurethane foam adhesive at rate required by roofing system manufacturer.

5. Flashing Sheet Application at Self-Adhering Membrane Field Applications:

a. Adhere flashing sheet to substrate in low-rise polyurethane foam adhesive at rate required by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing at a rate given by roofing system manufacturer.

1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement over a metal termination bar.
2. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches o.c. to achieve constant compression. Provide suitable, sealant at the top edge if required.

D. Install liquid flashing system according to manufacturer's recommendations.

1. Extend liquid flashing not less than 3 inches in all directions from edges of item being flashed.
2. Embed granules, matching color of roof membrane, into wet compound.

E. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

F. Roof Drains: Set 30-by-30-inch 4-pound lead flashing in bed of asphaltic adhesive on completed roofing membrane.

1. Cover lead flashing with roofing cap-sheet stripping, and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane.
2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
3. Install stripping according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations no less than once per week.

1. Warranty shall be issued upon manufacturer's acceptance of the installation.
2. Field observations shall be performed by a Technical Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
3. Provide observation reports from the Technical Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
4. Provide a final report from the Technical Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
2. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
3. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
4. Notify the Owner and Architect upon completion of corrections.
5. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

C. Roofing system will be considered defective if it does not pass inspections.

1. Additional inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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. Color: As selected by Architect from manufacturer's full range.

C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A653/A653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A755/A755M.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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. Color: As selected by Architect from manufacturer's full range.

D. Lead Sheet: ASTM B749 lead sheet.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 40 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized): Series 300 stainless steel or hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

A. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

B. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

D. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Material: Galvanized steel, 0.022 inch thick.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
4. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

5. Finish: Mill.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch-long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.
4. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
5. Accessories: Wire-ball downspout strainer.
6. Gutters with Girth up to 15 Inches: Fabricate from the following materials:

a. Galvanized Steel: 0.028 inch thick.

B. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight.

1. Fabricate from the Following Materials:

    a. Aluminum: 0.040 inch thick.

B. Base Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

C. Counterflashing: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

D. Roof-Penetration Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.

E. Roof-Drain Flashing: Fabricate from the following materials:

1. Lead: 4 lb.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

B. Drip Edges: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

C. Eave and Rake Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters:

1. Join sections with joints sealed with sealant.
2. Provide for thermal expansion.
3. Attach gutters at eave or fascia to firmly anchor them in position.
4. Provide end closures and seal watertight with sealant.
5. Slope to downspouts.
6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings:

1. Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

    a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
    b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

3.7 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silyl-terminated polyether joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Colors of Exposed Joint Sealants: Match existing surfaces or sealants.

2.2 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. STPE, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Service Temperature: Minus 40 degrees F to 180 degrees F.
2. Shrinkage: None.
3. Elongation, ASTM D 412: 750 percent.
4. Hardness, ASTM C 661, Shore A: 24 +/- 3.

5. VOC Content: 0 g/L.

2.3 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints in unit masonry.
b. Joints in sheet metal flashing and trim.
c. Other joints as indicated on Drawings.

2. Joint Sealant: STPE, S, NS, 50, NT.

END OF SECTION

SECTION 099113
EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of paint system and each color and gloss of topcoat.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: Match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

B. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. General: Existing surfaces previously painted or varnished and specified to be refinished, or surfaces damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter. Blistering, peeling, flaking or other deteriorated coatings shall be removed. Glossy or slick surfaces shall be roughened according to manufacturer's instructions. Damaged areas such as, but not limited to, nail holes, cracks, chips and spalls shall be repaired with suitable material to match adjacent undamaged areas. Edges of chipped paint or varnish shall be feathered and sanded smooth. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition. Solvent, mechanical, or chemical shall, be used to provide surfaces suitable for repainting.

1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
2. Remove hardware, hardware accessories, machined surfaces, plates, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

C. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Water-Based Light Industrial Coating System MPI EXT 5.1M.

a. Water-Based Prime Coat: Primer, rust inhibitive, water based, MPI #107.
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163.

END OF SECTION

SECTION 099653
ELASTOMERIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of elastomeric coatings to the following exterior substrates:

1. Concrete unit masonry (CMU).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of elastomeric coating indicated and in each color and gloss.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent but not less than 1 gal. of each material, color, and texture applied.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F unless otherwise permitted by manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Water penetration through the coating.
b. Deterioration of coating beyond normal weathering.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Moisture-Vapor Transmission: Minimum 12.0 perms, based on testing according to ASTM D 1653.

C. Elongation: Minimum 300%, based on testing according to ASTM D 2370 or ASTM D 412.

D. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

E. Colors: Match architect’s sample.

F. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated.

G. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

H. Concrete Unit Masonry Block Filler: Elastomeric coating manufacturer's recommended, factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.

B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.

C. Verify that substrate is within the range of alkalinity recommended by manufacturer.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
2. Perform cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

D. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

3.3 APPLICATION

A. Apply elastomeric coatings according to manufacturer's written instructions.

1. Use equipment and techniques best suited for substrate and type of material being applied.
2. Coat surfaces behind movable items the same as similar exposed surfaces.
3. Apply each coat separately according to manufacturer's written instructions.

B. Primers: Apply at a rate to ensure complete coverage.

C. Block Fillers: Apply at a rate to ensure complete coverage with pores filled.

D. Elastomeric Finish Coat(s): Manufacturer's recommended number of coats and total dry film thickness for condition of substrate.

E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats similar to color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

F. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform finish, color, and appearance.

G. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

H. Apply coatings to prepared surfaces as soon as practicable after preparation and before subsequent surface soiling or deterioration.

I. Spray Application: Use spray equipment for application only when permitted by authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

3.4 FIELD QUALITY CONTROL

A. Inspections: A minimum of three (Substrate, Application and Final) inspections by an approved manufacturer’s representative, will be required on all projects requiring a warranty.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities, touch up and restore damaged or defaced coated surfaces.

3.6 ELASTOMERIC COATING SCHEDULE

A. Concrete Unit Masonry (CMU) Substrates:

1. Elastomeric Coating System MPI EXT 4.2D:

a. Prime Coat: As recommended in writing by topcoat manufacturer.

b. Block Filler: As recommended in writing by topcoat manufacturer.
c. Intermediate Coat: As recommended in writing by topcoat manufacturer.
d. Topcoat: Elastomeric, pigmented, exterior, water-based, flat coating; MPI #113.

END OF SECTION

SECTION 221423
STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal roof drains.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Large-Sump, General-Purpose Roof Drains:

1. Standard: ASME A112.6.4.
2. Body Material: Cast iron.
3. Dimension of Body: Nominal 14- to 16-inch diameter.
4. Combination Flashing Ring and Gravel Stop: Required.
5. Outlet: Bottom.
6. Outlet Type: Match existing.
7. Extension Collars: Required.
8. Underdeck Clamp: Required.
9. Expansion Joint: Not required.
10. Sump Receiver Plate: Required.
11. Dome Material: Cast iron.
12. Vandal-Proof Dome: Not required.
13. Water Dam: 2 inches high at overflow drains.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

3.2 FLASHING INSTALLATION

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION